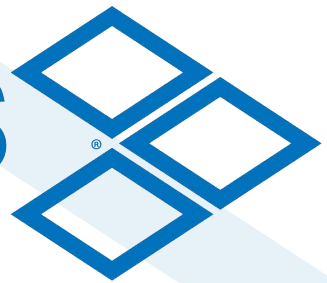


EFI REFERENCE NO: 93136-02
RAINBOW, CALIFORNIA
RANCHO AMIGOS GENERATOR BUILDING
WATER-SHED GENERATOR BUILDING

EFI-SOLUTIONS

efi-solutions.com



General Questions:

Does the generator come seismically anchored inside the building or will that be the responsibility of other

EFI-SOLUTIONS

1311 N Maple St
PO Box 723
Centralia, IL 62801
(618) 533-1351



WARRANTY

EFI-SOLUTIONS (referred hereafter as EFI) warrants, to the original user, each product of its manufacture to be free from defects in material and workmanship for the period of twelve (12) months from the time the station is placed in operation for beneficial use, or twelve (12) months following the initial start-up of the station, or eighteen (18) months after delivery or twenty-four (24) months from notice of manufacturer completion, whichever occurs first, provided the product is properly installed, maintained and operated under normal conditions according to the manufacturer's instructions.

The obligation of EFI under this warranty is limited to correction without charge of any part or parts thereof which shall upon examination disclose to the manufacturer's satisfaction to have been originally defective. Correction of such defects by repair or replacement shall constitute fulfillment of all obligations by EFI.

EFI gives no warranty on products, components or parts supplied by others for installation within EFI equipment.

EFI shall not be liable for loss, damage or expense directly or indirectly from the use of its products or from any other cause.

This warranty is conditional and does not apply to any of the following items:

- 1) Items that must be replaced because of normal usage such as pump seals, packing, grease, oil, light bulbs, etc.
- 2) Items that have been started up by persons not authorized by EFI, or that have been altered or repaired outside of the manufacturer's factory without written authorization from EFI.
- 3) Products that are not started, checked and adjusted by an authorized EFI technician within eighteen (18) months from the date of shipment, unless special written instructions have been requested and received from EFI.

The product is subject to no expressed, implied or statutory warranty other than herein set forth, and no agent, representative or distributor of EFI has any authority to alter the terms of this warranty.

DATE OF SHIPMENT

DATE OF START-UP

What are the testing procedures included in generator startup?



FACTORY START-UP SERVICES AND WARRANTY SERVICE STATEMENT

Start-up Services and Warranty Services technicians shall be performed by a qualified EFI Representative.

1. Start-up Service and Warranty Services technicians shall either be employees of EFI or an EFI Authorized Service Center. Warranty may be void if work is done during this period by an unauthorized company/individual.
2. EFI's price, as proposed/sold, includes 1 trip(s) and 1 total man day(s) for manufacture's field start-up service with instructions. Additional days & travel, if required due to factors outside this scope, will be billed at EFI Technician's on-site/travel rate: \$1,600/day plus expenses and EFI Programmer's on-site/travel rate: \$1,800/day plus expenses.
3. One of, but limited to, the following factory direct employees or authorized service center will perform service as required on the new station and any ancillary equipment, if any, as provided by EFI.

<u>EMPLOYEE NAME</u>	<u>POSITION</u>	<u>SERVICE YEARS</u>
Charles Waggoner	Service Manager	28
Bob Day	Assistant Service Manager	17
Dave Carrie	Service Technician	08
Tom Reese	Service Technician	08
Cody Keen	Service Technician	08
Scott Moore	Service Technician	06
Lincoln Dickinson	Service Technician	05
Holden Elwood	Service Technician	04
Darren Probst	Service Technician	04
Kevin Musgrave	Service Technician	02
Gilbert Dixon	Service Technician	02

Phone: (618) 533-1351 **Fax:** (618) 533-1459 **E-mail:** service@efi-solutions.com

Dan Vandelloo EFI-Solutions (618) 339-3481

Kevin Cates Applied Hydro Sales (702) 222-0857

Tim Hovda Engineered Solutions (317) 973-1304

4. All Start-up Service Reports shall be attested to by Technician/Representative of Owner or Engineer.
5. Service reports shall be distributed to:
 - A. Manufacturer's File.
 - B. Engineer's File.
 - C. Contractor's File.

Is this necessary for
a generator building?
In any case, the
suction pressures are
close to what our
current model
reflects.

TO WHOM IT MAY CONCERN:

RETURN OF SUBMITTAL

EFI MUST HAVE WRITTEN SUBMITTAL APPROVAL RETURNED IN ORDER TO
PROCEED WITH FABRICATION. THE APPROVAL PROCESS IS VITALLY
IMPORTANT.

SUCTION PRESSURE

33 PSI Minimum to
211 PSI Max.
PLEASE VERIFY

THIS SUBMITTAL IS BASED ON THE ASSUMPTION OF _____ PSI SUCTION.

**WE CANNOT CONSIDER THE JOB APPROVED, OR PROCEED WITH MATERIAL
RELEASE OR BEGIN CONSTRUCTION UNTIL SUCTION PRESSURE IS VERIFIED.**

RETURN TO:

**EFI-SOLUTIONS
1311 N MAPLE ST
PO BOX 723
CENTRALIA, IL 62801
or
email rbrinkamnn@efi-solutions.com**

TO THE BUYER OR ENGINEER

OPERATION AND MAINTENANCE MANUALS

PLEASE NOTE THAT TWO (2) OPERATION AND MAINTENANCE CDs WILL BE
FORTHCOMING AFTER THE EQUIPMENT ON THIS ORDER HAS BEEN
SHIPPED, INSTALLED AND STARTED UP. IF THE SPECIFIED NUMBER DOES
NOT MEET YOUR NEEDS, ADDITIONAL COPIES ARE AVAILABLE AT AN
ADDITIONAL FEE PER COPY.

SUBMITTAL

PROJECT LOCATION: RAINBOW, CALIFORNIA

PROJECT NAME: RANCHO AMIGO GENERATOR BUILDING

EFI PROJECT NUMBER: 93136-02 - WS-GENERATOR BUILDING

BID ITEM NUMBER:

EFI PART NAME: GENERATOR BUILDING

EFI PART NUMBER: 9313602-WS-002.

OWNER PART NAME
AND/OR NUMBER:

SUBMITTAL DATE: APRIL 3, 2023

MECHANICAL SECTION

GENERATOR BUILDING

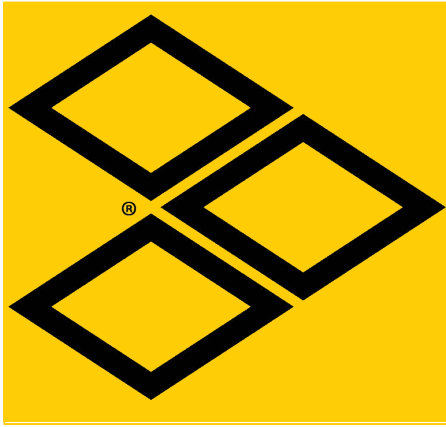
District to confirm.

Project	Rancho Amigos Pump Station			
	Rainbow Municipal Water Authority			
Location	Rainbow, California			
Engineer	Hoch Consulting			
Station Type	Generator Building			
EFI JOB REFERENCE NO. 93136-02				
PLEASE REVIEW EACH COMPONENT & INITIAL IF ACCEPTABLE				
PLEASE REVIEW STATION ORIENTATION AND PIPE SIZES				
Part ID	Part Description	Long Description	Qty	INITIALS
EFI MANUFACTURED BUILDING	SEE MECHANICAL DESIGN DETAIL DRAWING NOS. 9313602-WS-001. AND 9313602-WS-002. FOR STATION DIMENSIONS AND ORIENTATION			
WHITE FRP INTERIOR	NUDO	INTERIOR WALL FINISH	1	
WALSTONE	FULLERTON FINISH SIDING SYSTEM - BUILDING EXTERIOR	<p>STYLE OF MATERIAL: FULLERTON FINISH SYSTEMS/WALSTONE TYPE OF MATERIAL: NO ROUTING, AGGREGATE AMBER LITE #A with WOODWARD BEIGE RESIN - *SELECTED COLOR IN RAINBOW HEIGHTS PLANS AND SPECS</p>		
MERIDIAN	MCELROY METAL ROOFING SYSTEM	<p>STYLE OF MATERIAL: McElroy Metal, Meridian GAUGE OF MATERIAL: 24 GA COLOR OF MATERIAL: PLEASE VERIFY DOOR COLOR</p>	1	
6070 DOOR/FRAME	6070 DOUBLE DOOR/FRAME - EXTERIOR	<p>PLEASE VERIFY DOOR COLOR: _____ #YALE6100PANICEXIT panic bar installed on Right Side Active and Yale BAU546F Classroom Lever installed on Exterior*** GALVANEAL METAL DOOR(16GA), SCREW INSTALLED TOP CAP, NO WINDOW FRAME: 1-PIECE FRAME DRIP CAP, EFI STANDARD HARDWARE</p>	1	

District to confirm.

District to confirm.

8215C083	2"	ASCO SOLENOID VALVE	N/O 12VDC AL BODY, EPDM	1
EXHAUST PIPING INSULATON - CUSTOM WRAP ON EXHAUST SYSTEM				1
M-20-A-1275 MAXIM WALL THIMBLE				1
55-05-10.75SS - 304SS RAIN CAP 10DIA.				1
VICTAULIC GROOVED END FITTING				1 LOT
VICTAULIC RIGID COUPLINGS - STYLE 107N				1 LOT
SCH10 GALVANIZED - CARBON STEEL VENT PIPING				1 LOT
33-3001 - 3M EARMUFFS HEARING PROTECTION				4
RECOMMENDED RIGGING/LIFT PLAN				
MECHANICAL DESIGN DETAIL DRAWING NO. 9313602-WS-001.				
MECHANICAL DESIGN DETAIL DRAWING NO. 9313602-WS-002.				



EFI ENCLOSURES

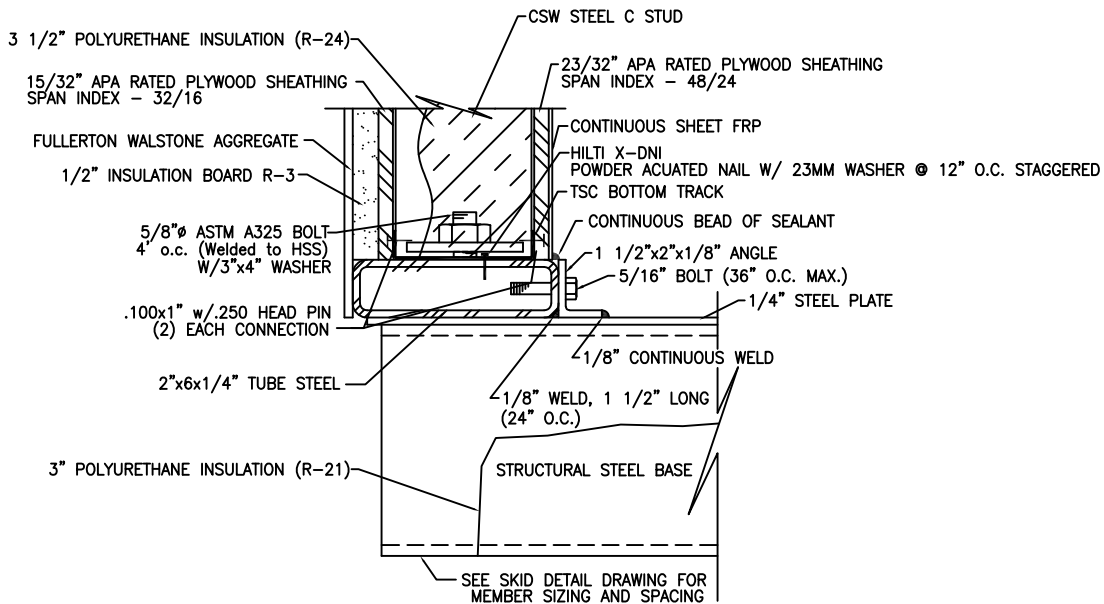
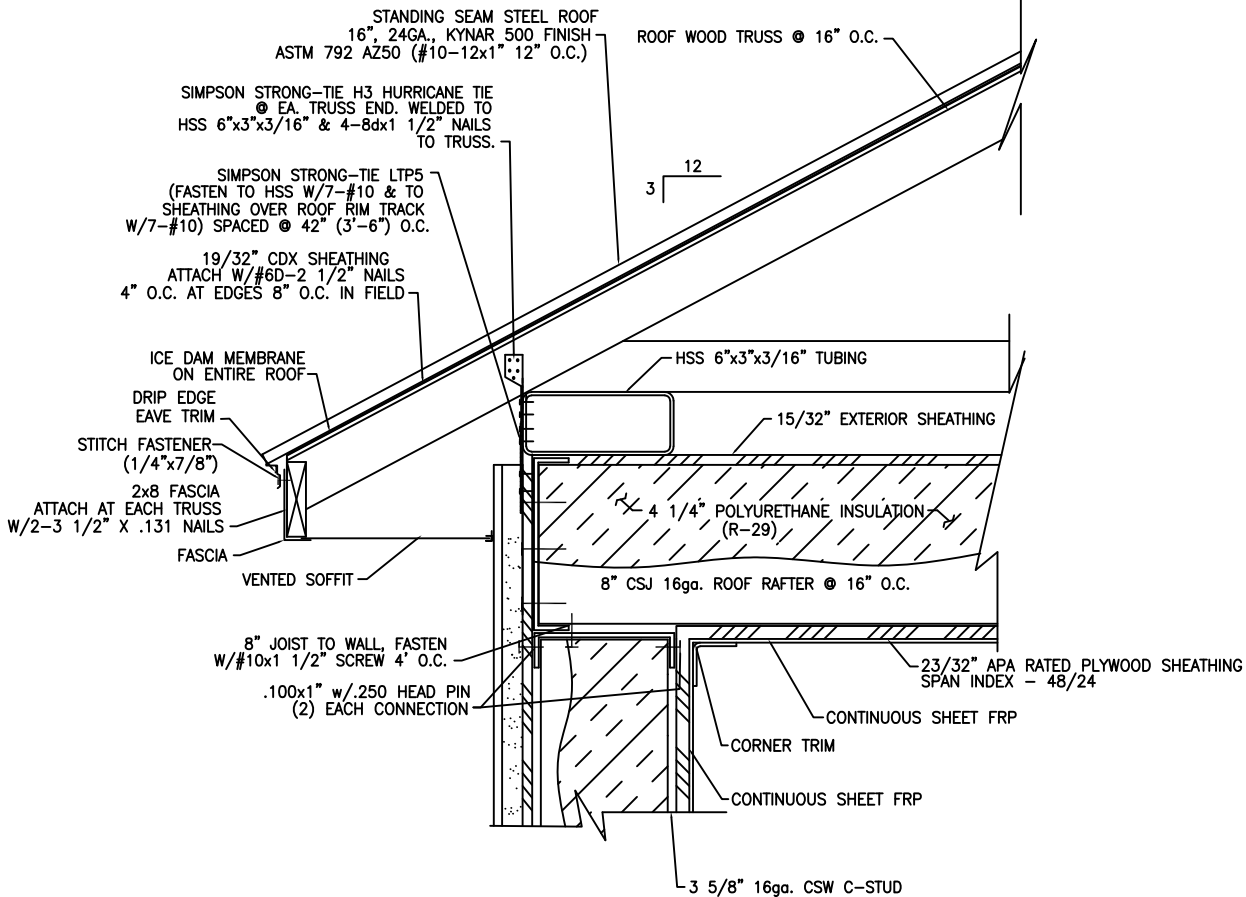
Factory-Built Modular Structures •



- Revolutionizing the Industry -

CONSTRUCTED ROOF SHIPPED SEPARATE FROM BUILDING. ON SIGHT CRANE LIFT REQUIRED FOR INSTALLATION ON BUILDING

RIDGE VENT (NOT SHOWN FOR CLARITY)



WALL SECTION



ENGINEERED FLUID, Inc.

P.O. DRAWER 723 * CENTRALIA, ILLINOIS 62801, 618-533-1351

JOB REF. NO. _____

DRAWING NO. _____

These are all old codes. Confirm we are not using the latest editions.

EFI Buildings are built to meet the following codes:

CODES:

2015 IBC – International Building Code

ASCE 7-10 – American Society of Civil Engineers

2014 NEC – National Electric Code (NFPA-70)

UL – Underwriters Laboratories – Industrial Control Panels

ETL – Intertek Testing Service – Packaged Pumping Systems

EFI Buildings are constructed for cold formed, 33 KSI yield strength minimum structural steel framing members. All structural steel framing members are manufactured to the following specifications:

MATERIAL SPECIFICATIONS:

Steel Studs: 1986 A.I.S.I. with 1989 Amendments

Steel Joists: 1986 A.I.S.I. with 1989 Amendments

Steel Track: 1986 A.I.S.I. with 1989 Amendments

Galvanized coating for studs, joints, and track: ASTM A-653.

EXTERIOR AND ROOFING FINISH

WalStone™

From Fullerton Finish Systems, Inc.



- Lightweight, durable, weather-resistant
- Easy and quick installation by your crew
- Quicker project completion
- No specialist subcontractors are required

Easy-Install Panels.

Choose from a wide range of stone types: crushed rock, granite, limestone, obsidian and more, with a variety of sizes, colors, textures and patterns. Each panel made to your specifications give you the perfect finish for any renovation or new construction.

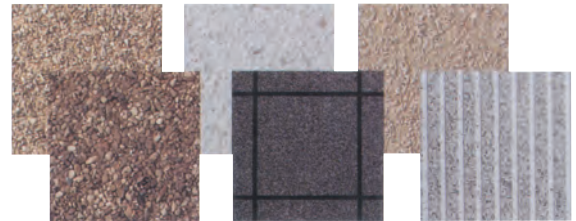
Natural Beauty & Permanence.

Factory-Finished Quality & Convenience.

WalStone™ panels give your building exteriors the distinctive flair of a natural stone finish, with consistency and fast, hassle-free installation.

The Fullerton Finish Systems Advantage...

- Low maintenance
- Design flexibility
- Consistent quality
- Lower structural cost
- Endless variety of custom looks



The Fullerton Finish Systems Advantage... Design and Technical Support.

Mix and Match Fullerton Finish Systems products, colors and finishes to create an unlimited range of design effects. Our expert, experienced architectural and engineering staff can help you find the right product for your project, and provide creative ways to use them. Just give us a call.



The Quality Solution for New & Remodel Exterior Finishing

PO Box 609, Sand Springs, OK 74063 • Phone 918.246.9995 • Toll Free 866.915.9995 • Fax 918.246.9976

www.fullertonfinishsystems.com

WalStoneTM

From Fullerton Finish Systems, Inc.

Veneer Panel Specification

Part 1 - General

1.1 Description

A. Work described herein consists of furnishing factory fabricated panels with an exterior face of exposed aggregate finish applied with polymer epoxy resin on mineral fiber reinforced cement board as manufactured in Sand Springs, Oklahoma by Fullerton Finish Systems, Inc. - (918) 246-9995.

B. Manufacturer shall have been continuously engaged in the manufacture of exterior wall panels for 35 or more years.

1.2 Warranty

Manufacturer to warranty from date of purchase against defective materials or workmanship in fabrication for a period of five years.

Part 2 - Products

2.1 Description

A. Exposed aggregate finish shall be _____ (color) and _____ (size) per approved sample. All material shall be obtained from one source to match in color and size as nearly as possible.

B. Epoxy resin finish shall conform to requirements of MIL Spec. Mil-R-9300A and MIL-R-21931.

C. Mineral fiber reinforced cement board (M.F.B.) substrate shall meet the following minimum requirements:

Compressive Strength (lb/in²) **7000**

Flexural Strength (lb/in²) **2000**

Percent Moisture Movement

50% to 90% RH **0.06%**

Thermal "R" Value **0.15**

Burn Character

Flame/Smoke **0/5**

D. Product samples and shop drawings, if required, shall be submitted for approval before panel fabrication.

2.2 Performance

A. Panel substrate and aggregate finish shall withstand the following tests without noted change in appearance or material failure:

1,000 hours in Atlas Twinarc weatherometer.

14 cycles salt fog and thermal shock.

100 cycles -50 to +150 degrees F.

B. All testing shall have been performed by an independent testing facility.

Part 3 - Execution

3.1 Erection

A. Panels shall be erected plumb and true by qualified workman.

B. Panels shall be aligned and spaced as shown on manufacturer's shop drawings, if required.

C. Panels shall be handled and attached to building structure as per manufacturer's shop drawings, if required, installation procedure and/or architectural drawings.

D. All horizontal or vertical panel joints shall be filled with sealant over bond breaker tape.

E. Accessories

1. Sealant (Equal to Sashco Big Stretch or Dow Corning 790 or 795) shall be applied in accordance with sealant manufacturer's recommendations.

2. Bond breaker tape (slick faced polyvinyl chloride tape) minimum of 3/4" wide and equal to #50 by All Type. Tape shall be field applied to surface behind panel joint before panel erection.

3. Fasteners shall be low profile self-drilling stainless steel or zinc and clear chromate plated for rust resistance. Fasteners may be color coated to match exposed aggregate finish, if required.

4. All the accessories shall be of size, shape and spacing as shown on manufacturer's shop drawings, if required, and/or listed in manufacturer's Installation Guide.



The Quality Solution for New & Remodel Exterior Finishing

PO Box 609, Sand Springs, OK 74063 • Phone 918.246.9995 • Toll Free 866.915.9995 • Fax 918.246.9976
www.fullertonfinishsystems.com

District to confirm.



WALSTONE STANDARD COLOR CHART



AMBER LITE



BLACK OBSIDIAN



CIBOLA GOLD



DARK BALDWIN



DESERT TAN



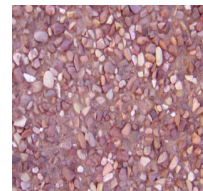
EAU CLAIRE



FLORENE GRAY



NUTMEG



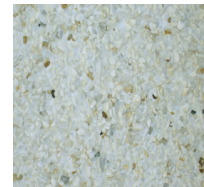
SOONER AZTEC



TEXAS RAINBOW



TOWN MOUNTAIN



WYOMING WHITE



SILVERADO RIBWAL



TEXAS BLUE



IVORY BOTTACINO

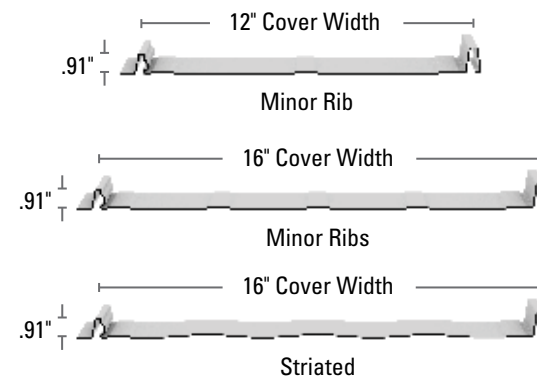


Standing Seam Systems



Meridian

Meridian is an economical, snap-together roofing system that is an excellent choice for commercial and residential applications. Panels are simply installed by placing pancake head fasteners in the panel's slotted flange. Meridian is installed over solid deck.



Details

- Factory formed eave notch upon request
- Minimum slope: 3:12
- Must be installed over solid deck

Panel Options

- Panel width: 12" and 16"
- Panel configurations: 16" minor ribs or striated, 12" minor ribs or striated
- Coating: Kynar 500® (PVDF)
- Substrate:
 - Standard 26 gauge Galvalume® for 16" panels only
 - Standard 24 gauge Galvalume for 12" and 16" panels

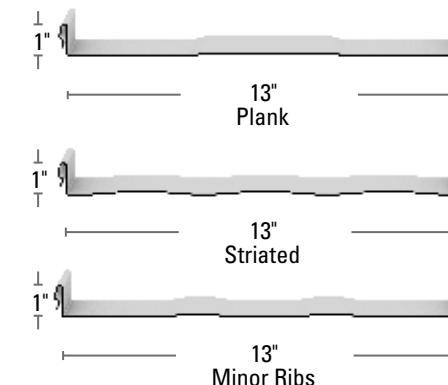
Testing Data

- Fire Rating: Class A
- Air Infiltration: ASTM E1680
- Water Infiltration: ASTM E1646
- Class 4 Impact Resistance: UL 2218
- Texas Department of Insurance Approval: Evaluation RC-34
- Florida State Approval: 2358.1
- For any available Test Data, Section Properties or Load Tables, please visit our download section at www.mcelroymetal.com.

Oil canning (pan wave) is a natural occurrence in metal panels and is not a cause for panel rejection.

Instaloc

Instaloc is a snap-together standing seam that features a 1" seam and is installed with concealed clips. Instaloc is an excellent selection for applications where greater uplift characteristics are required than achieved with Meridian.



Details

- Minimum Slope: 3:12
- Must be installed over solid deck
- Factory applied sealant

Panel Options

- Panel width: 13" standard. Other widths available upon request
- Panel configurations: striated pan, plank and minor rib
- Coating: Kynar 500® (PVDF)
- Substrate: Standard 24 gauge Galvalume

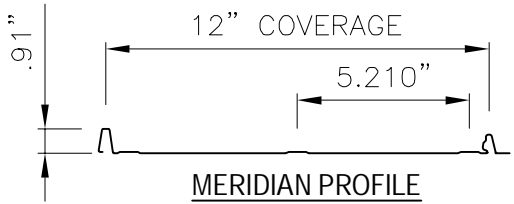
Testing Data

- Fire Rating: UL Class A
- Uplift Test: UL 580, UL 1897
- Class 4 Impact Resistance: UL 2218
- Texas Department of Insurance Approval: RC-86

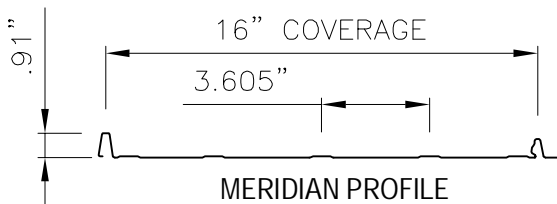
Instaloc is produced in Houston, TX

Meridian Panel

Product Data



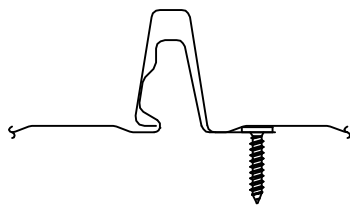
MERIDIAN PROFILE
(Striated or Minor Ribs)
(Minor Ribs Shown)



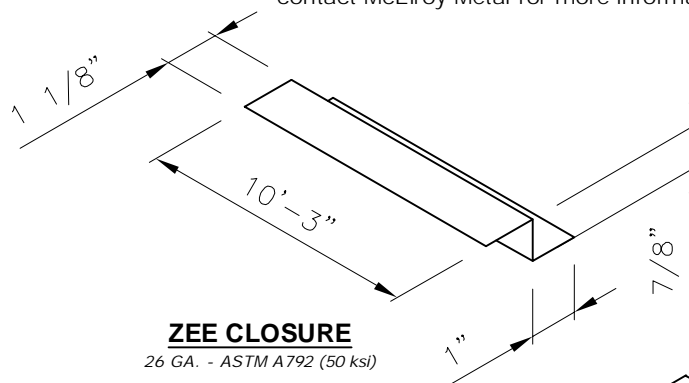
MERIDIAN PROFILE
(Striated or Minor Ribs)
(Minor Ribs Shown)



MERIDIAN PROFILE
(Striated or Minor Ribs)
(Striated Shown)



MERIDIAN SEAM



ZEE CLOSURE
26 GA. - ASTM A792 (50 ksi)



FOAM SEAM PLUG

Applications

Snap Seamed roof panel used on slopes down to 3:12. Standard panel lengths up to 45'. Please inquire for longer lengths.

Substrates

Plywood or ~~Rigid Insulation/Metal Deck.~~

Material

Standard ~~24 GA.~~ or 26 GA. ASTM A792 (50 ksi steel)
AZ55 - Bare, AZ50 - Painted

Manufacturing

Roll formed in factory.

Finishes

~~Acrylic Coated Galvalume®~~
Fluoropolymer (Kynar 500® PVDF resin-based)

Pan Conditions

16" ~~Minor Rib~~ or Striated - 24 or 26 ga.
12" ~~Minor Rib~~ or Striated - 24 ga. only
Oil canning is inherent in all metal panels and is not cause for panel rejection. A signed pan wave acknowledgement will be required for all orders prior to production.

Testing *

Uplift: UL 580 Class 90
Air & Water Infiltration: ASTM E1680, and ASTM E1646.
Fire Resistance: UL 790 Class A
Impact Testing: UL2218 Class 4
Florida Product Approval: FL 2358.1
Texas Windstorm: RC-34
Testing and Approvals are product specific. Please inquire for details.

NOTE:

All data represented on this sheet may not be applicable to all widths and gauges. Please contact McElroy Metal for more information.

ROOFING COLORS



Architectural Colors

District to confirm.

STANDARD COLORS



REGAL WHITE



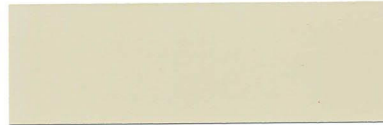
BONE WHITE



SURREY BEIGE



SANDSTONE



ALMOND



BUCKSKIN



ASH GRAY



SLATE GRAY



CHARCOAL



MATTE BLACK



MEDIUM BRONZE



DARK BRONZE



PATINA GREEN



EVERGREEN



MANSARD BROWN



COLONIAL RED



ROMAN BLUE



PATRICIAN BRONZE



TERRA COTTA

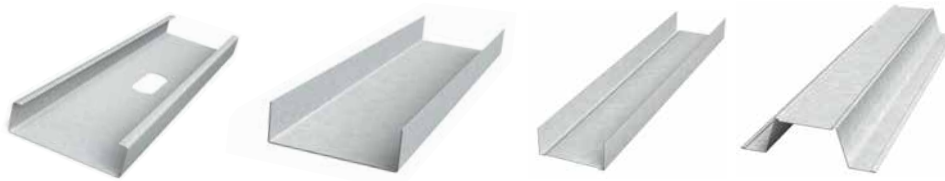
ALL COLORS ARE ENERGY STAR COMPLIANT



**BUILDING
FRAMING
MATERIAL**

ClarkDietrich™ PRODUCT INFORMATION

Example: 362S162-43 (33ksi, CP60) punched



S = Structural stud or joist
PDS = ProSTUD® drywall stud

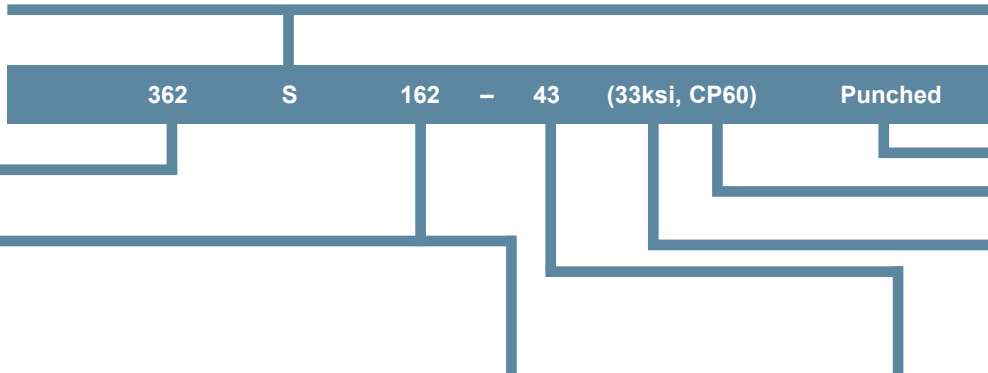
T = Structural track
PDT = ProTRAK® drywall track

U = CRC or U-channel

F = Furring channel

Punching

Punched studs or joists will be supplied unless the customer indicates unpunched material is required at time of order. All track and channels are unpunched.



Protective Coating
Structural framing CP60 (G90 available)
Drywall framing G40EQ (G40 or G60 available)

KSI -Yield Strength (Fy)
Structural: 33ksi or 50ksi steel
Drywall: See ProSTUD below.

ClarkDietrich structural member depths, flanges & available thickness

Member depths	Flange widths range	Mils range	Gauge range
(250) 2-1/2"	1-3/8," 1-5/8," 2" & 2-1/2"	33-68	20-14 ga
(350) 3-1/2"	1-3/8," 1-5/8," 2" & 2-1/2"	33-68	20-14 ga
(362) 3-5/8"	1-3/8," 1-5/8," 2" & 2-1/2"	33-97	20-12 ga
(400) 4"	1-3/8," 1-5/8," 2" & 2-1/2"	33-97	20-12 ga
(550) 5-1/2"	1-5/8," 2" & 2-1/2"	33-97	20-12 ga
(600) 6"	1-3/8," 1-5/8," 2," 2-1/2" & 3"	33-97	20-12 ga
(800) 8"	1-3/8," 1-5/8," 2," 2-1/2" & 3"	33-97	20-12 ga
(925) 9-1/4"	1-5/8," 2" & 2-1/2"	43-97	18-12 ga
(1000) 10"	1-5/8," 2," 2-1/2" & 3"	43-97	18-12 ga
(1200) 12"	1-5/8," 2," 2-1/2" & 3"	54-97	16-12 ga
(1400) 14"	1-5/8," 2," 2-1/2" & 3"	54-97	16-12 ga

ClarkDietrich return lip dimensions

Flange width	Return lip	Member depths
137 (1-3/8")	3/8"	3-5/8"-8"
162 (1-5/8")	1/2"	2-1/2"-14"
200 (2")	5/8"	3-5/8"-14"
250 (2-1/2")	5/8"	3-5/8"-14"
300 (3")	5/8"	6"-14"

Old stud/track designations

Designation	Type	Flange/leg
CWN	Stud	1-3/8"
CSJ	Stud	1-5/8"
CSW	Stud	2"
CSE	Stud	2-1/2"
CSS	Stud	3"
TSB	Track	1-1/4"
TSC	Track	2"
TSE	Track	3"

ClarkDietrich thickness identification and color coding

Member mils	Thickness gauge	Design thickness	Min. thickness	Color code
33	20	0.0346"	0.0329"	White
43	18	0.0451"	0.0428"	Yellow
54	16	0.0566"	0.0538"	Green
68	14	0.0713"	0.0677"	Orange
97	12	0.1017"	0.0966"	Red

ClarkDietrich ProSTUD® Drywall framing system thickness

Member gauge	Mils	KSI	Design thickness	Min. thickness	Color code
ProSTUD 25	15	50	0.0158	0.0150	None
ProSTUD 20	19	65	0.0200	0.0190	Pink
ProSTUD 20XD	22	57	0.0232	0.0220	Pink
ProSTUD 30MIL	30	33	0.0312	0.0296	Pink
ProSTUD 33MIL	33	33	0.0346	0.0329	White

ProTRAK (25, 20 & 20XD) = 50ksi ProTRAK 30 & 33mil = 33ksi

HOW TO IDENTIFY OUR PRODUCTS

ClarkDietrich has adopted standard nomenclature established by the American Iron and Steel Institute (AISI) for identifying each of its products. Coding of each member consists of four parts, in this order:

- A number which identifies the web depth of the member to two decimal places. 600 = 6.00," 1000 = 10.00," 550 = 5.50," 362 = 3.625," etc.
- A letter that tells you the type of member, such as S = Stud/joist, T = Track, U = U-channel, and F = Furring channel.
- A number that defines the flange dimension in inches to two decimal places. 162 = 1.625," 200 = 2.00," 125 = 1.25," etc.
- A number following a hyphen that denotes the minimum delivered thickness in mils (33mils = 33/1000 inches which is approximately 0.0329"). Minimum delivered thickness is 95% of design thickness.

Product availability.

Most products manufactured by ClarkDietrich are readily available in all markets, but there can be exceptions. Please contact your ClarkDietrich Sales Representative to make sure the product you need is available in your market area.

Protective coatings.

Non-structural products are coated to meet the requirements of AISI S220 and ASTM C645, with a G40 or a protective coating with an equivalent corrosion resistance. ProSTUD® Drywall Framing System meets the Code Compliance Research Report ATI CRRR-0207. Non-structural products may also be ordered with enhanced coatings for special applications.

Structural framing products are available with a variety of protective coatings that meet the CP60 coating protection level requirements of AISI S200 and ASTM C955. These coatings may include G60, A60, AZ50 or GF30, all of which satisfy the above referenced standards. G90 coatings are an enhanced option that can be requested for highly corrosive environments. ClarkDietrich can supply a specific or enhanced coating to meet specific project requirements when requested.

ClarkDietrich is a proud member of the Steel Framing Industry Association (SFIA).

INTERIOR WALL FINISH

NUDO FiberLite® FRP Class C Embossed and Smooth Wall & Ceiling Panels

NUDO FiberLite FRP panels are solid sheets, composed of fiberglass and calcium carbonate-filled polyester resin and comply with the ASTM D5319 Standard for Glass-Fiber Reinforced Polyester Wall and Ceiling Panels. This embossed or smooth panel is designed for interior wall finishes where, washable, durable panels are needed. NUDO FiberLite FRP is a durable, flexible building wall material that is resistant to mold, mildew and corrosion and meets the USDA guidelines. The panel has a Class C rating for flame spread and smoke development when tested per ASTM E-84.

Physical Properties: Table 1

Property	Typical Value		
	.09"	Measure	Test Method
Flexural Strength	17,000	psi	ASTM D790
Flexural Modulus	6.0 x 10 ⁵	psi	ASTM D790
Tensile Strength	8,000	psi	ASTM D638
Tensile Modulus	9.43 x 10 ⁵	psi	ASTM D638
Elongation	1.20	%	ASTM D638
Water Absorption	0.17	72 hrs @ 21°C	ASTM D570
Izod Impact	7.0	Ft-lbs/in	ASTM D256
Coefficient of Linear Thermal Expansion	2.22 x 10 ⁻⁵	50% Humidity Temp -23°C	ASTM D696
Barcol Hardness	30	Average	ASTM D2583
Specific Gravity	1.6138	N/A	ASTM D792
Abrasive Resistance	0.293	% weight loss	TABER
Flash Ignition Temperature	430°	Fahrenheit	ASTM D1929
Self Ignition Temperature	450°	Fahrenheit	ASTM D1929
Flame Spread Index	≤ 200	Unit N/A	ASTM E84
Smoke Generation	≤ 450	Unit N/A	ASTM E84
Surface Burn Test	Class C	Class C	ASTM E84

Physical Properties: Table 2

Part Number Identifier	Nominal Panel Thickness	Nominal Panel Weight	Color		Size
LP-F9 (Embossed)	.090	.65 psf	Almond Beige Black Blue Bordeaux Brown Ivory Silver	Khaki Pearl Red White Med Gray Dark Gray Pineapple	4' x 8', 10' Non-standard sizes available made-to-order.
LP-S9 (Smooth)	.090	.65 psf	Almond Pearl	White Black	4' x 8', 10'
LP-F9-CT (Embossed) LP-S9-CT (Smooth)	.090	.65 psf	Almond Ivory Pearl	Beige Silver White	2'x2'
LP-F10-CT (Embossed) LP-S10-CT (Smooth)	.10	.67 psf		White	2'x2', 4'

SPECIFICATIONS: The NUDO FiberLite FRP panels are manufactured with state-of-the-art laminating equipment and adhesives.

COMPOSITION:

1. Fiberglass and calcium carbonate-filled polyester resin.

FINISHED PANEL QUALITY:

1. The front side shall be embossed with a pebble type finish (embossed finished) or the panels shall have a wear side with a smooth finish (smooth). Colors shall be throughout the panel, and manufactured as specified.
2. The backside shall be smooth. Backside imperfections which do not affect functional properties are not cause for rejection.
3. Physical properties shall be set forth in Table 1.
4. Product quality standards and tolerance for panel weight and thickness shall be set for in Nudo Product, Inc. Quality Control Procedures/Standards which are available upon request.
5. Dimensions shall be specified on purchased order, subject to the following tolerances:
Width: $\pm 1/8"$ (3.2mm)
Length: $\pm 1/8"$ (3.2 mm)
Squareness: not more than $1/8"$ (3.2 mm) out of square.
5. Panels shall be installed in accordance with the manufacturer's guidelines as set forth in the installation guide.

CERTIFICATION:

1. Meets the minimum requirements of the major model building codes for Class C interior wall finishes. Flame spread of less than 200, smoke development less than 450 per ASTM E-84.

FABRICATING RECOMMENDATIONS:

Note: Protect your eyes with goggles; cover your nose and mouth with a filter mask when cutting FiberLite^{FRP} panels. When cutting FiberLite FRP, position the panel so that the saw blade enters the decorative side first, to avoid chipping and damage.

Hand Fabricating: Drilling – high speed drill bit (60° cutting angle, with 12° - 15° clearance) or hole saw.

Cutting: 72-tooth circular saw with reinforced carborundum or carbide-tipped blade.

STORAGE:

FiberLite FRP should be stored horizontally indoors on a contiguous flat surface. Protective film should remain on the panel until installation. Panels should never be stored on the floor or an outside wall. Optimum storage conditions are 60°F (16°C) to 75°F (24°C) and 35% to 55% relative humidity.

PRECONDITIONING:

Prior to installing FiberLite FRP, remove the packaging materials and allow the panels to acclimate to room temperature and humidity for at least 48 hours. Ideally, the room temperature and humidity during acclimation and installation should be the same as the final operation conditions.

PRODUCT LIMITATIONS:

FiberLite FRP is designed as an indoor decorative panel. It should never be exposed to extremely high or extremely low moisture conditions. FiberLite FRP is designed to be installed over a solid wall surface and should never be directly installed over studs, concrete, concrete block, or non insulated exterior walls. FiberLite FRP should be installed between 60°F (16°C) to 75°F (24°C) and 35% to 55% relative humidity. Non-compliance with product limitations may affect future performance and voids warranty.

We believe all information given is accurate. It is offered in good faith, but without guarantee. Since conditions of use are beyond our control, the user assumes all risks. Nothing herein shall be construed as a recommendation for use that infringes on valid patent or as extending a license under valid permit.

CLEANING INSTRUCTIONS:

FiberLite FRP is easy to clean. In most cases, use a clean, damp, non-abrasive cotton cloth and a mild liquid detergent or household cleaner. Always rinse with clean water and a clean, non-abrasive cotton cloth. Dry the panels with a soft, clean, non-abrasive cotton cloth.

DO NOT USE: Abrasive cleaners with bleach, cleaners with acid, alkali or sodium hypochlorite. They will damage and permanently discolor the surface. Be sure that bottles, rags or other materials with these cleaners never come in contact with the surface.

Examples of harsh cleaners to avoid, include but are not limited to:

- Bleach
- Drain Cleaners
- Metal Cleaners
- Over Cleaners
- Rust Removers
- Tub and Tile Cleaners
- Lime Scale Remover

REMOVAL OF STAINS:

To remove stains, use full strength Fantastik, All Purpose Cleaner, Formula 409, Pine-Sol, or other mild household cleaners. Blot with clean, damp, non-abrasive cotton cloth, and rinse with cleaner water. When recommended cleaner changes its formulation, the change may be harmful to the surface. Nudo Products, Inc. cannot be held responsible for these changes. Follow all directions and warnings on the cleaner label because many are extremely flammable.

Dyes and pharmaceutical products will permanently stain the panels. These include hair dyes and rinses, silver nitrate, laundry bluing, tannic acid, povidone-iodine, dermatological tar compounds, and peroxide. To reduce these stains, apply a paste of baking soda and water on the area to pull out the stain. Do not rub, as the paste will be slightly abrasive. Wipe up the past with a clean, damp, non-abrasive cotton cloth, and rinse with clean water.

Stains that are stubborn or even permanent and may not disappear include: wood stains, cash register inks, newspaper, marking pen inks, indelible ink, food pricing ink, and label inks.

Stubborn stains that may disappear on their own after a short time or after repeated cleaning include food stains, glass rings, water marks, coffee and tea stains.

FLAME SPREAD AND SMOKE DEVELOPMENT

RATINGS: The numerical flame spread and smoke development ratings are not intended to reflect hazards presented by Nudo Product, Inc. products or any other material under actual fire conditions. These rating are determined by small-scale tests conducted by Underwriters Laboratories and other independent testing facilities using the American Society for Testing and Materials E-84 test standards (commonly referred to as the "Tunnel-Test"). NUDO PRODUCTS, INC PROVIDES THESE RATING FOR MATERIAL COMPARISION PURPOSES ONLY. Like other organic building materials, (e.g. wood), panels made up of composite material will burn. When ignited, it may produce dense smoke very rapidly. All smoke is toxic. Fire safety requires proper design of facilities and fire suppression systems, as well as precautions during construction and occupancy. Local codes, insurance



1.800.826.4132 Ph
1.217.528.5636 Ph
1.217.528.8722 Fax

Form 3004N.C Rev. 13 6/19

Info@nudo.com
www.nudo.com

Marlite Adhesives Specifications

Marlite Brand Adhesives have been developed especially for use with Marlite Brand Products. When used in conjunction with a total Marlite Brand Product System, these adhesives assure the system's ease of installation, performance and long life.

~~C-375~~ ~~Construction Adhesive~~

C-375 is available in 3.5-gallon cans. A strong, flexible, water resistant adhesive formulated for fast, easy application, C-375 meets ASTM Specification C557. It is an excellent, multipurpose adhesive for use with wall panels, acoustic tile, and insulation (except polystyrene foam). It will bond surfaces together quickly or provide a long "open time" of up to 20 minutes, if required. Use to apply Plank or FRP panels over solid backing. This elastomeric polymer-base adhesive remains pliable to compensate for movement of up to 1/8". Application to both surfaces to be joined (cohesive method) produces a very strong immediate bond.

APPLICATION TEMPERATURE: >50°F
SHELF LIFE: 12 months in tightly closed cans
CONSISTENCY: ~~Y~~mastic, smooth paste
COVERAGE: 60 square feet per gallon
WEIGHT PER GALLON: 8.9 lbs.
BASE: elastomeric polymer
SOLVENT TYPE: naphtha
CLEAN-UP: naphtha or mineral spirits – exercise safe practice regarding flammability and toxicity when using mineral spirits
OPEN TIME: 20 minutes, depending on temperature and air movement
SERVICE TEMP. RANGE: -20°F to 140°F
MOISTURE RESISTANCE: excellent
FLAMMABILITY: flammable in wet state
FREEZE-THAW STABILITY: unaffected; will not freeze

C-551 FRP Adhesive

C-551 is available in 3.5-gallon cans. It is a highly water resistant, non-flammable adhesive designed for installing Marlite Brand FRP panels over existing porous-surfaced walls. Do not use on Marlite Plank or other wood-based products. Meets ASTM Specification C557. Also recommended for bonding polystyrene foamboard, polyurethane Foamboard, tileboard, and decorative strips to any structurally sound, porous interior surface, such as drywall or plywood.

APPLICATION TEMPERATURE: >50°F to 90°F
SHELF LIFE: 12 months in tightly closed cans
CONSISTENCY: medium viscosity, smooth smooth paste
COVERAGE: 60 square feet per gallon
WEIGHT PER GALLON: 10.6 lbs.
BASE: proprietary emulsion polymer
SOLVENT TYPE: naphtha
CLEAN-UP: use soapy water before adhesive sets. After adhesive sets, use mineral spirits - exercise safe practice regarding flammability and toxicity when using mineral spirits
OPEN TIME: 20 minutes, depending on temperature and humidity conditions
SERVICE TEMP. RANGE: 0°F to 140°F
MOISTURE RESISTANCE: excellent
FLAMMABILITY: nonflammable
FREEZE-THAW STABILITY: passes 5 cycles at 0°F
CAUTION: do not permit installation to go below freezing within the first 48 hours after application

BUILDING INSULATION

DESCRIPTION: ThermalGuard™ CC2 is a fast set, closed cell, 245fa blown spray polyurethane foam (SPF) insulation designed for use in residential and commercial structures, exterior foundation or perimeter insulation, below grade applications, exterior tank/pipe insulation, etc. ThermalGuard CC2 is applied as a liquid and expands 25x in seconds to fill and seal building cavities of any shape and size. It exhibits superior thermal insulation, air-barrier, and sound attenuation properties compared to conventional insulation materials. Once fully cured ThermalGuard CC2 remains rigid maintaining significant structural strength and thermal insulation properties in adverse conditions across a wide variety of applications. ThermalGuard CC2 achieves a Class I Fire retardance rating, is Appendix X compliant without any additional coatings and meets or exceeds minimum building code requirements for fire safety.

TYPICAL USES:

- Insulation foam for walls, ceilings, roof decks, crawlspaces
- Residential, commercial and industrial building insulation

FEATURES & BENEFITS:

- ICC-ES ESR-2100
- Passes NFPA 286 without a prescriptive thermal barrier when used in conjunction with Fireshell F10E fire-protective coating.
- Class I fire rated
- Appendix X compliant without any additional coatings
- Low odor during application and produces no toxic vapors after application
- Seals, insulates and minimizes uncontrolled air movement into a building envelope
- Reduces energy consumption from heating and cooling
- 245fa-blown, non-ozone depleting agent

CHEMICAL PROPERTIES:

		Isocyanate (A)	Resin (B)
Specific Gravity (grams/cc)	ASTM D-1475	1.23	1.13
Viscosity (cps)	ASTM D-2196	200 – 250	900 – 1200
Mix Ratio, Parts per Volume		1	1
Shelf Life - Unopened Containers		6 months	6 months

TYPICAL PHYSICAL PROPERTIES:

	Test	Result
Density (nominal):	ASTM D-1622	2.0 lb/ft3 (32 kg/m3)
Tensile Strength (psi)	ASTM D-1623	70
Compressive Strength (psi)	ASTM D-1621	40
Closed-Cell Content (%)	ASTM D-2856	96
Water Vapor Permeability (perm) @ 2" (51 mm)	ASTM E-96	.8
Air Leakage (L/s/m ² @ 75 Pa @ 1")	ASTM E-283	0.002
Fungus Growth	ASTM G-21	None
Dimensional Stability (%)	ASTM D-2126	<4Δ
Fire Rating:	ASTM E-84	Class I
Flame Spread Index	ASTM E-84	≤25
Smoke Development Index	ASTM E-84	≤450
R-Value:	ASTM C-518	6.85/inch
Service Temperature:		250° F (120° C)

PROCESS TEMPERATURE AND ENVIRONMENT CONDITIONS: ThermalGuard CC2 must be spray-applied using approved equipment. The system settings required to achieve quality spray foam application will vary depending on environmental and substrate conditions. The following recommended parameters will help ensure optimum foam quality.

Iso (A) & Resin (B) Components	Processing Pressure	Ambient Temperature
115 – 145° F (46 – 63° C)	900 – 1400 psi	20 – 105° F (-6.7 – 40.6° C)
Substrate Temperature	Substrate Moisture Content	Maximum Lift Thickness
20 – 105° F (-6.7 – 40.6° C)	<19%	4"

(continued)

THERMALGUARD™ CC2 (continued):

PREPARATION: ThermalGuard CC2 resin (B) does not require agitation. Do not pre-heat or recirculate resin (B) as doing so will result in the “boiling off” of the 245fa blowing agent which will result in poor yield and poor foam performance.

APPLICATION INSTRUCTIONS: ThermalGuard CC2 is installed by independent SPF contractors. It is recommended that building owners verify that the SPF insulation contractor maintains proper credentials, insurance, and licenses and is properly trained to safely install SPF insulation products.

ThermalGuard CC2 demonstrates excellent adhesion to various substrates when installed according to manufacturer specifications. Allow a minimum of 2 hours for full off-gas and cure before application of a primer, topcoat, or intumescent paint. For best results apply primer, topcoat, or intumescent coating within 72 hours of installation of foam. ThermalGuard CC2 should be installed at a maximum thickness of 4 inches per pass with a minimum of 30 minutes between passes. IT IS THE APPLICATOR'S RESPONSIBILITY TO TEST LIFT THICKNESS FOR A PARTICULAR APPLICATION PRIOR TO COMMENCING INSTALLATION TO ENSURE THAT THE PRODUCT CAN BE INSTALLED SAFELY AT THE DESIRED THICKNESS WITHOUT RISK OF CHARRING OR FIRE.

ThermalGuard CC2 should not be left exposed to sunlight, as UV light will rapidly degrade foam. Do not use near high heat or open flame.

ThermalGuard CC2 must be covered with an approved 15-minute thermal barrier when used as insulation for residential or commercial buildings. Installation must comply with all applicable building codes. Do not install ThermalGuard CC2 at a thickness exceeding 4 inches per pass and do not apply subsequent passes within 30 minutes of the previous pass.

SUBSTRATES: ThermalGuard CC2 is chemically & physically compatible with most common building materials including electrical wiring, wood, metal, concrete, plastic (PVC), copper, vinyl, and glass. It is the responsibility of the contractor to check substrate compatibility prior to starting of the job.

HOW SUPPLIED: Net weight per set is 965 pounds (437.7 kg). A set of ThermalGuard CC2 consists of one (1) 55 gallon (208 L) drum of 'A' component and one (1) 55 gallon (208 L) drum of 'B' component.

Part numbers - Set: TGCC2, Side A: FFPF-ISO A, Side B: FFPF-PUCC1.9P LOW ODOR.

STORAGE: ThermalGuard CC2 should be stored between 60 – 80° F (16 – 26° C) out of direct sunlight. Do not allow material to freeze.

SAFETY PRECAUTIONS: Health Considerations - Consult the Rhino Linings® Safety Data Sheets (SDS)

This chemical system requires the use of proper safety equipment and procedures. Please follow the Rhino Linings® product SDS and Safety Manual for detailed information and handling guidelines.

For Your Protection: The information and recommendations in this publication are, to the best of our knowledge, reliable. Suggestions made concerning the products and their uses, applications, storage and handling are only the opinion of Rhino Linings Corporation. Users should conduct their own tests to determine the suitability of these products for their own particular purposes and of the storage and handling methods herein suggested. The toxicity and risk characteristics of products made by Rhino Linings Corporation will necessarily differ from the toxicity and risk characteristics developed when such products are used with other materials during a manufacturing process. The resulting risk characteristics should be determined and made known to ultimate end-users and processors.

Because of numerous factors affecting results, **Rhino Linings Corporation makes no warranty of any kind, express or implied**, other than that the material conforms to its applicable current Standard Specifications. Rhino Linings Corporation hereby disclaims any and all other warranties, including but not limited to those of merchantability or fitness for a particular purpose. No statements made herein may be construed as a representation or warranty. The liability of Rhino Linings Corporation for any claims arising from or sounding in breach of warranty, negligence, strict liability, or otherwise shall be limited to the purchase price of the material.

Read This Before You Buy

What You Should Know About R-values

The chart shows the R-value of this insulation. R means resistance to heat flow. The higher the R-value, the greater the insulating power. Compare insulation R-values before you buy.

There are other factors to consider. The amount of insulation you need depends mainly on the climate you live in. Also, your fuel savings from insulation will depend upon the climate, the type and size of your house, the amount of insulation already in your house, and your fuel use patterns and family size. If you buy too much insulation, it will cost you more than what you'll save on fuel.

To get the marked R-value, it is essential that this insulation be installed properly.

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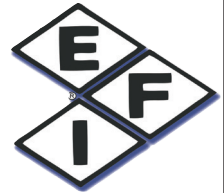


Rhino Linings Corporation

9747 Businesspark Avenue, San Diego, CA 92131
858-450-0441 • Fax 858-450-6881
1-800-422-2603
www.rhino linings.com

ENTRY DOORS

ENGINEERED FLUID, INC



Line-X Ultra

EFI-Solutions is pleased to offer a product with more durability, *dfchVMjcbžfYgJ]YbW UbX'gfYb[h''@bY!L i`hfU* is a two component *Dc`nUgdUfh]W5`d\Uh]WDc`ni fYU'gdfUm* coating that is UV stable. This *dfcXi VhWb`VY'i gYX Ug'U'* topcoat or a stand alone coating.

Chemical Technical Data

Mix Ratio By Volume:	1A:1B
Gel Time:	45 Sec
Viscosity A Side:	200±100 CPS
Viscosity B Side:	200±100 CPS
Density A Side:	9.41
Density B Side:	8.85

EFI Door Coating

EFI Standard Steel Doors come in three Line-X Ultra colors. Ash Gray, Slurry Beige and White

Please Refer to component page Steel Entry Door System for more information.

Please Select Your Desired Color Below

Ash Gray



Surrey Beige



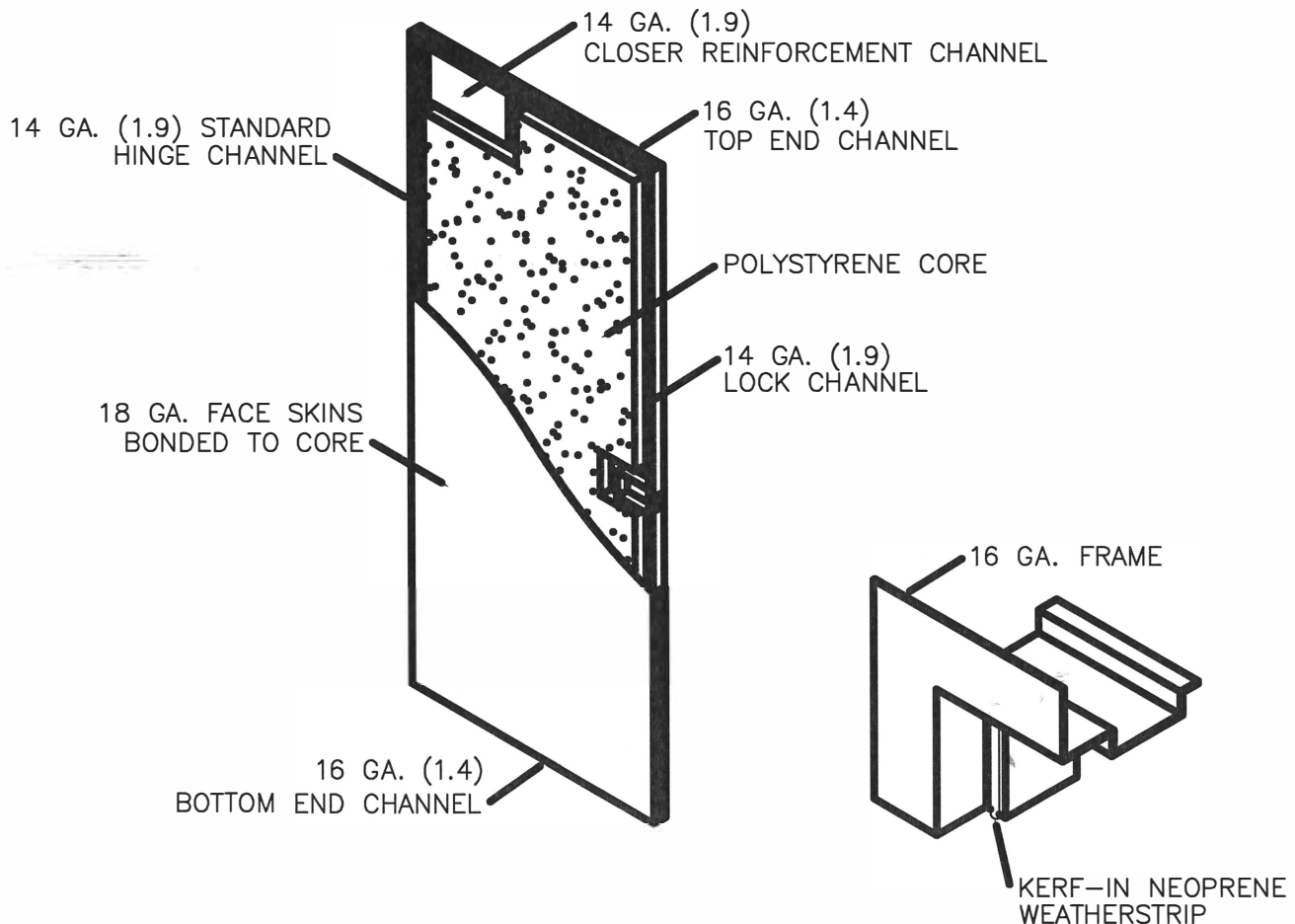
White



District to confirm.

STEEL ENTRY DOOR SYSTEM – BILL OF MATERIALS

- 1) CUSTOM 16 GA. STEEL FRAME
- 2) 18 GA. POLYSTYRENE FOAM INSULATED DOOR
- 3) GRADE 2 CONCEALED GEARED HINGE
- 4) GRADE 2 LEVER LOCKSET (CLASSROOM FUNCTION)
WITH SIX PIN REMOVABLE CORE
- 5) COMMERCIAL DOOR CONTROL WITH HOLD OPEN FEATURE
(UL 10C – ANSI A156.4 GRADE 1)
- 6) 7/8" EXTRUDED ALUMINUM THRESHOLD WITH BUMPER SEAL
- 7) ALUMINUM DRIP SHIELD ABOVE DOOR
- 8) KERF-IN NEOPRENE WEATHERSTRIPPING

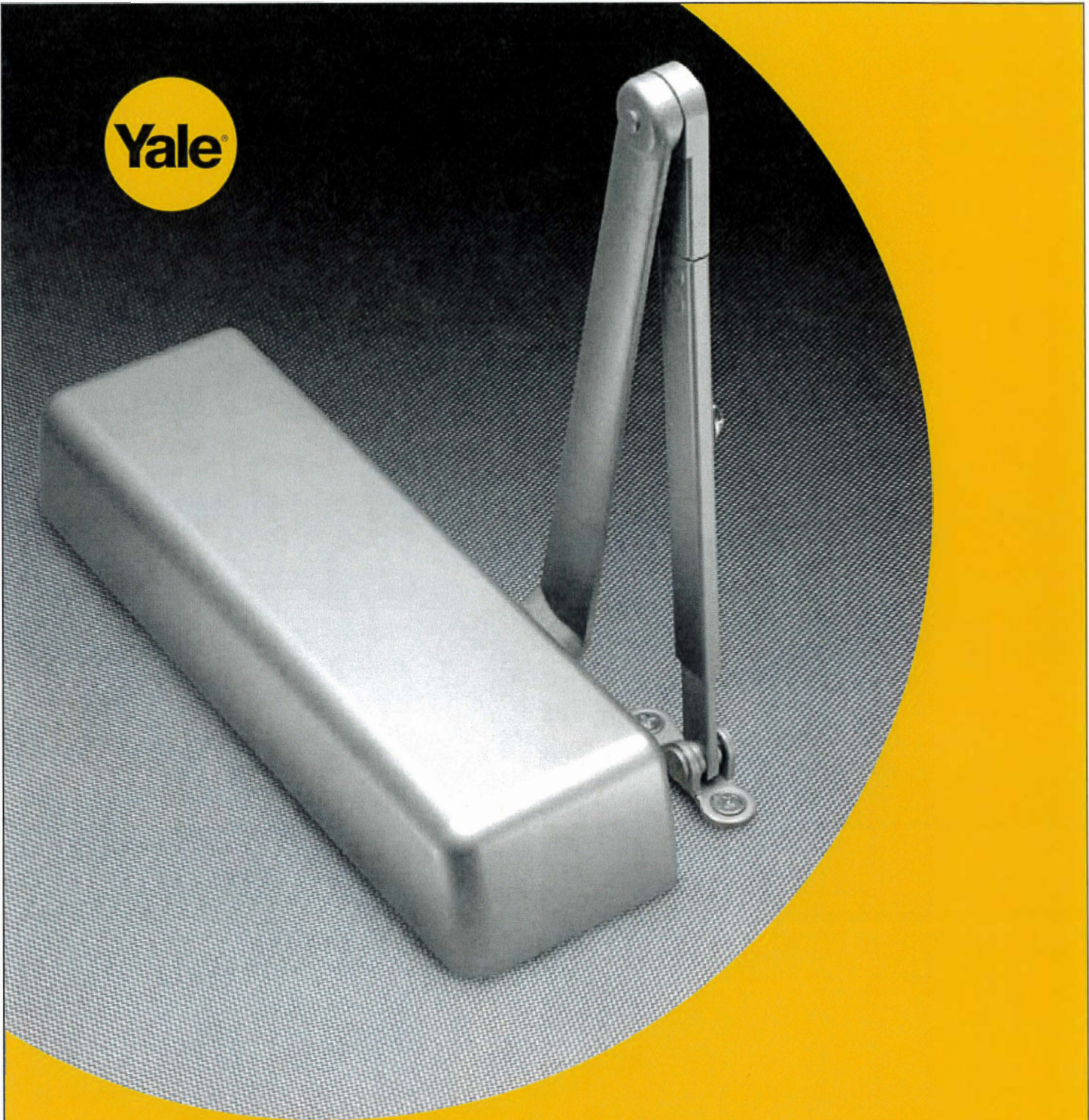


ENGINEERED FLUID, INC.

P.O. DRAWER 723 • CENTRALIA, ILLINOIS 62801, 618-533-1351

JOB REF. NO. _____

DRAWING NO. STEEL ENTRY DOOR



5800 Series

Cast Iron Door Closers

An ASSA ABLOY Group brand

ASSA ABLOY



introduction

Yale® 5800 series cast iron door closers are ideal for commercial applications where ease of use and installation are required at an economical price.

The 5800 series features rugged construction, adjustments for backcheck, closing and latch speed, rack and pinion operation and a variety of arm options.




features

- Adjustable spring sizes 1-6
- Non-handed
- Cast iron
- Tri-packed: regular, parallel or top jamb mounting
- Full plastic cover
- Spring power adjustment
- Hold open and heavy-duty arm configurations
- Sleeve nuts included with all models

functions

- Backcheck
- Closing speed
- Latching speed
- Delayed action; specify 5801DL

certifications

- Certified for ANSI/BHMA A156.4 Grade 1 
- UL and cUL listed. This includes compliance to UL10C. 
- Meets requirements for Americans with Disabilities Act (ADA)  and ANSI/BHMA A117.1
- 10-year limited warranty

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Door Closing Latching Cycle 2

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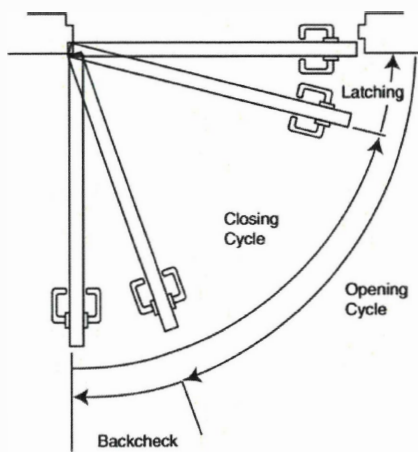
Parts/Accessories 4

How To Order 5

finishes

ANSI/BHMA Code	Finish Description
689	Aluminum Painted
690	Dark Bronze Painted

door closing latching cycle



arms

Non-Hold Open

Self-closes door every time door is opened. Auxiliary stop (by others) required except when using the Holder/Stop arm.

Hold Open

Achieved by means of friction or ball and detent/roller. Friction hold open has a range of 90° to 180° using template location and mechanical adjustment. Ball and detent or roller hold open is effective in a range of 85° to 110°.

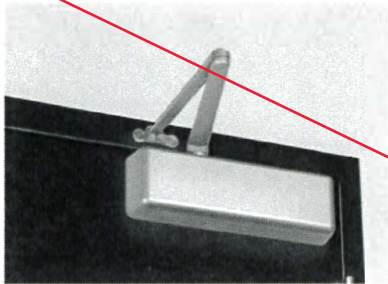
Hold open arm door closers are not permitted to be used on fire door assemblies.



5800 series | door closers

applications

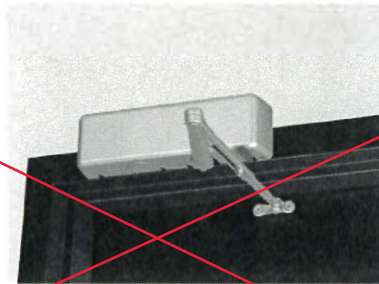
regular arm



Non-hold open arm shown, hold open application available.

- Pull side application, double lever arm
- Sufficient frame, door and/or ceiling clearance must be considered
- Due to arm projection, application may present an aesthetics issue or be prone to vandalism

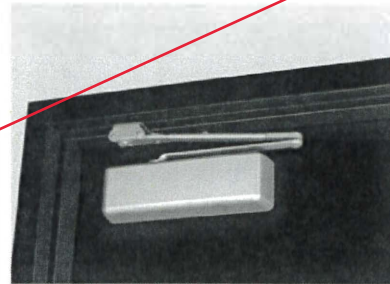
top jamb



Non-hold open arm shown, hold open application available.

- Push side application
- Sufficient frame face and/or ceiling clearance must be considered
- 2-1/4" (57mm) top rail on door is required
- Best door control for doors in exterior walls that swing out of building
- Consideration must be given to depth of reveal

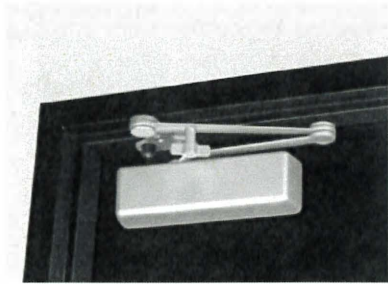
parallel arm



Non-hold open arm shown, hold open application available.

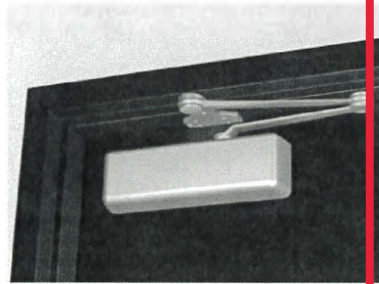
- Push side application
- In the closed position, there is little or no hardware projection beyond the frame face
- Due to arm geometry, approximately 25% less power-efficient than regular arm application
- Closer and arm mounted below the frame stop

holder/stop arm



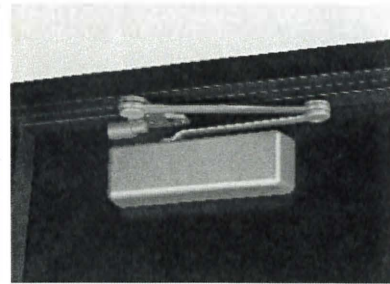
5821T Shown

- Holder/Stop arms incorporate a stop at the arm's soffit plate to dead stop the door at a predetermined degree of door swing between 85° and 110°, in 5° increments
- Prior to dead stop, backcheck slows the door speed to reduce the stop action



5821 Shown

- Holder/Stop arm is intended for use where an auxiliary door stop cannot be used and low to moderate abuse is anticipated
- Stop is removable to allow for additional applications where auxiliary door stops are installed



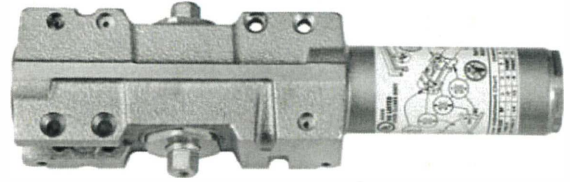
5831T Shown

- Holder/Stop Spring arms incorporate a buffer spring that provides greater protection at the end of the door opening cycle
- Spring is removable



model/part numbers

Model Number	Description
5801	Non-Hold Open Tri-Packed
5801DL	Non-Hold Open Tri-Packed, Delayed Action
5811	Hold Open Tri-Packed
5821	Heavy-Duty Non-Hold Open Parallel Arm with Removable Stop
5821T	Heavy-Duty Hold Open Parallel Arm with Thumbturn and Removable Stop
5831	Heavy-Duty Non-Hold Open Parallel Arm with Spring and Removable Stop
5831T	Heavy-Duty Hold Open Parallel Arm with Thumbturn, Spring and Removable Stop



Note: for heavy-duty parallel rigid arm applications, specify 5821 or 5821T, stop is removable.

See page 5 for more how to order info.

Miscellaneous Parts*	
Part Number	Description
5800COV	Full Plastic Cover
5800SP	Screw Pack
2730Kit	Door Saver Spring Stop

*Specify finish when ordering.

Optional Fasteners	
Part Number	Description
SN-134	Sleeve Nuts
TBGN134-47	Through-Bolts & Grommet Nuts

Note: Sleeve nuts furnished standard with all models.

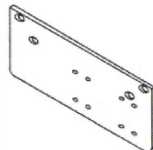
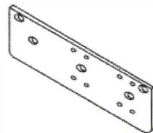
Cover Dimensions		
Width	Length	Projection
3-1/2" (89mm)	12-1/4" (311mm)	2-1/4" (57mm)



2730kit

accessories

closer mounting plates



5800RDP Narrow Frame Drop Plate (regular arm):
Required for hinge side mount where top rail is less than 3-3/4" (95mm). Plate requires 2" (51mm) minimum top rail.

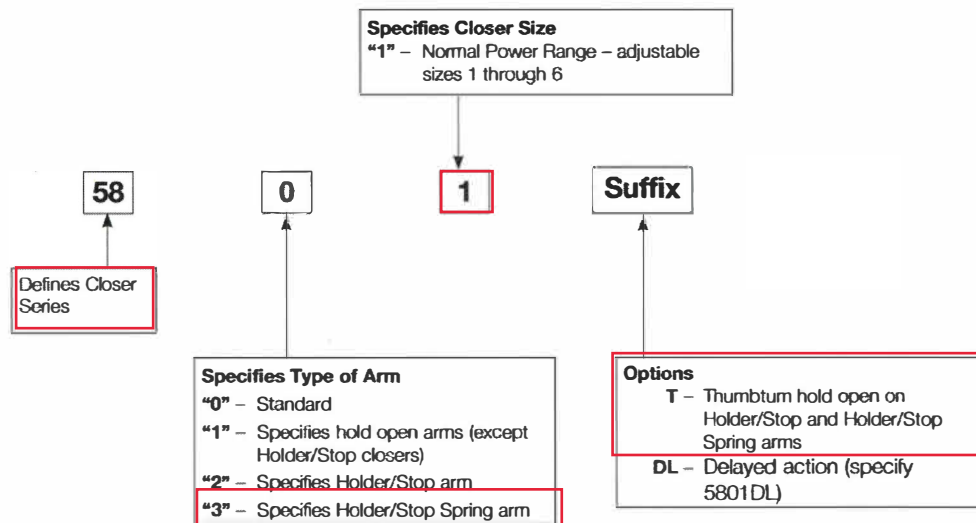
5800PDP Narrow Top Rail Drop Plate (parallel arm):
Required for parallel arm mounting where top rail is less than 5-1/2" (140mm), measured from the stop. Plate requires 2" (51mm) minimum top rail.

Note: All measurements are inches/mm.



5800 series | door closers

how to order

**Notes:**

- For heavy-duty parallel rigid arm applications, specify 5821 or 5821T, stop is removable.
- Warranty becomes void if door closer is installed on the exterior side of a door in the exterior wall of a building.
- It is strongly recommended, and required on fire door assemblies, that doors having a door closer be hung on ball bearing or anti-friction hinges or pivots; unless an alternate method is identified in the door manufacturer's listing.
- Failure to use the correct type and size fasteners may void factory warranty.
- Fasteners for fire/smoke door assemblies must conform to NFPA 80. In some applications additional fasteners may be mandated by NFPA 80 that are not shipped with standard Yale® product, such as sleeve-nuts/sex-nuts or through-bolts and grommet nuts.
- Contact factory if door weight exceeds 250 lbs.

Introduction



With a full range of functions and options and ANSI Grade 1 certification, the Yale® 6000ED Series exit devices provide the right security for your commercial facility.

The stylish, clean lines of the wide and narrow stile 6000ED are visually appealing and blend with any decor. With a multitude of mechanical and electromechanical functions available, the 6000ED can be used in many types of facilities including office buildings, retail environments and mixed-use, and is perfect for both new construction and retrofit applications.

Yale 6000ED Series exit devices come with a full array of electromechanical options and accessories and can be effortlessly integrated into existing security or fire alarm systems.

6100ED(F) Series (Wide Stile)

The 6100ED(F) exit device series is available in rim, SquareBolt®, mortise, surface and concealed vertical rod configurations. Perfect for single swing doors or pairs of doors of metal, wood or composite construction. The 6100ED(F) Series is available in both panic and fire rated versions. See pages 8-12 for more information.



6200ED Series (Narrow Stile)

The 6200ED exit device series is available in rim, SquareBolt®, surface and concealed vertical rod configurations. Perfect for single swing doors or pairs of doors of metal or aluminum. The 6200ED series is panic rated. See pages 13-16 for more information.



Warranty

- Mechanical exit devices and 400F, 500F, and 600F trims carry a 10-year limited warranty.
- 690F and 691F trims carry a two-year limited warranty.
- Electrical options and components carry a two-year limited warranty.




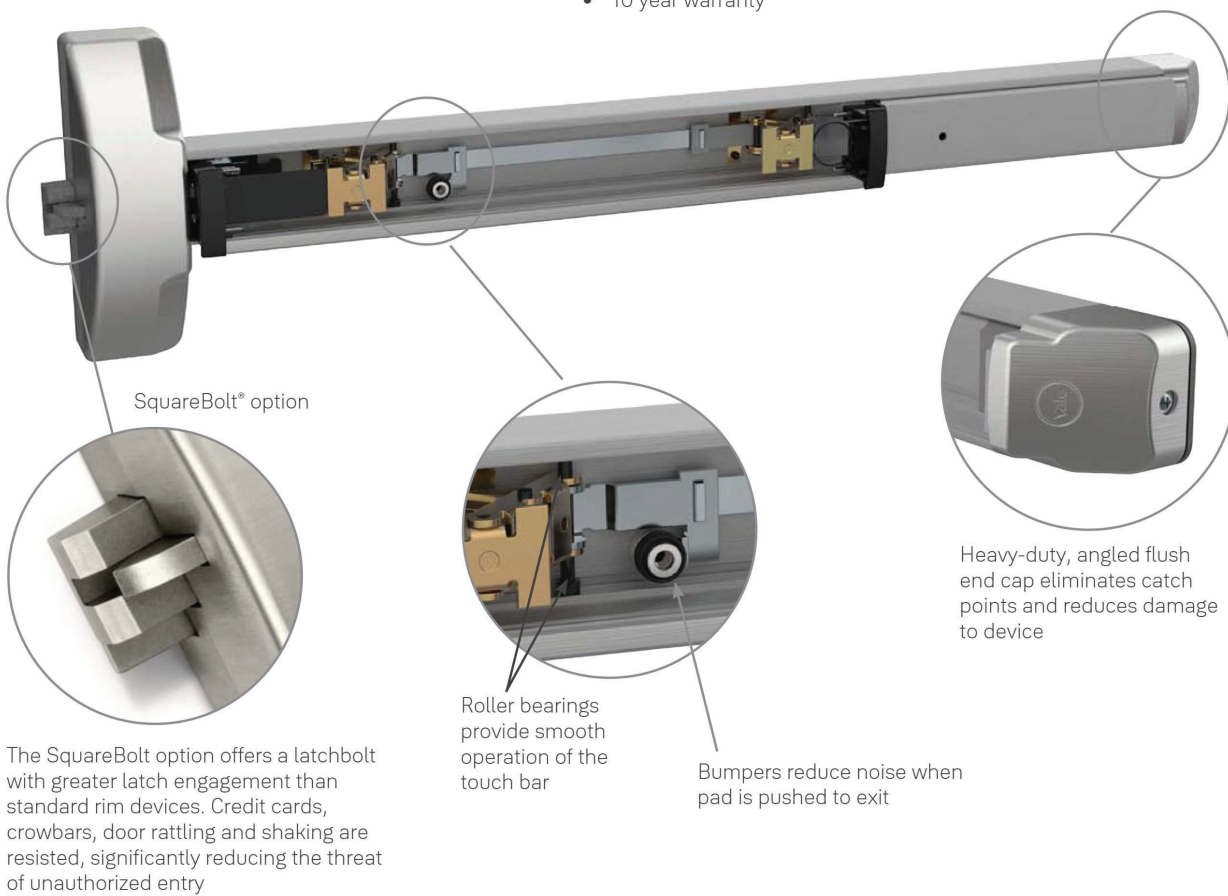
Benefits & Features

Benefits

- **Smooth, Quiet Operation:** Unique design provides noise reduction and smooth operation of the touch bar
- **Stylish:** Attractive, modern design blends aluminum rail with architectural finishes; available with over 38 levers to match any decor
- **Strong and Reliable:** ANSI/BHMA Grade 1 certified for long life
- **Secure:** Multiple security features provide added resistance against vandalism and authorized entry

Features

- ANSI/BHMA A156.3 Grade 1 certified 
- Available as rim, mortise, SquareBolt®, surface vertical rod and concealed vertical rod in wide or narrow stile configurations
- Highly durable aluminum rail design with architecturally finished touch bar in 5 finishes
- Heavy duty, angled end cap design protects rail, eliminates catch points and reduces damage
- Available in 13 mechanical functions and 11 electromechanical functions
- Available with standard or Reflections® decorative levers
- Complete offering of mechanical and electro-mechanical solutions
- Available with Microshield® antimicrobial coating
- 10 year warranty



6000 Series Commercial Exit Device

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5



How To Order

Using the chart below, construct the part number based on the options, trim and finish needed.

6	X	X	XED
	Second Digit: "1" -Standard device, 4-1/2" (114mm) or wider door stile. "2" -Narrow stile door or narrow escutcheon trim (500F, 510F Series)	Third Digit: "0" - Rim Device, Pullman Latch "1" - SVR Device (narrow stile) "2" - CVR Device (narrow stile) "3" - Mortise Device "5" - SquareBolt®, Rim Security "6" - CVR Device (wide stile) "7" - SVR Device (wide stile)	Fourth Digit: "0" - Standard "5" - Cylinder Dogging (Not with suffix "F")

It is recommended that exit devices and trim for the same opening be ordered together. Standard product is for 1-3/4" (44mm) reinforced metal doors. Accessories detached from the device and trim should be specified separately. Materials by others are required to be fit for the purpose as detailed in this catalog and the product installation literature.

Notes:

1. Required for electrical feature, Suffix "-SAFE" or "-SECURE".
2. LBR available on 6160(F90) and 6170(F90) devices only.
3. For double cylinder devices, suffix "-2" after fourth digit.
4. If "-24" device is to be used with a DOW greater than 24", the device will ship without UL label. The 12" touchpad will not cover 50% of the device touchbar length.
5. Contact door manufacturer for detailed frame/door requirements and limitations.

Ordering Examples

Exit Device Only

6150EDD-36 x 626 x RHR x SNB

Exit Device with Trim and Cylinder*

6170EDF90-9-48 x AU626F x 630 x LHR x 1109 GA 0-bit

Trim Only

MO656F x 630 x RHR x LC

Double Cylinder Exit Device with Trim

6150F-2-36 x AU626F x 630

*Yale® exit devices and trims are processed separately. To aid in order processing, the device, trim and cylinder should be detailed as separate line items. These items can be ordered on one line item as shown, but they will be entered to the factory and acknowledged separately.

6100ED(F) Rim



The 6100ED(F) is a rim exit device to be used with single doors or pairs of doors constructed of metal, wood or composite materials. Designed for application in high-use areas, the 6100ED(F) comes in a variety of finishes and can be combined with a variety of trims to match any desired style.

Features

- Designed for wide stile doors
- 3/4" throw deadlocking stainless steel pullman latchbolt
- Available in double cylinder function (must specify handing)
- Non-handed for easy installation



Applications

- Single swing doors
- Pairs of doors with removable mullions
- Wide stile aluminum, metal, wood or composite door materials

Specifications

Rail Sizes:	-24 for 24" (60cm) doors -36 for 30" - 36" (76cm - 91cm) doors -42 for 36" - 42" (91cm - 107cm) doors -48 for 42" - 48" (107cm - 122cm) doors Alternate sizes can be special ordered. Consult Technical Product Support.
Door Thickness:	1-3/4" (44mm) standard. Optional thicknesses to 4-1/2"; specify when ordering.
Minimum Stile Width:	4-1/2" (114mm)
Projection:	3-1/4" (83mm) active; 2-1/2" (63.5mm) dogged
Latchbolt:	Stainless steel pullman style, 3/4" (19mm), deadlocking
Strike(s):	757F standard; 793 optional for pairs, panic only
Fasteners:	Machine screws or wood door screws standard for panic; sex nuts and bolts (SNB) supplied standard for fire
Handing:	Non-handed
ANSI/BHMA:	Certified ANSI/BHMA A156.3 Type 1 Grade 1 standards
Dogging:	Hex key dogging standard on panic; optional cylinder dogging (-5)
Shim Kit:	#623SK optional
Finishes:	See page 6 for finish options
Options:	Double cylinder function (-2); specify hand. Anti-pry bracket #625AP.





4700LN Series

ANSI/BHMA Grade 1 Certified
Cylindrical Lever Locks



An ASSA ABLOY Group brand

ASSA ABLOY



Features

FEATURES

- Available in 19 functions, 3 lever designs, and 9 finishes
- Knurled lever designs available
- Freewheeling trim
- Available with Microshield® antimicrobial coating



SPECIFICATIONS

Door Thickness: 1-3/4" (44mm) to 2" (51mm); 1-3/8" (35mm) or 2-1/4" (57mm), please specify on order

Strike: ANSI 4-7/8" x 1-1/4" x 1-1/4" (124mm x 32mm x 32mm) lip to center. See page 14 for optional strikes.

Backset: 2-3/4" (70mm)


Handing: Non-handed

Installation: ANSI/BHMA A156.115(-W)

ANSI/BHMA: Certified ANSI/BHMA A156.2, Series 4000 Grade 1

Warranty: 5 year

APPLICATIONS AND LISTINGS

- UL – cUL listed for use on fire doors having a rating up to and including 3 hours
- Windstorm certified refer to local codes 
- Meets accessibility guidelines for the Americans with Disabilities Act and the requirements of the Uniform Federal Accessibility Standards and ANSI 117.1

Note: Any retrofit or other field modification to a fire-rated opening can potentially impact the fire-rating of the opening, and Yale Locks & Hardware makes no representations or warranties concerning what such impact may be in any specific situation. When retrofitting any portion of an existing fire rated opening, or specifying and installing a new fire-rated opening, please consult with a code specialist or local code official (Authority Having Jurisdiction) to ensure compliance with all applicable codes and ratings.

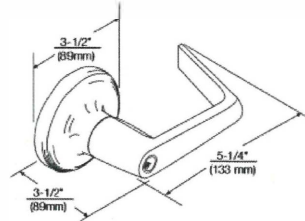
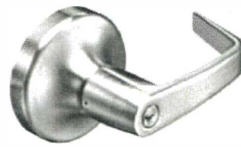




Lever Trim

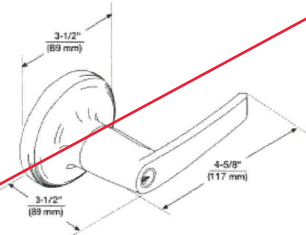
AUGUSTA AU

Lever: Cast Zinc
Rose: Wrought Brass



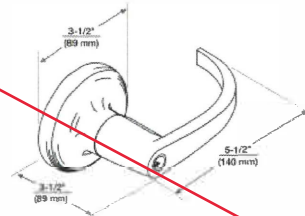
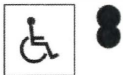
MONROE MO

Lever: Cast Zinc
Rose: Wrought Brass



PACIFIC BEACH PB

Lever: Cast Zinc
Rose: Wrought Brass



Available with large and small format interchangeable core. See page 11-12 for details.

Dimensions shown are in inches (mm).



Functions

4701LN (F75)

Passage or Closet Latch

- For doors that do not require locking.
- Either lever operates latchbolt at all times.

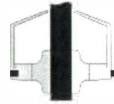


Outside Inside

4702LN (F76A)

Privacy, Bedroom or Bath Lock

- For lavatory or other privacy doors.
- Either lever operates latchbolt unless outside lever is locked by pushbutton inside.*
- Button automatically releases when inside lever is turned or door is closed.
- Emergency key inserted and turned in hole in outside lever will unlock door from outside. (Emergency key furnished with lockset. P/N 14-5302-1053-048)
- Inside lever always active.



Outside Inside

4703LN (F77A)

Patio or Privacy Lock

- For exit doors with limited entry.
- Deadlocking latchbolt.
- Either lever operates latchbolt unless outside lever is locked by pushbutton inside.*
- Button automatically releases when inside lever is turned or door is closed.
- Inside lever always active.

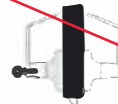


Outside Inside

4704LN (F82A)

Entry Lock

- For entrance or office doors.
- Deadlocking latchbolt.
- Either lever operates latchbolt (except when outside lever is locked from inside).*
- Pushing button in inside lever locks outside lever. (Automatically releases when inside lever is turned or key is rotated in locked outside lever.)
- Latchbolt is operated by key in outside lever or by rotating inside lever.
- Inside lever always active.

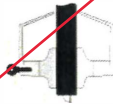


Outside Inside

4705LN (F86)

Storeroom or Closet Lock

- For use on storeroom, utility, exit doors.
- Deadlocking latchbolt.
- Latchbolt operated by lever inside, key in outside lever.
- Outside lever always locked.*
- Inside lever always active.



Outside Inside

4706LN (F92)

Service Station Lock

- Deadlocking latchbolt.
- Either lever operates latchbolt.
- Pushbutton in inside lever locks outside lever. (Automatically releases when inside lever is turned, door is closed or key is rotated in outside lever, except when slotted pushbutton is rotated 90° clockwise to retain outside lever in locked position.)*
- Latchbolt operated by key in outside lever, inside lever always active.



Outside Inside

4707LN (F109)

Entry Lock

- For entrance, general home or office doors.
- Deadlocking latchbolt.
- Either lever operates latchbolt (except when outside lever is locked from inside).*
- Pushing turn button in inside lever locks outside lever. (Automatically releases when inside lever is turned or key is rotated in locked outside lever.)
- Outside lever may be retained in locked position by pushing and rotating turn button 90° clockwise to a horizontal position; not released until turn button is manually returned to the vertical position.
- Latchbolt is operated by key in outside lever or by rotating inside lever.
- Inside lever always active.

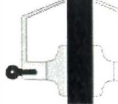


Outside Inside

4708LN (F84)

Classroom Lock

- For classroom or utility room doors.
- Deadlocking latchbolt.
- Either lever operates latchbolt (except when outside lever is locked by key).*
- Inside lever always active.
- Key releases outside lever.



Outside Inside

* Lever handles are Free-Wheeling in locked position. Shaded area denotes FreeWheeling lever.



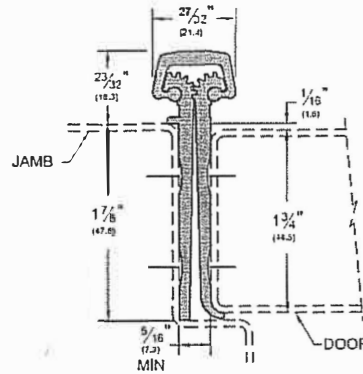
Full Mortise Hinges

- Full-Mortise units are designed mainly for new door applications and are applied to the frame rabbet and door edge to conceal both leaves

Full Mortise

_FM

AVAILABLE FINISHES: BL, C, D, G, PW, SN

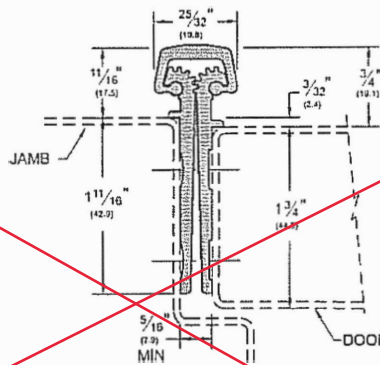


Full Mortise Short Leaf Inset

- Designed for use with doors which range between 1 3/4" to 2 1/4"
- Designed for use with hollow metal doors and frames where the inset conforms to S.D.I. specifications for aligning doors and frames

_FM_SLI

AVAILABLE FINISHES: BL, C, D, G, PW, SN

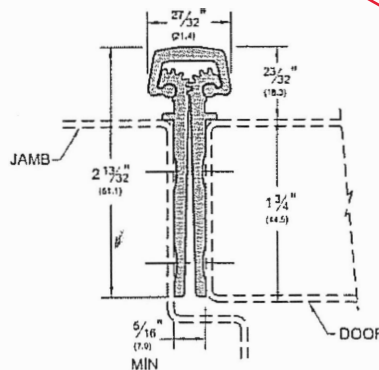


Full Mortise Short Leaf Flush

- Designed for use with doors which range between 1 3/4" to 2 1/4"
- Also used for bifold applications to keep the faces of the doors flush (not illustrated)

_FM_SLF

AVAILABLE FINISHES: BL, C, D, G, PW, SN



AVAILABLE FINISHES FOR PRODUCTS SHOWN ON THIS PAGE (see General Information section for finish chart)
 BL (Black Anodized) C (Clear Anodized) D (Dark Bronze Anodized) G (Gold Anodized)
 PW (Painted White) and SN (Satin Nickel) are special finishes available upon request.

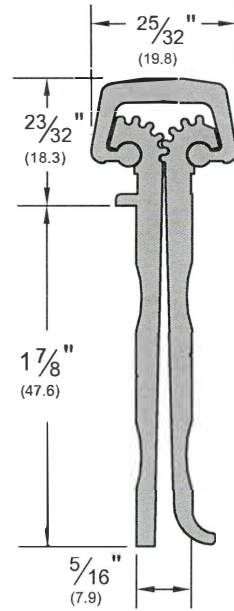
800-346-7707 | www.pemko.com

Check the web site for the up-to-date catalog

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 door opening solutions



_FM

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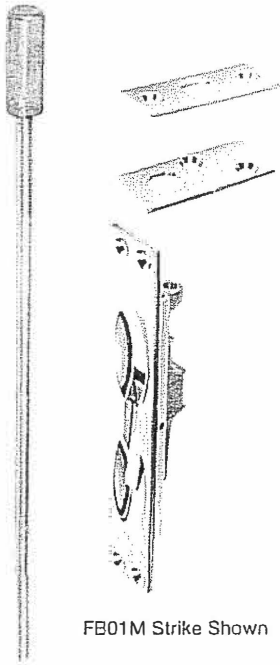
_FM_PDF Rev 2 - 06.06.13

Bolts & Coordinators Manual Flush Bolts

McKinney

ASSA ABLOY

Manual Flush Bolt (Listed for Fire Rated Hollow Metal Doors) No. FB01M, FB01M-5



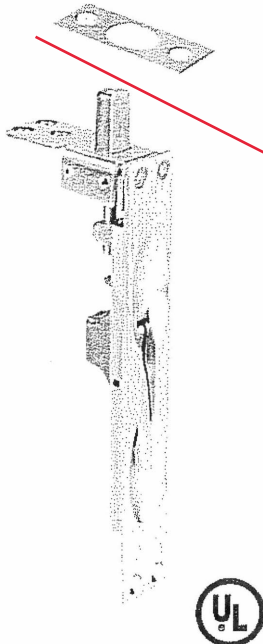
FB01M Strike Shown

- Material:** Brass
- Finishes:** 605, 606, 612, 613, 625, 626
- Fastener:** 8 ea. #8 x 3/4 FH Combo Screws
- Features:**
- Fits ANSI A115 door and frame preparation.
 - 3/4" bolt throw
 - 12" rod length
 - 1-1/2" adjustment for doors and strike clearances
 - Non-Handed
 - Conforms to Positive Pressure Standards UL 10C & UBC 7-2 (1997)
- Options:**
- Other size rods available are 18", 24", 36", 48".
 - Extra long bolt head - 2-1/2"
 - Use DPS1 Dust Proof Strike (shown on page 2) to eliminate dust or debris in the bottom strike

No.	Size	Weight	ANSI A156.16
FB01M	Face Plate: 1" x 6-3/4" Strike: 15/16" x 2-1/4" Guide: 1" x 2"	1.5 lbs./2	L04251
FB01M-5	Face Plate: 1-1/4" x 6-3/4" Strike: 15/16" x 2-1/4" Guide: 1" x 2" (Note: Extra Long Head Bolt not available on FB01M-5)	1.7 lbs./2	L04251

USED ON DOUBLE DOORS ONLY

Manual Lever Extension Flush Bolt (Listed for Wood Composite Fire Rated Doors) No. FB02W



- Material:** Cast Brass
- Finishes:** 605, 606, 612, 613, 625, 626
- Fastener:** 2 ea. #8 x 1" FH Combo Screws
6 ea. 8-32 x 1/2 FH MS
4 ea. #8 Counter Sunk Washer
- Features:** 3/4" bolt throw, 3/4" backset; door strength maintained by corner reinforcing plate.
Non-Handed
Conforms to Positive Pressure Standards UL 10C & UBC 7-2 (1997)
- Options:** Use DPS1 Dust Proof Strike (shown on page 2) to eliminate dust or debris in the bottom strike

No.	Size	Weight	ANSI A156.16
FB02W	Face Plate: 1" x 6-3/4" Strike: 15/16" x 2-1/4"	1.7 lbs./2	L04261

Architectural Door Accessories

ASSA ABLOY

Pemko Commercial Thresholds: Latching Panic Exit Saddles

The global leader in
door opening solutions

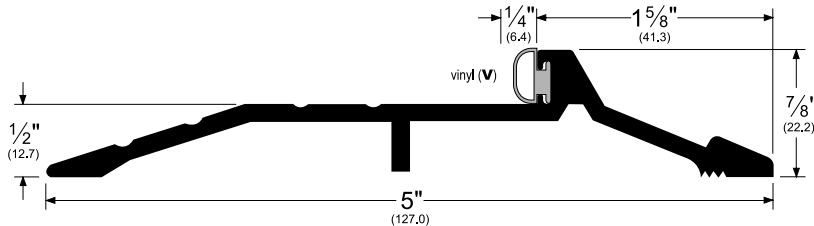
177_V



AVAILABLE FINISHES: A, B, D, G

WIDTH: 5" (127.0 mm)

HEIGHT: 7/8" (22.2 mm)



A (Mill Finish Aluminum)

B (Mill Finish Extruded Bronze [Brass])

D (Dark Bronze Anodized)

G (Gold Anodized)

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TITLE:
PREPARED FOR:
PREPARED BY:
DATE:
COMMENTS:

177_V_CUT Rev 1 - 02.10.17

Architectural Door Accessories

ASSA ABLOY

Pemko Product Reference Tech-Spec

The global leader in
door opening solutions

315_N_ Door Bottom

Example: 315 | C | N | 36

Profile# Finish Insert Length

TYPE: Door Bottom Sweep

MATERIAL: 6063-T6 Aluminum Alloy and Temper

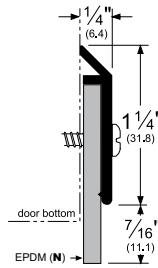
FINISHES: B (Brass), D (Dark Bronze Anodized), G (Gold Anodized)
PW (Painted White), SN (Satin Nickel Anodized)

LENGTHS: Up to 185"

WIDTH: 1/4" (6.4 mm)

HEIGHT: 1-11/16" (42.86 mm)

WEIGHT: Estimated per foot: 0.15 lbs



Product Test Ratings:



See Product Testing
section for more
information.

ANSI NUMBER: Aluminum: R3B434; Brass: R1B434

LEAD TIME: 4 working days (or less)

AVAILABLE: 315_N_ is shipped from Pemko's Memphis, Ventura, Vancouver and Toronto locations

WARRANTY: 5 Years from purchase date

CROSS REFERENCE: NGP: 200; Zero: 39

INSTRUCTIONS, CAD DRAWINGS, PROFILE DRAWINGS and CUT SHEET

Available upon request and on website

PRODUCT TESTING:

- **Air Infiltration Tested** – Tested to ASTM E-283-04 (2012) for low air leakage allowance; allows no more than 0.3 cfm per square foot at 1.57 psf.
- **Sound Tested** – Tested to ASTM E90 – 2009 in a single or in multiple sound seal configurations for sound attenuation in an opening
- **Smoke Tested** – Tested to UL 1784 and meets the requirements of NFPA 105-2013 for smoke leakage in an opening; allows no more than 3.0 cfm per square foot at 0.10" water column (about 75 Pa).
- **Fire Rated** – Tested to UL10B Standard Fire Tests and UL10C Positive Pressure Fire Tests of Door Assemblies
- **BHMA Certified** – Tested for performance with regards to the requirements in:
 - ANSI/BHMA A156.22 – Door Gasketing and Edge Seal Systems

MATERIAL SAFETY / FIRE HAZARDS

Per OSHA Regulations (Standards – 29 CFR) this Pemko item is considered an “article” as described in section 1910.1200 paragraph (c), meaning that it is a manufactured item other than a fluid and is not a hazard. To help our customers we are providing additional information in this section to cover relevant topics found on Safety Data Sheets (SDS) but not found elsewhere in this document.

FIRE HAZARD:

Aluminum alloy is a non-combustible material. Solid aluminum does not present a fire hazard.

FIRST AID MEASURES

Under normal conditions this item presents no small parts and so this item cannot be inhaled or swallowed and has no adverse reaction when coming in contact with skin. Observe good industrial hygiene after installation.

Note to physician: treat symptomatically and supportively

FIREFIGHTING MEASURES

As in any fire, prevent human exposure to fire, smoke, fumes, or products of combustion. Evacuate non-essential personnel from the fire area. Firefighters should wear face mask with self-contained breathing apparatus (SCBA) and impervious protective clothing. In case of aluminum fire, use class D dry powder to extinguish. DO NOT USE water or halogenated extinguishing media.

- Hazardous combustion products: none.

SPILL PROCEDURES

Sweep up any off-cuts from product and store in a suitable container for disposal

HANDLING, STORAGE, AND DISPOSAL

There are no specific handling instructions. Always store at room temperature and keep away from heat sources. When disposing, if possible, recycle the item and its packaging. Otherwise disposal should be in accordance with local, state, or federal legislation. Bury in an authorized landfill site or incinerate under approved controlled conditions.

EFFECTS OF EXPOSURE

There are no effects under normal conditions of use. Observe good industrial hygiene.

TOXICITY

There is no toxicity hazard under normal conditions of use

HEALTH HAZARD

This product may contain hazardous ingredients; harmful effects are unlikely under normal conditions.

ASSA ABLOY is the global leader in door opening solutions, dedicated to satisfying end-user needs for security, safety and convenience

ASSA ABLOY

CARE AND MAINTENANCE

CLEANING

Pemko's aluminum products and solid gasket products can be cleaned with a mild soap with warm water. A clean non-abrasive cloth should be used to clean the surface of these products. For removing grease, sealant, or other minimal adhesives a mild solvent such as mineral spirits may be used; then clean with mild soap mixed with warm water. To dry, either allow to air dry or wipe dry with a chamois, squeegee, or lint-free cloth.

For sponge gasket and weatherstrip products, wipe with a damp cloth. Do not use mineral spirits or other chemical as this may cause the plastic to "melt" or deteriorate. To dry, either allow to air dry or wipe dry with a chamois, squeegee, or lint-free cloth.

The use of strong solvents or cleaner concentrations may cause damage to the finish surface and isn't recommended.

MAINTENANCE

Pemko products are generally low-maintenance and require nothing more than general cleaning. Should anything outside of "general cleaning" arise, please consult Pemko Customer Service.

If you have any questions, or if you have a situation outside this scope, please contact Pemko Customer Service.

www.pemko.com

MEMPHIS, TN USA	VENTURA, CA USA	VANCOUVER, BC CA	TORONTO, ON CA
P: 800 824-3018	P: 800 283-9988	P: 877 535-7888	P: 877 535-7888
F: 800 243-3656	F: 800 283-4050	F: 877 535-7444	F: 877 535-7444

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315_N_TS
Revised 06.09.17
Page 3 of 3

3310 Series Fan Forced Wall Heater - Without Summer Fan Switch

Features



- Powder coated 18 gauge steel front
- Automatic reset thermal limit
- Vane axial fan blade: 600 RPM / 175 CFM
- Rough in dimensions:
14 1/8" Wide x 19 1/2" High x 4" Deep
- Grill dimensions: 16 3/16" Wide x 21" High
- Steel block fin element
- Weight 22 lbs.
- Units with dual wattage, factory wired to highest wattage
- Wattage selectable at time of installation on some models
- Made in U.S.A.



WARNING: This product can expose you to chemicals including nickel which is known to the State of California to cause cancer, and chromium, which is known to the State of California to cause birth defects and/or reproductive harm. For more information go to www.P65Warnings.ca.gov.

Standard Models

MODELS WITH IN-BUILT DOUBLE POLE THERMOSTAT (0° - 110° F TEMPERATURE RANGE)							
IVORY		WHITE		WATTS	MAX BTUs	VOLTS	AMPS
MFG CATALOG NUMBER	MFG MODEL NUMBER	MFG CATALOG NUMBER	MFG MODEL NUMBER				
03263402	E3312T2RP	03264802	E3312T2RPW	1000	3413	120	8.3
03263502	E3313T2RP	03264902	E3313T2RPW	1500	5120		12.5
				750	2560	6.25	
03263602	F3316T2RP	03265002	F3316T2RPW	4000	13648	208	19.2
03263702	F3317T2RP	03265102	F3317T2RPW	4800	16380		23
03264002	HF3315T2RP	03265402	HF3315T2RPW	3000 / 2250	10240	240 / 208	12.5 / 10.8
				1500 / 1125	5120		6.2 / 5.4
03264102	HF3316T2RP	03265502	HF3316T2RPW	4000 / 3000	13648		16.8 / 14.4
				2000 / 1500	6826		8.3 / 7.2
03264202	H3317T2RP	03265602	H3317T2RPW	4800	16380	240	20.0
03264302	G3314T2RP	03265702	G3314T2RPW	2000	6826	277	7.2
03264402	G3315T2RP	03265802	G3315T2RPW	3000	10240		10.8
03264502	G3316T2RP	03265902	G3316T2RPW	4000	13648		14.4
03264602	G3317T2RP	03266002	G3317T2RPW	4800	16380		17.3

MODELS WITH IN-BUILT SINGLE POLE THERMOSTAT (0° - 110° F TEMPERATURE RANGE)							
03825202	E3312TRP	03826102	E3312TRPW	1000	3413	120	8.3
03806502	E3313TRP	03841602	E3313TRPW	1500	5120		12.5
				750	2560	6.25	
03799402	F3316TRP	03841802	F3316TRPW	4000	13648	208	19.2
03803002	F3317TRP	03841902	F3317TRPW	4800	16380		23
03805602	HF3315TRP	03822202	HF3315TRPW	3000 / 2250	10240	240 / 208	12.5 / 10.8
				1500 / 1125	5120		6.2 / 5.4
03799802	HF3316TRP	03822302	HF3316TRPW	4000 / 3000	13648		16.8 / 14.4
				2000 / 1500	6826		8.3 / 7.2
03803102	H3317TRP	03822402	H3317TRPW	4800	16380	240	20.0
03805902	G3314TRP	03842602	G3314TRPW	2000	6826	277	7.2
03807502	G3315TRP	03842702	G3315TRPW	3000	10240		10.8
03800102	G3316TRP	03842802	G3316TRPW	4000	13648		14.4
03791702	G3317TRP	03842902	G3317TRPW	4800	16380		17.3

MODELS WITHOUT AN IN-BUILT THERMOSTAT							
03266202	E3312RP	03267602	E3312RPW	1000	3413	120	8.3
03266302	E3313RP	03267702	E3313RPW	1500	5120		12.5
				750	2560	6.25	
03285302	F3316RP	03267802	F3316RPW	4000	13648	208	19.2
03266502	F3317RP	03267902	F3317RPW	4800	16380		23
03266802	HF3315RP	03268202	HF3315RPW	3000 / 2250	10240	240 / 208	12.5 / 10.8
				1500 / 1125	5120		6.2 / 5.4
03266902	HF3316RP	03268302	HF3316RPW	4000 / 3000	13648		16.8 / 14.4
				2000 / 1500	6826		8.3 / 7.2
03267002	H3317RP	03268402	H3317RPW	4800	16380	240	20.0
03267102	G3314RP	03268502	G3314RPW	2000	6826	277	7.2
03267202	G3315RP	03268602	G3315RPW	3000	10240		10.8
03267302	G3316RP	03268702	G3316RPW	4000	13648		14.4
03267402	G3317RP	03268802	G3317RPW	4800	16380		17.3

AFA-801 8 in. Frame, Airfoil Blade

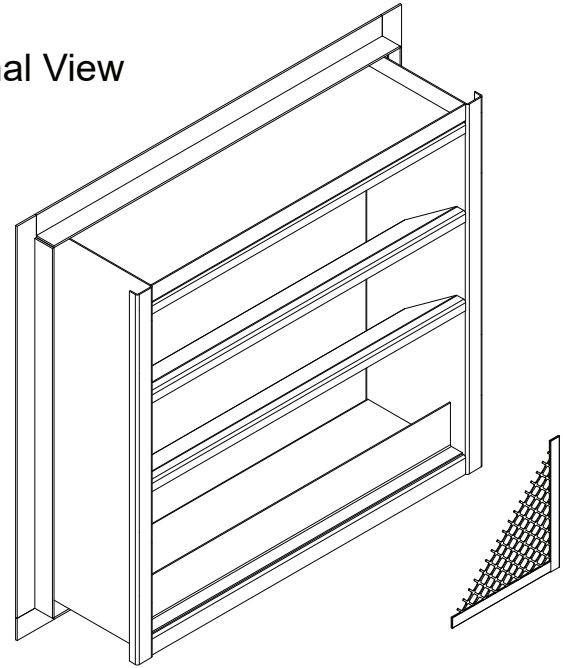
APPLICATION & DESIGN

AFA-801 is an acoustical weather louver designed to protect air intake and exhaust openings in building exterior walls. Design incorporates airfoil style insulated acoustical blades and high free area to provide maximum resistance to rain and weather while providing minimum resistance to airflow. The AFA-801 is an extremely efficient louver with AMCA LICENSED PERFORMANCE DATA enabling designers to select and apply with confidence.

PRODUCT DETAILS

Frame: 8 in. x 0.08 in. Frame Thickness
Frame Type: Flanged, 1.5 in., Exterior
Blades: 0.08 in. Fixed Blade Thickness
Material: Aluminum
Sizing: 1/4 Inch Under
Shape: Rectangular
Construction: Mechanically Fastened

Internal View



OPTIONS & ACCESSORIES

Finish: Mill
Bird Screen: 0.75 in. x 0.05 in., Flat Expanded Aluminum, Internal, Mill Finish
Union Label: No Preference
Warranty: 1 year Standard Product Warranty

SUMMARY

ID #	TAG	QTY.	W (in.)	H (in.)	FREE AREA (ft2)	FREE AREA (%)	SECT. WIDE	SECT. HIGH	SHIP SECT.
1-1	INTAKE1	1	144	120	44.23	37	3	1	3
1-2	INTAKE2	1	60	120	18.59	37.4	1	1	1
1-3	EXHAUST	2	120	66.125	19.32	35.3	2	1	4
Line Notes: STACK UNITS									

Total Louver Qty: 4 **Total Weight (lb):** 1,269 **Louver Area (ft2):** 280
Total Ship Sect.: 8

**Weight shown is an estimate only based on the default base product configuration without options or accessories.

Larger openings may require field assembly of multiple louver panels to make up the overall opening size. Individual louver panels are designed to withstand windloads up to a maximum of 25 PSF (size and configuration dependent). Design, materials and installation of structural reinforcement required to adequately support large sections or multiple section assemblies within a large opening are not provided by Greenheck. Options and accessories including, but not limited to, screens, filter racks, louver doors, and blankoff panels are not subject to structural analysis unless indicated otherwise by Greenheck. Unless specifically indicated, the following are NOT included in the quote provided: structural steel, installation hardware (anchors, angle clips, continuous angles, shims, fasteners, inserts, backer rod and sealant), field measuring and/or installation, miscellaneous flashing, trim or enclosures, blank off panels, mullion covers or mullion hardware, hinged frames or removable subframes, custom bird/insect screen, 3-coat, metallic and/or exotic paint finishes, bituminous paints for unlike metals, any applicable taxes, stamped and sealed structural calculations seismic calculations or job specific engineered submittal drawings.

VCD-23 Low Leakage 3V Blade Volume Control Damper

APPLICATION & DESIGN

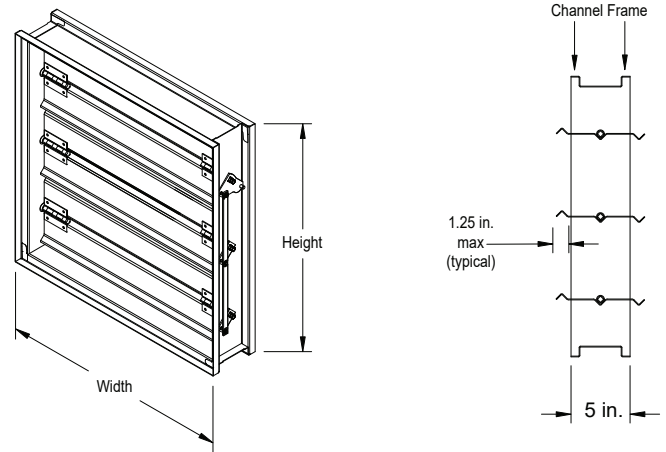
The VCD-23 is a ruggedly built low leakage control damper intended for applications in low to medium pressure and velocity systems. A wide range of electric actuators are available.

DAMPER RATINGS

Pressure:	Up to 5 in. wg - pressure differential
Velocity:	Up to 3,000 ft/min
Leakage:	Class 1A @ 1 in. wg Class 1 @ up to 5 in. wg
Temperature:	Up to 250 F

PRODUCT DETAILS

Frame Type:	Channel
Frame Thickness:	16 ga
Material:	Galvanized
Blade Type:	3V
Blade Action:	Parallel
Blade Seal Material:	TPE
Axle/Linkage Material:	Steel
Axle Bearings:	Synthetic
Jamb Seal Material:	Stainless Steel
Damper Temp. Rating:	180 F
Jackshafting:	No Preference
Actuator Sizing:	Default SqFt
Multi-Section Fastening:	Standard
Sizing:	Nominal



- This drawing shows a general damper configuration and is not intended to depict the exact configuration of all dampers in this submittal.
- Width and height furnished approximately 0.250 in. undersize.
- Factory supplied actuators are sized for 1,500 fpm and a fully-closed differential pressure of 2 in. wc. Contact factory for actuator sizing on applications exceeding those levels.
- Installation instructions available at www.greenheck.com.

ACTUATOR INFORMATION

Actuator Type:	120 VAC
Actuator Mounting:	Internal
Actuator Location:	Right Side
Operating Mode:	TwoPosition
Actuator Operation:	Spring Return
Fail Position:	Open
NEMA Enclosure:	Least Cost
Auxiliary Switches:	No
Spring Return Time:	Standard

CODES APPROVED

IECC (International Energy Conservation Code) compliant
The AMCA Certified Ratings Seal applies to Air Leakage and Air Performance ratings.

OPTIONS & ACCESSORIES

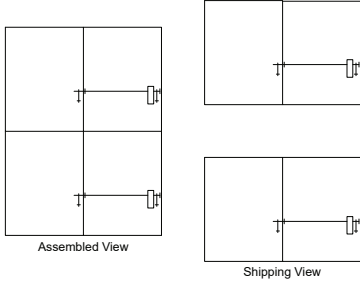
Union Label:	No Preference
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SUMMARY

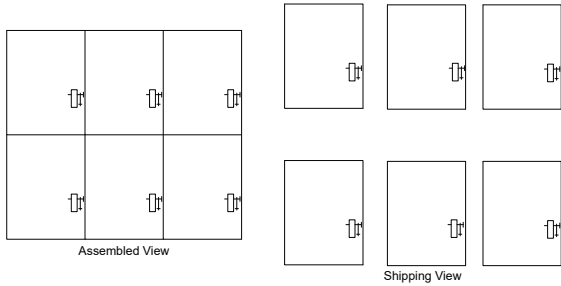
ID #	TAG	QTY	Width	Height	CONFIGURATION				
2-1		1	144.000 in.	120.000 in.	Drive Arrangement:	Actuator Mfr:	Actuator Model:	Actuator Qty:	
					Drive-CC-32-6FIR-0	Siemens	GVD221.1U	6	
2-2		1	60.000 in.	120.000 in.	Act. Orientation:	Drive Arrangement:	Actuator Mfr:	Actuator Model:	Actuator Qty:
					Perp Down	Drive-CC-22-2FIR-2	Belimo	EFB120	2
2-3		1	120.000 in.	132.000 in.	Act. Orientation:	Drive Arrangement:	Actuator Mfr:	Actuator Model:	Actuator Qty:
					Perp Down	Drive-CC-32-6FIR-6	Belimo	EFB120	6

Damper Drive Arrangements Job Summary -Start-

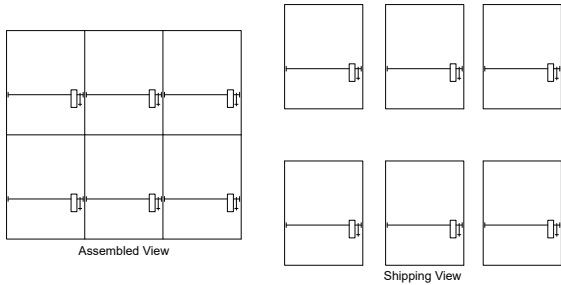
Drive Arrangement: Drive-CC-22-2FIR-2



Drive Arrangement: Drive-CC-32-6FIR-0



Drive Arrangement: Drive-CC-32-6FIR-6



Damper Drive Arrangements Job Summary -End-

Louvers Mill Aluminum Finish

Aluminum in the mill finish state will be commercially smooth and substantially free from blisters, inclusions, voids, slivers and kinks. Slight discontinuity resulting from flow and die lines inherent in the extrusion process will exist. Occasional discontinuities that can be reasonably removed making the surface suitable for finishing operations are acceptable. Although aluminum is naturally resistant to corrosion, its appearance changes as a result of weathering and aging. Aluminum in the mill finish state may also have a non-uniform surface appearance resulting from oil, heat and oxide discoloration inherent in the manufacturing process.

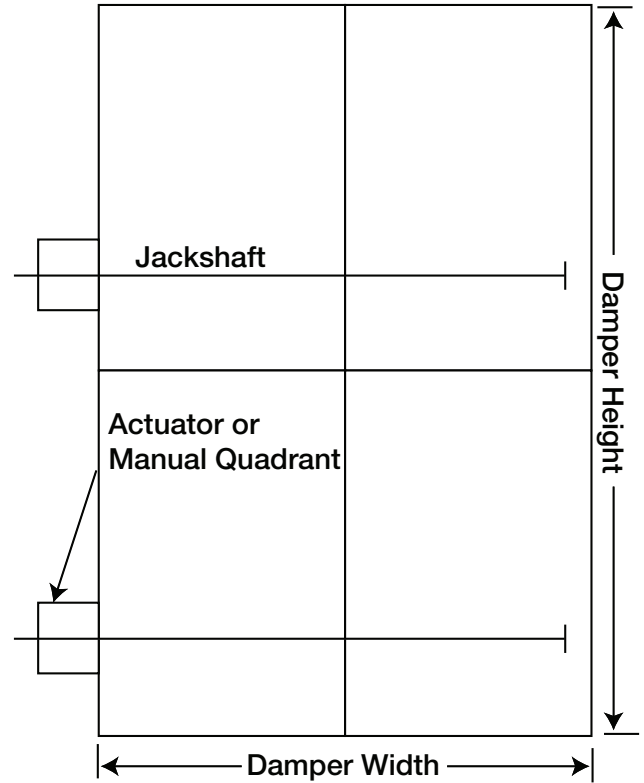
Drive Arrangement Definition

On multi-blade dampers (except vertical blade and Face & Bypass), they are given a drive arrangement code that helps describe the construction of the damper. The following breaks down what each number and letter represents.

22-2FEL-2

① ② ③ ④ ⑤ ⑥ ⑦

- ① Number of sections wide
- ② Number of sections high
- ③ Number of actuators or manual quadrants
- ④ Who supplies the actuators or manual quadrants
F - Factory
C - Customer Supplied (field mounted)
- ⑤ Actuator or manual quadrant mounting
E - External
I - Internal
B - Both internal and external
- ⑥ Actuator or manual quadrant location
L - Left hand drive
R - Right hand drive
B - Both right and left
- ⑦ Number of jackshafts



Vertical blade and face & bypass dampers are given a configuration ID number that helps describe the construction of the damper. See the following examples:

Model	Drive Arrangement Prefix
AMD-23, 33, 42	AMD
AMD-42V	VB
DFD-210, 230; DFDAF-310; DFDAF-330; SEDFD-210	MLS
FBH & FBV	FB
FSD, OFSD, CFSD, SMD, SEFSD, SSFSD, SESMD, SSSMD series (except vertical blade models)	MLS
FSD-311V, SMD-301V	VB
GFSD series	GFSD
ICD series	CC
IMO series	MLS
MBD-15 & VCD series (except vertical blade models)	CC
VCD-xxV (vertical blade models)	VB

Used on 144"W x 120"H
Damper

OpenAir® GVD/GKD Series Electronic Damper Actuator

UL Listed Fire/Smoke and Smoke Control Dampers

2-Position, 30-second Run Time,

15-second Spring Return Time



Description

The OpenAir direct coupled, fast-acting, two-position, spring return electronic actuators are available as 24 Vac, 120 Vac, and 230 Vac models. They are intended for use on UL-listed smoke control dampers and combination fire/smoke rated dampers.

Features

- Optional built-in auxiliary switches: Fixed switch points at 5° and 85° rotation.
- Optional built-in Electronic Fusible Link (EFL) capability with four temperature ratings: 165°F (74°C), 212°F (100°C), 250°F (121°C), and 350°F (177°C).
- Reversible fail-safe spring return.
- High temperature polymer housing.
- Pre-cabled, insulated lead wires.
- Thirty-second powered operation at rated torque, temperature and voltage.
- Fifteen-second mechanical fail-safe at rated torque and temperature.

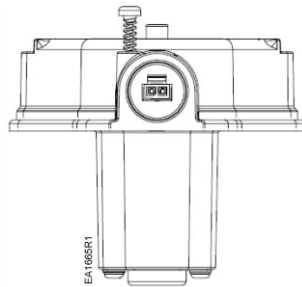
Application

This actuator is used for the control of dampers requiring up to 80 lb-in (9 Nm) (GKD) and 200 lb-in (22 Nm) (GVD) driving torque. It is intended for control of UL-listed smoke control dampers and combination fire/smoke HVAC dampers. This actuator is designed to meet the 2002 revisions to the UL 555/555S and the AMCA Standard 520 specifications.

Product Numbers

Product Number	Torque		Voltage			Control Signal	EFL Capability	3-ft Plenum Cable	Auxiliary Switch
	80 lb-in (9Nm)	200 lb-in (22 Nm)	24 Vac	120 Vac	230 Vac	2-Position			
GKD121.1U	●	—	●	—	—	●	●	●	—
GKD126.1U	●	—	●	—	—	●	●	●	●
GKD221.1U	●	—	—	●	—	●	●	●	—
GKD226.1U	●	—	—	●	—	●	●	●	●
GKD321.1U	●	—	—	—	●	●	●	●	—
GKD326.1U	●	—	—	—	●	●	●	●	●
GVD121.1U	—	●	●	—	—	●	●	●	—
GVD126.1U	—	●	●	—	—	●	●	●	●
GVD221.1U	—	●	—	●	—	●	●	●	—
GVD226.1U	—	●	—	●	—	●	●	●	●
GVD321.1U	—	●	—	—	●	●	●	●	—
GVD326.1U	—	●	—	—	●	●	●	●	●

Accessories



Electronic Fusible Link (EFL)

ASK791.165 (165°F [74°C] operation)
 ASK791.212 (212°F [100°C] operation)
 ASK791.250 (250°F [121°C] operation)
 ASK791.350 (350°F [177°C] operation)

Determine and order appropriate actuator before selecting an EFL.

Figure 1. Electronic Fusible Link.

Warning/Caution Notations

WARNING		Personal injury or loss of life may occur if you do not perform a procedure as specified.
CAUTION:		Equipment damage may occur if you do not perform a procedure as specified.


Service



WARNING:

Do not open the actuator. Personal injury may occur if opened. Opening the actuator voids the warranty.

If the actuator is inoperative, replace the unit.

Specifications	Operating voltage	24 Vac \pm 20%	
	Frequency	50/60 Hz	
Power supply		120 Vac \pm 10%	
	Frequency	60 Hz 230 Vac \pm 10%	
	Power Consumption:	GKD (80 lb-in)	GVD (200 lb-in)
		Run/Hold	Run/Hold
	GxD12x.1U	26 VA/8 VA	35 VA/9 VA
	GxD22x.1U	26 VA/8 VA	35 VA/9 VA
	GxD32x.1U	26 VA/8 VA	35 VA/9 VA
	 CAUTION:	Continuous use at voltages above the recommended tolerances may damage the actuator.	
Function	Running torque	80 lb-in GKD (9 Nm) (minimum) 200 lb-in GVD (23 Nm) (minimum)	
	Stall torque (minimum)	130 lb-in GKD (14.6 Nm) (minimum) 280 lb-in GVD (32 Nm) (minimum)	
	Powered runtime for 90°	30 seconds nominal	
	Fail-safe closing (on power loss) with spring return	15 seconds maximum	
	Nominal angle of rotation	95°	
Life Expectancy		Minimum 20,000 full stroke cycles	
Mounting	Damper shaft size	1/2-inch (12,7 mm) to 1" (25 mm) round	
	Damper shaft length, minimum	3-inch (76.2 mm)	
Housing	Enclosure	NEMA 1/IP40	
	Material	High temperature polymer	
Ambient conditions	Operation	0°F to 140°F (-18°C to 60°C) one time 350°F (177°C) ½ hour per UL555S	
	Storage and transport	-40°F to 158°F (-40°C to 70°C)	
	Ambient humidity (non-condensing)	Maximum 95% rh non-condensing	
	Cross-linked polyethylene cable	400°F (200°C)	
Fixed Dual End Switches	Fixed Dual End Switches AC rating	24 Vac to 250 Vac, 24 Vdc 6A resistive/ 2 FLA/12 LRA	
	Temperature rating	350°F (177°C)	
Agency certification		UL60730 cUL CSA 60730 CE Conformity for residential, commercial, and industrial environments Australian RCM conformity China-RoHS with Environmental Protection Use Period	
Miscellaneous	Pre-cabled connection Length:	3 ft (0.9m) 19/30 strand 18 GA	
	Dimensions	10.7" H \times 3.4" W \times 3.8" D (272.8 mm H \times 101.5 mm W \times 96.4 mm D)	
	Weight	\approx 9 lb (4.1 kg)	
	Country of Origin	USA	

Operation

When power is applied, the actuator coupling moves toward the open position, 90°. The actuator opens in **30** seconds nominal, 90° at 60 Hz. In the event of a power failure or when operating voltage is turned off, the actuator returns to the **0** position. The return time is 15 seconds nominal for 90°.

The National Fire Protection Association NFPA 92A Standard for Recommended Practice for Smoke-Control System and UL 864 Standard for Control Units and Accessories for Fire Alarm Systems, require weekly self-tests for **dedicated** smoke control equipment used in a smoke control system. The National Fire Protection Association NFPA 72 Standard for National Fire Alarm Codes states that all life-safety systems are to be functionally checked at least annually.

The GVD/GKD actuators do not require any periodic cycling to function properly as an integral part of an active smoke control damper system. Check the smoke control damper/actuator every time you functionally check your smoke detectors, emergency lights, and/or power generators for operation.

Installation

See *OpenAir® GVD/GKD Series Electronic Damper Actuator Designed for UL Listed Fire/Smoke and Smoke Control Dampers Installation Instructions (A5W00094027)* for detailed guidelines.



CAUTION:

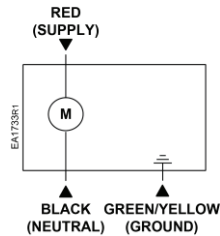
Read and carefully follow the Installation Instructions to avoid equipment damage.

Wiring

All wiring must conform to NEC and local codes and regulations.

Wire Designations

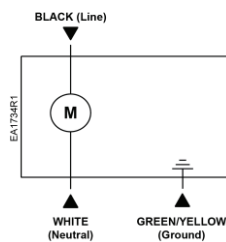
24 Vac



Function	Color
Supply	Red
Neutral	Black
Ground	Green/Yellow

Figure 2.

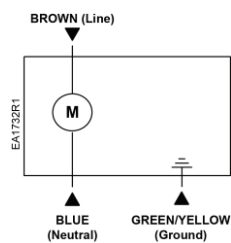
120 Vac



Function	Color
Line	Black
Neutral	White
Ground	Green/Yellow

Figure 3.

230 Vac



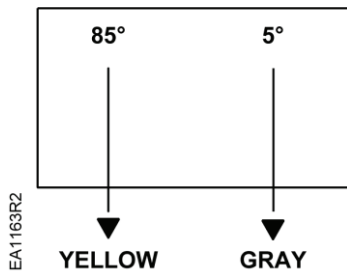
Function	Color
Line	Brown
Neutral	Blue
Ground	Green/Yellow



CAUTION:

The actuator must be wired with a 230 Vac line with respect to neutral and the ground lead must be connected for proper protection of the actuator. Any other connection, such as phase-to-phase, can damage the actuator.

Figure 4.



Switch	Wire Color	Switch Makes	Switch Breaks
5°	Gray	< 5°	> 5°
85°	Yellow	> 85°	< 85°

Figure 5. Fixed Dual End Switches.

NOTE:

Both sets of contacts are open when actuator is between 5° and 85°.



CAUTION:

Mixed switch operation to the switching outputs of both dual end switches (5° and 85°) is not permitted.

Either AC line voltage from the same phase must be applied to all four outputs of the fixed dual end switches, or UL-Class 2 voltage must be applied to all four outputs.

Wiring, Continued

NOTE:

If you are not using an EFL, do not modify the actuator. An EFL or jumper must be installed for actuator to work properly.

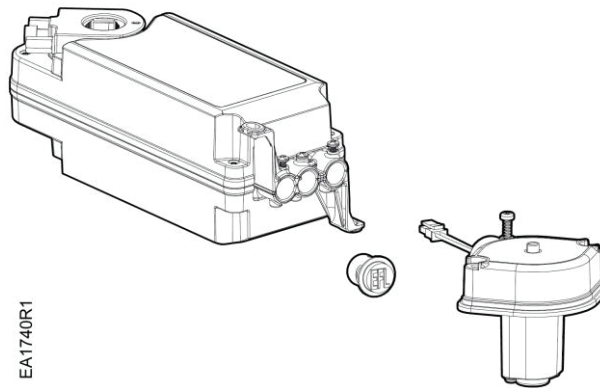


Figure 6.

Dimensions

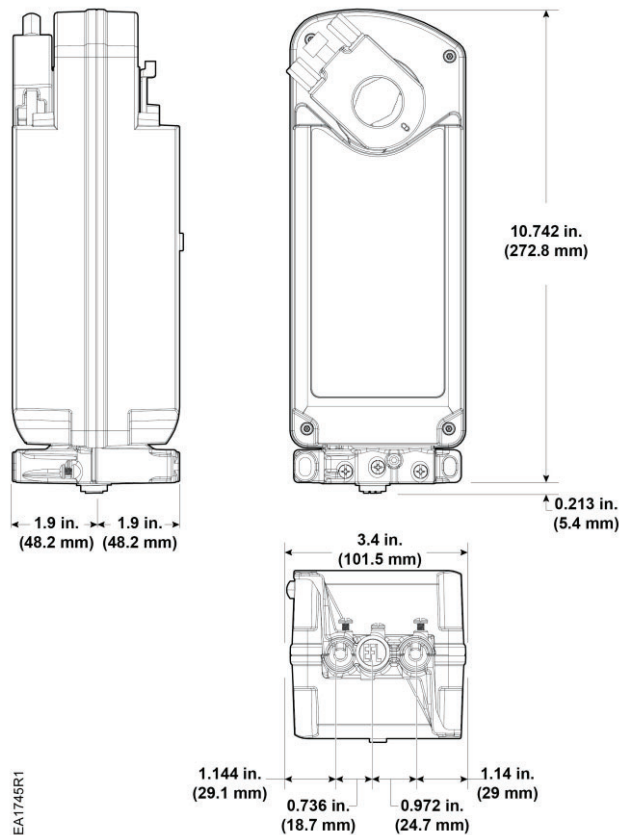


Figure 7. Dimensions of the OpenAir GVD/GKD Actuator in Inches (Millimeters).

Information in this publication is based on current specifications. The company reserves the right to make changes in specifications and models as design improvements are introduced. OpenAir is a registered trademark of Siemens Schweiz AG. Other product or company names mentioned herein may be the trademarks of their respective owners. © 2022 Siemens Industry, Inc.

EFB120 - Damper Actuator

On/Off, Spring Return, 100 to 240 VAC



Technical Data

Power Supply	100...240 VAC, -20% / +10%, 50/60 Hz, 100...125 VDC, ±10%
Power consumption in operation	9.5 W
Power consumption in rest position	4.5 W
Transformer sizing	21 VA @ 100 VAC, 29 VA @ 240 VAC
Shaft Diameter	1/2" to 1.05" round, centers on 3/4" with insert, 1.05" without insert
Electrical Connection	3ft [1m], 18 GA appliance cable with 1/2" conduit connector
Overload Protection	electronic throughout 0° to 95° rotation
Electrical Protection	actuators are double insulated
Angle of rotation	Max. 95°, adjustable with mechanical end stop, 35° to 95°
Torque motor	270 in-lbs [30 Nm]
direction of rotation motor	reversible with CW/CCW mounting
direction of rotation spring-return	reversible with CW/CCW mounting
Position indication	visual indicator, 0° to 95° (0° is full spring return position)
Manual override	5 mm hex crank (3/16" Allen), supplied
Running time motor	75 sec
Running time emergency control position	<20 sec @ -4°F to 122°F [-20°C to 50°C], <60 sec @ -22°F [-30°C]
Ambient humidity	5 to 95% RH non-condensing
Ambient temperature	-22...122 °F [-30...50 °C]
Non-operating temperature	-40...176 °F [-40...80 °C]
Degree of Protection	IP54, NEMA 2, UL Enclosure Type 2
Housing material	Aluminum die cast and plastic casing
Agency Listing	cULus acc. to UL60730-1A/-2-14, CAN/CSA E60730-1:02, CE acc. to 2004/108/EC and 2006/95/EC
Noise level, motor	≤56.5 dB (A)
Noise Level (Fail-Safe)	≤71 dB (A)
Maintenance	maintenance free
Quality Standard	ISO 9001
Weight	11.57 lb [5.25 kg]

†Rated Impulse Voltage 4kV, Type of action 1.AA, Control Pollution Degree 3.

Torque min. 270 in-lb, for control of air dampers

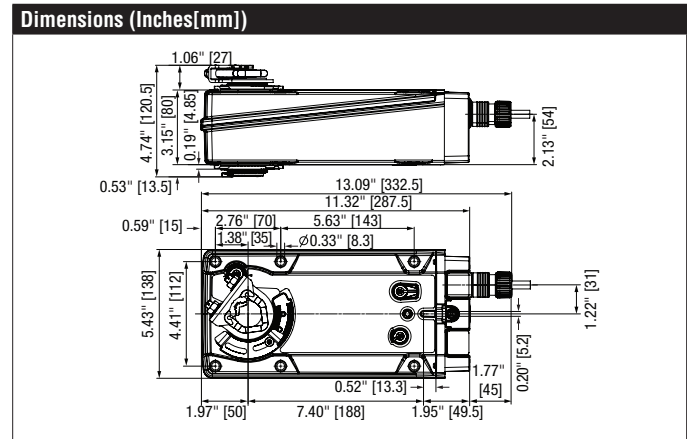
Application

For On/Off, fail-safe control of dampers in HVAC systems. Actuator sizing should be done in accordance with the damper manufacturer's specifications. Control is On/Off from an auxiliary contact or a manual switch. The actuator is mounted directly to a damper shaft up to 1.05" in diameter by means of its universal clamp. A crank arm and several mounting brackets are available for applications where the actuator cannot be direct coupled to the damper shaft. Maximum of two EF's can be piggybacked for torque loads of up to 540 in-lbs. Minimum 3/4" diameter shaft and parallel wiring.

Operation

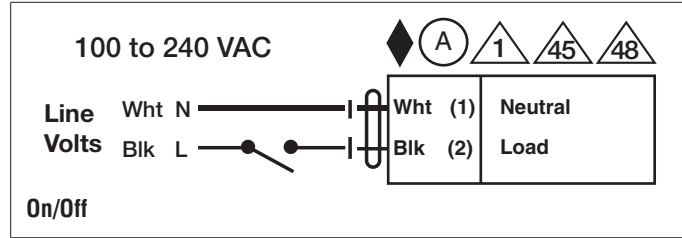
The EF.120 series actuators provide true spring return operation for reliable failsafe application and positive close off on air tight dampers. The spring return system provides constant torque to the damper with, and without, power applied to the actuator. The EF.120 series provides 95° of rotation and is provided with a graduated position indicator showing 0° to 95°. The actuator may be stalled anywhere in its normal rotation without the need of mechanical end switches. The EF.120 actuator is shipped at 5° (5° from full fail-safe) to provide automatic compression against damper gaskets for tight shut-off.

Installation Note: Use flexible metal conduit. Push the UL listed conduit fitting device over the actuator's cable to butt against the enclosure. Screw in conduit connector. Jacket the actuator's input wiring with UL listed flexible conduit. Properly terminate the conduit in a suitable junction box.



Date created, 02/04/2019 - Subject to change. © Belimo Aircontrols (USA), Inc.

Accessories	
AV8-25	Shaft extension 240 mm [9.8"]
EF-P	Anti-rotation bracket EFB(X)/GKB(X)/GMB(X).
IND-EFB	Stop indicator
K9-2	Spindle clamp set
KG10A	Straight ball joint with M8
KH10	Damper lever
KH-EFB	Actuator arm
SH10	Push rod for KG10A ball joint (36" L, 3/8" diameter).
TOOL-07	13 mm wrench.
ZG-100	Univ. right angle bracket (17" H x 11-1/8" W x 6" base).
ZG-120	Jackshaft mounting bracket.
ZG-DC1	Damper clip for damper blade, 3.5" width.
ZG-DC2	Damper clip for damper blade, 6" width.
ZG-EFB	Mounting kit for linkage operation EF.A
ZG-JSA-3	1.05" diameter jackshaft adaptor (12" L).
P475	Shaft mount, non-Mercury aux. switch for 1/2" dia. shafts.
P475-1	Shaft mount, non-Mercury aux. switch for 1" dia. shafts.
PS-100	Actuator power supply and control simulator.
TF-CC US	Cable conduit connector, 1/2".



Typical Specification

On/Off spring return damper actuators shall be direct coupled type which require no crank arm and linkage and be capable of direct mounting to a jackshaft up to a 1.05" diameter. The actuators must be designed so that they may be used for either clockwise or counter clockwise fail-safe operation. Actuators shall be protected from overload at all angles of rotation. If required, two SPDT auxiliary switch shall be provided having the capability of one being adjustable. Actuators with auxiliary switches must be constructed to meet the requirements for Double Insulation so an electrical ground is not required to meet agency listings. Actuators shall be cULus listed and have a 5 year warranty, and be manufactured under ISO 9001 International Quality Control Standards. Actuators shall be as manufactured by Belimo.

Wiring Diagrams

⚠ WARNING! LIVE ELECTRICAL COMPONENTS!
 During installation, testing, servicing and troubleshooting of this product, it may be necessary to work with live electrical components. Have a qualified licensed electrician or other individual who has been properly trained in handling live electrical components perform these tasks. Failure to follow all electrical safety precautions when exposed to live electrical components could result in death or serious injury.

◆ Meets cULus requirements without the need of an electrical ground connection.

Ⓐ Actuators with appliance cables are numbered.

1 Provide overload protection and disconnect as required.

45 Actuators may be powered in parallel. Power consumption must be observed.

48 Parallel wiring required for piggy-back applications.



Exhaust Fan, 18 In, 115 V, 1860 CFM

Exhaust Fan, Direct Drive, Shutter Mounted, Speed Controllable, Propeller Dia 18 In, CFM @ 0.000-In SP 1860, @ 0.125-In SP 850, Sones @ 0.000-In. SP @ 5 Ft. 8.4, Voltage 115, 60 Hz, Single Phase, Full Load Amps 1.3, HP 1/15, Max Ambient Temp 104 F, Motor Type Shaded Pole, Bearing Type Sleeve, Height 21 1/8 In, Width 21 1/8 In, Max Depth 14 7/8 In, Sq Opening Required 19 In, Propeller Material Stamped Aluminum, Guard Material Steel, Includes Automatic Shutter

Brand	DAYTON
Mfr. Model #	1HLA4

- UL and C-UL Listed.
 - Mount: vertical only Motors: totally enclosed, 115V, 60 Hz Max. inlet/ambient temp.: 104°F 7 through 24" dia. propellers are aluminum; 30 and 36" propellers are galvanized steel OSHA-compliant gray polyester powder-coated wire guards

Tech Specs

- **Item:** Exhaust Fan
- **Type:** Direct Drive, Shutter Mounted, Speed Controllable
- **Propeller Dia. (In.):** 18
- **CFM @ 0.000-In. SP:** 1860
- **CFM @ 0.125-In. SP:** 850
- **Sones @ 0.000-In. SP @ 5 Ft.:** 8.4
- **Motor RPM:** 1075
- **Voltage:** 115
- **Hz:** 60
- **Phase:** 1
- **Full Load Amps:** 1.3
- **HP:** 1/15

- **Max. Ambient Temp. (F):** 104
- **Motor Type:** Shaded Pole
- **Motor Enclosure:** Totally Enclosed Air-Over
- **Motor Insulation:** Class A
- **Bearing Type:** Sleeve
- **Height (In.):** 21-1/8
- **Width (In.):** 21-1/8
- **Max. Depth (In.):** 14-7/8
- **Sq. Opening Required (In.):** 19
- **Frame Material:** Cold Rolled Steel
- **Frame Finish:** White Polyester
- **Propeller Material:** Stamped Aluminum
- **Guard Material:** Steel
- **Wire Guard Finish:** Gray Polyester
- **Speed Control:** 1DGV1
- **Number of Blades:** 3
- **Thermal Protection:** Auto
- **Agency Compliance:** UL Listed for US and Canada
- **Includes:** Automatic Shutter

Notes & Restrictions

There are currently no notes or restrictions for this item.

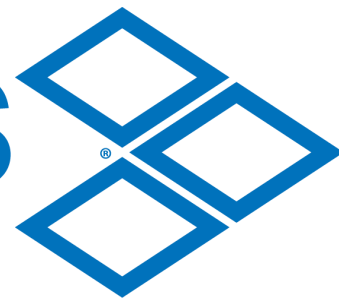
MSDS

This item does not require a **Material Safety Data Sheet (MSDS)**.

Required Accessories

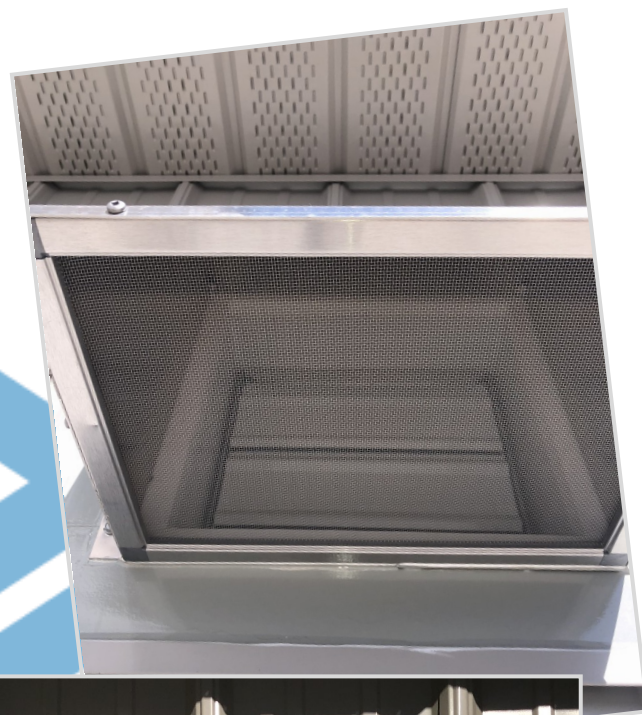
There are currently no required accessories for this item.

EFI-SOLUTIONS



efi-solutions.com

Aluminum Mill-Finish Exterior Vent Hood With a Protective Insect Cover





Protective & Marine Coatings

MACROPOXY® 646 FAST CURE EPOXY

PART A B58-600 SERIES
PART B B58V600 HARDENER

Revised: August 23, 2017

PRODUCT INFORMATION

4.53

PRODUCT DESCRIPTION

MACROPOXY 646 FAST CURE EPOXY is a high solids, high build, fast drying, polyamide epoxy designed to protect steel and concrete in industrial exposures. Ideal for maintenance painting and fabrication shop applications. The high solids content ensures adequate protection of sharp edges, corners, and welds. This product can be applied directly to marginally prepared steel surfaces and hot substrates up to 250°F/120°C

- Low VOC
- Low odor
- Outstanding application properties
- Meets Class A requirements for Slip Coefficient, 0.36 @ 6 mils / 150 microns dft (Mill White only)
- Chemical resistant
- Abrasion resistant

PRODUCT CHARACTERISTICS

Finish: Semi-Gloss
Color: Mill White, Black and a wide range of colors available through tinting
Volume Solids: 72% ± 2%, mixed, Mill White
Weight Solids: 85% ± 2%, mixed, Mill White
VOC (EPA Method 24): Unreduced: <250 g/L; 2.08 lb/gal
 mixed Reduced 10%: <300 g/L; 2.50 lb/gal
Mix Ratio: 1:1 by volume

Recommended Spreading Rate per coat:

	Minimum	Maximum
Wet mils (microns)	7.0 (175)	13.5 (338)
Dry mils (microns)	5.0* (125)	10.0* (250)
~Coverage sq ft/gal (m ² /L)	116 (2.8)	232 (5.7)
Theoretical coverage sq ft/gal (m ² /L) @ 1 mil / 25 microns dft	1152 (28.2)	

*May be applied at 3.0-10.0 mils (75-250 microns) dft in a multi-coat system. Refer to Recommended Systems and Performance Tips Sections.

NOTE: Brush or roll application may require multiple coats to achieve maximum film thickness and uniformity of appearance.

Drying Schedule @ 7.0 mils wet (175 microns):

	@ 35°F/1.7°C	@ 77°F/25°C 50% RH	@ 100°F/38°C
To touch:	4-5 hours	2 hours	1.5 hours
To handle:	48 hours	8 hours	4.5 hours
To recoat:			
minimum:	48 hours	8 hours	4.5 hours
maximum:	1 year	1 year	1 year
To cure:			
Service:	10 days	7 days	4 days
Immersion:	14 days	7 days	4 days
<i>If maximum recoat time is exceeded, abrade surface before recoating. Drying time is temperature, humidity, and film thickness dependent. Paint temperature must be at least 40°F (4.5°C) minimum.</i>			
Pot Life:	10 hours	4 hours	2 hours
Sweat-in-time:	30 minutes	30 minutes	15 minutes

When used as an intermediate coat as part of a multi-coat system:

Drying Schedule @ 5.0 mils wet (125 microns):

	@ 35°F/1.7°C	@ 77°F/25°C 50% RH	@ 100°F/38°C
To touch:	3 hours	1 hour	1 hour
To handle:	48 hours	4 hours	2 hours
To recoat:			
minimum:	16 hours	4 hours	2 hours
maximum:	1 year	1 year	1 year

PRODUCT CHARACTERISTICS (CONT'D)

Shelf Life: 36 months, unopened
Store indoors at 40°F (4.5°C) to 110°F (43°C).

Flash Point: 91°F (33°C), TCC, mixed

Reducer/Clean Up: Reducer, R7K15
In California: Reducer R7K111 or Oxsol 100

PERFORMANCE CHARACTERISTICS

Substrate*: Steel
Surface Preparation*: SSPC-SP10/NACE 2
System Tested*:
 1 ct. Macropoxy 646 Fast Cure @ 6.0 mils (150 microns) dft
 *unless otherwise noted below

Test Name	Test Method	Results
Abrasion Resistance	ASTM D4060, CS17 wheel, 1000 cycles, 1 kg load	84 mg loss
Accelerated Weathering-QUV¹	ASTM D4587, QUV-A, 12,000 hours	Passes
Adhesion	ASTM D4541	1,037 psi
Corrosion Weathering¹	ASTM D5894, 36 cycles, 12,000 hours	Rating 10 per ASTM D714 for blistering; Rating 9 per ASTM D610 per rusting
Nuclear Decontamination	ASTM D4256/ANSI N 5.12	99% Water Wash; 95% Overall
Direct Impact Resistance²	ASTM D2794 Modified	**120 in. lb.
Dry Heat Resistance	ASTM D2485	250°F (121°C)
Exterior Durability	1 year at 45° South	Excellent, chalks
Flexibility	ASTM D522, 180° bend, 3/4" mandrel	Passes
Fuel Contribution	NFPA 259	5764 btu/lb
Humidity Resistance	ASTM D4585, 6000 hours	No blistering, cracking, or rusting
Immersion	1 year fresh and salt water	Passes, no rusting, blistering, or loss of adhesion
Radiation Tolerance	ASTM D4082 / ANSI 5.12	Pass at 21 mils (525 microns)
Pencil Hardness	ASTM D3363	3H
Salt Fog Resistance¹	ASTM B117, 6,500 hours	Rating 10 per ASTM D610 for rusting; Rating 9 per ASTM D1654 for corrosion
Slip Coefficient, Mill White*	AISC Specification for Structural Joints Using ASTM A325 or ASTM A490 Bolts	Class A, 0.36
Surface Burning	ASTM E84/NFPA 255	Flame Spread Index 20; Smoke Development Index 35 (at 18 mils or 450 microns)
Water Vapor Permeance	ASTM D1653, Method B	1.16 US perms

Epoxy coatings may darken or discolor following application and curing.

*Refer to Slip Certification document

** Performed on 1/16 inch blasted steel

Footnotes:

¹ Zinc Clad II Plus Primer

² Two coats of Macropoxy 646 Fast Cure Epoxy

DISCLAIMER

The information and recommendations set forth in this Product Data Sheet are based upon tests conducted by or on behalf of The Sherwin-Williams Company. Such information and recommendations set forth herein are subject to change and pertain to the product offered at the time of publication. Consult your Sherwin-Williams representative to obtain the most recent Product Data Information and Application Bulletin.



Protective & Marine Coatings

MACROPOXY® 646 FAST CURE EPOXY

PART A **B58-600**
PART B **B58V600**

SERIES
HARDENER

Revised: August 23, 2017

PRODUCT INFORMATION

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RECOMMENDED USES

- Marine applications
- Fabrication shops
- Pulp and paper mills
- Power plants
- Offshore platforms
- Nuclear Power Plants
- Nuclear fabrication shops
- Mill White and Black are acceptable for immersion use for salt water and fresh water, not acceptable for potable water
- Suitable for use in USDA inspected facilities
- Acceptable for use in Canadian Food Processing facilities, categories: D1, D2, D3 (Confirm acceptance of specific part numbers/boxes with your SV Sales Representative)
- Conforms to AWWA D102 OCS #5
- Conforms to MPI # 108
- This product meets specific design requirements for non-safety related nuclear plant applications in Level II, III and Balance of Plant, and DOE nuclear facilities*.
- * Nuclear qualifications are NRC license specific to the facility.
- Suitable for use in the Mining & Minerals Industry
- Acceptable for use over and/or under Loxon S1 and Loxon H1 Caulking

RECOMMENDED SYSTEMS

		Dry Film Thickness / ct.	
		Mils	(Microns)
Immersion and atmospheric:			
Steel:			
2 cts.	Macropoxy 646 Fast Cure Epoxy	5.0-10.0	(125-250)
Concrete/Masonry, smooth:			
2 cts.	Macropoxy 646 Fast Cure Epoxy	5.0-10.0	(125-250)
Concrete Block:			
1 ct.	Kem Cati-Coat HS Epoxy Filler/Sealer	10.0-20.0	(250-500)
<i>as needed to fill voids and provide a continuous substrate.</i>			
2 cts.	Macropoxy 646 Fast Cure Epoxy	5.0-10.0	(125-250)
Atmospheric:			
Steel:			
(Shop applied system, new construction, AWWA D102, can also be used at 3 mils / 75 microns minimum dft when used as an intermediate coat as part of a multi-coat system)			
1 ct.	Macropoxy 646 Fast Cure Epoxy	3.0-6.0	(75-150)
1-2 cts.	of recommended topcoat		
Steel:			
1 ct.	Recoat Epoxy Primer	4.0-6.0	(100-150)
2 cts.	Macropoxy 646 Fast Cure Epoxy	5.0-10.0	(125-250)
Steel:			
1 ct.	Macropoxy 646 Fast Cure Epoxy	5.0-10.0	(125-250)
1-2 cts.	Acrolon 218 Polyurethane	3.0-6.0	(75-150)
	or Hi-Solids Polyurethane	3.0-5.0	(75-125)
	or SherThane 2K Urethane	2.0-4.0	(50-100)
	or Hydrogloss	2.0-4.0	(50-100)
Steel:			
2 cts.	Macropoxy 646 Fast Cure Epoxy	5.0-10.0	(125-250)
1-2 cts.	Tile-Clad HS Epoxy	2.5-4.0	(63-100)
Steel:			
1 ct.	Zinc Clad II Plus	2.0-4.0	(50-100)
1 ct.	Macropoxy 646 Fast Cure Epoxy	3.0-10.0	(75-250)
1-2 cts.	Acrolon 218 Polyurethane	3.0-6.0	(75-150)
Steel:			
1 ct.	Zinc Clad III HS	3.0-5.0	(75-125)
	or Zinc Clad IV	3.0-5.0	(75-125)
1 ct.	Macropoxy 646 Fast Cure Epoxy	3.0-10.0	(75-250)
1-2 cts.	Acrolon 218 Polyurethane	3.0-6.0	(75-150)
Aluminum:			
2 cts.	Macropoxy 646 Fast Cure Epoxy	2.0-4.0	(50-100)
Galvanizing:			
2 cts.	Macropoxy 646 Fast Cure Epoxy	2.0-4.0	(50-100)
FIRETEX M89/02, M90, M90/02, and M93/02:			
Steel & Galvanized Substrates being primed for FIRETEX only:			
1 ct.	Macropoxy 646 Fast Cure Epoxy	2.0-5.0	(50-125)

The systems listed above are representative of the product's use, other systems may be appropriate.

SURFACE PREPARATION

Surface must be clean, dry, and in sound condition. Remove all oil, dust, grease, dirt, loose rust, and other foreign material to ensure adequate adhesion.

Refer to product Application Bulletin for detailed surface preparation information.

Minimum recommended surface preparation:

Iron & Steel			
Atmospheric:		SSPC-SP2/3 or SSPC-SP WJ-3/NACE WJ-3L	
Immersion:		SSPC-SP10/NACE 2, 2-3 mil (50-75 micron) profile or SSPC-SP WJ-2/NACE WJ-2L	
Aluminum:			
		SSPC-SP1	
Galvanizing:		SSPC-SP1; See Surface Preparations section on page 3 for application of FIRETEX intumescent coating systems	
Concrete & Masonry			
Atmospheric:		SSPC-SP13/NACE 6, or ICRI No. 310.2R, CSP 1-3	
Immersion:		SSPC-SP13/NACE 6-4.3.1 or 4.3.2, or ICRI No. 310.2R, CSP 2-4	

Surface Preparation Standards

Condition of Surface	ISO 8501-1 BS7079:A1	SSPC	NACE
White Metal	Sa 3	SP 5	1
Near White Metal	Sa 2.5	SP 10	2
Commercial Blast	Sa 2	SP 6	3
Brush-Off Blast	Sa 1	SP 7	4
Hand Tool Cleaning	C St 2	SP 2	-
Pitted & Rusted	D St 2	SP 2	-
Rusted	C St 3	SP 3	-
Pitted & Rusted	D St 3	SP 3	-

TINTING

Tint Part A with Maxitones at 150% strength. Five minutes minimum mixing on a mechanical shaker is required for complete mixing of color.

Tinting is not recommended for immersion service.

APPLICATION CONDITIONS

Temperature:	
Air:	35°F (1.7°C) minimum, 120°F (49°C) maximum
Surface:	35°F (1.7°C) minimum, 250°F/120°C maximum
Material:	40°F (4.5°C) minimum, 120°F (49°C) maximum
Relative humidity:	Min 5°F (2.8°C) above dew point 85% maximum

Refer to product Application Bulletin for detailed application information.

ORDERING INFORMATION

Packaging:	
Part A:	1 gallon (3.78L) and 5 gallon (18.9L) containers
Part B:	1 gallon (3.78L) and 5 gallon (18.9L) containers
Weight:	
	12.9 ± 0.2 lb/gal ; 1.55 Kg/L mixed, may vary by color

SAFETY PRECAUTIONS

Refer to the MSDS sheet before use.

Published technical data and instructions are subject to change without notice. Contact your Sherwin-Williams representative for additional technical data and instructions.

WARRANTY

The Sherwin-Williams Company warrants our products to be free of manufacturing defects in accord with applicable Sherwin-Williams quality control procedures. Liability for products proven defective, if any, is limited to replacement of the defective product or the refund of the purchase price paid for the defective product as determined by Sherwin-Williams. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY SHERWIN-WILLIAMS, EXPRESSED OR IMPLIED, STATUTORY, BY OPERATION OF LAW OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.



Protective & Marine Coatings

MACROPOXY® 646 FAST CURE EPOXY

PART A B58-600 SERIES
PART B B58V600 HARDENER

Revised: August 23, 2017

APPLICATION BULLETIN

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SURFACE PREPARATIONS

Surface must be clean, dry, and in sound condition. Remove all oil, dust, grease, dirt, loose rust, and other foreign material to ensure adequate adhesion.

Iron & Steel, Atmospheric Service:

Minimum surface preparation is Hand Tool Clean per SSPC-SP2. Remove all oil and grease from surface by Solvent Cleaning per SSPC-SP1. For better performance, use Commercial Blast Cleaning per SSPC-SP6/NACE 3, blast clean all surfaces using a sharp, angular abrasive for optimum surface profile (2 mils / 50 microns). Prime any bare steel within 8 hours or before flash rusting occurs.

Iron & Steel, Immersion Service:

Remove all oil and grease from surface by Solvent Cleaning per SSPC-SP1. Minimum surface preparation is Near White Metal Blast Cleaning per SSPC-SP10/NACE 2. Blast clean all surfaces using a sharp, angular abrasive for optimum surface profile (2-3 mils / 50-75 microns). Remove all weld spatter and round all sharp edges by grinding. Prime any bare steel the same day as it is cleaned.

Aluminum

Remove all oil, grease, dirt, oxide and other foreign material by Solvent Cleaning per SSPC-SP1.

Galvanized Steel

Allow to weather a minimum of six months prior to coating. Solvent Clean per SSPC-SP1 (recommended solvent is VM&P Naphtha). When weathering is not possible, or the surface has been treated with chromates or silicates, first Solvent Clean per SSPC-SP1 and apply a test patch. Allow paint to dry at least one week before testing adhesion. If adhesion is poor, brush blasting per SSPC-SP7 is necessary to remove these treatments. Rusty galvanizing requires a minimum of Hand Tool Cleaning per SSPC-SP2, prime the area the same day as cleaned.

In preparing galvanized steel substrates for the application of FIRE-TEX intumescent coating systems, Surface Preparation Specification SSPC-SP 16 must be followed obtaining a surface profile of minimum 1.5 mils (38 microns). Optimum surface profile will not exceed 2.0 mils (50 microns).

Concrete and Masonry

For surface preparation, refer to SSPC-SP13/NACE 6, or ICRI No. 310.2R, CSP 1-3. Surfaces should be thoroughly clean and dry. Concrete and mortar must be cured at least 28 days @ 75°F (24°C). Remove all loose mortar and foreign material. Surface must be free of laitance, concrete dust, dirt, form release agents, moisture curing membranes, loose cement and hardeners. Fill bug holes, air pockets and other voids with Steel-Seam FT910.

Concrete, Immersion Service:

For surface preparation, refer to SSPC-SP13/NACE 6, Section 4.3.1 or 1.3.2 or ICRI No. 310.2R, CSP 2-4.

Follow the standard methods listed below when applicable:

ASTM D4258 Standard Practice for Cleaning Concrete.
ASTM D4259 Standard Practice for Abrading Concrete.
ASTM D4260 Standard Practice for Etching Concrete.
ASTM F1869 Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete.

SSPC-SP 13/Nace 6 Surface Preparation of Concrete.

ICRI No. 310.2R Concrete Surface Preparation.

Previously Painted Surfaces

If in sound condition, clean the surface of all foreign material. Smooth, hard or glossy coatings and surfaces should be dulled by abrading the surface. Apply a test area, allowing paint to dry one week before testing adhesion. If adhesion is poor, or if this product attacks the previous finish, removal of the previous coating may be necessary. If paint is peeling or badly weathered, clean surface to sound substrate and treat as a new surface as above.

Surface Preparation Standards

Condition of Surface	ISO 8501-1 BS7079:A1	SSPC	NACE
White Metal	Sa 3	SP 5	1
Near White Metal	Sa 2.5	SP 10	2
Commercial Blast	Sa 2	SP 6	3
Brush-Off Blast	Sa 1	SP 7	4
Hand Tool Cleaning	Rusted	SP 2	-
	Pitted & Rusted	SP 2	-
Power Tool Cleaning	Rusted	SP 3	-
	Pitted & Rusted	SP 3	-

APPLICATION CONDITIONS

Temperature:

Air: 35°F (1.7°C) minimum, 120°F (49°C) maximum

Surface: 35°F (1.7°C) minimum, 250°F/(120°C) maximum

Material: 40°F (4.5°C) minimum, 120°F (49°C) maximum

Relative humidity: At least 5°F (2.8°C) above dew point
85% maximum

APPLICATION EQUIPMENT

The following is a guide. Changes in pressures and tip sizes may be needed for proper spray characteristics. Always purge spray equipment before use with listed reducer. Any reduction must be compliant with existing VOC regulations and compatible with the existing environmental and application conditions.

Reducer/Clean Up Reducer R7K15

In California..... Reducer R7K111

Airless Spray

Pump..... 30:1

Pressure..... 2800 - 3000 psi

Hose..... 1/4" ID

Tip017" - .023"

Filter 60 mesh

Reduction..... As needed up to 10% by volume

Conventional Spray

Gun DeVilbiss MBC-510

Fluid Tip E

Air Nozzle..... 704

Atomization Pressure..... 60-65 psi

Fluid Pressure..... 10-20 psi

Reduction..... As needed up to 10% by volume

Requires oil and moisture separators

Brush

Brush..... Nylon/Polyester or Natural Bristle

Reduction..... As needed up to 10% by volume

Roller

Cover 3/8" woven with solvent resistant core

Reduction..... As needed up to 10% by volume

Plural Component Spray ...Acceptable

Refer to April 2010 Technical Bulletin - "Application Guidelines for Macroproxy 646 Fast Cure Epoxy & Recoatable Epoxy

Primer Utilizing Plural

Component Equipment"

If specific application equipment is not listed above, equivalent equipment may be substituted.



Protective & Marine Coatings

MACROPOXY® 646 FAST CURE EPOXY

PART A
PART B

B58-600
B58V600

SERIES
HARDENER

Revised: August 23, 2017

APPLICATION BULLETIN

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APPLICATION PROCEDURES

Surface preparation must be completed as indicated.

Mix contents of each component thoroughly with low speed power agitation. Make certain no pigment remains on the bottom of the can. Then combine one part by volume of Part A with one part by volume of Part B. Thoroughly agitate the mixture with power agitation. Allow the material to sweat-in as indicated prior to application. Re-stir before using.

When spraying above 120°F, reduce material 10% with R7K100. Spray apply only. Product will produce an orange peel appearance when applied at elevated temperatures.

If reducer solvent is used, add only after both components have been thoroughly mixed, after sweat-in.

Apply paint at the recommended film thickness and spreading rate as indicated below:

Recommended Spreading Rate per coat:

	Minimum	Maximum
Wet mils (microns)	7.0 (175)	13.5 (338)
Dry mils (microns)	5.0* (125)	10.0* (250)
~Coverage sq ft/gal (m ² /L)	116 (2.8)	232 (5.7)
Theoretical coverage sq ft/gal (m ² /L) @ 1 mil / 25 microns dft	1152 (28.2)	

*May be applied at 3.0-10.0 mils (75-250 microns) dft in a multi-coat system. Refer to Recommended Systems and Performance Tips Sections.

NOTE: Brush or roll application may require multiple coats to achieve maximum film thickness and uniformity of appearance.

Drying Schedule @ 7.0 mils wet (175 microns):

	@ 35°F/1.7°C	@ 77°F/25°C 50% RH	@ 100°F/38°C
To touch:	4-5 hours	2 hours	1.5 hours
To handle:	48 hours	8 hours	4.5 hours
To recoat:			
minimum:	48 hours	8 hours	4.5 hours
maximum:	1 year	1 year	1 year
To cure:			
Service:	10 days	7 days	4 days
Immersion:	14 days	7 days	4 days
<i>If maximum recoat time is exceeded, abrade surface before recoating.</i>			
<i>Drying time is temperature, humidity, and film thickness dependent.</i>			
Paint temperature must be at least 40°F (4.5°C) minimum.			
Pot Life:	10 hours	4 hours	2 hours
Sweat-in-time:	30 minutes	30 minutes	15 minutes

When used as an intermediate coat as part of a multi-coat system:

Drying Schedule @ 5.0 mils wet (125 microns):

	@ 35°F/1.7°C	@ 77°F/25°C 50% RH	@ 100°F/38°C
To touch:	3 hours	1 hour	1 hour
To handle:	48 hours	4 hours	2 hours
To recoat:			
minimum:	16 hours	4 hours	2 hours
maximum:	1 year	1 year	1 year

Application of coating above maximum or below minimum recommended spreading rate may adversely affect coating performance.

CLEAN UP INSTRUCTIONS

Clean spills and spatters immediately with Reducer R7K15. Clean tools immediately after use with Reducer R7K15. In California use Reducer R7K111. Follow manufacturer's safety recommendations when using any solvent.

PERFORMANCE TIPS

Stripe coat all crevices, welds, and sharp angles to prevent early failure in these areas.

When using spray application, use a 50% overlap with each pass of the gun to avoid holidays, bare areas, and pinholes. If necessary, cross spray at a right angle.

Spreading rates are calculated on volume solids and do not include an application loss factor due to surface profile, roughness or porosity of the surface, skill and technique of the applicator, method of application, various surface irregularities, material lost during mixing, spillage, overthinning, climatic conditions, and excessive film build.

Excessive reduction of material can affect film build, appearance, and adhesion.

Do not mix previously catalyzed material with new.

Do not apply the material beyond recommended pot life.

In order to avoid blockage of spray equipment, clean equipment before use or before periods of extended downtime with Reducer R7K15. In California use Reducer R7K111.

Tinting is not recommended for immersion service.

Use only Mill White and Black for immersion service.

Insufficient ventilation, incomplete mixing, miscatalyzed, and external heaters may cause premature yellowing.

Excessive film build, poor ventilation, and cool temperatures may cause solvent entrapment and premature coating failure.

Quik-Kick Epoxy Accelerator is acceptable for use. See data page 4.99 for details.

When coating over aluminum and galvanizing, recommended dft is 2-4 mils (50-100 microns).

Acceptable for Concrete Floors.

Can be used as a metalizing sealer. Consult Technical Bulletin - Sealers for Thermal Spray Metalizing, or your local Sherwin-Williams representative.

Refer to Product Information sheet for additional performance characteristics and properties.

SAFETY PRECAUTIONS

Refer to the MSDS sheet before use.

Published technical data and instructions are subject to change without notice. Contact your Sherwin-Williams representative for additional technical data and instructions.

DISCLAIMER

The information and recommendations set forth in this Product Data Sheet are based upon tests conducted by or on behalf of The Sherwin-Williams Company. Such information and recommendations set forth herein are subject to change and pertain to the product offered at the time of publication. Consult your Sherwin-Williams representative to obtain the most recent Product Data Information and Application Bulletin.

WARRANTY

The Sherwin-Williams Company warrants our products to be free of manufacturing defects in accord with applicable Sherwin-Williams quality control procedures. Liability for products proven defective, if any, is limited to replacement of the defective product or the refund of the purchase price paid for the defective product as determined by Sherwin-Williams. NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY SHERWIN-WILLIAMS, EXPRESSED OR IMPLIED, STATUTORY, BY OPERATION OF LAW OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

EFI's APS FLOOR COATING!



EFI has begun offering its new APS Floor Coating on all of its Water-Shed® stations in *dark gray*.

Our APS floor coating system is a Polyurea Spray Elastomer offering superior **ABRASION RESISTANCE, CHEMICAL and CORROSION PROTECTION** while providing a **SAFER WORK ENVIRONMENT**.

It can withstand the harshest elements encountered in any municipal or industrial water application.

Our APS Floor Coating offers durable protection that permanently bonds to steel surfaces and provides complete chemical and corrosion protection for all flooring substrate surfaces. It provides an impenetrable barrier to protect station flooring in all environments typically found in the water pumping, treatment or distribution market.

In addition, the APS Floor Coating helps to enhance safety by providing a non-skid surface when wet conditions may create a slip hazard.

The coating is applied to 100-125 mils, making it 3 1/2 times stronger than coatings usually found in pick-up truck beds.

Basic Physical Properties:

All tests are performed by OCM Test Laboratories.

- ISO 17025 Certified
- American Association for Laboratory Accreditation (A2LA)

Test Name	Test Methods	Value
Water Vapor Trans.	ASTM E96	0.499 Grains/Hr Sq.Ft.
Dielectric Const.	ASTM D150	3.6
Flexural Strength	ASTM D790	2,630 PSI
Volume Resistance	ASTM D257	2.3x10 ¹⁴ ohm cm
Elongation	ASTM D412	162%
Tensile Strength	ASTM D412	3,432 PSI
Flexural Modulus	ASTM D790	0.056 MSI
Fungus Test	MIL-STD 810F	Pass
Coefficient of Friction	ASTM D1894	
Static		0.305
Kinetic		0.127
Taber Abrasion (gm Loss/1000 cycles)	ASTM D4060	0.0698
Tear Strength	ASTM D624	783 PSI
Hardness Shore D	ASTM D2240	60 ±1
Pull-off Test-Adhesion	ASTM C297	
To-Metal - No Primer		1,800 PSI
To Metal - XPM Primer		1,910 PSI
To Metal - LXS F515 Primer		1,870 PSI
Dissipation Factor	ASTM D150	0.031

The strength and durability of **EFI APS** Floor coating is clear! Imagine what it can do on your next **EFI** station!



"EFI-Solutions; first in Quality, Cost, Delivery and Customer Service!"

To learn more, contact your local **EFI** Representative for more information.



Chemical Resistances per ASTM D543

Chemical Names	Volume Change (%)	Elongation ASTM D412 Change (%)	Hardness Change (%)	Tensile Strength ASTM D412 Change
Sodium Carbonate 10%	4%	57%	-8%	23%
Potassium Hydroxide 50%	2%	65%	-3%	47%
Water (H2O)	2%	77%	-9%	29%
Saline Solution 30%	3%	NA	-8%	NA
Sodium Chloride 30%	2%	63%	-4%	31%
Tannic Acid 40%	4%	47%	-7%	30%
Phosphoric Acid 50%	4%	46%	-5%	27%
Sodium Sulfate 20%	2%	74%	-1%	30%
Sulfuric Acid 10%	2%	54%	-8%	28%
Toluene	17%	-29%	-18%	-63%
Sulfuric Acid 25%	2%	67%	-2%	39%
Sodium Sulfate 30%	5%	54%	-7%	6%
Xylene	17%	-3%	-24%	-59%
1,1,1 - Trichloroethylene	8%	-53%	-13%	-79%
Sodium Hydroxide 50%	0%	-9%	4%	49%
Sea Water	3%	79%	-7%	24%
Sugar Solution 30%	2%	62%	-6%	23%
Sodium Hydroxide 10%	2%	74%	-8%	26%



UL XP-461

April 2022

TECHNICAL DATA SHEET

PRODUCT MANUFACTURER

ULTIMATE LININGS
10301 Round Up Lane
Houston TX, 77064
800-989-9869

GENERAL PRODUCT DESCRIPTION

UL XP-461 is a 100% solids, two-component, high performance aromatic pure polyurea spray elastomer system. UL XP-461 is designed as a user-friendly product for moisture insensitive applications because of its pure polyurea chemistry and offers exceptional adhesion properties for properly prepared substrates. UL XP-461 produces an excellent skin formation for chemical resistance and moisture protection.

APPLICATION GUIDELINES

Both the Iso "A" Side and Resin "B" Side should be preconditioned between 70°F to 90°F (21°C to 32°C) before application. UL XP-461 must be applied using high-pressure, plural component, heated, 1:1 by volume, spray equipment with a minimum of 2,000 psi fluid pressure capability. UL XP-461 material (both Iso "A" Side and Resin "B" Side) should be heated between 140°F to 160°F (60°C to 71°C). Spray equipment must generate adequate fluid pressure for proper mixing and best polymerization results.

APPLICATION EQUIPMENT

UL XP-461 is designed to be sprayed through high-pressure impingement mixing equipment. Plural component spray equipment must have material heat-control capability, 1:1 by volume, and sprayable with round or flat tip. Refer to equipment manufacturer for equipment specifics and accessories.

EQUIPMENT SETTING PARAMETERS

Iso "A" and Polyol "B" components must be pumped by low-pressure transfer pumps to a suitable high-pressure proportional pumping system.

Temperature Settings

Iso "A" Block Heater:	140°F - 160°F
Resin "B" Block Heater:	140°F - 160°F
Hoses (Iso and Polyol):	140°F - 160°F

Hydraulic Pressure Setting

Equipment Hydraulic Pressure: 2,000 - 2,500 psi

EQUIPMENT CLEAN UP

Spray equipment should be cleaned immediately after use following equipment manufacturer's recommended procedures. Please refer to spray equipment operating and maintenance procedures for further details. UL XP-461 should be cleaned with environmentally safe urethane-grade cleaners. Cleaning materials must be free of reactive contaminants such as water and alcohol. All gun cleaners and spray equipment cleaning materials must be used and disposed of as permitted under local rules and regulations.

MATERIAL STORAGE

UL XP-461 has a shelf life of twelve (12) months from manufacture date in factory sealed containers. UL XP-461 should be stored between 60°F to 100 °F (16°C to 38°C). Do not expose unused materials to high humidity conditions. Always provide airtight reseal conditions to unused materials. For materials that are currently connecting to the pumps, always provide as much airtight and moisture free conditions to unused materials as possible to ensure proper chemical performance. Drums should be stored on pallets to avoid direct contact with the warehouse floor/ground.

SAFETY AND HANDLING

Please refer to Safety Data Sheets (SDS) for safety and handling of this material. All personnel working with this material are expected to read and understand all safety recommendations per SDS. All Personal Protection Equipment must be properly worn to comply with worker health and safety requirements.



UL XP-461

April 2022

TECHNICAL DATA SHEET

CHEMICAL TECHNICAL DATA

Conditions: 77°F and 50% Rel. Humidity	
Mix Ratio by Volume	1A:1B
Gel Time	2 to 5 sec.
Tack Free Time	5 to 10 sec.
Density "A" Side (lbs/gal)	9.50
Density "B" Side (lbs/gal)	8.40
Viscosity "A" Side	1000 ± 150 cP
Viscosity "B" Side	370 ± 150 cP

LIMITATIONS

The chemical resistance chart should be consulted prior to application; this is an exhaustive chemical compatibility list quantifying pre- and post-physical properties for chemicals exposure per ASTM D543. Application specific processing parameters such as temperature and operating pressure of coated objects must be considered before installing UL XP-461 coatings system.

BASIC PHYSICAL PROPERTIES

All tests are performed by independent third-party material test laboratories:

- OCM Test Laboratories
- ISO 17025 Certified
- American Association for Laboratory Accreditation (A2LA)
- Truesdail Laboratories, Inc.
- Pira International Material Test Lab
- Associated Polymer Labs, Inc.

PRODUCT USER RESPONSIBILITIES

Users of UL XP-461 product are responsible for reading the general guidelines, product data sheets, specifications and Safety Data Sheets (SDS) before using this material. Printed technical data and instructions are subject to change without notice. Contact your local ULTIMATE LININGS representative or visit our website www.ultimatelinings.com for current technical data instructions.

Test Name	Test Method	Value
Coefficient of Friction Static Kinetic	ASTM D1894	0.530 0.434
DMA Test (Loss Modulus, E" Tg)	ASTM D4065	-34°C
Elongation	ASTM D412	161%
Hardness Shore D	ASTM D2240	60 ± 1
Taber Abrasion (mg Loss/1000 cycles)	ASTM D4060	24.9 mg
Tear Strength	ASTM D624	658 pli
Tensile Strength	ASTM D412	2,958 psi
Flammability of Interior Materials	FMVSS 302	Pass
Impact	ASTM D2794	320 in. lbs. no failure

ADDITIONAL PRODUCT CERTIFICATIONS

- Complies with USFDA Coating Regulations for Incidental-Food-Contact Applications (Keller and Heckman LLP Letter of Opinion)



UL XP-461

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TECHNICAL DATA SHEET

CHEMICAL RESISTANCES PER ASTM D543 FOR IMMERSION IN FLUIDS METHODS

UL XP-461 materials are immersed in the chemicals below for a period of 7 days; physical properties of pre- and post-immersion were measured to quantify the changes in product physical properties.

Chemicals Name	Tensile Strength ASTM D412 Change (%)	Elongation ASTM D412 Change (%)	Hardness Change (%)	Mass Change (%)	Density Change (%)	Rating
Acetic Acid 10%	-32.62	21.62	-12.70	4.42	0.33	4
Ammonium Chloride 30%	-12.31	21.62	-3.17	1.13	0.19	2
Ammonium Hydroxide	-10.77	28.38	-1.59	2.33	0.59	2
Automotive Oil	-34.46	6.08	-7.94	0.61	0.26	3
Baking Soda 25%	-14.77	15.54	-9.52	1.51	0.25	2
Bleach (Chloride)	-20.31	19.59	-9.52	2.41	-0.12	2
Boric Acid 3%	-25.23	7.43	-4.76	1.78	-2.81	2
Calcium Chloride 50%	-8.62	12.84	-4.76	1.15	0.15	1
Calcium Hypochloride 5%	-16.92	10.14	-3.17	1.60	0.03	1
Citric Acid 10%	-15.08	18.92	-7.94	1.74	0.22	1
Club Soda	-17.85	18.24	-7.94	1.80	0.23	2
Cream Soda (POP)	-24.31	21.62	-6.35	1.82	0.19	2
Crude Oil (Heating)	2.46	5.41	-3.17	0.46	0.11	1
DEF	1.54	26.81	0.77	1.25	2.18	2
Diesel Fuel	-3.38	4.73	-12.70	1.58	-0.38	3
Ethylene Glycol	-2.77	18.24	-4.76	0.76	-0.45	1
Hydrochloric acid 5%	-27.69	-9.46	-6.35	0.35	0.17	2
Kerosene	-11.38	4.05	1.59	3.32	-10.28	2
Lactic Acid 20%	-12.31	24.32	0.00	2.65	0.37	2
Mineral Spirits	-39.69	-10.14	-6.35	0.57	0.05	4
Nitric Acid 10%	-42.46	25.68	-7.94	3.44	0.75	4
Phosphoric Acid 50%	-24.31	-5.41	-3.17	6.83	1.89	2
Potassium Hydroxide 50%	-14.15	-4.73	0.00	0.57	-0.23	1
Saline Solution 30%	-13.85	-0.68	-6.35	1.00	0.02	1
Sea Water	-25.85	-1.35	-1.59	1.72	-0.09	2
Sodium Carbonate 10%	-19.38	18.24	3.17	1.70	-0.01	2
Sodium Chloride 30%	-32.62	-8.78	-6.35	1.79	-1.54	3
Sodium Hydroxide 50%	-4.62	-8.78	3.17	-0.32	-0.12	1
Sodium Hydroxide 10%	-16.00	-2.03	-4.76	0.50	0.23	1
Sodium Sulfate 30%	-26.77	-0.68	-7.94	1.67	10.40	2
Sodium Sulfate 20%	-29.54	-1.35	-6.35	1.73	0.38	3
Sugar Solution 30%	-36.00	-14.19	-6.35	1.82	0.17	3
Sulfuric Acid 25%	-23.08	11.49	-3.17	1.38	0.26	2
Sulfuric Acid 10%	-18.15	18.92	-9.52	1.70	0.05	2
Tannic Acid 40%	-23.69	24.32	-9.52	2.91	0.24	2
Water (DI)	-20.71	-3.92	-1.79	1.78	1.03	1

1 – Excellent

2 – Good

3 – Fair

4 – Moderate

5 – Not Recommended



UL XP-461

April 2022

TECHNICAL DATA SHEET

PRODUCT DISCLAIMER

All guidelines, recommendations, statements, and technical data contained herein are based on information and tests we believe to be reliable and correct, but accuracy and completeness of said tests are not guaranteed and are not to be construed as a warranty, either expressed or implied. It is the user's responsibility to satisfy himself, by his own information and test, to determine suitability of the product for his own intended use, application and job situation and user assumes all risk and liability resulting from his use of the product. We do not suggest or guarantee that any hazards listed herein are the only ones that may exist. Neither seller nor manufacturer shall be liable to the buyer or any third person for any injury, loss or damage directly or indirectly resulting from use of, or inability to use, the product. Recommendations or statements, whether in writing or oral, other than those contained herein shall not be binding upon the manufacturer, unless in writing and signed by a corporate officer of the manufacturer. Technical and application information is provided for the purpose of establishing a general profile of the material and proper application procedures. Test performance results were obtained in a controlled environment and ULTIMATE LININGS makes no claim that these tests or any other tests accurately represent all environments.



UL KG 9000 FS

DOOR AND DOOR FRAME

July 2020
Version: 2.0

TECHNICAL DATA SHEET

PRODUCT MANUFACTURER

ULTIMATE LININGS
10301 Round Up Lane
Houston, TX 77064
800-989-9869

GENERAL PRODUCT DESCRIPTION

UL KG 9000 FS is a two-component aliphatic polyurea spray coating that is UV stable. This product can be used as a topcoat for polyurea and polyurethane systems on properly prepared substrates or as a stand-alone coating. UL KG 9000 FS is 100% solids with zero VOCs (Volatile Organic Compounds) and superior physical properties. UL KG 9000 FS is an environmentally friendly product with excellent color, gloss retention and UV stability.

Suitable applications include:

- Topcoat for polyurea and polyurethane
- Stand-alone coating

UL KG 9000 FS is sold in clear and black. Applicators may purchase pigments in standard colors. Custom colors can be formulated upon request.

UL KG 9000 FS is packaged in a 10-gallon set. A set is comprised of one (5) gallon of Isocyanate "A" component and one (5) gallon of Resin "B" component.

APPLICATION PROCESSING DATA

As a topcoat, UL KG 9000 FS should be applied as soon as possible over hot or warm base coat but no longer than one hour after base coat application. Tack free time and full cure time is temperature, humidity and film thickness dependent. Thicker films will take longer to through-cure. High humidity will shorten cure time. In cold, dry conditions, the cure time will be prolonged.

Approximate values only. This data should not be considered a specification and is intended for general information for planning the application process.

APPLICATION GUIDELINES

UL KG 9000 FS is optimally applied at four (4) mils of thickness for topcoat applications. Maximum thickness for stand-alone is 20 mils and minimum 10 mils.

PIGMENT MIXING INSTRUCTIONS

UL KG 9000 FS is sold as clear and can be pigmented. For custom color blends for UL KG 9000 FS, please contact your customer order representative.

APPLICATION EQUIPMENT

PIGMENT LOAD FOR ALL PIGMENTS

"B" SIDE RESIN VOLUME	PIGMENT LOAD
1.00 gallon (128 oz.)	2.95 lbs.
2.00 gallons (256 oz.)	5.90 lbs.
3.00 gallons (384 oz.)	8.85 lbs.
4.00 gallons (512 oz.)	11.80 lbs.
5.00 gallons (640 oz.)	14.75 lbs.

UL KG 9000 FS is designed to be sprayed through plural component equipment. Equipment must have material heat control capabilities, 1:1 by volume and sprayable with flat tips. Refer to equipment manufacturer for equipment specifics and accessories.

UL KG 9000 FS is tack free in one and half (1.5) to two (2) minutes. Prior to application, proper surface preparation is required. Surfaces must be clean, dry and in sound condition. Remove all oil, dust, grease, loose particles and rust.



UL KG 9000 FS

July 2020
Version: 2.0

TECHNICAL DATA SHEET

EQUIPMENT CLEAN UP

Xylene, Methyl Ethyl Ketone (MEK), Acetone, or Brake Clean are acceptable for cleanup of spray equipment, application tools, and for excess product removal.

MATERIAL STORAGE

UL KG 9000 FS has a shelf life of twelve (12) months from manufacture date in factory-sealed containers. UL KG 9000 FS should be stored between 65°F to 80°F (18°C to 27°C) and out of direct sunlight. Do not expose unused materials to high humidity conditions.

Always provide an airtight reseal for unused materials and store away from fire hazards.

SAFETY AND HANDLING

Please refer to safety data sheets (SDS) for safety and handling of this material. All personnel working with this material are expected to read and understand all safety recommendations per SDS. All Personal Protection Equipment must be properly worn to comply with worker health and safety requirements.

CHEMICAL TECHNICAL DATA

Conditions: 77°F and 50% Rel. Humidity	
Mix Ratio by Volume	1A:1B
Gel Time	20-30 seconds
Tack Free Time	1.5-2 minutes
Recoat Window	1 hour
Return to Service	24 hours
Density "A" Side (lbs/gal)	9.35 ± 0.5
Density "B" Side (lbs/gal)	8.80 ± 0.5
Viscosity "A" Side (cP)	350 ± 70
Viscosity "B" Side (cP)	90 ± 30

PHYSICAL PROPERTIES

TEST NAME	TEST METHOD	VALUE
Tensile Strength	ASTM D412	2700 psi
Elongation	ASTM D412	90%
Hardness	ASTM D2240	58 Shore D
Tear	ASTM D624	500 pli
Chip Resistance	ASTM D3170	Rated 10 No Failures
Taber Abrasion (mg loss/1000 cycles)	ASTM D4060	13 mg loss
Flammability of Interior Materials	FMVSS 302	Pass
UV Weathering Test	ASTM G154	Delta E 0.12 @ 1038 hrs.

CHEMICAL RESISTANCE

ASTM D1308 – 24 Hours Spot Test Under Watch-Glass at 77°F.

Chemical	Rating
Acetic Acid 10%	2
Ammonium Hydroxide 28-30%	1
Bleach	1
Brake Fluid, DOT 3	NR
Citric Acid 10%	1
Diesel	1
Distilled Water	1
Gasoline	1
Hydrochloric Acid 36-38%	3
Isopropyl Alcohol	1
Lactic Acid 45%	4
Phosphoric Acid 50%	2
Dawn Pot & Pan Detergent	1
Potassium Hydroxide 50%	1
Sodium Chloride 30%	1
Sodium Hydroxide 10%	2
Sodium Hydroxide 50%	3
Sulfuric Acid 10%	1
Sulfuric Acid 25%	4
Sulfuric Acid 95-98%	NR



UL KG 9000 FS

July 2020
Version: 2.0

TECHNICAL DATA SHEET

Toluene	NR
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Please contact your Ultimate Linings Technical Team for any questions regarding UL KG 9000 FS applications not referenced here.

RATING SYSTEM	
1	No Visible Damage
2	Little Visible Damage
3	Softening
4	Swelling and Softening
5	Discoloration
NR	Not Recommended

PRODUCT USER

Users of UL KG 9000 FS product are responsible for reading the general guidelines, training materials, product data sheets, specifications and safety data sheets (SDS) before using this material. Printed technical data and instructions are subject to change without notice. Contact your local Ultimate Linings representative for current technical data instructions.

PROJECT SPECIFIC

The following application details provide general guidelines for UL KG 9000 FS applications. All applications require proper surface preparation including the removal of all oil, dust, grease, loose particles and rust. Apply at 2-4 mils wet film thickness per coat for topcoat. Maximum thickness for stand-alone is 20 mils. Both the Isocyanate "A" Side and Resin "B" Side

PRODUCT DISCLAIMER

All guidelines, recommendations, statements, and technical data contained herein are based on information and tests we believe to be reliable and correct, but accuracy and completeness of said tests are not guaranteed and are not to be construed as a warranty, either expressed or implied. It is the user's responsibility to satisfy himself, by his own information and test, to determine suitability of the product for his own intended use, application and job situation and user assumes all risk and liability resulting from his use of the product. We do not suggest or guarantee that any hazards listed herein are the only ones that may exist. Neither seller nor manufacturer shall be liable to the buyer or any third person for any injury, loss or damage directly or indirectly resulting from use of, or inability to use, the product. Recommendations or statements, whether in writing or oral, other than those contained herein shall not be binding upon the manufacturer, unless in writing and signed by a corporate officer of the manufacturer. Technical and application information is provided for the purpose of establishing a general profile of the material and proper application procedures. Test performance results were obtained in a controlled environment and Ultimate Linings makes no claim that these tests or any other tests accurately represent all environments.

SPRAY APPLICATIONS

need to be heated to 160°F (71°C). UL KG 9000 FS should be sprayed with Plural Component Equipment. Please consult with your Technical Representative for further details. UL KG 9000 FS as topcoat should be applied to the base coat as soon as possible while the coating is warm, no later than 1 hour after base application.

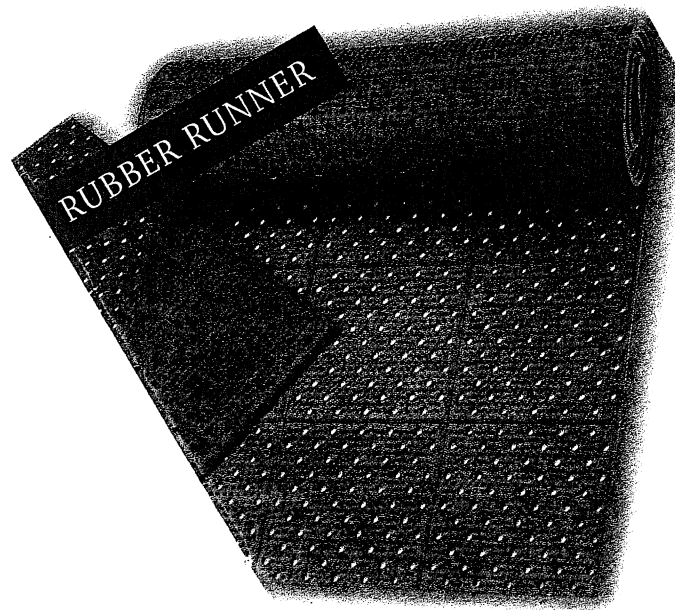
SPRAY OVER ALUMINUM OR GALVANIZED STEEL
<ul style="list-style-type: none"> SSPC 10: 2 to 3 Mil Surface Profile Depth Prime with FCP or XPM

SPRAY OVER FIBERGLASS
<ul style="list-style-type: none"> Sand using a 40 to 80 Grit Sandpaper Prime with FCP or XPM

PRODUCT DATA SHEET

SAFETY MATTING

MANUFACTURED FOR E.F.I. BY: Koneta/LRV
1400 Lunar Drive
Wapakoneta, Ohio 45895



Rubber Drainage Runner

Specifications

Medium duty 1/2" Thickness
Unique tread design for sure footing
Promotes safety in wet or oily areas
Open slot design
Open slot underside permits aeration
and drainage
Raised knob underside reduces fatigue
Color: Charcoal



ENGINEERED FLUID, INC.

P.O. DRAWER 723 • CENTRALIA, ILLINOIS 62801

JOB REF. NO. Standard

DRAWING NO. 1720-011305-01

Features

- Lightweight, low-cost valves for air service
- Ideal for low pressure applications
- Provides high flow, Cv up to 138 (Kv 118)
- Air and vacuum service

Construction

Valve Parts in Contact with Fluids	
Body	Aluminum
Seals, Diaphragms, Disc	NBR
Disc-Holder	PA (10.1 and 11.6 watt Normally Open only)
Core Guide	POM
Core Tube	305 Stainless Steel
Rider Rings	PTFE
Core and Plugnut	430F Stainless Steel
Springs*	302 Stainless Steel
Shading Coil	Copper

* For 8040H006, 8040H007, 8040H008, spring material is 17-7 PH

Electrical

Standard Coil and Class of Insulation	Watt Rating and Power Consumption				Spare Coil Part No.			
	DC Watts	AC			General Purpose		Explosionproof	
		Watts	VA Holding	VA Inrush	AC	DC	AC	DC
F	-	6.1	16	40	238210	-	238214	-
F	11.6	10.1	25	70	238610	238710	238614	238714
F	15.8	15.4	27	160	99257	501695	99257	501696
F	-	28.2	50	385	206409	-	206409	-

Standard Voltages: 24, 120, 240, 480 volts AC, 60 Hz (or 110, 220 volts AC, 50 Hz), 6, 12, 24, 120, 240 volts DC. Must be specified when ordering. Other voltages available when required. (Note: 24 volt AC, 60 Hz not available with 28.2 watt coil)

Solenoid Enclosures

Standard: RedHat II - Watertight, Types 1, 2, 3, 3S, 4, and 4X; RedHat - Type I.

Optional: RedHat II - Explosionproof and Watertight, Types 3, 3S, 4, 4X, 6, 6P, 7, and 9; RedHat - Explosionproof and Raintight, Types 3, 7, and 9.

(Except EF8215A40 and EF8215A90, which are suitable for Types 3 and 7 (C and D) only and have a T2B temperature rating code.)

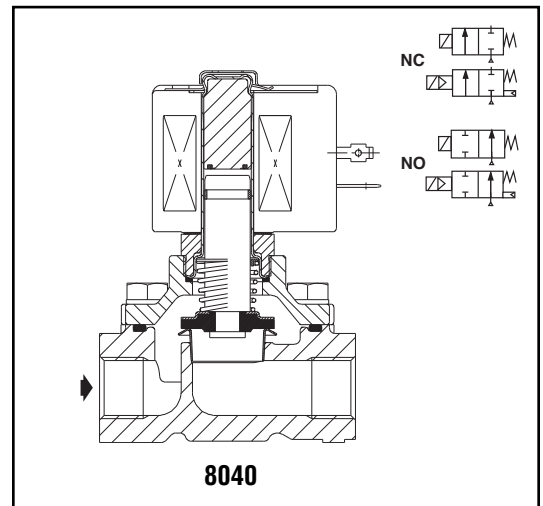
To order, add prefix "EF" to catalog number.

See *Optional Features Section* for other available options.

Nominal Ambient Temp. Ranges

Series	AC	DC
	RedHat II/RedHat	RedHat II
8040	-40°F to 125°F (-40°C to 52°C)	-
8215	32°F to 125°F (0°C to 52°C)	32°F to 104°F (0°C to 40°C)

Refer to Engineering Section for details.



Approvals:

CSA certified to:

8040 Series:

- 1) Standard C22.2 No. 139 "Electrically Operated Valves," File 10381.
- 2) Automatic Gas Valves Z21.21 (6.5) C/I, File 112872.
- 3) Automatic Gas Safety Shutoff Valves (3.9), File 112872.

8215 Series Normally Closed:

- 1) Standard C22.2 No. 139 "Electrically Operated Valves," File 10381.
- 2) Automatic Gas Valves Z21.21 (6.5) C/I, File 112872.

8215 Series Normally Open:

- 1) Standard C22.2 No. 139 "Electrically Operated Valves," File 10381.

UL listed, as indicated. FM approved (Normally Closed only, except Catalog Numbers 8215A090 and 8215A040). RedHat II meets applicable CE directives.

Refer to Engineering Section for details.

Specifications (English units)

Pipe Size (in)	Orifice Size (in)	Cv Flow Factor	Gas Capacity Btu/hr ⑥	Operating Pressure Differential (psi)			Max. Fluid Temp. °F		Aluminum Body Catalog Number	Const. Ref.		UL ⑤ Listing	Watt Rating/ Class of Coil Insulation ②	
				Min.	Max. AC	Max. DC	AC	DC		AC	DC		AC	DC
					Air-Fuel Gas	Air-Fuel Gas								
NORMALLY CLOSED (Closed when de-energized)														
1/8	5/16	1.0	53,700	0	15	-	125	-	8040H006	11	○	6.1/F	-	
1/4	5/16	1.1	59,000	0	15	-	125	-	8040H007	11	○	6.1/F	-	
3/8	5/16	1.2	64,400	0	15	-	125	-	8040H008	11	○	6.1/F	-	
3/8	3/4	3.4	183,000	0	50	25	125	104	8215G010	2	○	10.1/F	11.6/F	
3/8	3/4	3.5	-	5	125	125	125	104	8215G001 ①	1	○	6.1/F	11.6/F	
1/2	3/4	5.4	291,000	0	2	-	125	-	8040G022	13A	○	10.1/F	-	
1/2	3/4	4.4	238,500	0	50	25	125	104	8215G020	2	○	10.1/F	11.6/F	
1/2	3/4	4.8	-	5	125	125	125	104	8215G002 ①	1	○	6.1/F	11.6/F	
3/4	3/4	9.5	512,000	0	2	-	125	-	8040G023	13B	○	10.1/F	-	
3/4	3/4	5.1	247,500	0	50	25	125	104	8215G030	4	○	10.1/F	11.6/F	
3/4	3/4	5.1	-	5	125	125	125	104	8215G003 ①	3	○	6.1/F	11.6/F	
1	1 5/8	21	1,119,000	0	25	-	125	-	8215B050 ③	6	○	15.4/F	-	
1	1 5/8	21	1,119,000	0	-	25	-	104	8215G050 ③⑧⑨	16	○	-	15.8/F	
1 1/4	1 5/8	32	1,730,000	0	25	-	125	-	8215B060 ③	6	○	15.4/F	-	
1 1/4	1 5/8	32	1,730,000	0	-	25	-	104	8215G060 ③⑧⑨	16	○	-	15.8/F	
1 1/2	1 5/8	35	1,900,000	0	25	-	125	-	8215B070 ③	6	○	15.4/F	-	
1 1/2	1 5/8	35	1,900,000	0	-	25	-	104	8215G070 ③⑧⑨	16	○	-	15.8/F	
2	2 3/32	60	3,251,000	0	25	-	125	-	8215B080 ③	7	○	15.4/F	-	
2	2 3/32	60	3,251,000	0	-	15	-	104	8215G080 ③⑧⑨	17	○	-	15.8/F	
2 1/2	3	117	5,821,000	0	5	-	125	-	8215A090 ⑦	8	○	28.2/F	-	
3	3	138	7,430,000	0	5	-	125	-	8215A040 ⑦	8	○	28.2/F	-	
NORMALLY OPEN (Open when de-energized)														
3/8	3/4	3.2	172,500	0	125	125	125	104	8215G013	9	●	10.1/F	11.6/F	
1/2	3/4	4	206,250	0	125	125	125	104	8215G023	9	●	10.1/F	11.6/F	
3/4	3/4	4.6	247,500	0	125	125	125	104	8215G033	10	●	10.1/F	11.6/F	
1	1 5/8	22	1,191,750	0	25	15	125	104	8215C053	12	-	15.4/F	-	
1	1 5/8	22	1,191,750	0	25	15	125	104	8215G053 ⑧⑨	-	18	●	-	15.8/F
1 1/4	1 5/8	33	1,793,250	0	25	15	125	104	8215C063	12	-	15.4/F	-	
1 1/4	1 5/8	33	1,793,250	0	25	15	125	104	8215G063 ⑧⑨	-	18	●	-	15.8/F
1 1/2	1 5/8	37	1,988,250	0	25	15	125	104	8215C073	13	-	15.4/F	-	
1 1/2	1 5/8	37	1,988,250	0	25	15	125	104	8215G073 ⑧⑨	-	18	●	-	15.8/F
2	2 3/32	58	3,100,000	0	25	15	125	104	8215C083	14	-	15.4/F	-	
2	2 3/32	58	3,100,000	0	25	15	125	104	8215G083 ⑧⑨	-	19	●	-	15.8/F
2 1/2	3	117	6,290,000	0	5	-	125	-	8215B093 ④⑦	15	●	28.2/F	-	

① Do not use for Fuel Gas.

② On 50 hertz service, the watt rating for the 6.1/F solenoid is 8.1 watts.

③ FM Approved Process Control Valves. See Engineering Section (Approvals) for details.

④ Type I enclosure only.

⑤ ○ = Safety Shutoff Valve; ● = General Purpose Valve. Refer to Engineering Section (Approvals) for details.

⑥ 1" W.C. Drop @ 2" W.C. Inlet Pressure, 1,000 Btu/cu.ft. or more, 0.64 Specific Gravity Gas.

⑦ Not available with 24 volt, 60 Hz coil.

⑧ Coil options EF, HT, and HC only.

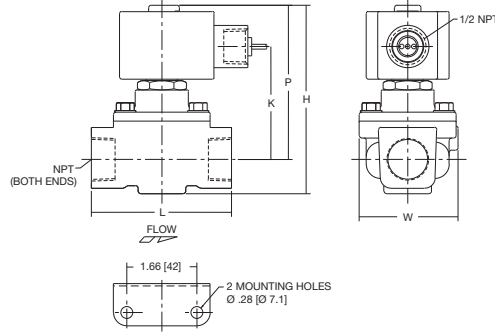
⑨ Not available with 6 VDC coil.

Dimensions: inches (mm)

Const. Ref.		H	K	L	P	W
1	in	3.42	2.00	2.75	2.87	2.46
	mm	87	51	70	73	63
2	ins	4.02	2.49	2.75	3.46	2.46
	mm	102	63	70	88	63
3	in	3.87	2.19	3.31	3.05	2.33
	mm	98	56	84	77	59
4	in	4.46	2.68	3.31	3.64	2.33
	mm	113	68	84	92	59
6 ①	in	6.84	4.25	5.00	5.59	5.38
	mm	174	108	127	142	137
7 ①	in	7.47	4.53	6.09	5.94	6.31
	mm	190	115	155	151	160
8 ①	in	10.25	5.75	7.79	7.91	7.94
	mm	260	146	198	201	202
9	in	4.42	2.72	2.75	3.86	2.36
	mm	112	69	70	98	60
10	in	4.86	2.72	3.31	4.04	2.36
	mm	123	69	84	103	60
11	in	2.74	1.44	2.00	2.30	1.69
	mm	69	36	51	58	43
12	in	6.84	2.22	5.00	3.63	5.38
	mm	174	56	127	92	137
13	in	6.84	2.16	5.00	3.56	5.38
	mm	174	55	127	90	137
13A	in	4.05	2.46	2.75	3.44	2.42
	mm	103	63	70	87	62
13B	in	4.49	2.65	3.31	3.63	2.39
	mm	114	67	84	92	61
14 ②	in	7.44	2.41	6.09	3.81	6.31
	mm	189	61	155	97	160
15 ②	in	10.25	3.07	7.80	5.22	7.94
	mm	260	78	198	133	202
16	in	6.7	4.4	5.00	5.5	5.38
	mm	171	111	127	139	137
17	in	7.3	4.7	6.1	5.8	6.31
	mm	186	120	155	148	160
18 ②	in	6.7	2.4	4.8	3.5	5.4
	mm	171	60	121	89	137
19 ②	in	7.3	2.6	6.1	3.7	6.3
	mm	187	66	155	95	161

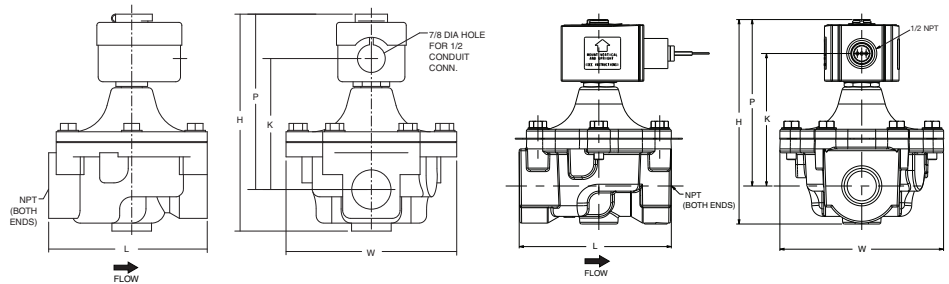
IMPORTANT: Valves may be mounted in any position except all DC constructions and those marked ①, which must be mounted with the solenoid vertical and upright. Constructions marked ② must be mounted with the solenoid vertical and upright or horizontal only.

Const. Ref. 1-4, 9, 10, 13A, 13B

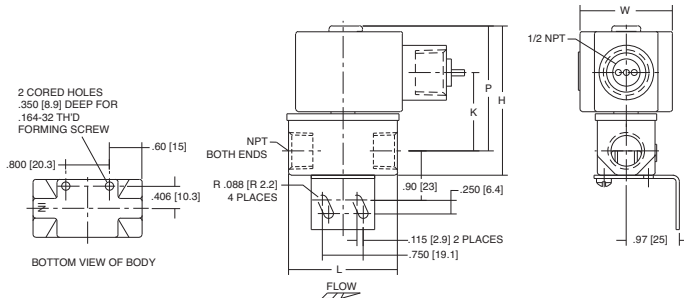


Const. Ref. 6, 7, 8

Const. Ref. 16, 17

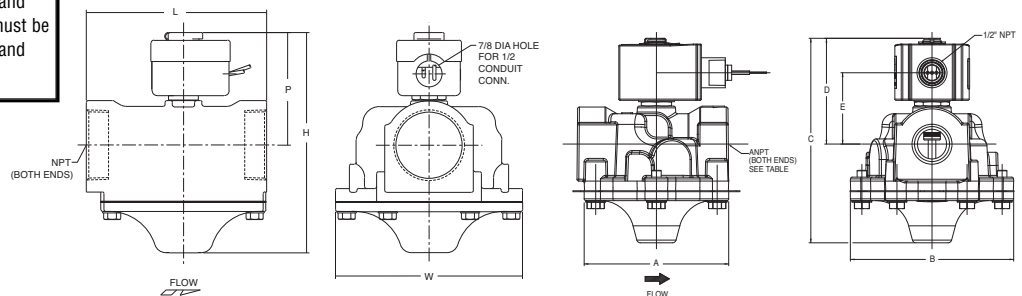


Const. Ref. 11



Const. Ref. 12-15

Const. Ref. 18-19



Maxim Silencers Industrial Insulation Blankets

INDUSTRIAL INSULATION BLANKETS OVERVIEW

Maxim Silencers custom removable industrial insulation blankets are designed for the marine, power generation, oil & gas markets. Our experience allow us to apply tested, proven and certified technology with superior design and choice of materials capable of withstanding the toughest conditions for your insulation needs. This combination of materials provides our insulated blankets with the ability to retain energy and provide higher efficiency of equipment plus providing noise reduction, safety and protection for personnel. Our Insulated Blankets help reduce engine compartment temperatures to an acceptable level. In some cases, the temperature of the engine compartment is a very critical issue, since it can affect the performance of surrounding equipment. Maxim Silencers industrial insulation blankets can solve this problem by bringing the temperature down.

We specialize in

- Exhaust Piping
- Silencers
- Catalytic Converters
- Manifolds
- Bellows
- Expansion Joints

Along with Exhaust Insulation Blankets, we have experience in insulation blankets for various other applications such as

- Industrial Heaters
- Acoustical Blankets
- Heat Exchangers
- Gas Turbines
- Steam Turbines
- Gate Valves



Maxim Silencers Industrial Insulation Blankets

THREE LAYER CONSTRUCTION

Outer Protective Cover: Silicone Coated Fiberglass Cloth - Style 725: The fiberglass base fabric that has been impregnated with a specially formulated silicone rubber compound. This silicone coating adds extended life, while providing greater oil and water resistance than uncoated fabrics, as well as low smoke and flame retardation. Style 725 is a fiberglass fabric that has been tested and meets MIL-I-20079G and meets NRC-136 and Military Spec. MIL-I-224244



Mat Insulation: High-density type "E" glass fibers: Mat Insulation is composed of 100% select grade high-density (11lbs./cu. ft.) type "E" glass fibers needled together into mat form. The mat is processed in such a way to maximize thermal efficiency. It is non-respirable, non-combustible, asbestos free and contains no resinous or inorganic binders. This Mat Insulation material has been tested and conforms to MIL-I-24244, USCG Subpart 164.009, ASTM E84 industry standards and NRC-136

Knitted Wire Mesh Liner: Made of 304 Stainless Steel (1500°F max. temp.) or 600 Inconel (2300°F max. temp.) In wire sizes .011", recommended for maximum strength and temperature extremes or .008" for intermediate applications. Proven to be the ideal material to enclose fiberglass blankets providing protection from fuel leaks, durability, and a slight air gap between the blanket material on the hot side.



FEATURES

- Custom Made
- Removable
- Reusable
- Flexible
- Thermal Insulation

BENEFITS

- Noise Reduction
- Energy Conservation
- Fireproofing
- Freeze Protection
- Employee Protection and Safety
- Maintain Temperatures
- Protect Equipment

SPECIFICATIONS

Temperature Range

- -67°F to 1200°F

Thickness

- Standard 1", available 1/2" - 4"

Outer Protective Cover

- Standard Style 725 silicone-coated fiberglass cloth, options available

Mat Insulation

- High-density (11 lbs./cu. ft.) type "E" glass fibers needled together into mat form

Inner Mesh Liner

- Standard 304 stainless steel mesh, or options available including Foil Liners

Construction

- Seams: 304 stainless steel "hog ring" staples (.065")

Attachments

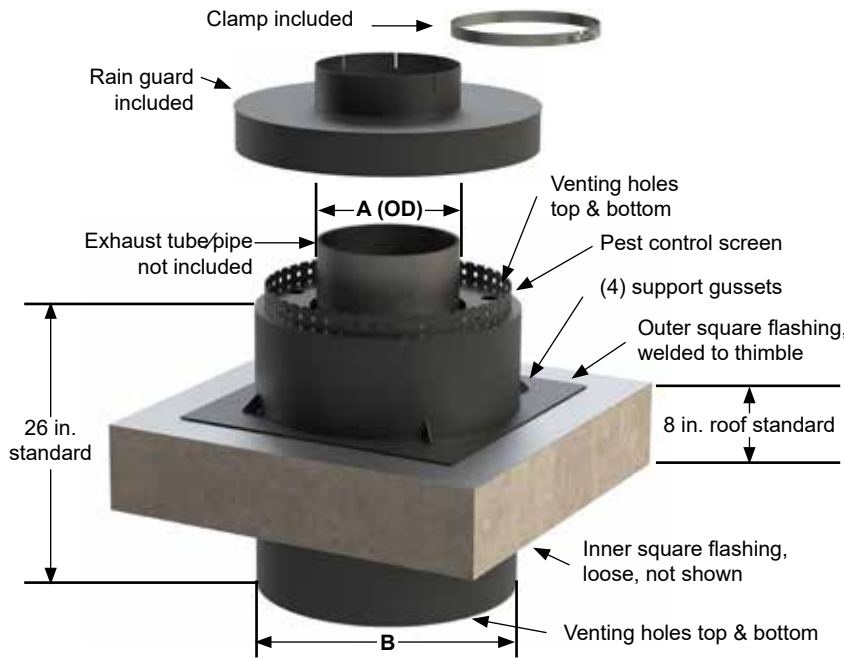
- Tie anchors, lacing hooks and washers: 304 stainless steel
- Tie wire: 16 gauge 304 stainless steel
- Tags, optional: Stainless steel

Specification Compliance

- MIL-I-24244
- NRC-136
- NFPA 255 & 110
- UL 492 (Self Extinguishing)
- ASTM E84 Industry Standards
- USCG Certificate 164.009/94/0

M-20 THIMBLES

Wall and Roof Thimbles



Wall and Roof Thimbles

- When calculating height thimble must have a 9" clearance on each side of the wall or roof.
- To prevent warping, outer flashing is not welded 100%.
- Be sure to include correct roof pitch on all roof applications. There is an additional charge for non-flat roof applications.
- Conforms to NFPA 37 and 110.
- Thimbles have been sized for standard (8") thick walls and roofs.
- Thermal barrier used within the thimbles is composed of high density, type "E" fibers, fibrous glass heavy-duty insulation.
- Please apply high-temp silicone caulking where needed.
- Pest Control Screen adds 2"-3" to exterior height.

Type A (Combustible Walls Only)				Type B (Roof & Non-Combustible Walls)			
Part Number	A (OD)	B	WT	Part Number	A (OD)	B	WT
M-20-A-200	2	14	52	M-20-B-200	2	9	38
M-20-A-238	2.38	15	53	M-20-B-238	2.38	9	39
M-20-A-250	2.5	15	53	M-20-B-250	2.5	9	39
M-20-A-288	2.88	15	57	M-20-B-288	2.88	10	43
M-20-A-300	3	15	57	M-20-B-300	3	10	43
M-20-A-350	3.5	16	58	M-20-B-350	3.5	10	44
M-20-A-400	4	16	66	M-20-B-400	4	11	46
M-20-A-450	4.5	17	68	M-20-B-450	4.5	11	49
M-20-A-500	5	17	88	M-20-B-500	5	12	60
M-20-A-556	5.56	18	90	M-20-B-556	5.56	12	61
M-20-A-600	6	18	98	M-20-B-600	6	13	69
M-20-A-663	6.63	19	100	M-20-B-663	6.63	13	70
M-20-A-800	8	20	114	M-20-B-800	8	15	84
M-20-A-863	8.63	21	117	M-20-B-863	8.63	15	86
M-20-A-1000	10	22	130	M-20-B-1000	10	17	104
M-20-A-1075	10.75	23	136	M-20-B-1075	10.75	17	108
M-20-A-1200	12	24	146	M-20-B-1200	12	19	117
M-20-A-1275	12.75	25	150	M-20-B-1275	12.75	19	121
M-20-A-1400	14	26	159	M-20-B-1400	14	20	131
M-20-A-1600	16	28	175	M-20-B-1600	16	22	145
M-20-A-1800	18	30	218	M-20-B-1800	18	26	180

Standard Schedule Pipe	
Pipe Size	A (OD)
2	2.38
2.5	2.88
3	3.50
4	4.50
5	5.56
6	6.63
8	8.63
10	10.75
12	12.75
14	14

A - dimension measures the outside diameter of the exhaust tube or pipe

- All dimensions are in inches. All weights are in pounds. Weights are approximate.
- Other sizes available, call for details.
- Carbon steel construction. Available in stainless steel.



M-22 RAIN CAPS

Stainless Steel Rain Caps

Standard (304 Stainless Steel)

Part Number	ID (Collar)
-------------	-------------

M-22-200-S	2
M-22-250-S	2.5
M-22-300-S	3
M-22-350-S	3.5
M-22-400-S	4
M-22-450-S	4.5
M-22-500-S	5
M-22-556-S	5.56
M-22-600-S	6
M-22-663-S	6.63
M-22-800-S	8

Recommended for vertical installation only.



Heavy Duty (304 Stainless Steel)

Part Number	ID (Collar)	Weight
-------------	-------------	--------

M-22-863-S	8.63	6
M-22-1000-S	10	7
M-22-1075-S	10.75	8
M-22-1200-S	12	9
M-22-1275-S	12.75	10
M-22-1400-S	14	26
M-22-1600-S	16	29
M-22-1800-S	18	43
M-22-2000-S	20	64
M-22-2200-S	22	72
M-22-2400-S	24	84

Recommended for vertical installation only.



- All dimensions are in inches. All weights are in pounds. Weights are approximate.
- Other sizes available, call for details.



No. V10



No. V11



No. V20

1.0 PRODUCT DESCRIPTION

Available Sizes

- 2 – 12"/DN50 – DN300

Pipe Material

- Carbon steel

Maximum Working Pressure

- 400 psi/2758 kPa

Application

- Connects pipe and provides change in direction
- Supplied with Victaulic Original Groove System (OGS) grooved ends
- Exclusively for use with Victaulic couplings, valves, accessories and pipe which feature ends formed with the Victaulic OGS groove profile

NOTES

- QuickVic™ grooved end fittings are intended for use only in grooved piping systems and are not intended for use with Victaulic plain end couplings.
- QuickVic™ grooved end fittings shall not be used with flange adapters, such as the Victaulic Style 741 or 743 *Vic-Flange* Adapters. When connecting to flanged components, a No. V15 or No. V16 flanged elbow shall be used.

2.0 CERTIFICATION/LISTINGS

Product designed and manufactured under the Victaulic Quality Management System, as certified by LPCB in accordance with ISO-9001:2015.

3.0 SPECIFICATIONS - MATERIAL

Fitting: Ductile iron conforming to ASTM A536, Grade 65-45-12.

Fitting Coating: (specify choice)

- Standard: Orange coating.
- Optional: Hot dipped galvanized as per ASTM A123.

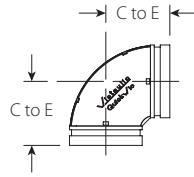
ALWAYS REFER TO ANY NOTIFICATIONS AT THE END OF THIS DOCUMENT REGARDING PRODUCT INSTALLATION, MAINTENANCE OR SUPPORT.

4.0 DIMENSIONS

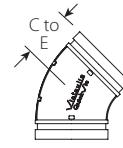
Elbows

No. V10 90° Elbow

No. V11 45° Elbow



No. V10



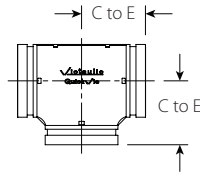
No. V11

Size		No. V10 90° Elbow		No. V11 45° Elbow	
Nominal inches DN	Actual Outside Diameter inches mm	C to E inches mm	Approx. Wgt. (Each) lb kg	C to E inches mm	Approx. Wgt. (Each) lb kg
2 DN50	2.375 60.3	2.75 70	1.5 0.7	2.00 51	1.2 0.5
2 ½	2.875 73.0	3.00 77	2.2 1.0	2.25 58	1.7 0.8
3 DN80	3.500 88.9	3.50 86	2.9 1.4	2.50 64	2.3 1.0
4 DN100	4.500 114.3	4.00 102	4.4 2.0	3.00 77	3.7 1.7
5	5.563 141.3	4.88 124	7.3 3.3	3.25 83	5.4 2.4
6 DN150	6.625 168.3	5.50 140	10.8 4.9	3.50 89	7.4 3.4
8 DN200	8.625 219.1	6.88 173	25.4 11.5	4.25 108	18.9 8.6
10 DN250	10.750 273.0	8.25 210	41.0 18.6	4.00 102	25.0 11.3
12 DN300	12.750 323.9	9.50 239	66.3 30.1	4.50 115	35.9 16.3

4.1 DIMENSIONS

Tee

No. V20 Straight Tee



No. V20

Size		No. V20 Straight Tee	
Nominal	Actual Outside Diameter	C to E	Approx. Wgt. (Each)
inches DN	inches mm	inches mm	lb kg
2 DN50	2.375 60.3	2.75 70	2.1 0.95
2 ½	2.875 73.0	3.00 77	2.2 1.5
3 DN80	3.500 88.9	3.50 86	4.8 2.2
4 DN100	4.500 114.3	4.00 102	6.0 2.7
5	5.563 141.3	4.88 124	14.4 6.5
6 DN150	6.625 168.3	5.50 140	20.0 9.1
8 DN200	8.625 219.1	6.88 173	36.9 16.8
10 DN250	10.750 273.0	8.25 210	63.6 28.8
12 DN300	12.750 323.9	9.50 239	90.3 41.0

4.2 DIMENSIONS

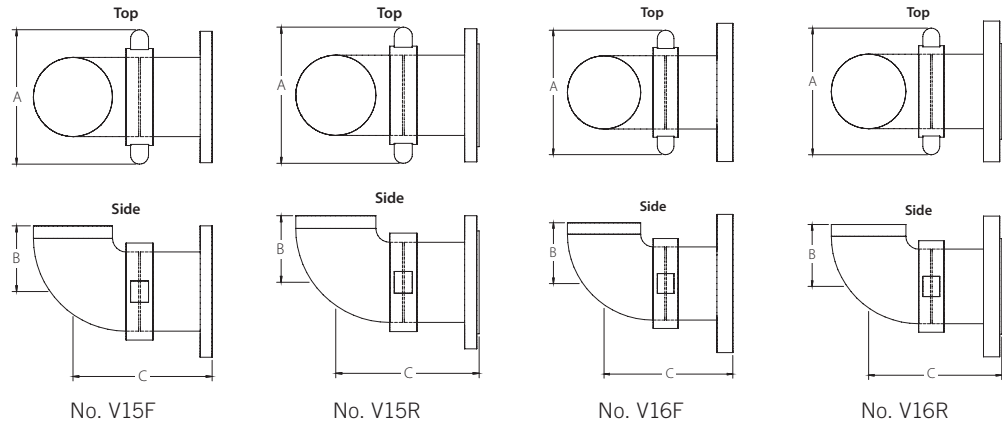
Flanged Elbows

No. V15F ANSI Class 150 Flanged Elbow (Flat Face)

No. V15R ANSI Class 150 Flanged Elbow (Raised Face)

No. V16F ANSI Class 300 Flanged Elbow (Flat Face)

No. V16R ANSI Class 300 Flanged Elbow (Raised Face)



Size		No. V15F and No. V15R ANSI Class 150 Flanged Elbow				No. V16F and No. V16R ANSI Class 300 Flanged Elbow			
Nominal inches DN	Actual Outside Diameter inches mm	A inches mm	B inches mm	C inches mm	Approx. Weight (Each) lb kg	A inches mm	B inches mm	C inches mm	Approx. Weight (Each) lb kg
2 DN50	2.375 60.3	6.13 156	2.75 70	6.88 175	10.2 4.6	6.13 156	2.75 70	6.88 175	12.4 5.6
2½	2.875 73.0	6.75 171	3.00 76	7.13 181	14.9 6.8	6.75 171	3.00 76	7.13 181	16.9 7.7
3 DN80	3.500 88.9	7.50 191	3.50 89	7.63 194	18.1 8.2	7.50 191	3.50 89	7.63 194	22.9 10.4
4 DN100	4.500 114.3	8.75 222	4.00 102	10.13 257	27.7 12.6	8.75 222	4.00 102	10.13 257	36.6 16.6
6 DN150	6.625 168.3	11.25 286	5.50 140	11.63 295	45.4 20.6	11.25 286	5.50 140	11.63 295	65.4 29.7
8 DN200	8.625 219.1	14.25 362	6.88 175	13.06 332	82.4 37.4	14.25 362	6.88 175	13.06 332	111.4 50.5
10 DN250	10.750 273.0	17.13 435	8.25 210	16.44 418	129.8 58.9	17.13 435	8.25 210	16.44 418	166.6 75.6
12 DN300	12.750 323.9	19.00 483	9.50 241	17.69 449	183.2 83.1	19.00 483	9.50 241	17.69 449	241.4 109.5

5.0 PERFORMANCE

Flow Data







Frictional Resistance

This chart expresses the frictional resistance of the Victaulic QuickVic™ Grooved End Fittings as equivalent feet of straight pipe.

Size		No. V10 90° Elbow	No. V11 45° Elbow	No. V20 Tee	
Nominal inches DN	Actual Outside Diameter inches mm			Branch ft m	Run ft m
2 DN50	2.375 60.3	3.5 1.1	1.8 0.5	8.5 2.6	3.5 1.1
2½	2.875 73.0	4.3 1.3	2.2 0.7	10.8 3.3	4.3 1.3
3 DN80	3.500 88.9	5.0 1.5	2.6 0.8	13.0 4.0	5.0 1.5
4 DN100	4.500 114.3	6.8 2.1	3.4 1.0	16.0 4.9	6.8 2.1
5	5.563 141.3	8.5 2.6	4.2 1.3	21.0 6.4	8.5 2.6
6 DN150	6.625 168.3	10.0 3.0	5.0 1.5	25.0 7.6	10.0 3.0
8 DN200	8.625 219.1	13.0 4.0	6.5 2.0	33.0 10.1	13.0 4.0
10 DN250	10.750 273.0	17.0 5.2	8.3 2.5	41.0 12.5	17.0 5.2
12 DN300	12.750 323.9	20.0 6.1	10.0 3.0	50.0 15.2	20.0 6.1

6.0 NOTIFICATIONS

⚠ WARNING



- Read and understand all instructions before attempting to install, remove, adjust, or maintain any Victaulic piping products.
- Always verify that the piping system has been completely depressurized and drained immediately prior to installation, removal, adjustment, or maintenance of any Victaulic products.
- Wear safety glasses, hardhat, and foot protection.

Failure to follow these instructions could result in death or serious personal injury and property damage.

7.0 REFERENCE MATERIALS

[06.33: Victaulic QuickVic™ Installation-Ready™ Rigid Coupling Style 107V](#)

[07.01: Victaulic OGS Grooved End Fittings](#)

[29.01: Victaulic Terms and Conditions of Sale](#)

[I-100: Victaulic Field Installation Handbook](#)

User Responsibility for Product Selection and Suitability

Each user bears final responsibility for making a determination as to the suitability of Victaulic products for a particular end-use application, in accordance with industry standards and project specifications, and the applicable building codes and related regulations as well as Victaulic performance, maintenance, safety, and warning instructions. Nothing in this or any other document, nor any verbal recommendation, advice, or opinion from any Victaulic employee, shall be deemed to alter, vary, supersede, or waive any provision of Victaulic Company's standard conditions of sale, installation guide, or this disclaimer.

Intellectual Property Rights

No statement contained herein concerning a possible or suggested use of any material, product, service, or design is intended, or should be construed, to grant any license under any patent or other intellectual property right of Victaulic or any of its subsidiaries or affiliates covering such use or design, or as a recommendation for the use of such material, product, service, or design in the infringement of any patent or other intellectual property right. The terms "Patented" or "Patent Pending" refer to design or utility patents or patent applications for articles and/or methods of use in the United States and/or other countries.

Note

This product shall be manufactured by Victaulic or to Victaulic specifications. All products to be installed in accordance with current Victaulic installation/assembly instructions. Victaulic reserves the right to change product specifications, designs and standard equipment without notice and without incurring obligations.

Installation

Reference should always be made to the Victaulic installation handbook or installation instructions of the product you are installing. Handbooks are included with each shipment of Victaulic products, providing complete installation and assembly data, and are available in PDF format on our website at www.victaulic.com.

Warranty

Refer to the Warranty section of the current Price List or contact Victaulic for details.

Trademarks

Victaulic and all other Victaulic marks are the trademarks or registered trademarks of Victaulic Company, and/or its affiliated entities, in the U.S. and/or other countries.

Victaulic® QuickVic™ Rigid Coupling

Style 107N



2 – 12"/DN50 – DN300

1.0 PRODUCT DESCRIPTION

Available Sizes

- 2 – 12"/DN50 – DN300

Pipe Material

- Carbon steel; Stainless steel.
- For exceptions reference section 6.0 Notifications.

Maximum Working Pressure

- Accommodates pressures ranging from full vacuum (29.9 in Hg/760 mm Hg) up to 750 psi/5171 kPa.
- Working pressure dependent on material, wall thickness and size of pipe.

Operating Temperature

- Dependent on gasket selection from section 3.0.

Function

- Joins carbon steel and/or stainless steel pipe prepared with the Victaulic Original Groove System (OGS) groove profile.
- Provides a rigid pipe joint designed to restrict axial or angular movement.

NOTE

- Applications that require NSF 61-approved products should specify the Victaulic Installation-Ready™ Rigid Coupling Style 807N ([publication 06.28](#)).

Pipe Preparation

- Cut or roll grooved in accordance with [publication 25.01](#): Victaulic Standard Groove Specifications.

Codes and Requirements

- Hanger support spacing corresponds to ASME B31.1 Power Piping Code and ASME B31.9 Building Services Piping Code.

2.0 CERTIFICATION/LISTINGS



LPS 1219: Issue 3.1
Cert/LPCB Ref. 104-1a/37

EN 10311
CPR (EU)
No. 305/2011

BS EN 10311
CPR (UK)
2019 No. 465

NOTE

- See [publication 10.01](#) for Fire Protection Certifications/Listings Reference Guide.

ALWAYS REFER TO ANY NOTIFICATIONS AT THE END OF THIS DOCUMENT REGARDING PRODUCT INSTALLATION, MAINTENANCE OR SUPPORT.

3.0 SPECIFICATIONS - MATERIAL

Housing: Ductile iron conforming to ASTM A536, Grade 65-45-12. Ductile iron conforming to ASTM A395, Grade 65-45-15, is available upon special request.

Housing Coating: (specify choice)

- Standard: Orange coating.
- Optional: Hot dipped galvanized conforming to ASTM A123.
- Optional: Contact Victaulic with your requirements for other coatings.

Gasket: (specify choice¹)

Grade "EHP" EPDM

EHP (Red and Green or Yellow and Green Stripes color code). Temperature range -30°F to +250°F/-34°C to +121°C. May be specified for hot water service within the specified temperature range plus a variety of dilute acids, oil-free air and many chemical services. NOT COMPATIBLE FOR PETROLEUM SERVICES.

Grade "T" Nitrile

Nitrile (Orange stripe color code). Temperature range -20°F to +180°F/-29°C to +82°C. May be specified for petroleum products, air with oil vapors, and vegetable and mineral oils within the specified temperature range. Not compatible for hot water services over +150°F/+66°C or for hot dry air over +140°F/+60°C.

Grade "O" Fluoroelastomer

Fluoroelastomer (Blue stripe color code). Temperature range +20°F to +300°F/-7°C to +149°C. May be specified for many oxidizing acids, petroleum oils, halogenated hydrocarbons, lubricants, hydraulic fluids, organic liquids and air with hydrocarbons. NOT COMPATIBLE FOR USE WITH HOT WATER SERVICES OR STEAM SERVICES.

Others

For alternate gasket selection, reference [publication 05.01](#): Victaulic Seal Selection Guide - Elastometric Seal Construction.

¹ Services listed are General Service Guidelines only. It should be noted that there are services for which these gaskets are not compatible. Reference should always be made to the latest [Victaulic Seal Selection Guide](#) for specific gasket service guidelines and for a listing of services which are not compatible.

NOTES

- Victaulic reserves the right to substitute equivalent and/or higher grade elastomer products.
- For Grade EHP EPDM Gasket reference [publication 06.33](#) for the Style 107V.

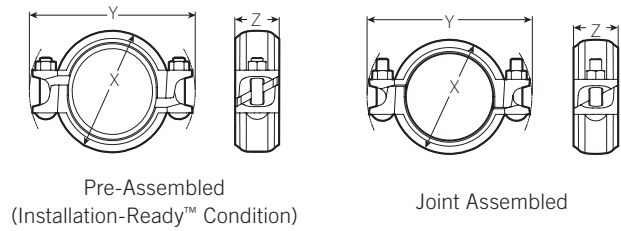
Bolts/Nuts: (specify choice²)

- Standard: Carbon steel oval neck track bolts meeting the mechanical property requirements of ASTM A449 (imperial) and ISO 898-1 Class 9.8 (M10-M16) Class 8.8 (M20 and greater). Carbon steel hex nuts meeting the mechanical property requirements of ASTM A563 Grade B (imperial - heavy hex nuts) and ASTM A563M Class 9 (metric - hex nuts). Track bolts and hex nuts are zinc electroplated per ASTM B633 FE/ZN5, finish Type III (imperial) or Type II (metric).
- Optional: Stainless steel oval neck track bolts meeting the mechanical property requirements of ASTM F593, Group 2 (316 stainless steel), condition CW. Stainless steel heavy nuts meeting the mechanical property requirements of ASTM F594, Group 2 (316 stainless steel), condition CW. Bolts and nuts include galling reducing coating.²

² Optional bolts/nuts are available in imperial size only.

4.0 DIMENSIONS

Style 107N QuickVic™ Rigid Coupling



Size		Pipe End Separation ³		Bolt/Nut ⁴		Dimensions					Weight	
Nominal inches DN	Actual Outside Diameter inches mm	Allowable inches mm	Qty.	Size inches mm	Pre-Assembled (Installation-Ready™ Condition)		Joint Assembled			Approximate (Each) lb kg		
					X inches mm	Y inches mm	X inches mm	Y inches mm	Z inches mm			
2 DN50	2.375 60.3	0.15 3.8	2	½ x 3 M12 x 76	4.00 100	6.13 156	3.63 92	6.13 156	2.13 54	2.7 1.2		
2 ½	2.875 73.0	0.15 3.8	2	½ x 3 M12 x 76	4.50 114	6.75 171	4.00 102	6.75 171	2.13 54	3.0 1.4		
DN65	3.000 76.1	0.15 3.8	2	½ x 3 M12 x 76	4.63 118	6.88 175	4.13 105	6.88 175	2.13 54	3.1 1.4		
3 DN80	3.500 88.9	0.15 3.8	2	½ x 3 ¼ M12 x 83	5.25 133	7.38 187	4.63 118	7.50 191	2.13 54	3.7 1.7		
4 DN100	4.500 114.3	0.15 3.8	2	½ x 3 ¼ M12 x 83	6.63 168	8.75 222	5.88 149	8.75 222	2.13 54	5.1 2.3		
	4.250 108.0	0.15 3.8	2	½ x 3 ¼ M12 x 83	6.38 162	8.50 216	5.75 146	8.50 216	2.13 54	4.7 2.1		
5	5.563 141.3	0.15 3.8	2	¾ x 4 M16 x 101	7.75 197	10.25 260	7.13 181	10.25 260	2.25 57	7.0 3.2		
	5.250 133.0	0.15 3.8	2	¾ x 4 M16 x 101	7.50 191	10.00 254	6.75 171	9.88 251	2.25 57	6.1 3.0		
DN125	5.500 139.7	0.15 3.8	2	¾ x 4 M16 x 101	7.75 197	10.25 260	7.00 178	10.13 257	2.25 57	6.7 3.0		
6 DN150	6.625 168.3	0.15 3.8	2	¾ x 4 M16 x 101	8.88 226	11.38 289	8.13 207	11.25 286	2.25 57	8.2 3.7		
	6.250 159.0	0.15 3.8	2	¾ x 4 M16 x 101	8.50 216	11.00 279	7.75 197	10.88 276	2.25 57	7.6 3.4		
	6.500 165.1	0.15 3.8	2	¾ x 4 M16 x 101	8.75 222	11.25 286	8.00 203	11.13 283	2.25 57	7.9 3.6		
	8.515 216.3	0.20 5.1	2	¾ x 5 M20 x 127	11.25 286	14.25 362	10.38 264	14.13 359	2.63 67	15.0 6.8		
8 DN200	8.625 219.1	0.20 5.1	2	¾ x 5 M20 x 127	11.25 286	14.37 365	10.50 267	14.25 362	2.63 67	15.1 6.8		
267.4mm	10.528 267.4	0.20 5.1	2	7/8 x 6 ½ M22 x 165	13.50 343	16.75 425	12.50 318	16.38 416	2.63 67	23.5 10.7		
10 DN250	10.750 273.0	0.20 5.1	2	7/8 x 6 ½ M22 x 165	13.75 349	17.00 432	13.00 330	17.13 435	2.75 70	23.6 10.7		
318.5mm	12.539 318.5	0.20 5.1	2	7/8 x 6 ½ M22 x 165	15.50 394	18.63 473	14.63 372	18.50 470	2.63 67	26.9 12.2		
12 DN300	12.750 323.9	0.20 5.1	2	7/8 x 6 ½ M22 x 165	15.63 397	19.00 483	15.00 381	19.00 483	2.75 70	27.2 12.3		

³ The Allowable Pipe End Separation dimension shown is for system layout purposes only. Style 107N Installation-Ready™ rigid couplings are considered rigid connections and will not accommodate expansion/contraction or angular movement of the piping system. Contact Victaulic for torsional resistance information.

⁴ Number of bolts required equals number of housing segments.

5.0 PERFORMANCE

Style 107N QuickVic™ Rigid Coupling – ANSI Standard

Size		Schedule 10			Standard		
Nominal	Actual Outside Diameter	Wall Thickness	Maximum Joint Working Pressure ⁵	Maximum Permissible End Load ⁵	Wall Thickness	Maximum Joint Working Pressure ⁵	Maximum Permissible End Load ⁵
inches DN	inches mm	inches mm	psi kPa	lb N	inches mm	psi kPa	lb N
2 DN50	2.375 60.3	0.109 2.8	750 5171	3323 14781	0.154 3.9	750 5170	3323 14780
2 ½	2.875 73.0	0.120 3.1	600 4135	3895 17325	0.203 5.2	750 5170	4869 21658
3 DN80	3.500 88.9	0.120 3.1	600 4135	5773 25680	0.216 5.5	750 5170	7216 32098
4 DN100	4.500 114.3	0.120 3.1	600 4135	9543 42449	0.237 6.0	750 5170	11928 53058
5	5.563 141.3	0.134 3.4	500 3447	12153 54059	0.258 6.6	750 5171	18229 81087
6 DN150	6.625 168.3	0.134 3.4	500 3450	17236 76670	0.280 7.1	700 4825	24130 107335
8 DN200	8.625 219.1	0.148 3.8	300 2070	17528 77970	0.322 8.2	600 4135	35056 155936
10 DN250	10.750 273.0	0.165 4.2	300 2065	27200 121040	0.365 9.3	500 3450	45400 202030
12 DN300	12.750 323.9	0.180 4.6	300 2065	38300 170380	0.375 9.5	400 2750	51000 226950

⁵ Working Pressure and End Load are total, from all internal and external loads, based on ANSI B36.10 sized carbon steel pipe, grooved in accordance with Victaulic specifications. Contact Victaulic for performance on other pipe.

NOTES

- WARNING: FOR ONE-TIME FIELD TEST ONLY, the Maximum Joint Working Pressure may be increased to 1½ times the figures shown.
- LPCB and VdS approved for DIN wall pipe (6.3mm thickness) for 10" rated to 232 psi/16 bar, (7.8mm thickness) for 12" rated to 232 psi/16 bar.
- FM approved on schedule 10 pipe: 2-4 inch sizes rated to 400 psi/28 bar; 5-6 inch sizes rated to 300 psi/21 bar; and 8 and 10 inch sizes (.188" wall thickness) rated to 300 psi/21 bar. FM approved on standard pipe: 2-4 inch sizes rated to 600 psi/41 bar; 5-6 inch sizes rated to 500 psi/34 bar; and 10 and 12 inch sizes rated to 400 psi/28 bar. Includes all metric sizes in range.
- UL listed on schedule 10 pipe: 2, 2 ½, 3 and 4 inch sizes rated to 400 psi; and 6, 8 and 10 inch sizes rated to 300 psi. Standard pipe: 2, 2 ½ and 3 inch sizes rated to 600 psi; 4 inch rated to 450 psi; and 6, 8, 10 and 12 inch sizes rated to 400 psi.

5.1 PERFORMANCE

Style 107N QuickVic™ Rigid Coupling – ISO Standard

Size		ISO Wall Pipe					
Nominal inches DN	Actual Outside Diameter inches mm	Wall Thickness inches mm	Maximum Joint Working Pressure ⁶ psi kPa	Maximum Permissible End Load ⁶ lb N	Wall Thickness inches mm	Maximum Joint Working Pressure ⁶ psi kPa	Maximum Permissible End Load ⁶ lb N
2 50	2.375 60.3	0.091 2.3	750 5171	3323 14781	0.157 4.0	750 5171	3323 14780
DN65	3.000 76.1	0.150 3.8	600 4135	4239 18856	0.200 5.1	750 5170	5299 73571
3 80	3.500 88.9	0.114 2.9	600 4135	5773 25680	0.197 5.0	750 5171	7216 32098
4 100	4.500 114.3	0.126 3.2	600 4137	9543 42449	0.220 5.6	750 5171	11928 53058
	4.250 108.0	0.114 2.3	600 4135	8507 37841	0.220 5.6	750 5170	10634 47302
	5.250 133.0	0.142 3.6	500 3447	10818 48121	0.248 6.3	750 5170	16227 72181
DN125	5.500 139.7	0.150 3.8	500 3447	11873 52814	0.220 5.6	750 5170	17810 79223
6 150	6.625 168.3	0.157 4.0	500 3450	17236 76670	0.280 7.1	700 4826	24130 107335
	6.250 159.0	0.197 5.0	500 3447	15332 68200	0.276 7.0	700 4825	21465 95481
	6.500 165.1	0.134 3.4	500 3447	16583 73765	0.276 7.0	700 4825	23216 103270
	8.515 216.3	0.228 5.8	300 2070	17075 75953	0.315 8.0	600 4135	34150 151907
8 200	8.625 219.1	0.177 4.5	300 2070	17528 77970	0.315 8.0	600 4137	35056 155936
267.4 mm	10.528 267.4	0.188 4.8	300 2065	26116 116170	0.365 9.3	500 3450	43526 193613
10 250	10.750 273.0	0.228 5.8	300 2065	27200 121040	0.248 6.3	500 3450	45400 202030
318.5 mm	12.539 318.5	0.188 4.8	300 2065	37000 164797	0.406 10.3	400 2750	49394 219715
12 300	12.750 323.9	0.264 6.7	300 2065	38300 107380	0.307 7.8	400 2750	51000 226950

⁶ Working Pressure and End Load are total, from all internal and external loads, based on ISO 4200 sized carbon steel pipe, grooved in accordance with Victaulic specifications. Contact Victaulic for performance on other pipe.

NOTES

- WARNING: FOR ONE-TIME FIELD TEST ONLY, the Maximum Joint Working Pressure may be increased to 1½ times the figures shown.
- LPCB and VdS approved for DIN wall pipe (6.3mm thickness) for 10" rated to 232 psi/16 bar, (7.8mm thickness) for 12" rated to 232 psi/16 bar.
- FM approved on schedule 10 pipe: 2-4 inch sizes rated to 400 psi/28 bar; 5-6 inch sizes rated to 300 psi/21 bar; and 8 and 10 inch sizes (.188" wall thickness) rated to 300 psi/21 bar. FM approved on schedule 40 pipe: 2-4 inch sizes rated to 600 psi/41 bar; 5-6 inch sizes rated to 500 psi/34 bar; and 10 and 12 inch sizes rated to 400 psi/28 bar. Includes all metric sizes in range.
- UL listed on schedule 10 pipe: 2, 2½, 3 and 4 inch sizes rated to 400 psi; and 6, 8 and 10 inch sizes rated to 300 psi. Schedule 40 pipe: 2, 2½ and 3 inch sizes rated to 600 psi; 4 inch rated to 450 psi; and 6, 8, 10 and 12 inch sizes rated to 400 psi.
- Sizes 267.4 mm and 318.5 mm are not UL Listed or FM Approved.

6.0 NOTIFICATIONS

WARNING



- Read and understand all instructions before attempting to install, remove, adjust, or maintain any Victaulic piping products.
- Depressurize and drain the piping system before attempting to install, remove, adjust, or maintain any Victaulic piping products.
- Wear safety glasses, hardhat, and foot protection.

Failure to follow these instructions could result in death or serious personal injury and property damage.

WARNING

- Victaulic RX roll sets must be used when grooving light-wall/thin-wall stainless steel pipe for use with Victaulic Couplings.

Failure to use Victaulic RX roll sets when grooving light-wall/thin-wall stainless steel pipe may cause joint failure, resulting in serious personal injury and/or property damage.

NOTICE

- Victaulic RX grooving rolls must be ordered separately. They are identified by a silver color and the designation RX on the front of the roll sets.

WARNING

- When assembling Style 107N Couplings onto end caps, take additional care to ensure the end cap is seated fully against the center leg of the gasket.
- Use only Victaulic End Caps containing the “QV” or “EZ QV” marking on the inside face.
- Victaulic recommends the use of Victaulic fittings with Style 107N Couplings.

Failure to follow this instruction could cause improper product installation, resulting in personal injury and/or property damage.

NOTICE

- Victaulic does not recommend the use of any furnace butt-welded pipe with sizes NPS 2”/DN50 and smaller Victaulic gasketed joint products. This includes, but is not limited to, ASTM A53 Type F pipe.

7.0 REFERENCE MATERIALS

[05.01: Victaulic Seal Selection Guide](#)

[06.15: Victaulic Pressure Ratings and End Loads for Victaulic Couplings on Steel Pipe](#)

[06.28: Victaulic QuickVic™ Installation-Ready™ Rigid Coupling for Potable Water Applications Style 807N](#)

[06.33: Victaulic® QuickVic™ Rigid Coupling Style 107V](#)

[10.01: Victaulic Fire Protection Certifications/Listings Reference Guide](#)

[17.01: Victaulic Pipe Preparation for Use on Stainless Steel Pipe With Victaulic Products](#)

[17.09: Victaulic Pressure Ratings and End Loads for Victaulic Ductile Iron Grooved Couplings on Stainless Steel Pipe](#)

[25.01: Victaulic Standard Groove Specifications](#)

[26.01: Victaulic Design Data](#)

[29.01: Victaulic Terms and Conditions of Sale](#)

[I-100: Victaulic Field Installation Handbook](#)

[I-107N: Victaulic Installation Instructions - Style 107N QuickVic™ Installation-Ready™ Rigid Coupling](#)

[I-ENDCAP: Victaulic End Cap Installation Safety Instructions](#)

[I-IMPACT: Victaulic Impact Tool Usage Guidelines](#)

User Responsibility for Product Selection and Suitability

Each user bears final responsibility for making a determination as to the suitability of Victaulic products for a particular end-use application, in accordance with industry standards and project specifications, as well as Victaulic performance, maintenance, safety, and warning instructions. Nothing in this or any other document, nor any verbal recommendation, advice, or opinion from any Victaulic employee, shall be deemed to alter, vary, supersede, or waive any provision of Victaulic Company's standard conditions of sale, installation guide, or this disclaimer.

Intellectual Property Rights

No statement contained herein concerning a possible or suggested use of any material, product, service, or design is intended, or should be construed, to grant any license under any patent or other intellectual property right of Victaulic or any of its subsidiaries or affiliates covering such use or design, or as a recommendation for the use of such material, product, service, or design in the infringement of any patent or other intellectual property right. The terms "Patented" or "Patent Pending" refer to design or utility patents or patent applications for articles and/or methods of use in the United States and/or other countries.

Note

This product shall be manufactured by Victaulic or to Victaulic specifications. All products to be installed in accordance with current Victaulic installation/assembly instructions. Victaulic reserves the right to change product specifications, designs and standard equipment without notice and without incurring obligations.

Installation

Reference should always be made to the Victaulic installation handbook or installation instructions of the product you are installing. Handbooks are included with each shipment of Victaulic products, providing complete installation and assembly data, and are available in PDF format on our website at www.victaulic.com.

Warranty

Refer to the Warranty section of the current Price List or contact Victaulic for details.

Trademarks

Victaulic and all other Victaulic marks are the trademarks or registered trademarks of Victaulic Company, and/or its affiliated entities, in the U.S. and/or other countries.



2 in. x 21 ft. Galvanized Plain End Schedule 10 Pipe

Part #DGPPEA135S10K | Item #862058

Call for Pricing

[Log In / Create Account](#)

Packaging Info:

Quantity Per Foot: 1, Stick: 21

How to get it:

 **Pick Up Not Available**
0 in [Paducah, KY](#) ▾

 **Shipping**
Call for Availability: [\(270\) 575-0066](#)



Product Details

Specifications

ASTM Specifications: ASTM A-135

Application: Fire Protection, Residential

Coating: Galvanized

End Connection 1: Plain End

End Connection 2: Plain End

End Connections: Plain End

FM Approved: Yes

Length: 21 ft

Material: Carbon Steel

Origin: Domestic

Pipe Tubing Size: 2 in

Schedule Class: 10

UL Listed: Yes

Popular Products



2 in. x 21 ft. Schedule 40 Galvanized Coated Plain End Carbon Steel Pipe

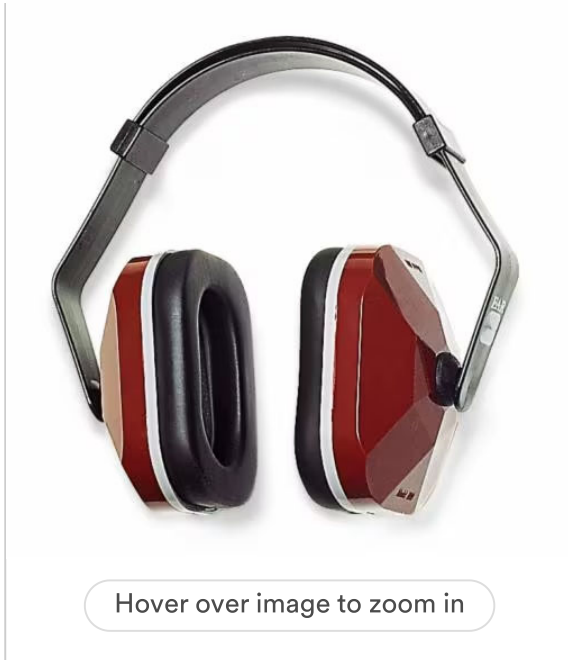
At 3M, we discover and innovate in nearly every industry to help solve problems around the world.

[United States](#) > [All 3M Products](#) > [Personal Protective Equipment](#) > [Hearing Protection](#) > [Earmuffs](#) > [3M™ E-A-R™ Model 1000 Earmuffs 330-](#)

3M™ E-A-R™ Model 1000 Earmuffs 330-3001

Part Number 30000, 3M Product Number 330-3001, 3M ID 7000002314, UPC
00080529300003,10080529300000

★★★★★ 0.0 (0)



3M™ E-A-R™ Model 1000 Earmuffs 330-3001



Specifications

Details

Attenuation Rating	20.0 Decibel
Bluetooth	No
Brands	E-A-R™
CSA Class	CSA Class B
Case Quantity	24
Corded	No
Dielectric	Yes
Earmuff Style	Over the Head
Electrically Insulated	Yes
Hearing Protection Style	Over-the-Head, Multi-position
Hearing Protection Type	Headband
Material	ABS
Metal Detectable	No
Noise Attenuating Headsets	Yes
Product Color	Black, Maroon
Product Series	E-A-R
Product Type	Earmuff
Recommended Application	Cleaning, Demolition, Electrical, Machine Operation, Assembly, Painting, Welding, Sanding, Grinding, Facility Maintenance
Recommended Industry	Metal Fabrication, Pharmaceutical, Automotive, Oil & Gas, Transportation, General Manufacturing, Military Maintenance,

Repair & Operation (MRO), Mining, Repair & Operation (MO),
Military Maintenance

Shape

Earmuffs

Details

Highlights

Large earcup openings and soft, foam-filled cushions offer a snug, comfortable fit

Durable, lightweight construction of non-conductive, dielectric plastic

Noise Reduction Rating* NRR 20 dB (CSA class B) when the band is worn over-the-head.

NRR 22 dB (CSA Class A) when the band is worn under-the-chin. NRR 22 dB (CSA Class B)

when band is worn behind-the-head

*The NRR may overestimate the hearing protection provided during typical use

3M™ earmuffs feature durable, lightweight construction of non-conductive, dielectric plastic that can be worn over-the-head, behind-the-neck or under-the-chin.

Low-profile and lightweight earmuffs may be worn over-the-head, behind-the-head, or under-the-chin. Provides a protective seal without excess pressure while the pivoting earcup connections maintain the seal and proper alignment. • Large earcup openings and soft, foam-filled cushions offer a snug, comfortable fit. • Durable, lightweight construction of non-conductive, dielectric plastic. • Noise Reduction Rating* NRR 20 dB (CSA class B) when the band is worn over-the-head. NRR 22 dB (CSA Class A) when the band is worn under-the-chin. NRR 22 dB (CSA Class B) when band is worn behind-the-head. *The NRR may overestimate the hearing protection provided during typical use. 3M recommends reducing the NRR by 50% for estimating the amount of noise reduction provided. 3M is Leading the Advancement of Hearing Conservation™.

Resources

Brochures (1)

Catalogs (1)

Data Sheets (2)

Product Technical Illustrations (1)

PRODUCT DATA SHEET

STEEL PIPE – FITTINGS – FLANGES

Piping shall be steel and conform to material specification ASTM A-53(CW) for nominal pipe size four (4) inch and smaller and ASTM A-53(ERW) Grade B for nominal pipe size five (5) inches and larger.

Steel Butt-welding fittings shall conform to material specification ASTM A-234 Grade WPB and to the dimensions and tolerances of ANSI Standards B16.9.

Forged steel flanges shall conform to material specification ASTM A-105 Class 60 and/or ASTM A-181 for carbon steel forgings and to the dimensions and tolerances of ANSI Standards B16.5 as amended in 1992 for Class 150 and Class 300 flanges.

The piping sizes shall be as shown on the drawing.
Size 10 inch and below – Schedule 40
Size 12 inch and above – Standard Weight (.375" wall)



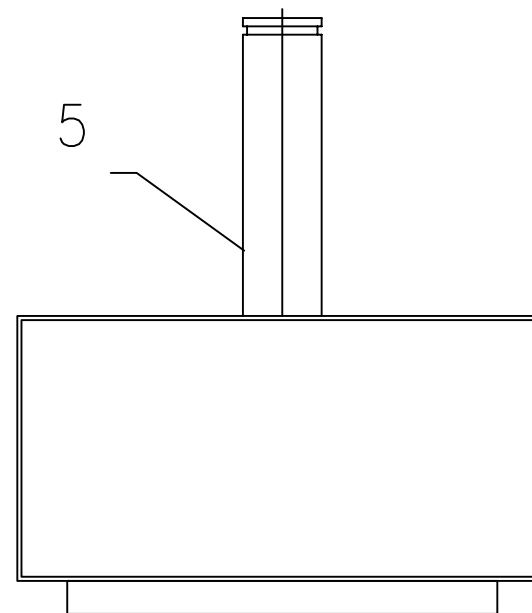
ENGINEERED FLUID, INC.

P.O. DRAWER 723 • CENTRALIA, ILLINOIS 62801

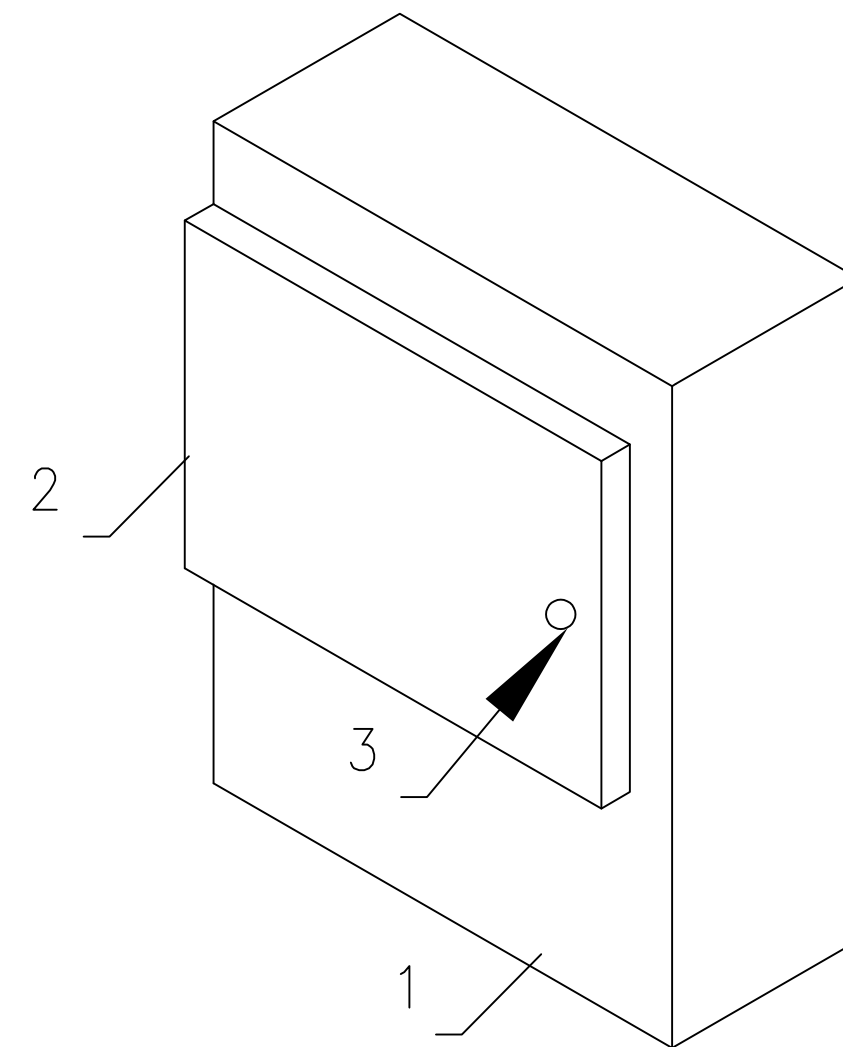
JOB REF. NO. Standard

DRAWING NO. 1704-022398

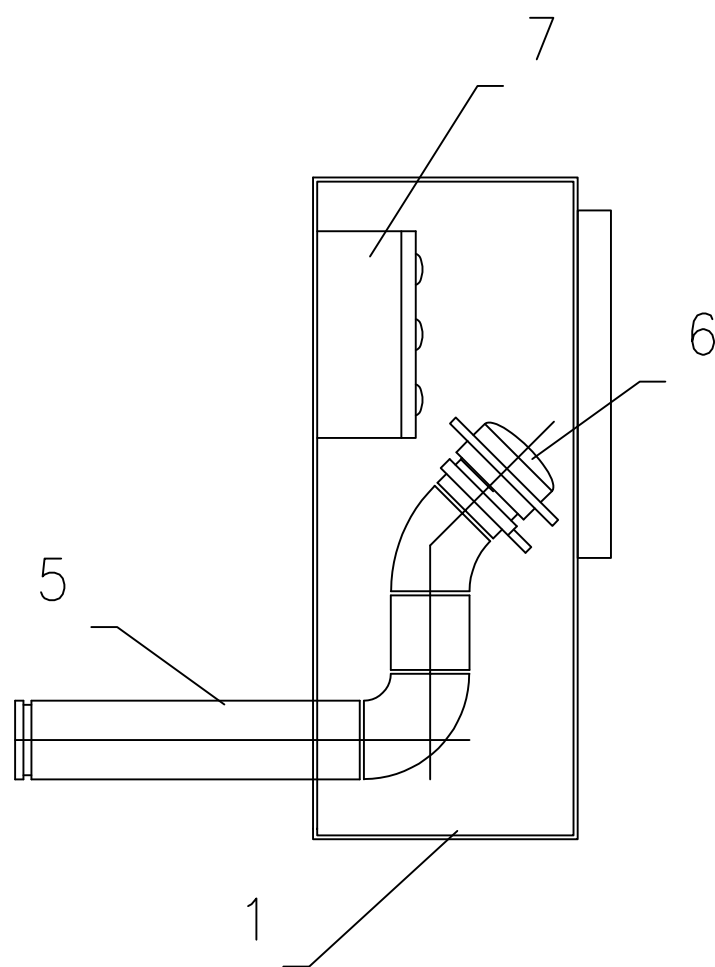
ITEM	QTY.	DESCRIPTION
1	1	SPILL/FILL BOX
2	1	COVER
3	1	KEY LOCK
4		
5	1	2" FILL LINE CONNECTION
6	1	2" CAP
7	1	FILL LIGHT PANEL



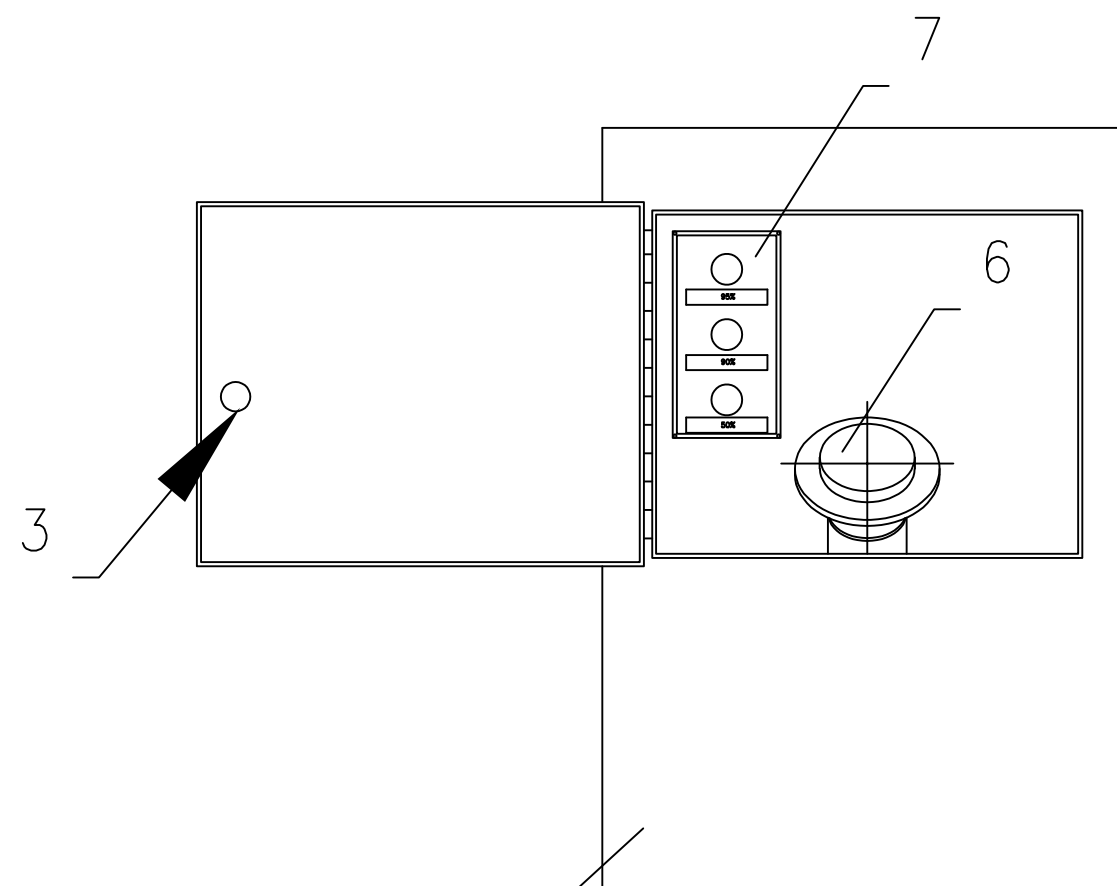
TOP VIEW



ISOMETRIC VIEW

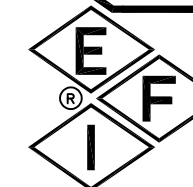


SIDE VIEW



FRONT VIEW

DRAWN BY: CK CHECKED BY: SCALE: N.T.S.



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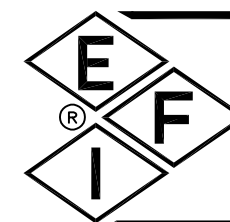
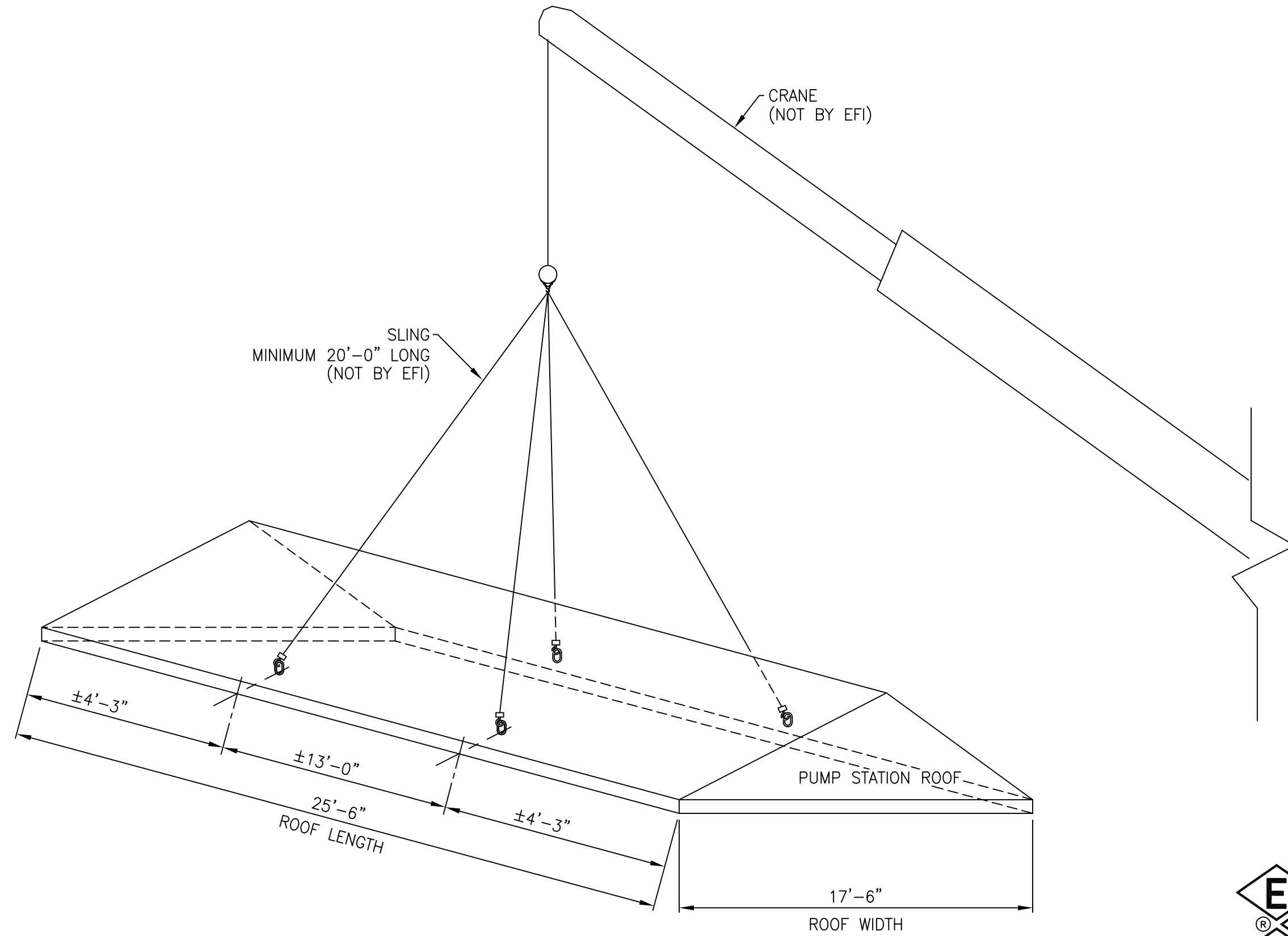
2023

TYPICAL DETAILS

5 GALLON FUEL FILL BOX

JOB REF NO. 5GFFBOX

DRWG. NO. 12112013

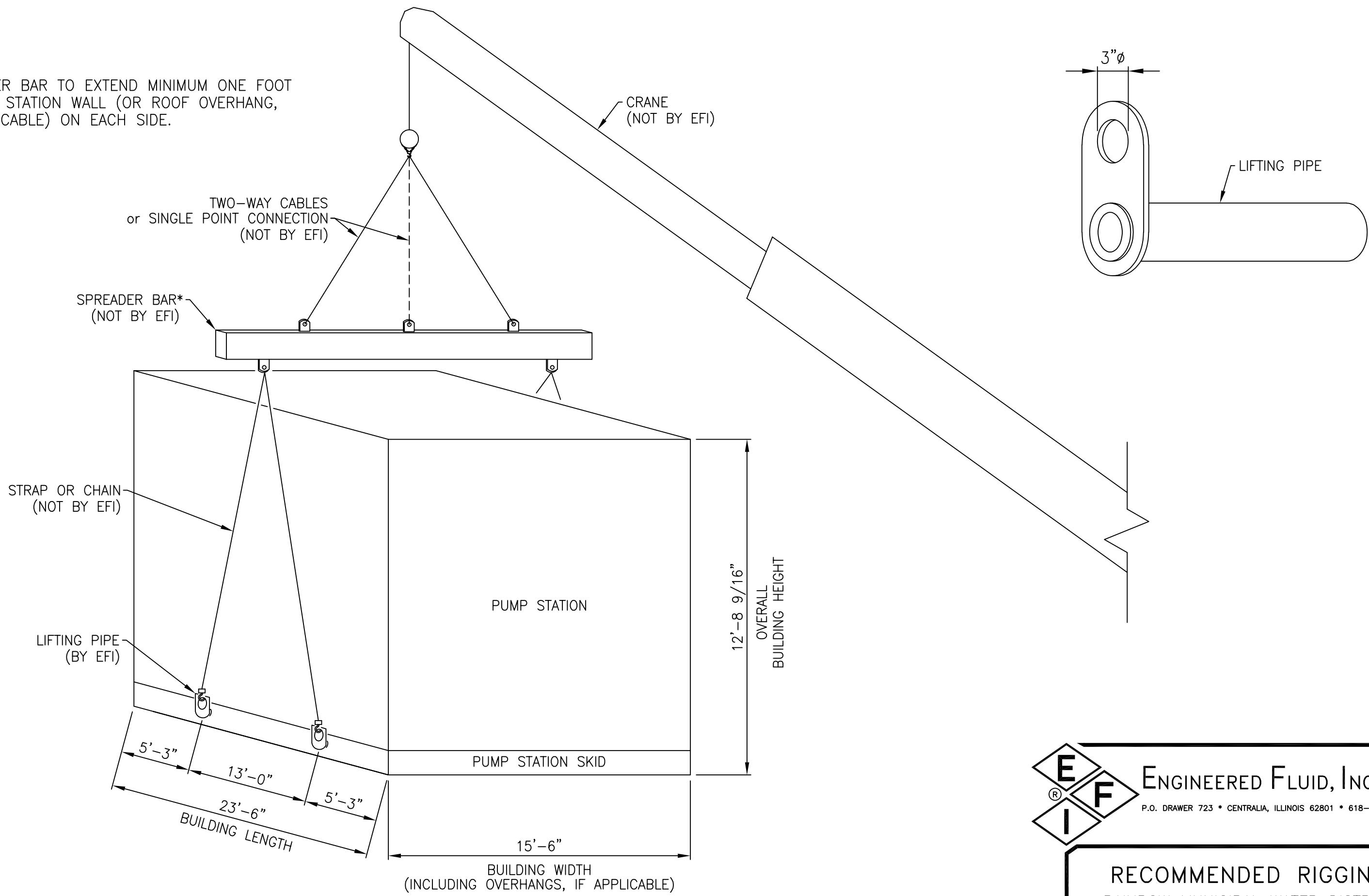


ENGINEERED FLUID, INC.
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RECOMMENDED RIGGING
 RAINBOW MUNICIPAL WATER DISTRICT
 RANCHO AMIGOS PS
 RAINBOW, CA

COORDINATE STATION DELIVERY WITH EFI DELIVERY COORDINATOR:
 Carin Jourdan / cjourdan@engineeredfluid.com / (618) 545-3633.

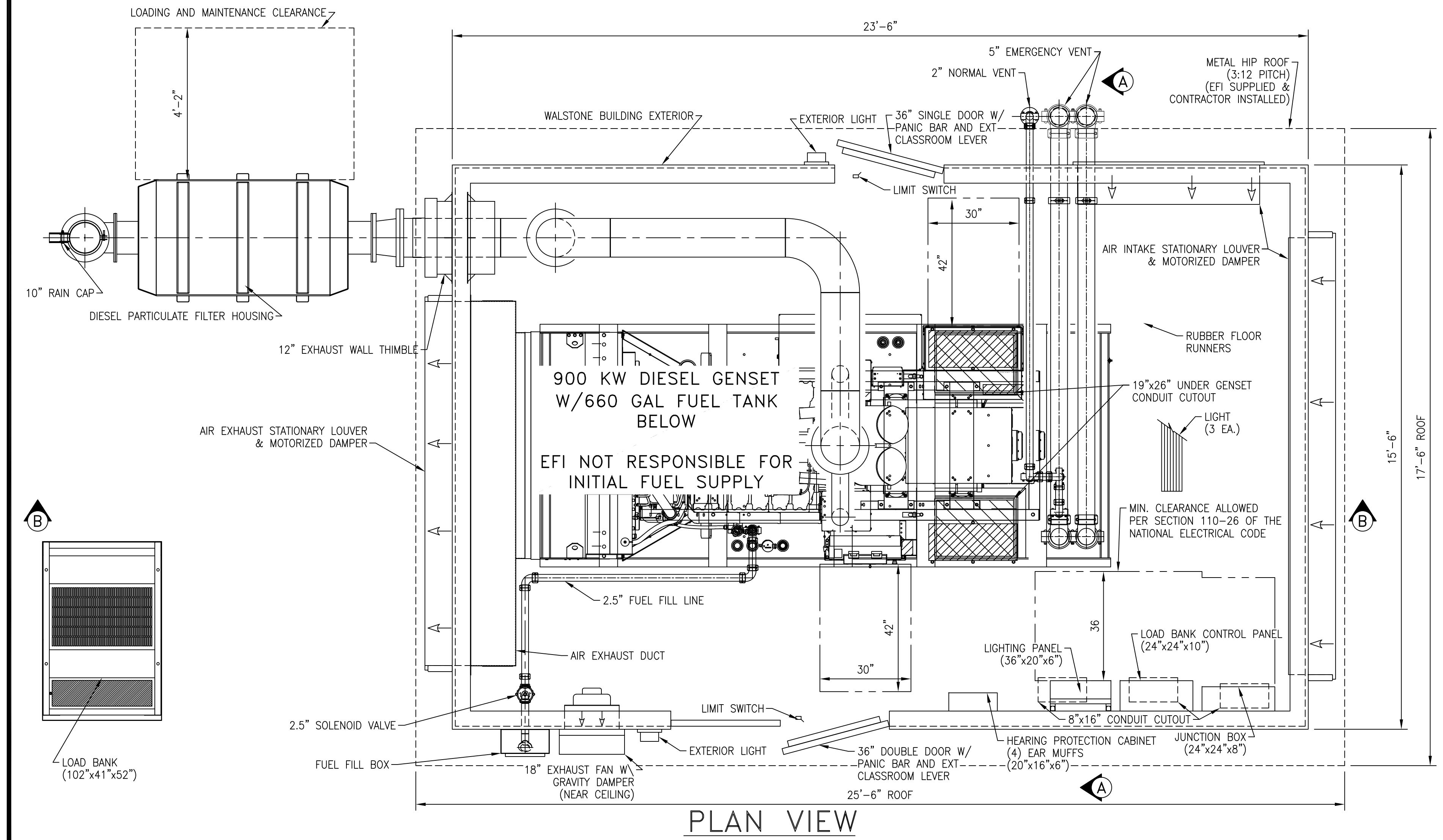
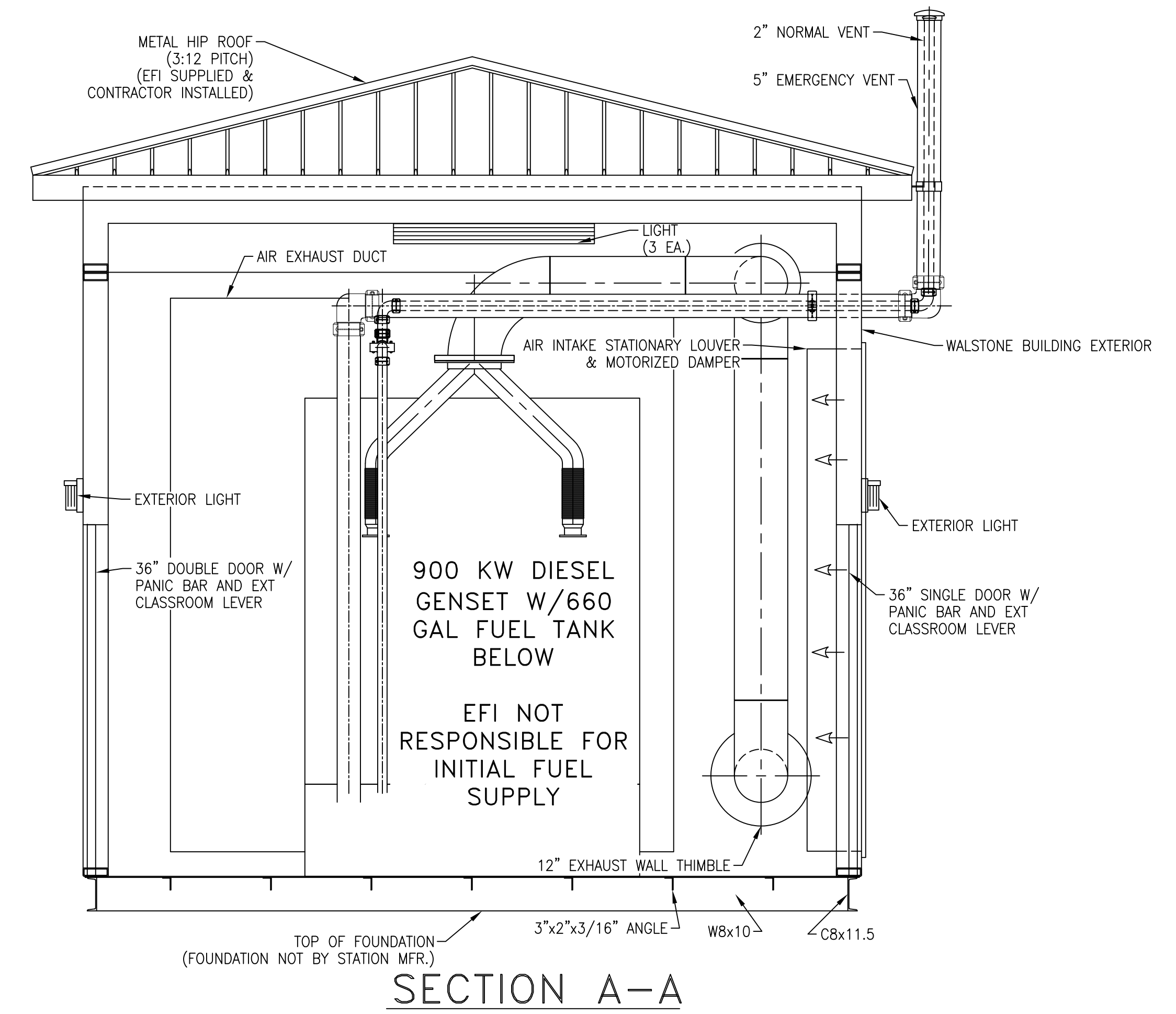
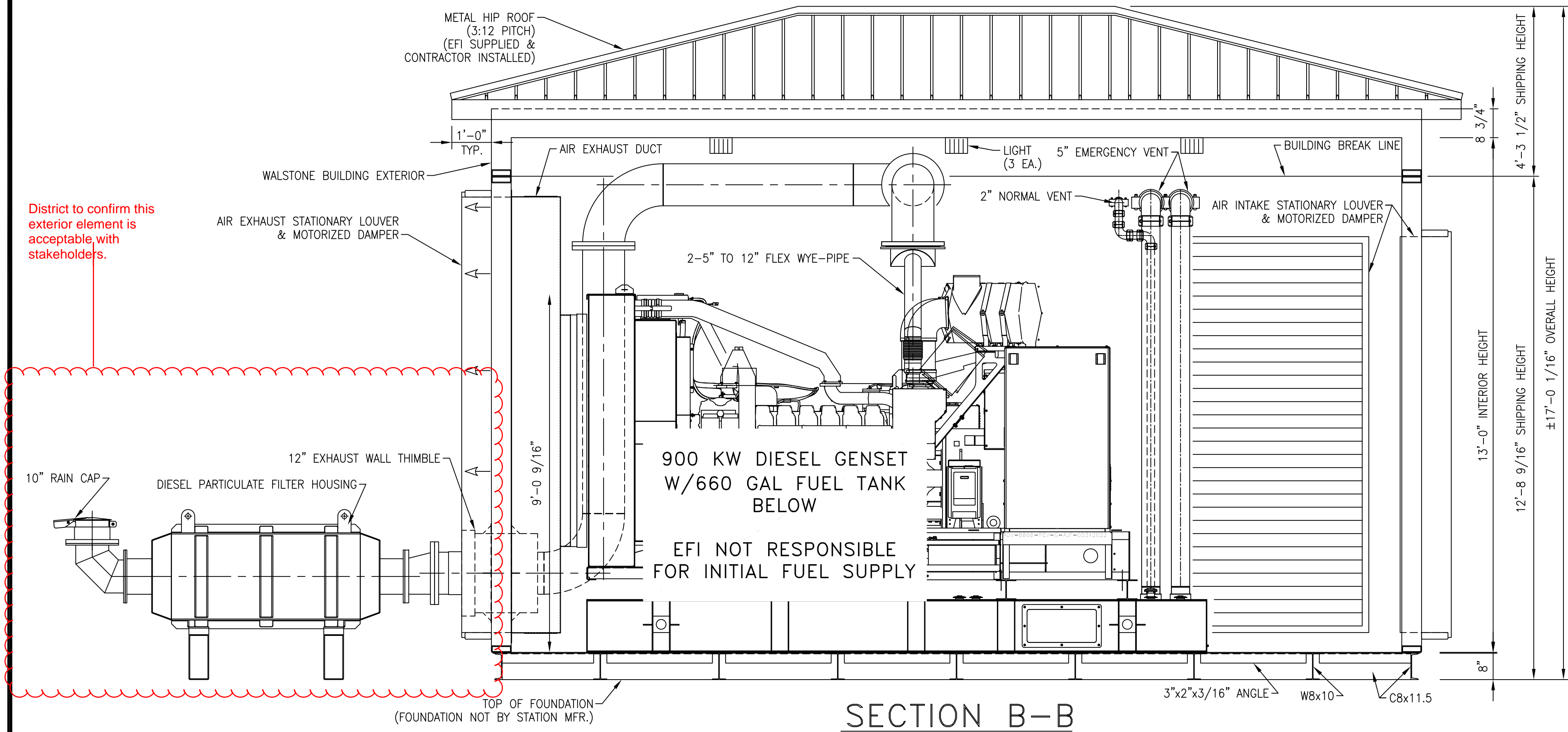
* SPREADER BAR TO EXTEND MINIMUM ONE FOOT BEYOND STATION WALL (OR ROOF OVERHANG, IF APPLICABLE) ON EACH SIDE.



ENGINEERED FLUID, INC.
 P.O. DRAWER 723 * CENTRALIA, ILLINOIS 62801 * 618-533-1351

RECOMMENDED RIGGING
 RAINBOW MUNICIPAL WATER DISTRICT
 RANCHO AMIGOS PS
 RAINBOW, CA

COORDINATE STATION DELIVERY WITH EFI DELIVERY COORDINATOR:
 Carin Jourdan / cjourdan@engineeredfluid.com / (618) 545-3633.



GENERAL NOTES

ALL EQUIPMENT WILL BE ADEQUATELY SUPPORTED AND BRACED

PLATE & STRUCTURAL STEEL: ASTM A-36

STRUCTURAL TUBING: A500, GRADE B

CONTRACTOR'S NOTES

SHIMS MAY BE REQUIRED AROUND PERIMETER OF WATERSHED* TO ENSURE PROPER LEVEL. WITHOUT PROPER LEVEL ENGINEERED FLUID CANNOT BE RESPONSIBLE FOR PROPER DOOR OPERATION.

PLEASE NOTE ORIENTATION OF THE ELECTRICAL CONDUIT LOCATIONS IN REFERENCE TO THE JOBSITE LAYOUT.

EFI CANNOT BE HELD RESPONSIBLE UNLESS CONFIRMATION OF THESE ORIENTATIONS IS RECEIVED THROUGH THE APPROVED SUBMITTALS.

ESTIMATED TOTAL STATION WEIGHT: TBD

Please provide info.

NOTES:

- INSTALLING CONTRACTOR TO COORDINATE ALL CONDUIT QUANTITIES AND LOCATIONS WITH EFI DURING SUBMITTAL REVIEW
- CONFIRM ALL PANEL SIZES NOT PROVIDED BY STATION MFR.

REVISION #	DATE	REVISED BY	DESCRIPTION
DESIGNED BY: RCB	MECHANICAL CHECKED BY (C.E.):	ELECTRICAL CHECKED BY:	SCALE: 1/2" = 1'-0"
DRAWN BY: CK			

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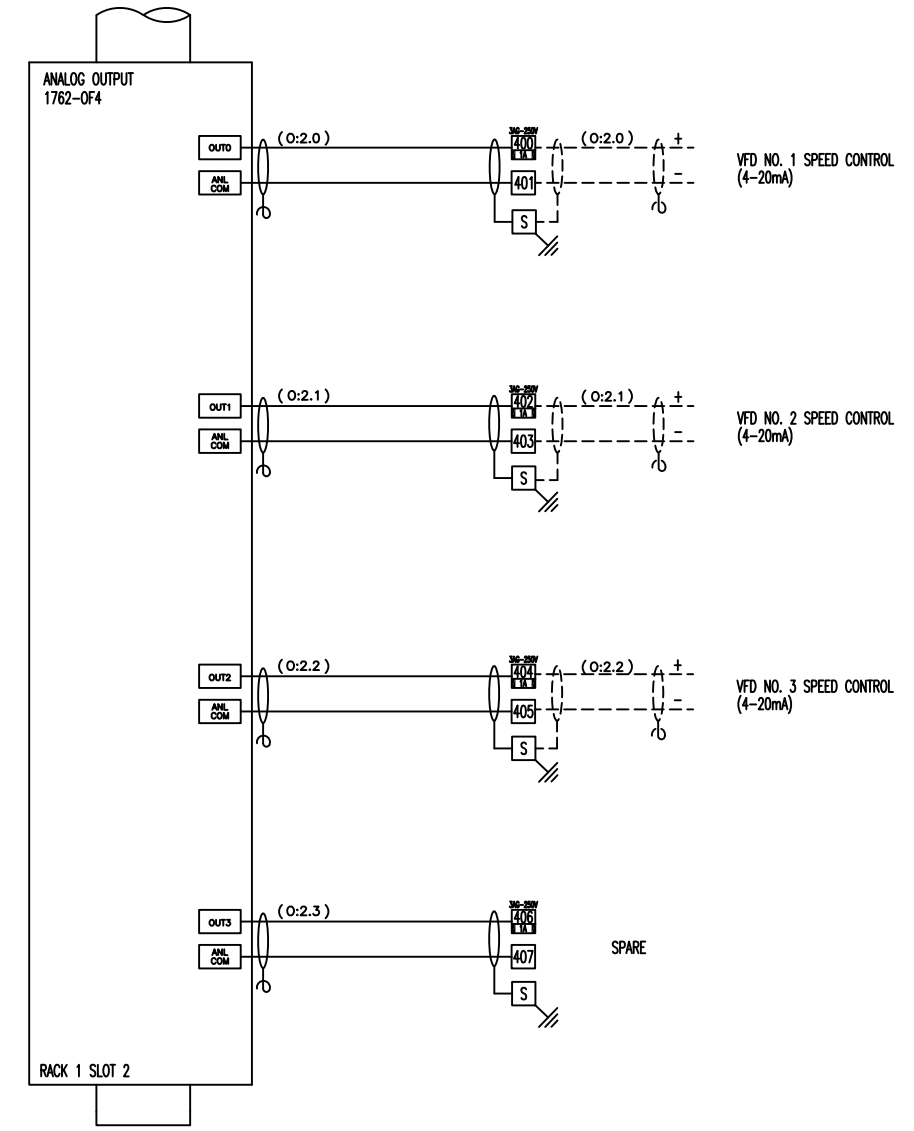
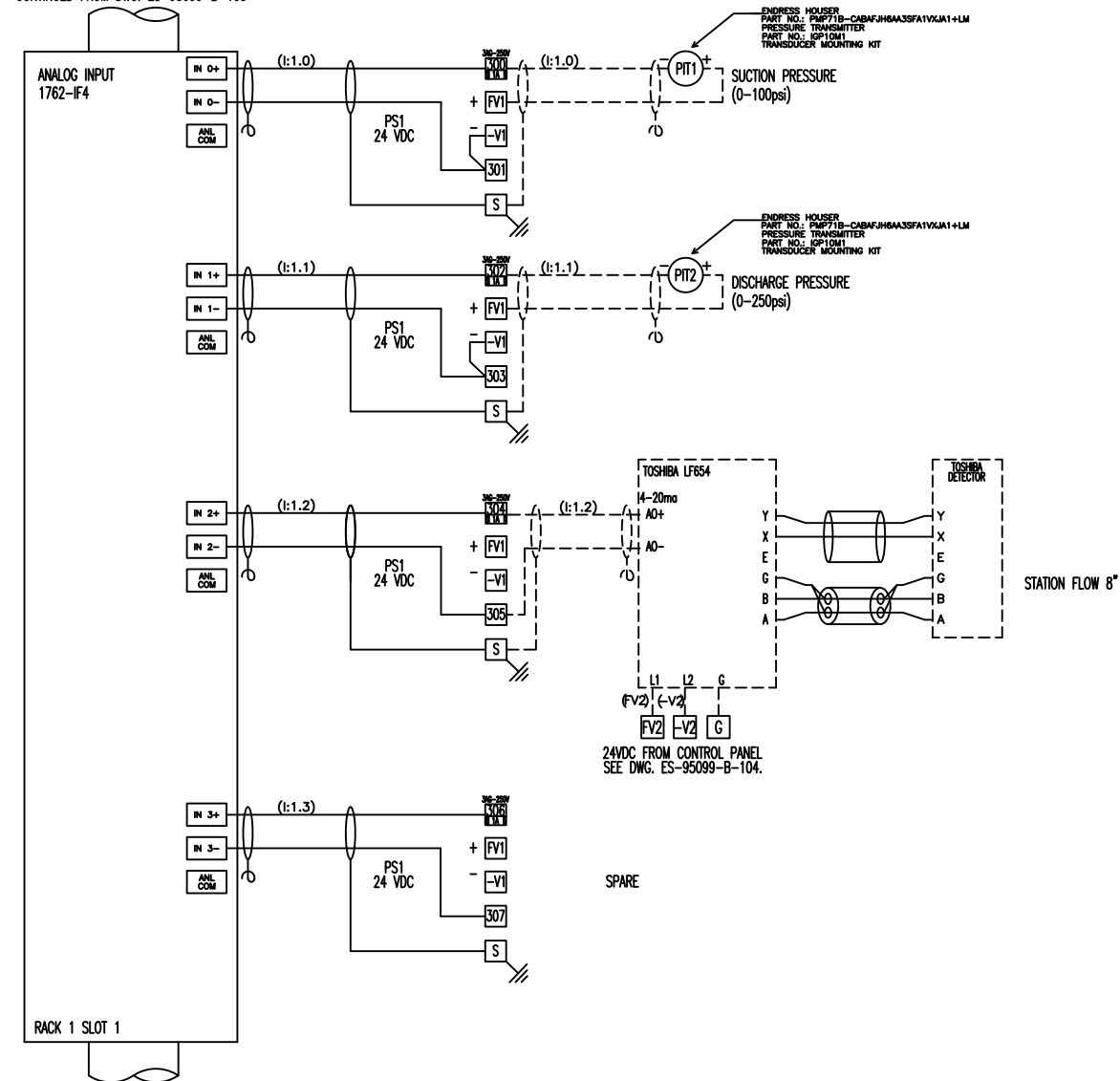
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This drawing is conceptual and does not reveal certain details and manufacturing processes required to successfully build the equipment. As such, Engineered Fluid, Inc. is not responsible for injury or damages caused by any unauthorized fabrication or assembly using all or any part of this drawing.

GENERATOR/CONTROL BLDG.
 RAINBOW MUNICIPAL WATER DISTRICT
 RANCHO AMIGOS PS
 RAINBOW, CALIFORNIA

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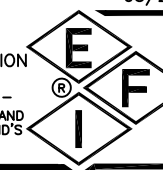
CONTINUED FROM DWG. ES-95099-B-105



03/27/23

6 D

SCCR 5KA @ 120VAC
U.L. TYPE ONE INSTALLATION
NEMA 4/12 ENCLOSURE
REMOTE TO PANEL
CONTROL PANEL WILL BE LISTED AND
LABELED UNDER ENGINEERED FLUID'S
U.L. FILE NUMBER E85917



ENGINEERED FLUID, INC.

P.O. DRAWER 723 • CENTRALIA, ILLINOIS 62801 • 618-533-1351

WSBPS

ELECTRICAL SCHEMATIC

PHASE 1 WATER DISTRIBUTION SYSTEM IMPROVEMENT

DENISON, IA

DATE:	REV. NO.	REVISED BY:	DESCRIPTION:

TERMINAL BLOCK		TERMINAL BLOCK		TERMINAL BLOCK	
In.	Code	Panel-Block	CP-No	In.	Code
1/4"	CL-D	48	CL-D	3/16"	CL-D
3/16"	CL-D	60	CL-D	1/2"	CL-D
1/2"	CL-D	80	CL-D	3/4"	CL-D
3/4"	CL-D	100	CL-D	1"	CL-D
1"	CL-D	120	CL-D	1 1/4"	CL-D
1 1/4"	CL-D	140	CL-D	1 3/4"	CL-D
1 3/4"	CL-D	160	CL-D	2"	CL-D
2"	CL-D	180	CL-D	2 1/4"	CL-D
2 1/4"	CL-D	200	CL-D	2 3/4"	CL-D
2 3/4"	CL-D	220	CL-D	3"	CL-D
3"	CL-D	240	CL-D	3 1/4"	CL-D
3 1/4"	CL-D	260	CL-D	3 3/4"	CL-D
3 3/4"	CL-D	280	CL-D	4"	CL-D
4"	CL-D	300	CL-D	4 1/4"	CL-D
4 1/4"	CL-D	320	CL-D	4 3/4"	CL-D
4 3/4"	CL-D	340	CL-D	5"	CL-D
5"	CL-D	360	CL-D	5 1/4"	CL-D
5 1/4"	CL-D	380	CL-D	5 3/4"	CL-D
5 3/4"	CL-D	400	CL-D	6"	CL-D

DRAWN BY: AB CHECKED BY:

JOB REF NO. 95099

DRWG. NO. ES-95099-B-106.

ELECTRICAL SECTION

GENERATOR BUILDING

Please provide services to obtain the authority to Construct from SDAPCD.

Project	Rancho Amigos Generator Building			
	Rainbow Water Municipal Authority			
Location	Rainbow, California			
Engineer	Hoch Consulting			
Station Type	Generator Building			
EFI JOB REFERENCE NO. 93136-02				
PLEASE REVIEW EACH COMPONENT & INITIAL IF ACCEPTABLE				
PLEASE REVIEW STATION ORIENTATION AND PIPE SIZES				
Part ID	Part Description	Long Description	Qty	INITIALS
	GENERATOR BUILDING			
KD900	KOHLER 900KW GENSET	KD900 Generator System INDOOR GENERATOR	1	
P1C100BT26CH01	EATON 100A PANELBOARD	<p>PANELBOARDS 30 CIRCUITS, 100A, FULLY RATED, 120/240V 1PH 3W, COPPER BUS, 10KAIC, 100A, 2P BAB MAIN BREAKER[TOP FED], SURFACE MOUNTED CATALOG NO P1C100BT26CH01 DESIGNATION 93136 LP-2</p> <p>QTY LIST OF MATERIALS</p> <p>1 100A, 2P BAB MAIN BREAKER 22 PADLOCKABLE LOCKOFF DEVICE 4 1P BAB BRANCH PROVISION ONLY 1 50A, 2P BAB BRANCH BREAKER 1 40A, 2P BAB BRANCH BREAKER 2 30A, 2P BAB BRANCH BREAKER 2 30A, 1P BAB BRANCH BREAKER 12 15A, 1P BAB BRANCH BREAKER 4 20A, 1P BAB BRANCH BREAKER 1 COPPER MAIN BUS, 100 AMPS 1 STD. BOLTED CU GROUND BAR (CU CABLE ONLY) 1 PANEL NAMEPLATE - WHITE WITH BLACK LETTERS 1 TYPE 1 ENCLOSURE: EZB2036R 1 EZ TRIM, DOOR IN DOOR, CONCEALED HARDWARE: EZT2036S MAIN DEVICE TYPE: MAIN BREAKER - TOP CABLE ENTRY MAIN TERMINALS: MECHANICAL - (1) #8-1/0 (CU/AL) NEUTRAL TERMINALS: MECHANICAL - (1) #14-1/0 (CU/AL) 36" X 20" X 6"</p>	1	
LS35P51B02	ABB DPDT ROLLER LEVER LIMIT SWITCH 2NC		2	

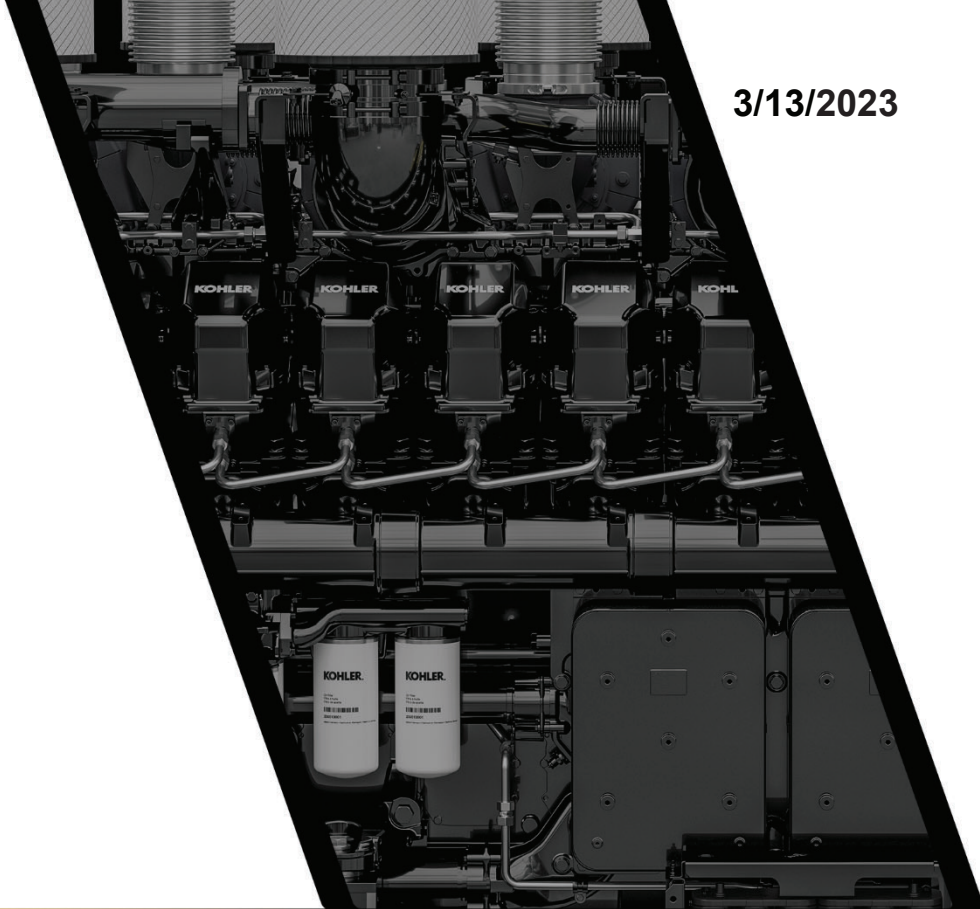
ETD9STS	COLUMBUS ELECTRIC SPDT HEAT OR COOL THERMOSTAT		3	
S1209F	GENTEX SMOKE ALARM		1	
FEML486000LMIMAFLM DMVOLTGZ1040	LITHONIA FEM LED LIGHTING FIXTURE		3	
PRS-20-5K-PC	HUBBELL 20W LED EXTERIOR WALLPACK W/PHOTOCELL	VOLTAGE: 120-277V WATTAGE: 22.8 COLOR: 5K LUMENS: 2898	2	
2P12G1-ELF3-LD10-M	LIGHT ALARM EMERGENCY LIGHT 12VOLT 2LAMP	MR16 LED HEAD 6W MIST WHITE	1	
HBL1203IL	HUBBELL 3 WAY LIGHT SWITCH, 15A, 120/277VAC		4	
BR15WR	HUBBELL 15A 125V BROWN DUPLEX RCPT		2	
GFRST15I	HUBBELL 15A COM SELF TEST GFCI IVORY		1	
ATM-10	BUSSMANN AUTOMOTIVE 10A ATM FUSE		5	
ATM-FHID	BUSSMANN IN-LINE ATM FUSE HOLDER		1	
	INTERFACE PANEL			
CSD24248	HOFFMAN NEMA 412 LP ENCLOSURE		1	
CP2424	HOFFMAN NEMA 412 MP PANEL		1	
Q3PBPCDM	HOFFMAN 3 HOLE PUSH-BUTTON ENCLOSURE		1	
LC1D09G7	SQUARE D IEC CONTACTOR, 9A, 3 POLE, 120VAC COIL		1	

PK9GTA	SQUARE D GROUNDING BAR KIT		1	
RU4S-D-D12	IDEC RELAY 12VDC		1	
SY4S05	IDEC SOCKET BASE		1	
ZB5AV043	SQUARE D RED PILOT LIGHT HEAD		3	
ZB5AVJ1	SQUARE D WHITE LIGHT MODULE		3	
ZB4BD3	SQUARE D 3 POSITION SWITCH		1	
ZB4BZ009	SQUARE D MOUNTING COLLAR		1	
ZBE101	SQUARE D N/O CONTACT BLOCK		2	
ZBY2387	SQUARE D HOA LEGEND PLATE		1	
1492-J4	AB FEED THROUGH SCREW TERMINAL, GRAY, 4MM		50	
1492-EBJ3	AB 4MM TERMINAL BLOCK END BARRIER GRAY		8	
1492-EAJ35	AB SCREW END ANCHOR FOR 35MM DIN		8	
1492-CJ6-10	AB SCREW CENTER JUMPER 6MM 10 POLE YELLOW		1	
1492-MT6X12	AB TERMINAL STRIP MARKING TAG 6 X 12 MM		1	
ELECTRICAL DESIGN DRAWING ES-9313602-WS-101.				
ELECTRICAL DESIGN DRAWING ES-9313602-WS-102.				
ELECTRICAL DESIGN DRAWING ES-9313602-WS-103.				
ELECTRICAL DESIGN DRAWING ES-9313602-WS-104.				

3/13/2023



NIXON
POWER SERVICES



SUBMITTAL PACKAGE

EFI 93136 KD900

CONTRACTOR / INSTALLER: Engineered Fluids Inc



www.nixonpower.com



Nixon Power Services



Nixon Power Services



@nixon_power_services



@Nixon_Power



Cass White
PROJECT MANAGER

Chaz Pal
PROJECT ENGINEER



CONTACT:

📞 615-347-4060
✉️ cwhite@nixonpower.com
📍 La Vergne, TN

CONTACT:

📞 615-406-8468
✉️ cpal@nixonpower.com
📍 La Vergne, TN



WORK EXPERIENCE:

- **Nixon Power Services**
Project Manager
- **Nixon Power Services**
Inside Sales Engineer

WORK EXPERIENCE:

- **Nixon Power Services**
Project Engineer
- **Nixon Power Services**
Inside Sales Engineer



RESPONSIBILITIES:

- Internal Project Setup
- Submittal Requests
- Release Equipment
- Vendor POC
- Track Shipping Schedules
- Coordinate Delivery
- Invoice Management
- Close Out Documents

RESPONSIBILITIES

- Submittal Follow Up
- Submittal Approvals
- On-Site Walk Thru
- Engineering Diagrams
- Oversee Equip. Installation
- Pre-Startup Inspections
- Startup Planning/Scheduling
- Commissioning Assistance



Indiana, Kentucky &
Tennessee





Project Engineer

T

SUBMITTAL Preparation



Project Engineer

I

FOLLOW UP
on Submittal
STATUS



Project Manager

M

Once Submittal
Approved **RELEASE**
EQUIPMENT for
MANUFACTURING



Kohler

E

Build
EQUIPMENT



Project Manager

L

COORDINATE
site **DELIVERY**



Project Engineer

I

Equipment
INSTALLATION



Project Engineer

N

STARTUP



Project Manager

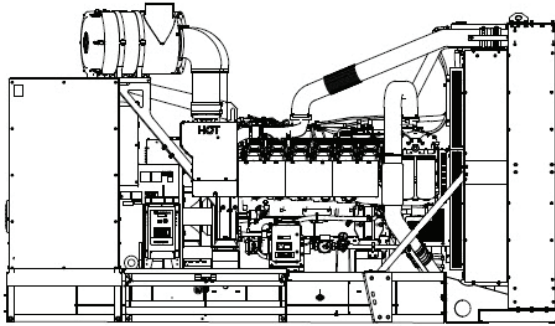
E

JOB
CLOSEOUT



Nixon Power Services
 1515 J P Hennessy Drive
 La Vergne, TN 37086
 P: 615-244-0650
 T: 800-766-4966
 F: 615-244-0689

Generator



Kohler Model: KD900

This diesel generator set equipped with a KH03450TO4D alternator operating at 277/480 volts is rated for 900 kW/1125 kVA. Output amperage: 1354

Qty	Description
	KD900 Generator System
1	KD900 Generator Set Includes the following: Literature Languages English Approvals and Listings UL2200 Listing Approvals and Listings IBC Seismic Certification Engine KD900, 60Hz, EPA, Tier 2 Nameplate Rating Standby 130C Rise Voltage 60Hz, 277/480V, Wye, 3Ph, 4W Alternator KH03450TO4D Cooling System Unit Mounted Radiator, 50C Skid and Mounting Skid, High Iso Mount Air Intake Standard Duty Controller APM603 Controller Accy, Installed Digital I/O Starting Aids, Installed 6000W,480V,1Ph,w/Valves Cooling System Acc.,Installed Radiator Guard w/Duct Flange Electrical Accy.,Installed Battery, 2/12V, AGM Electrical Accy.,Installed Batt. Rack & Cables Electrical Accy.,Installed Battery Charger, 24V-20AMP Rating, LCB 1 Right 100% Rated Amps, LCB 1 Right 1,600 Trip Type, LCB 1 Right Electronic, LSI



Nixon Power Services
 1515 J P Hennessy Drive
 La Vergne, TN 37086
 P: 615-244-0650
 T: 800-766-4966
 F: 615-244-0689

	LCB1 Right Interrupt Rating	65kA At 480V
	Aux Contact, LCB 1 Right	Auxiliary Contact, Qty.1
	Aux Trip, LCB 1 Right	Shunt Trip
	Rating, LCB 1 Left	100% Rated
	Amps, LCB 1 Left	1,600
	Trip Type, LCB 1 Left	Electronic, LSI
	LCB1 Left Interrupt Rating	65kA At 480V
	Aux Contact, LCB 1 Left	Auxiliary Contact, Qty.2
	Aux Trip, LCB 1 Left	Shunt Trip
	LCB Accy. Installed	Shunt Trip Wiring
	Fuel Lines, Installed	Flexible Fuel Lines
	Fuel System Acc.,Installed	Fuel/Water Separator
	Miscellaneous Accy,Installed	Air Cleaner Restriction Ind.
	Miscellaneous Accy,Installed	Coolant in Genset
	Miscellaneous Accy,Installed	Oil in Genset
	Miscellaneous Accy,Installed	Air Intake Transit Cap
	Warranty	Standard
	Testing, Additional	Power Factor Test,0.8,3Ph Only
	Total unit length in inches	181
	Total unit width in inches	85
	Total unit height in inches	98
	Total unit weight (lbs)	16,423
	Weight/Dimensions Disclaimer *	Estimates-Not for Construction
1	NEC Remote, E-Stop	
1	Lit Kit, General Maint., KD900, 60Hz	
1	660Gallon, UL142 Subbase Fuel Tank w/ Standard UL142 Features	
1	DPF Housing & Catalyst	
	Includes:	
	~ DPF Data Logger Kit / Assembly	
	~ Insulation Blankets	
	~ 90Degree Outlet Elbow	
	~ Rain Cap	
1	Freestanding 900kW Load Bank, 480V w/ Remote Controller and Auto Load-Leveling	

Aux Circuits Required:

- Load Bank Remote Controller
20A, 120V Circuit for Control Power
- Generator Block Heater:
6000W, 480V 1Ph
- Generator Battery Charger:
20A Receptacle

PROJECT MANAGER CONTACT INFO:

Chaz Pal
Industrial Project Engineer
Mobile: (615) 406-8468
cpal@nixonpower.com

MODBUS

Beiden 9841

CONTROL WIRES

4ea. THHN 16ga.

REMOTE START

4ea. THHN 16ga.

E-STOP BUTTON

2ea. THHN 16ga.

DPF FACTORY HARNESS

DPF WIRING FOR GEN

8ea. THHN 16ga.

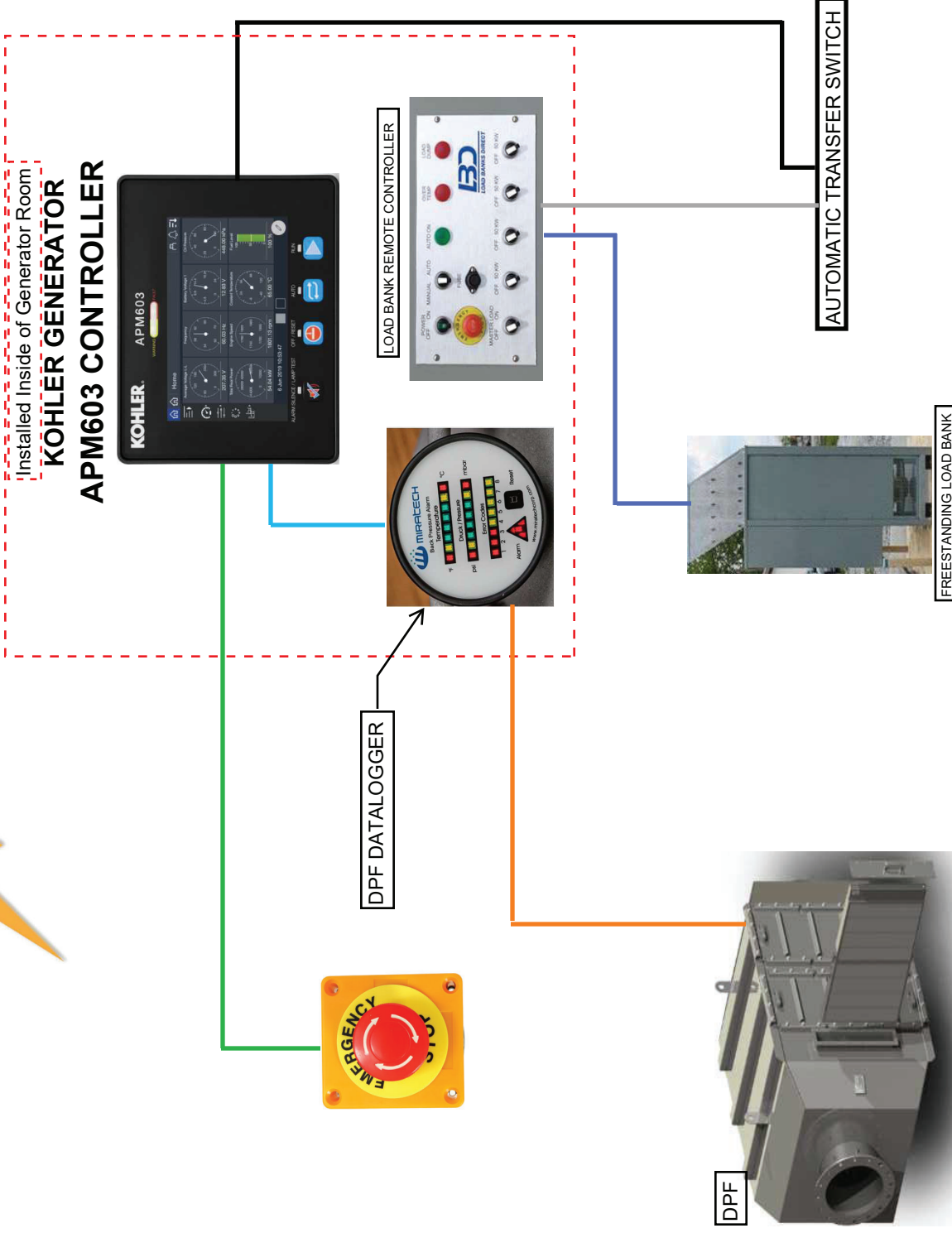
LOAD BANK COMMS

22ea. THHN 16ga.

COMMUNICATION DRAWING

AS BUILT DRAWINGS FOR EPSS COMMUNICATION SYSTEM

Items shown in this diagram are examples only and are not true depictions of equipment ordered. Enclosures, colors, and styles may vary

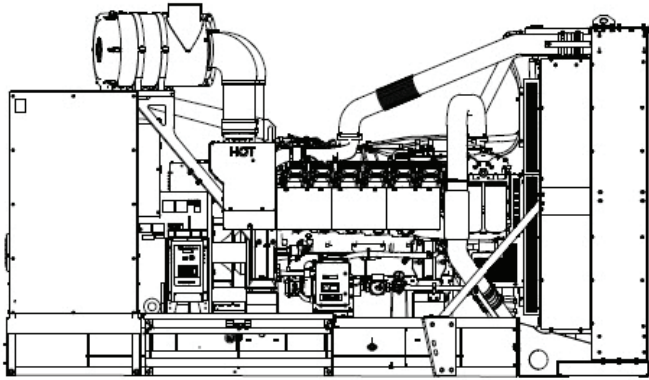


DRAWN BY NIXON POWER
Chaz Pal (800) 766-4966



KOHLER®

Spec Sheets



Standard Features

- Kohler Co. provides one-source responsibility for the generating system and accessories.
- Approved for use with certified renewable Hydrotreated Vegetable Oil (HVO) / Renewable Diesel (RD) fuels compliant with EN15940/ASTM D975.
- The generator set and its components are prototype-tested, factory-built, and production-tested.
- The 60 Hz generator set offers a UL 2200 listing.
- The generator set accepts rated load in one step.
- The 60 Hz generator set meets NFPA 110, Level 1, when equipped with the necessary accessories and installed per NFPA standards.
- A standard three-year or 1000-hour limited warranty for standby applications. Five-year basic, five-year comprehensive, and ten-year extended limited warranties are also available.
- A standard two-year or 8700-hour limited warranty for prime power applications.
- Battery Rack and Cables
- Closed Crankcase Ventilation (CCV) Filters
- Customer Connection
- Integral Vibration Isolation
- Local Emergency Stop Switch
- Oil Drain and Coolant Drain Extension
- Operation and Installation Literature

Alternator Features

- The pilot-excited, permanent magnet (PM) alternator provides superior short-circuit capability.
- All models are brushless, rotating-field alternators.
- NEMA MG1, IEEE, and ANSI standards compliance for temperature rise and motor starting.
- Sustained short-circuit current of up to 300% of the rated current for up to 10 seconds.
- Sustained short-circuit current enabling downstream circuit breakers to trip without collapsing the alternator field.
- Self-ventilated and dripproof construction.
- Superior voltage waveform from two-thirds pitch windings and skewed stator.

Other Features

- Kohler designed controllers for one-source system integration and remote communication.
- The low coolant level shutdown prevents overheating (standard on radiator models only).

Generator Set Rating

Standby 130C Rise Ratings

Alternator	Voltage	Ph	Hz	Peak kVA	kW/kVA	Amps
KH03450TO4D	277/480	3	60	3136	900/1125	1354

Model: KD900, continued

Alternator Specifications

Specifications	Alternator
Alternator manufacturer	Kohler
Type	4-Pole, Rotating-Field
Exciter type	Brushless, Permanent-Magnet Pilot Exciter
Voltage regulator	Solid State, Volts/Hz
Insulation	NEMA MG1, UL 1446, Vacuum Pressure Impregnated (VPI)
Insulation: Material	Class H, Synthetic, Nonhygroscopic
Insulation: Temperature Rise	130 ° C, 150 ° C Standby
Bearing: quantity, type	1, Sealed
Coupling	Flexible disc
Amortisseur windings	Full
Rotor balancing (60Hz)	125%
Alternator winding type	Random Wound
Voltage regulation, no-load to full-load RMS	+/-0.25%
Unbalanced load capability	100% of Rated Standby Current
<ul style="list-style-type: none"> • The pilot-excited, permanent magnet (PM) alternator provides superior short-circuit capability. <ul style="list-style-type: none"> • All models are brushless, rotating-field alternators. • NEMA MG1, IEEE, and ANSI standards compliance for temperature rise and motor starting. <ul style="list-style-type: none"> • Sustained short-circuit current of up to 300% of the rated current for up to 10 seconds. • Sustained short-circuit current enabling downstream circuit breakers to trip without collapsing the alternator field. <ul style="list-style-type: none"> • Self-ventilated and dripproof construction. • Superior voltage waveform from two-thirds pitch windings and skewed stator. • Brushless alternator with brushless pilot exciter for excellent load response. 	

Engine

Engine Specification

Engine Manufacturer	Kohler Diesel
Engine Model	KD27V12
Engine: type	4-Cycle, Turbocharged
Cylinder arrangement	12-V
Displacement, L (cu. in.)	27 (1648)
Bore and stroke, mm (in.)	135 x 157 (5.31 x 6.18)
Compression ratio	15.0:1
Piston speed, m/min. (ft./min.)	565 (1854)
Main bearings: quantity, type	7, Precision Half-Shell
Rated rpm	1800
Max. power at rated rpm, kWm (BHP)	1019 (1367)
Cylinder head material	Cast Iron
Crankshaft material	Steel
Valve (exhaust) material	Steel
Governor: type, make/model	KODEC Electronic Control
Frequency regulation, no-load to-full load	Isochronous
Frequency regulation, steady state	± 0.25%
Frequency	Fixed
Air cleaner type, all models	Dry

Model: KD900, continued

Exhaust

Exhaust System

Exhaust flow at rated kW,m3/min. (cfm)	189.4 (5258)
Exhaust temperature at rated kW, dry exhaust, ° C (° F)	494 (921)
Maximum allowable back pressure, kPa (in. Hg)	8.5 (2.5)
Exh. outlet size at eng. hookup, mm (in.)	See ADV Drawing

Engine Electrical

Engine Electrical System

Starter motor qty. at starter motor power rating, rated voltage (DC)	Standard: 1 @ 7.8 kW, 24; Redundant (optional): 2 @ 7.8kW, 24
Battery charging alternator: Ground (negative/positive)	Negative
Battery charging alternator: Volts (DC)	24
Battery charging alternator: Ampere rating	140
Quantity, CCA rating each, type (with standard starters)	2, 1110, AGM
Quantity, CCA rating each, type (with optional redundant starters)	4, 1110, AGM
Battery voltage (DC)	12

Fuel

Fuel System

Fuel type	Diesel
Fuel supply line, min. ID, mm (in.)	14 (0.55)
Fuel return line, min. ID, mm (in.)	14 (0.55)
Max. fuel flow, Lph (gph)	350 (93)
Min./max. fuel pressure at engine supply connection, kPa (in. Hg)	-30/30 (-8.8/8.8)
Maximum diesel fuel lift, m (ft.)	3.7 (12)
Max. return line restriction, kPa (in. Hg)	30 (8.8)
Fuel Filter Primary	1
Fuel Filter Water Separator	1
Recommended fuel	#2 Diesel ULSD / HVO / RD

Lubrication

Lubrication System

Type	Full Pressure
Oil pan capacity dipstick mark max., L (qt.)	79 (83.5)
Oil pan capacity, initial filling, L (qt.)	101 (106.7)
Oil filter: quantity, type	2, Cartridge
Oil cooler	Water-Cooled

Model: KD900, continued

Cooling

Radiator System

Ambient temperature, ° C (° F)	40 (104) 50 (122)
Engine jacket water flow, Lpm (gpm)	1015 (268)
Engine jacket water capacity, L (gal.)	55 (14.4)
Radiator system capacity, including engine, L (gal.)	113.5 (29.5) 123 (32.4)
Heat rejected to cooling water at rated kW, dry exhaust, kW (Btu/min.)	367 (20890)
Charge cooler air inlet temperature, ° C (° F)	211 (412)
Heat rejected to charge air cooler at rated load, kW (Btu/min.)	256 (14571)
Water pump type	Vane Wheel
Fan diameter, including blades, mm (in.)	1350 (53.1)
Fan, kWm (HP)	48 (64.3)
Max. restriction of cooling air, intake and discharge side of radiator, kPA (in. H2O)	0.125 (0.5)

* Enclosure with enclosed silencer reduces ambient temperature capability by 5 ° C (9 ° F)

Operation Requirements

Air Requirements

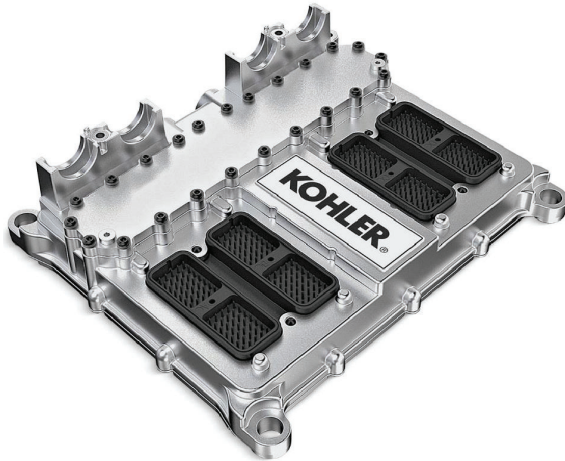
Radiator-cooled cooling air, m3/min. (scfm) *	1212 (42801)
Cooling air required for generator set when equipped with city water cooling or remote radiator, based on 14 ° C (25 ° F) rise, m3/min. rise and ambient temp. of 29 ° C (85 ° F) m3/min. (cfm)	611.2 (21584)
Combustion air, m3/min. (cfm)	67.8 (2396)
Heat rejected to ambient air: Engine, kW (Btu/min.)	124 (7058)
Heat rejected to ambient air: Alternator, kW (Btu/min.)	47 (2675)

*Air density = 1.20 kg/m3 (0.075 lbf/ft3)

Fuel Consumption

Diesel, Lph (gph), at % load	Rating
Standby Fuel Consumption at 100% load	245 Lph (64.7 gph)
Standby Fuel Consumption at 75% load	192 Lph (50.8 gph)
Standby Fuel Consumption at 50% load	135 Lph (35.7 gph)
Standby Fuel Consumption at 25% load	76 Lph (20.1 gph)

With a 660 gallon tank, this will provide the District with roughly 10 hours of fuel. Is this acceptable? District to confirm.



Applicable to the following:

KD800 to KD3250

KD800-YF to KD3250-YF

The ECU2-HD, rated I6K9K, can be used under harsh conditions with connected or disconnected cable harness. The control is suitable for diesel engines with up to 12 cylinders.

In a cascaded configuration, it controls up to 20 cylinders. The ECU is compatible with the common rail system found on the KD Series Kohler engine. The control unit also fulfills functional safety requirements of international safety standards. Due to the integrated diagnostics, the ECU can do self-checks, facilitating maintenance. Integrated fuel cooling ensures safe and reliable operation of the ECU.

Features

- Combined control of engine and exhaust gas treatment.
- Twelve power outputs for injector evaluation.
- Control of up to 20 cylinders in a cascaded configuration.
- Suitable for direct mounting on the engine.
- High performance, self-diagnostics for safe operation.
- Standardized communication interfaces J1939, UDS.
- Functional safety features according to EN ISO 13849.
- Temperature range from -40°C to 125°C (-40°F to 257°F).
- Reliable operation in harsh conditions.
- Platform for EU Stage IV/V, Euro V/VI, and EPA Tier 4f.

Specifications and Features

Specification/Feature	
Generator Set Availability	KD800-3250
Microcontroller	Freescale SPC56xx Family
Frequency	256 MHz
Housing	Diecast aluminum
Dimensions	334 X 296 X 85.9 mm (13.1 x 11.7 x 3.4 in.) without strain relief clamp
Weight	5.4 kg (11.9 lbs.)
Rated voltage	+24 VDC
Operating temperature	-40°C to +80°C (-40°F to 176°F) with air cooling, -40°C to max +125°C (-40°F to max. 257°F) with fuel cooling
Flammability	UL 94 V-0
IP rating	IP6K9K with and without connected cable harness
Memory	4 MB Flash, 256 kB RAM internal, 4 MB RAM external (optional), 128 kB EEPROM external
Digital inputs	10 x configurable logic levels
Analog inputs	2 x configurable 0-5 V/0-25 mA, 17 x 0-5 V, 14 x 0-33 V
Resistance inputs	19 x resistance 0-50 kOhms
Frequency inputs	2 x Hall speed sensor, 8 x universal frequency measurement range 0.5 Hz to 10 kHz
Constant voltage outputs	12 x 5 V, 2 x 12 V, 11 x UBATT
Pulse Width Modulation (PWM) outputs	10 x half-bridge configuration with current measurement
Digital outputs	12 x high-side, 8 x low-side
Controlled analog outputs	1
Communication interfaces	4 x CAN according to ISO 11898-2, thereof one galvanically isolated
Power outputs for injectors	12 x split into four stages
Plug	Deutsch DRC 280 Pins (4 x 70)

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The APM603 generator set controller provides advanced control, system monitoring, and system diagnostics for a single generator set or paralleling multiple generator sets. The APM603 interfaces the generator set to other power system equipment and network management systems using standard industry network communications. It uses a patented digital voltage regulator and unique software logic to manage alternator thermal overload protection as well as serves as an overcurrent protective relay, features normally requiring additional hardware. The APM603 controller meets NFPA 110, Level 1.

Display, Interface, and Accessibility

- A 7-inch color TFT touchscreen for easy local access to data.
 - Home screen can be customized to show critical data at a glance.
 - Create a custom favorites list for quick access to important data
- Measurements are selectable in metric or English units.
- Supports Modbus® protocol through serial bus and Ethernet networks, and supports SNMP and BACnet® through Ethernet networks.

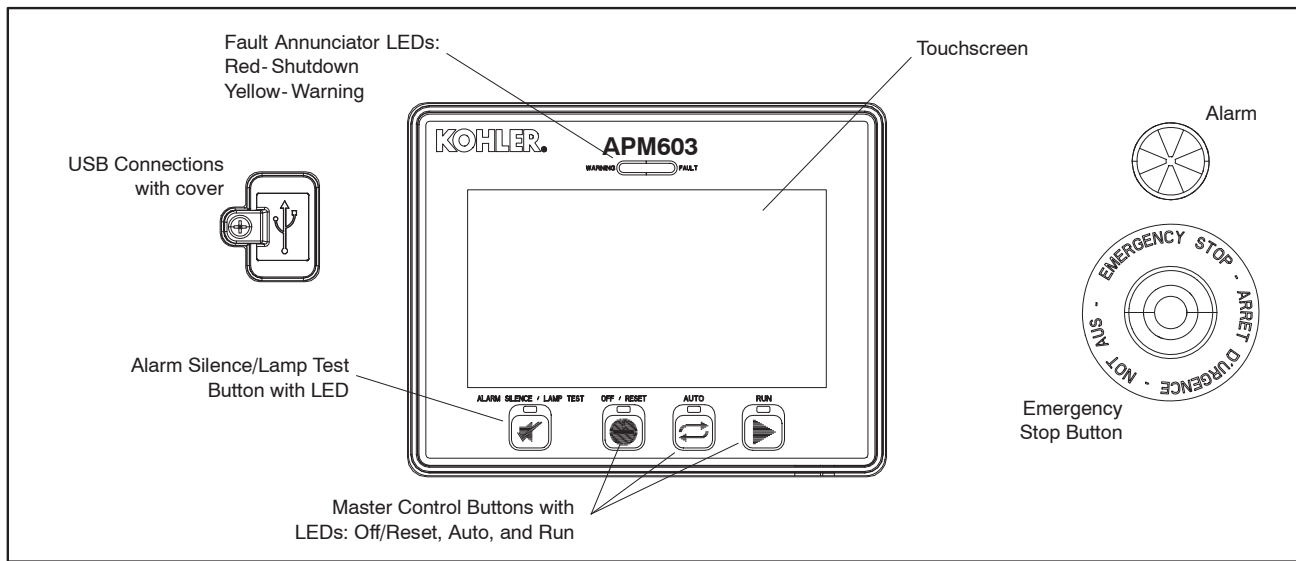
Global Support

- Sales, installation, and service support from more than 800 Kohler and SDMO service providers around the world.

On-board Diagnostics

- Immediate visibility of warnings and faults with text description and code display.
 - 15 seconds of critical data are captured around each warning and fault
 - Critical data can be viewed on the display and downloaded
- Store up to 10,000 events locally along with historical data logging of successful starts.
 - Accurate time stamp from real-time clock
 - Event log can be downloaded
- Data logging of customized parameter list for report generation and advanced troubleshooting.
 - Store to external USB drive for easy transfer to another device

Modbus® is a registered trademark of Schneider Electric.
BACnet® is a registered trademark of ASHRAE.



Controller Features

AC Output Voltage Regulator Adjustment	Maximum of $\pm 10\%$ of the system voltage
Alarm Horn	Indicates a generator set warning or shutdown condition
Alarm Silence	For NFPA-110 application or user convenience
Alternator Protection	Generator set overload and short circuit protection
Cyclic Cranking	Provides automatic restart after a failed start attempt with programmable on/off time and number of attempts
ECU Diagnostics	Displays engine ECU fault codes and descriptions for engine troubleshooting
Emergency Stop Button	Shuts down the generator set immediately, for emergency situations
Engine Start Aid	Control for an optional engine starting aid
Environmentally Sealed Membrane Keypad	Three master control buttons with LEDs: Off/Reset, Auto, and Run
Patented High-Speed RMS Digital Voltage Regulator	$\pm 0.25\%$ no-load to full-load regulation with three-phase true RMS sensing
Lamp Test	Verifies functionality of the indicator LEDs
Real-time Clock	Includes battery back-up to retain date and time through controller power cycle
Remote Reset	Allows remote fault resets and restarting of the generator set
Remote Monitoring Panel	Compatible with the Kohler® Remote Serial Annunciator
Run Time Hourmeter	Displays generator set run time
Run Relay	Indicates that the generator set is running
Time Delay Engine Cooldown (TDEC)	Time delay before the generator set shuts down
Time Delay Engine Start (TDES)	Time delay before the generator set starts

Communication

USB Port	(1) Mini-USB port for PC connection (1) USB port for storage device
Serial (RS-485) Port	(1) Non-isolated for RSA III (1) Isolated for Modbus devices (1) Isolated for paralleling communication
Ethernet Port	(1) RJ45 for Modbus TCP, SNMP, and BACnet

Controller Specifications

Nominal voltage	12 or 24 VDC protected against reverse battery connection
Power	800 mAmps at 12 VDC 400 mAmps at 24 VDC
Operating Temperature	-40°C to 70°C (-40°F to 158°F)
Storage Temperature	-40°C to 85°C (-40°F to 185°F)
Humidity	5% to 95% non-condensing
Display Size, W x H	154 x 86 mm (6.0 x 3.4 inches)
Protection Index	IP65 Front

Paralleling Features

- Isochronous control with real and reactive load sharing with other APM603 controller equipped generator sets
 - Supports paralleling up to 8 generators
- Random first-on logic to prevent two or more generator sets from closing to a dead bus and provides the fastest response for a single generator online
- Automatic synchronizer with dead bus closing
- Soft loading and unloading for generator management
- Protective relay functions:
 - Synch check (25C)
 - Over current (51)
 - Over frequency (81O)
 - Over power (32O)
 - Over voltage (59)
 - Reverse power (32R)
 - Reverse reactive power (32RQ)
 - Under frequency (81U)
 - Under voltage (27)
- Generator management to allow the start and stop of generators based on load demand or state of other generators
 - Fuel level
 - Run time
 - Manual order
 - Time of day
 - Efficiency
- Simplified paralleling system view from any generator controller in the system

Overcurrent Protective Device

- Provides protection against line-to-line and line-to-neutral faults
- Uses thermal and instantaneous current limit settings for alternator protection
- Includes a maintenance mode for arc flash reduction per NEC 240.87

Load Management Features

- Programmable outputs included to command the connect and disconnect of loads based on generator or paralleling system state
 - Loads connected based on available capacity
 - Loads disconnected at system startup
 - Loads disconnected based on a maximum kW setting or underfrequency setting
- Supports up to 16 prioritized load steps per system
 - Can be used on a single generator system
 - Can be combined in a paralleling system for a total system load control capability
- Simplified load management system view from any generator controller in the system
- Requires input/output module option

Advanced Programmable I/O

- Configurable inputs and outputs can be programmed for customer specific use
- PLC-like capability for applying logic to customize generator system behavior

Troubleshooting Features

- 15 seconds of key data automatically captured around each warning and shutdown
 - Data can be exported for detailed analysis
 - Data can be viewed on controller for convenient on-site troubleshooting support
- Configurable data logger will allow you to select parameters to monitor
 - Data stored to USB device for flexibility on amount of data stored and ability to export for detailed analysis
 - Data capture controlled by user to allow capturing specific data required

NFPA 110 Requirements

In order to meet NFPA 110, Level 1 requirements, the generator set controller monitors the engine/generator functions/faults shown below.

- Engine functions:
 - Overcrank
 - Low coolant temperature warning
 - High coolant temperature warning
 - High coolant temperature shutdown
 - Low oil pressure shutdown
 - Low oil pressure warning
 - High engine speed
 - Low fuel (level or pressure) *
 - Low coolant level
 - EPS supplying load
 - High battery voltage
 - Low battery voltage
- General functions:
 - Master switch not in auto
 - Battery charger fault *
 - Lamp test
 - Contacts for local and remote common alarm
 - Audible alarm silence button
 - Remote emergency stop *

* Function requires optional input sensors or kits and is engine dependent, see Engine Data.

Standards

The generator set controller has been tested and verified for compliance with the following standards.

- NFPA 99
- NFPA 110, Level 1
- CSA 282-09
- UL 6200
- ASTM B117 (salt spray test)

Controller Functions

The controller displays warning, shutdown, and status messages. **All functions are available as relay outputs.**

Warning causes the yellow fault LED to show and sounds the alarm horn, signaling an impending problem.

Shutdown causes the red fault LED to show, sounds the alarm horn, and stops the generator set.

The controller communicates with the engine ECU and supports a large number of warning and shutdown events that are not listed here. This table highlights the items required for NFPA 110.

Event	Warning	Shutdown
Alternator Thermal Protection †		●
Battery Charger Fault *	▲	
CAN Option Board1 Comm Loss	▲	
Critically Low Fuel Level (diesel) *	▲	
ECU Diagnostic Event	▲	
ECU Mismatch Shutdown †		●
Fuel Leak Alarm (diesel) *	▲	
High Battery Voltage Warning	▲	
High Coolant Temperature Shutdown †		●
High Coolant Temperature Warning	▲	
High Fuel Level Warning (diesel) *	▲	
High Oil Temperature Shutdown †		●
High Oil Temperature Warning	▲	
Local Emergency Stop Shutdown †		●
Loss ECU Comms Shutdown †		●
Loss of Signal Low Coolant Level Voltage	▲	
Low Battery Voltage Warning	▲	
Low Coolant Level Shutdown †		●
Low Coolant Temperature Warning	▲	
Low Fuel Level Shutdown (diesel) * †		●
Low Fuel Level Warning (diesel) *	▲	
Low Fuel Pressure Warning (gas) *	▲	
Low Oil Pressure Shutdown †		●
Low Oil Pressure Warning	▲	
Low RTC (clock) Battery Voltage	▲	
Maintenance Reminder1	▲	
Maintenance Reminder2	▲	
Maintenance Reminder3	▲	
Maximum Power Shutdown †		●
Maximum Power Warning	▲	
Not In Auto Alarm	▲	
Over Crank Shutdown †		●
Over Current Shutdown (L1, L2, L3) †		●
Over Current Warning (L1, L2, L3)	▲	
Over Frequency Shutdown †		●
Over Frequency Warning	▲	
Over Power Shutdown †		●
Over Power Warning	▲	
Over Speed Shutdown †		●
Over Voltage Shutdown (L-L, L-N, each phase) †		●
Over Voltage Warning (L-L, L-N, each phase)	▲	

Event	Warning	Shutdown
Remote Emergency Stop Shutdown †		●
Reverse Power Shutdown †		●
Reverse VAR Shutdown †		●
Under Frequency Shutdown †		●
Under Frequency Warning	▲	
Under Voltage Shutdown (L-L, L-N, each phase) †		●
Under Voltage Warning (L-L, L-N, each phase)	▲	
Weak Cranking Battery	▲	
Status Messages		
Auto Button Pressed		
EPS Supplying Load		
Generator Running		
Generator Started		
Generator Stopped		
GFCI Warning *		
Load Shed Overload		
Load Shed Under Frequency		
Off Button Pressed		
RSA Event Programmable Digital Inputs, 1 - 8		
Run Button Pressed		
* Function requires optional input sensors or kits		
† Items included with common fault shutdown 10		

John Deere Engine-Powered Models Inputs and Outputs

Standard Dedicated User Inputs	Input Type
Auxiliary Fault (Shutdown)	Digital Input
Auxiliary Warning	
Battery Charger Fault	
Breaker Closed *	
Breaker Open *	
Excitation Over Voltage (350 kW and up)	
Fuel Leak Alarm	
Low Fuel Level Switch	
Remote Emergency Stop	
Remote Engine Start	
Speed Bias	Two-wire input
Voltage Bias	Analog Voltage Input, Scalable up to +/- 10 VDC

Standard Dedicated User Outputs	Output Type
Close Breaker *	Relay Driver Output
Common Failure	
Run	
Trip Breaker / Shunt Trip *	

* Only with remote-mounted electrically operated circuit breakers.

Optional Configurable User Inputs and Outputs	
User Configurable Inputs	2 Analog, 0-5 VDC 4 Dry Contact Digital
User Configurable Relay Outputs	14 NO/NC Relays 1 Common Fault Relay

Note: Programmable I/O is configurable by a Kohler-authorized technician

JD Engine Data

The following John Deere engine data is displayed on the APM603 controller.

Parameter
Engine Model Number
Engine Serial Number
ECU Serial Number
Coolant Temperature
Engine Speed
Fuel Pressure
Fuel Consumption Rate
Oil Pressure
Run Time Hours

Kohler KD Engine-Powered Models Inputs and Outputs

Standard Dedicated User Inputs	Input Type	
Auxiliary Fault (Shutdown)	Digital Input	
Auxiliary Warning		
Battery Charger Fault		
Breaker Closed *		
Breaker Tripped/Open *		
Fuel Leak Alarm		
Fuel Level		
Idle Switch		
Key Switch Enable		
Low Fuel Level Switch		
Low Oil Level		
Remote Emergency Stop		
Remote Reset		
Remote Engine Start		Two-wire input
Speed Bias		Analog Voltage Input, Scalable up to +/- 10 VDC
Voltage Bias		

Standard Dedicated User Outputs	Output Type
Close Breaker *	Relay Driver Output
Common Failure	
Common Warning	
EPS Supplying Load	
Generator Running	
Horn	
Low Coolant Temperature	
Not in Auto	
System Ready	
Trip Breaker / Shunt Trip *	

* Only with remote-mounted electrically operated circuit breakers.

Optional Configurable User Inputs and Outputs	
User Configurable Inputs	16 Dry Contact Digital
User Configurable Relay Outputs	8 NO/NC Relays

Note: Programmable I/O is configurable by a Kohler-authorized technician.

KD Engine Data

The following Kohler Diesel engine data is displayed on the APM603 controller.

Parameter
Engine Model Number
Engine Serial Number
Ambient Temperature
Charge Air Pressure
Charge Air Temperature
Common Rail Fuel Pressure
Coolant Level
Coolant Temperature
Crankcase Pressure
Engine Speed
Fuel Consumption Rate
Fuel Pressure
Fuel Temperature
Intercooler Coolant Temperature (K175 engines only)
Oil Temperature
Oil Pressure
Run Time Hours

APM603 Available Options

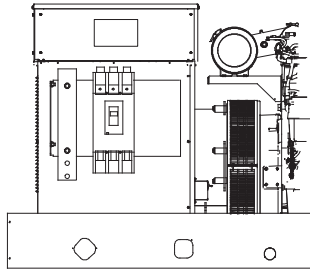
- Common Failure Relay** provides a relay output to signal a generator set fault.
- Battery Charger** available with 6 amp, 10 amp, and 20 amp output for 12 and 24V DC voltage output. (Availability is generator model dependent.) The 10 amp and 20 amp models provide NFPA 110 charging and alarming capability.
- Electrically Operated Circuit Breakers**
 - For paralleling systems
 - Available generator-mounted or remote-mounted
 - 24VDC
- Ground Fault Relay** provides a relay output to signal a ground fault is detected.
- Input/Output Module** for Kohler Diesel (KD) and Mitsubishi models provides:
 - 16 digital input connections with connection to ground
 - 8 relay output connections (Form C, rated 8A, 240 VAC or rated 0.5 A, 48 VDC)
- Input/Output Module** for models other than KD or Mitsubishi provides:
 - 2 analog inputs (0-5 VDC)
 - 4 digital input connections with connection to ground
 - 14 relay output connections (Form C, rated 10A, 120V)
 - 1 common fault relay output (NO, rated 2A, 24VDC)
- Key Switch** to allow selection of RUN, OFF and AUTO modes. Lockable in the AUTO position by removing the key.
- Remote Emergency Stop Switch** available as a wall mounted panel to remotely shut down the generator set.
- Remote Monitoring Panel.** The Kohler® Remote Serial Annunciator (RSA) enables the operator to monitor the status of the generator set from a remote location, which may be required for NFPA 99 and NFPA 110 installations, and up to four Automatic transfer switches.
- Shunt Trip Wiring** provides relay outputs to trip a shunt trip circuit breaker and to signal the common fault shutdowns. Contacts rated at 10 amps at 28 VDC or 120 VAC.

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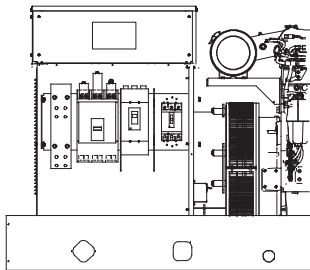
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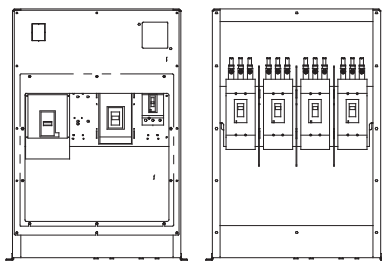
Line Circuit Breakers 15-3250 kW



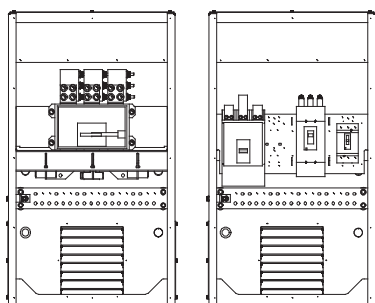
Single Circuit Breaker Kit with Neutral Bus Bar
15-300 kW Model Shown



Multiple Circuit Breaker Kit with Neutral Bus Bar
180-300 kW Model Shown



Multiple Circuit Breaker Kits with Neutral Bus Bar
350-2250 kW Model Shown
(also applies to some 300 kW models)



Circuit Breaker Kits with Neutral Bus Bar
700-2500 kW KD Model Shown

Standard Features

- The line circuit breaker interrupts the generator set output during a short circuit and protects the wiring when an overload occurs. Use the circuit breaker to manually disconnect the generator set from the load during generator set service.
- Circuit breaker kits are mounted to the generator set and are provided with load-side lugs and neutral bus bar.
- Kohler Co. offers a wide selection of molded-case line circuit breaker kits including single, dual, and multiple configurations for each generator set.
- Four types of line circuit breakers are available: (see page 2 for definitions and pages 3 and 4 for application details)
 - Magnetic trip
 - Thermal magnetic trip
 - **Electronic trip**
 - Electronic with ground fault (LSIG) trip
- In addition, line circuit breakers are offered with 80% and 100% ratings.
- Single line circuit breaker kits allow circuit protection of the entire electrical system load.
- Dual line circuit breaker kits allow circuit protection of selected priority loads from the remaining electrical system load.
- Multiple line circuit breaker kits with field connection barrier allow circuit protection for special applications (350-2500 kW models and selected 80-300 kW models).
- Up to four line circuit breakers can be used on 350-2500 kW models.
- Line circuit breakers comply with the following codes and standards unless otherwise stated.
 - UL 489 Molded Case Circuit Breakers
 - UL 1077 Supplementary Protectors
 - UL 2200 Stationary Engine Generator Assemblies

Line Circuit Breaker Types

Magnetic Trip

The magnetic trip features an electromagnet in series with the load contacts and a moveable armature to activate the trip mechanism. When a sudden and excessive current such as a short circuit occurs, the electromagnet attracts the armature resulting in an instantaneous trip.

Thermal Magnetic Trip

Thermal magnetic trip contains a thermal portion with a bimetallic strip that reacts to the heat produced from the load current. Excessive current causes it to bend sufficiently to trip the mechanism. The trip delay is dependent on the duration and excess of the overload current. Elements are factory-calibrated. A combination of both thermal and magnetic features allows a delayed trip on an overload and an instantaneous trip on a short circuit condition.

Electronic Trip

These line circuit breakers use electronic controls and miniature current transformers to monitor electrical currents and trip when preset limits are exceeded.

LI breakers are a combination of adjustable trip functions including long-time ampere rating, long-time delay, and instantaneous pickup. LSI breakers have all of the LI breaker features plus short-time pickup, short-time delay, and defeatable instantaneous pickup. LSI breakers have all of the LSI breaker features plus ground-fault pickup and delay.

NOTE: MG-frame does not have a long-time delay when selected with LI breakers.

Electronic with Ground Fault Trip

The ground fault trip feature is referred to as LSI in this document. Models with LSI compare current flow in phase and neutral lines, and trip when current unbalance exists.

Ground fault trip units are an integral part of the circuit breaker and are not available as field-installable kits. The ground fault pickup switch sets the current level at which the circuit breaker will trip after the ground fault delay. Ground fault pickup values are based on circuit breaker sensor plug only and not on the rating plug multiplier. Changing the rating plug multiplier has no effect on the ground fault pickup values.

80% Rated Circuit Breaker

Most molded-case circuit breakers are 80% rated devices. An 80% rated circuit breaker can only be applied at 80% of its rating for continuous loads as defined by NFPA 70. Circuit conductors used with 80% rated circuit breakers are required to be rated for 100% of the circuit breaker's rating.

The 80% rated circuit breakers are typically at a lower cost than the 100% rated circuit breaker but load growth is limited.

100% Rated Circuit Breaker

Applications where all UL and NEC restrictions are met can use 100% rated circuit breakers where 100% rated circuits can carry 100% of the circuit breaker and conductor current rating.

The 100% rated circuit breakers are typically at a higher cost than the 80% rated circuit breaker but have load growth possibilities.

When applying 100% rated circuit breakers, comply with the various restrictions including UL Standard 489 and NEC Section 210. If any of the 100% rated circuit breaker restrictions are not met, the circuit breaker becomes an 80% rated circuit breaker.

Line Circuit Breaker Options

Alarm Switch

The alarm switch indicates that the circuit breaker is in a tripped position caused by an overload, short circuit, ground fault, the operation of the shunt trip, an undervoltage trip, or the push-to-trip pushbutton. The alarm resets when the circuit breaker is reset.

Auxiliary Contacts

These switches send a signal indicating whether the main circuit breaker contacts are in the open or closed position.

Breaker Separators (350- 2500 kW)

Provides adequate clearance between breaker circuits.

Bus Bars

Bus bar kits offer a convenient way to connect load leads to the generator set when a circuit breaker is not present.

15- 300 kW. Bus bar kits are available on alternators with leads for connection to the generator set when circuit breakers are not ordered.

350- 2500 kW. A bus bar kit is provided when no circuit breaker is ordered. Bus bars are also available in combination with circuit breakers or other bus bars on the opposite side of the junction box. On medium voltage (3.3 kV and above) units, a bus bar kit is standard (not applicable to KD models).

Field Connection Barrier

Provides installer wiring isolation from factory connections.

Ground Fault Annunciation

A relay contact for customer connection indicates a ground fault condition and is part of a ground fault alarm.

Lockout Device (padlock attachment)

This field-installable handle padlock attachment is available for manually operated circuit breakers. The attachment can accommodate three padlocks and will lock the circuit breaker in the OFF position only.

Lugs

Various lug sizes are available to accommodate multiple cable sizes for connection to the neutral or bus bar.

Overcurrent Trip Switch

The overcurrent trip switch indicates that the circuit breaker has tripped due to overload, ground fault, or short circuit and returns to the deenergized state when the circuit breaker is reset.

Shunt Trip, 12 VDC or 24 VDC

A shunt trip option provides a solenoid within the circuit breaker case that, when momentarily energized from a remote source, activates the trip mechanism. This feature allows the circuit breaker to be tripped by customer-selected faults such as alternator overload or overspeed. The circuit breaker must be reset locally after being tripped. Tripping has priority over manual or motor operator closing.

Shunt Trip Wiring

Connects the shunt trip to the generator set controller. (standard on KD models with the APM802 controller)

Undervoltage Trip, 12 VDC or 24 VDC

The undervoltage trips the circuit breaker when the control voltage drops below the preset threshold of 35%- 70% of the rated voltage.

700-2500 kW KD Model Line Circuit Breaker Specifications

80% Rating Circuit Breaker

Alt. Model	Ampere Range	Trip Type	C. B. Frame Size
KH	15-150	Thermal Magnetic	HD
	60-150	Electronic LI	
		Electronic LSI	
		Electronic LSI ²	
	60-150	Electronic LI	HG
		Electronic LSI	
		Electronic LSI ²	
	30	9-325 A. Mag. Trip	HJ
	50	84-546 A. Mag. Trip	
	100	180-1040 A. Mag. Trip	
	150	348-1690 A. Mag. Trip	
	175-250	Thermal Magnetic	JD
		Electronic LI	
		Electronic LSI	
	250	Electronic LSI ²	JG
		Electronic LSI	
		Electronic LSI ²	
	250	684-2500 A. Mag. Trip	JJ
	400	2000-4800 A. Mag. Trip	LG
	600	3000-7200 A. Mag. Trip	
	400-600	Electronic LI	
		Electronic LSI	
		Electronic LSI ²	
	800	Electronic LI	MG
1000-1200	Thermal Magnetic	PG	
800-1200	Electronic LSI		
	Electronic LSI ²		
1200	Thermal Magnetic	PJ	
	Electronic LSI		
1600-2500	Electronic LSI ²	RJ	
	Thermal Magnetic		
	Electronic LSI		

100% Rating Circuit Breaker

Alt. Model	Ampere Range	Trip Type	C. B. Frame Size
KH	15-150	Thermal Magnetic	HD
	60-150	Electronic LI	
		Electronic LSI	
		Electronic LSI ²	
	60-150	Electronic LI	HG
		Electronic LSI	
		Electronic LSI ²	
	175-250	Thermal Magnetic	JD
	250	Electronic LI	
		Electronic LSI	
	250	Electronic LSI ²	JG
		Electronic LSI	
		Electronic LSI ²	
	400	Electronic LI	LG
		Electronic LSI	
		Electronic LSI ²	
	600-1200	Electronic LSI	PG
		Electronic LSI ²	
	1200	Electronic LSI	PJ
		Electronic LSI ²	
	1600-2500	Electronic LSI ²	RJ
	1600-3000	Electronic LSI	NW
		Electronic LSI ²	

100% Rating Electrically Operated Breakers

For use as paralleling breakers with the APM603 controller.

Alt. Model	Amps	Trip Unit	Frame
KH	250, 400, 600, 800, 1000, 1200	3.0 LI	PJ
		5.0 LSI	PJ
		3.0 LI	PL
		5.0 LSI	PL
	1600, 2000, 2500, 3000	Electronic LSI	NW
		Electronic LSI ²	NW

All circuit breakers listed in this table include line side bus and load side lugs, 24VDC motor operators, and 1 type C SDE overcurrent switch contact. P-frame breakers include 2 type C auxiliary contacts. NW breakers include 4 auxiliary contacts.

No second breakers are allowed in combination with these breakers.

Load Bus Rating

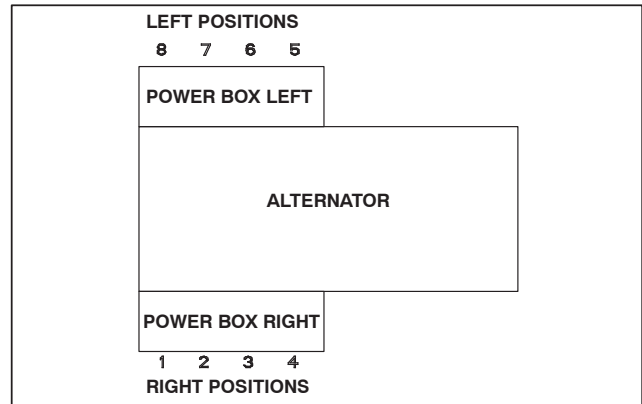
Gen. Set Model	Alt. Model	Rating, Amperes	Type
KD700- KD750	KH	2000- 3000	Load Bus
KD800- KD1750		2000- 4000	
KD2000- KD2500		3000- 4500	

700-2500 kW KD Model Line Circuit Breaker Specifications

Interrupting Ratings

Circuit Breaker Frame Size	240 Volt, kA	480 Volt, kA	600 Volt, kA
HD	25	18	14
HG	65	35	18
HJ	100	65	25
JD	25	18	14
JG	65	35	18
JJ	100	65	25
LG	65	35	18
MG			
PG			
PJ	100	65	25
RJ			
NW	100	100	85

Breaker Positions



Circuit Breaker Lugs Per Phase (Al/Cu)

Frame Size	Ampere Range	Wire Range
H	15-150	One #14 to 3/0
J	175	One 1/0 to 4/0
	200-250	One 3/0 to 350 kcmil
LG	400-600	Two 2/0 to 500 kcmil
M	800	Three 3/0 to 500 kcmil
P	600-800	Three 3/0 to 500 kcmil
	1000-1200	Four 3/0 to 500 kcmil
R	1600-2500	(8) 1/0 to 750 kcmil or (16) 1/0 to 300 kcmil
NW	1600-3000	(10) 1/0 to 750 kcmil or (20) 1/0 to 300 kcmil
Mechanical Load Lugs Included with H, J, and LG LSIG Neutrals		
H	60-150	One #14 to 3/0 AL/CU
J	250	One 3/0 to 350 kcmil AL/CU
LG	400-600	Two 4/0 to 500 kcmil AL/CU

NOTE: Breaker and load bus phasing on right positions is A- B- C and on left positions is C- B- A.

NOTE: H, J, and LG-frames when selected with LSIG trip require two mounting spaces (one space for the breaker and one space for the LSIG neutral). These combinations are not reflected in the Multiple Circuit Breaker Combinations table on this page.



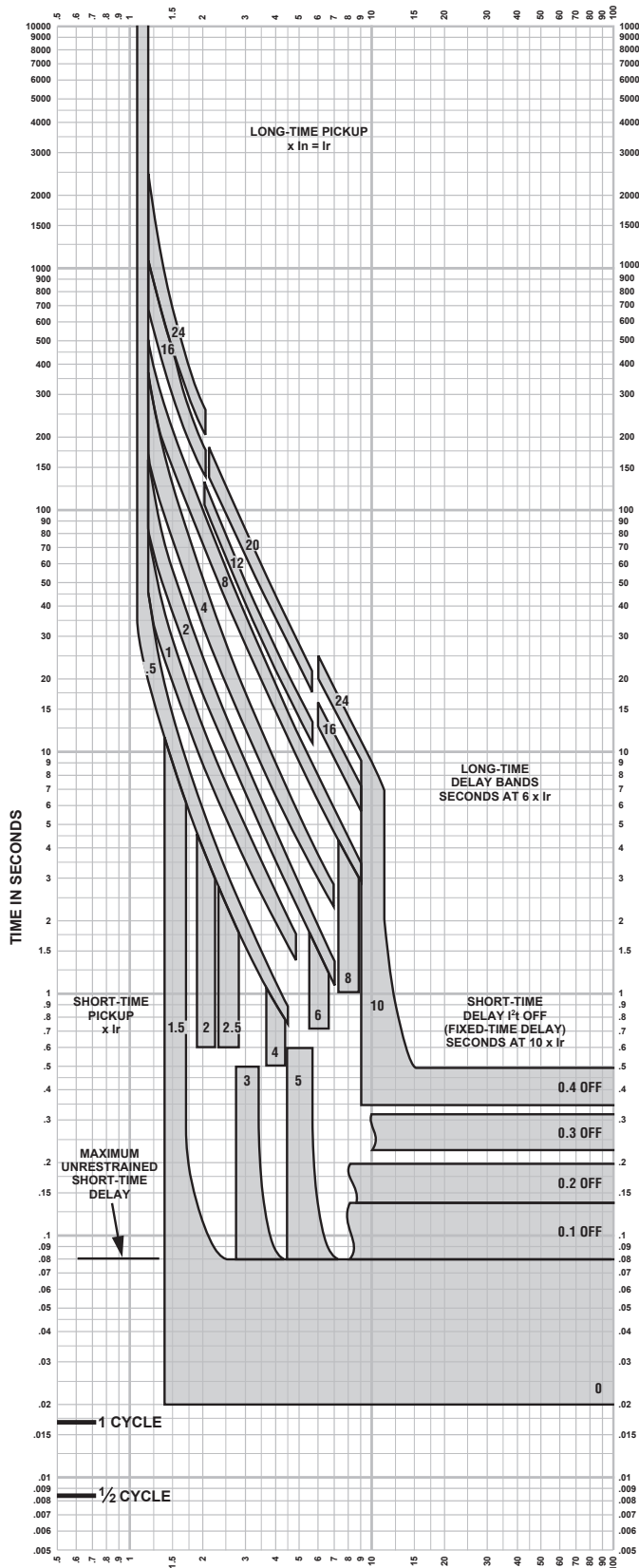
KOHLER CO., Kohler, Wisconsin 53044 USA
Phone 920-457-4441, Fax 920-459-1646
For the nearest sales and service outlet in the
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CURRENT IN MULTIPLES OF I_r ($I_r = \text{LONG-TIME SETTING} \times I_n$)



**MICROLOGIC® 5.0/6.0 A/P/H TRIP UNIT
CHARACTERISTIC TRIP CURVE NO. 613-4**

Long-time Pickup and Delay
Short-time Pickup and I^2t OFF Delay

The time-current curve information is to be used for application and coordination purposes only.

Curves apply from -30°C to $+60^{\circ}\text{C}$ ambient temperature.

Notes:

1. There is a thermal-imaging effect that can act to shorten the long-time delay. The thermal-imaging effect comes into play if a current above the long-time delay pickup value exists for a time and then is cleared by the tripping of a downstream device or the circuit breaker itself. A subsequent overload will cause the circuit breaker to trip in a shorter time than normal. The amount of time delay reduction is inverse to the amount of time that has elapsed since the previous overload. Approximately 20 minutes is required between overloads to completely reset thermal-imaging.
2. The end of the curve is determined by the interrupting rating of the circuit breaker.
3. With zone-selective interlocking on, short-time delay utilized and no restraining signal, the maximum unrestrained short-time delay time band applies regardless of the setting.
4. Total clearing times shown include the response times of the trip unit, the circuit breaker opening, and the extinction of the current.
5. For a withstand circuit breaker, instantaneous can be turned OFF. See 613-7 for instantaneous trip curve. See 613-10 for instantaneous override values.
6. Overload indicator illuminates at 100%.

- Merlin Gerin
 - Modicon
 - Square D
 - Telemecanique
 - Federal Pioneer
 - Federal Pacific
- Schneider Electric Brands



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Curve No. 0613TC0004
December 2000
Drawing No. B48095-613-04

POWERPACT® P- and R-Frame Molded Case Circuit Breakers (Standard or 100% rated up to 2500 A)

The most compact and innovative molded case circuit breakers



P-Frame 1200 A



R-Frame

POWERPACT Molded Case Circuit Breakers lead the industry with proven, reliable protection and innovative design. Providing unparalleled performance and control, this generation of P- and R-frame circuit breakers features exclusive MICROLOGIC® Trip Units, which allow for a range of sophisticated applications for metering and monitoring. In addition, units can be interchanged to allow for maximum flexibility and are field-installable for easy upgrades as needed.

The compact P- and R-frame circuit breakers permit smaller footprint and higher density installations using I-LINE® Panelboards and Switchboards. These circuit breakers are available in 100% rated construction up to 2500 A to meet a broad range of commercial and industrial application needs.

Full-Featured Performance

- P-frame – 1200A available in both standard and 100% ratings with sensor sizes 250–1200A. Interrupting ratings (AIR) G-35kAIR, J-65kAIR and L-100kAIR at 480 VAC
- R-frame – 2500A available in both standard and 100% ratings with sensor sizes 600–2500A. Interrupting ratings (AIR) G-35kAIR, J-65kAIR and L-100kAIR at 480 VAC
- Compact breaker size allows for smaller footprint installations using I-LINE Panelboards and Switchboards. 9" width on P-frame designs and 15" width on R-frame designs provide increased density installations
- Most field-installable accessories are common to all frame sizes for easier stocking and installation
- Selection of four interchangeable MICROLOGIC Trip Units with POWERLOGIC® power metering and monitoring capabilities available in advanced trip units
- Compatible with POWERLOGIC® systems and high amperage power circuit breakers
- Built-in MODBUS® protocol provides an open communications platform and eliminates the need to purchase additional, proprietary network solutions
- Connection options include bus, cable or I-Line for installation flexibility
- Additional options are available for 5-cycle closing, stored energy mechanisms and draw-out mounting of 1200 A breakers

POWERPACT® P- and R-Frame Molded Case Circuit Breakers (Standard or 100% rated up to 2500 A)

Onboard Intelligence

For “smarter breakers,” a range of MICROLOGIC® Trip Units provides advanced functionality, such as a communications interface, and power metering and monitoring capabilities. With the appropriate MICROLOGIC Trip Unit, you can communicate with breakers, gather power information, monitor events and remotely control breakers based on predetermined conditions, leading to substantial savings in electrical system operating costs.

These interchangeable, microprocessor-controlled, plug-in devices provide the next generation of protection, measurement and control functions, delivering not only greater electrical system safety but also improved system integration and coordination.



MICROLOGIC® Trip Units

Choose the Model that Meets Your Needs

MICROLOGIC 3.0 and 5.0

- Basic circuit protection including long-time, instantaneous and optional short-time adjustments

MICROLOGIC 3.0A, 5.0A and 6.0A

- Long-time, instantaneous and optional short-time adjustments
- Integrated ammeter and phase loading bar graph
- LED trip indicator
- Zone selective interlocking with downstream and upstream breakers
- Optional ground-fault protection
- Optional MODBUS® communications interface

MICROLOGIC 5.0P and 6.0P

- Long-time, instantaneous and optional short-time adjustments
- Advanced relay protection (current imbalance, under/over voltage, etc.)
- Inverse Definite Minimum Time Lag (IdmtL) long-time delay curve shaping for improved coordination
- Basic power metering and monitoring functions
- Standard MODBUS communications interface compatibility with POWERLOGIC® installations
- Standard GF alarm on 5.0P. 6.0P has equipment ground-fault tripping protection

MICROLOGIC 5.0H and 6.0H

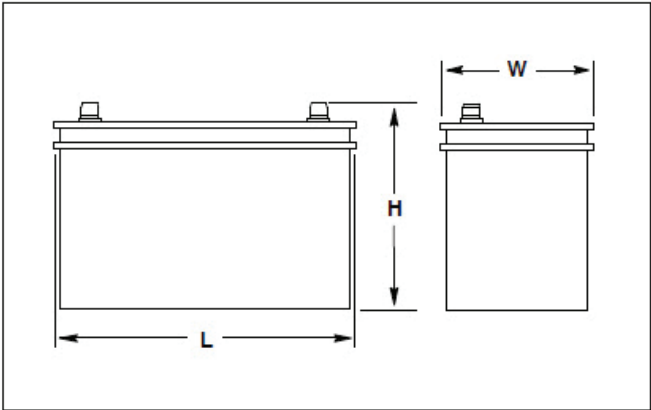
- All 5.0P and 6.0P functions
- Enhanced POWERLOGIC power metering and monitoring capabilities
- Basic power quality (harmonic) measurement
- Waveform capture

Contact your Square D sales representative for additional information. Or, visit www.SquareD.com.





Typical Overall Dimensions

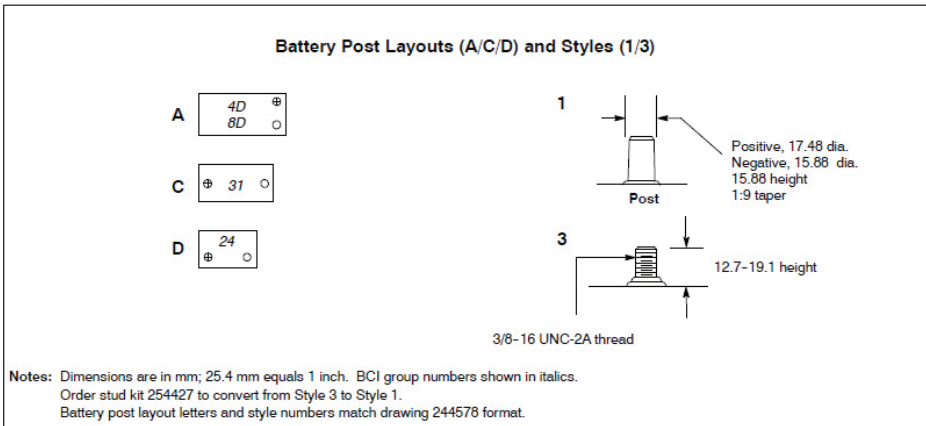


Standard Features

- Kohler Co. selects batteries to meet the engine manufacturer's specifications and to comply with NFPA requirements for engine-cranking cycles.
- Heavy-duty starting batteries are the most cost-effective means of engine cranking and provide excellent reliability in generator set applications.
- Batteries are rated according to SAE standard J-537. All batteries are 12-volt and have lead-calcium or lead-antimony plates with sulfuric acid electrolyte.
- Most generator set battery kits offer dry-charged or wet-charged batteries.
- Tough polypropylene cases protect against life-shortening vibration and impact damage.
- Removable cell covers allow checking of electrolyte specific gravity.
- Absorbant glass mat (AGM) batteries are sealed and maintenance free.
- Batteries are for applications below and above 0 ° C (32 ° F).

Charge Type*	Battery Part Number	Battery Qty. per Size	BCI Group Size	Battery SAE Dimension, mm (in.)			Cold Cranking Amps at 18°C (0°F) Min.	Reserve Capacity Minutes at 27° (80°F) Min.	Battery Post Layout and Style
				L	W	H			
AGM	10702001800	2	4D	527.1 (20.8)	216.0 (8.5)	258.0 (10.2)	1110	380	A/1

Battery Specifications



24V, 20A Battery Charger



The battery charger uses High Frequency charging technology. The battery charger incorporates Power Factor Correction Circuitry to achieve high efficiency and a wide input range.

This filtered output unit is designed and built to charge VRLA (Gel-Cell, AGM), Flooded Lead Acid, and Nickel Cadmium batteries.

The battery charger is equipped with an LCD display showing DC Volts, DC Amps, and three status LEDs. Integrated Battery Charge Divider / Isolator provides connections for charging up to three independent batteries simultaneously.

Applicable to the following: KD Model Generator Sets

Standard Features

- Microprocessor Controlled High Frequency Charging Technology
- Single Phase AC Input 105- 264VAC, 45- 65Hz
- LCD Display
- Charger Failure Alarm with LED Indicator and Form “C” Dry Type Relay Contact
- Adjustable Float Voltage
- AC to DC Isolation
- Filtering Suitable for VRLA Batteries
- Internal Temperature Compensation with Disable Option
- Input and Output Fuses
- Adjustable Current Limiting
- Meets NFPA 110 and C62.41A
- UL/cUL 1236 Listed

Front Panel Display



DC Output		AC Input		Overall Dimensions W x D x H	Shipping Weight	
Volts (Nominal)	Amps	Volts (Nominal)	Amps		kgs	lbs
24	20	105/264	5.0/2.45	243 x 116.1 x 403 mm 9.63 x 4.58 x 16.25 in	5.05	11.14



KOHLER CO., Kohler, Wisconsin 53044 USA
Phone 920-457-4441, Fax 920-459-1646
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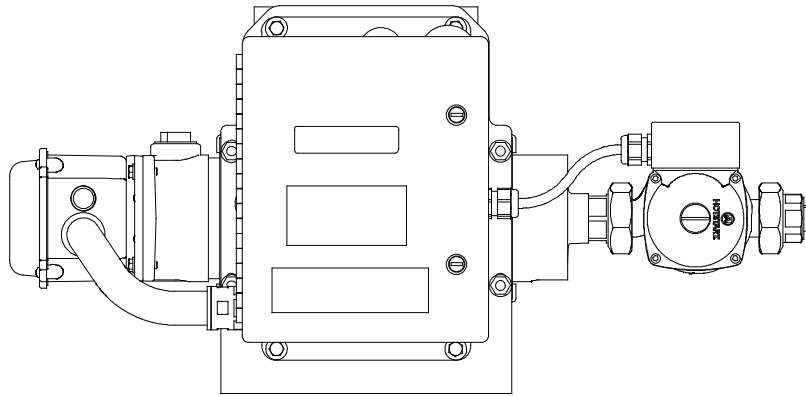
Specifications

AC Input	105- 264 VAC, 45- 65 HZ, Single Phase
Nominal DC Output	20A @ 24 V
Regulation - Power Stage Only Line: Load:	$\pm 10\%$ $<\pm 0.5\%$
Protection Input: Output: Thermal: AC Over Voltage	Fuse with surge and transient protection Fuse with surge protection Reverse current polarity Short circuit protection Shuts down when overheated
Output Current Limit	Factory set at 100% Adjustable from 50- 105%
Metering	LCD DC Output Digital Voltmeter and Ammeter (1%)
Adjustable Voltage Range (Per Cell)	2.15- 2.35 volts/cell (Lead) 1.39- 1.49 volts/cell (NiCad)
Alarm Contacts	Charger Failure (Form "C" Contact for Charger Failure)
Monitoring LCD Display: LED Indications:	Volts Amps Current Limit (Red) AC ON (Green) Charger Fail (Red) Low Current (Red- Blinking)
Environmental Operating: Storage: Relative Humidity:	- 20°C to 50°C (- 4°F to 122°F) (Derated up to 70°C (158°F)) - 40°C to 85°C (- 40°F to 185°F) 0% to 95% non condensing
Enclosure Structural Design: Cable Entry:	Wall Mounting / Powder coat finish Bottom
Standards	USCG requirements ANSI C62- 41 cUL NFPA 110

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Engine Block Heater Kits

Block Heater Kit, Typical

Applicable Models

- **KD800- KD1750**
- KD2000- KD3250
- KD3500- KD4000

Standard Features

- UL- C/US listed (60 Hz Models) - E250789CE
- CE compliant
- Controls for automatic operation
- Compact design
- Easy to install

Description

The engine block heater kit heats the engine coolant in cold ambient, warming the cylinders, oil, and charge air circuit which all help to give a faster starting time. The engine block heater has a thermostat, pump, and temperature control system. The pump circulates warm coolant into the engine and supplies constant heating to the engine. The engine block heater kit helps to extend element life and gives a significant reduction in electrical consumption.

The engine block heater has a fixed setting thermostat that turns ON when the engine coolant temperature reaches 49°C (120°F) and turns OFF when the engine coolant temperature reaches 60°C (140°F).

The engine block heater kit is recommended for ambient temperatures below 10°C (50°F).

The engine block heater kits are available in 208 V, 240 V, 380 V, and 480 V versions.

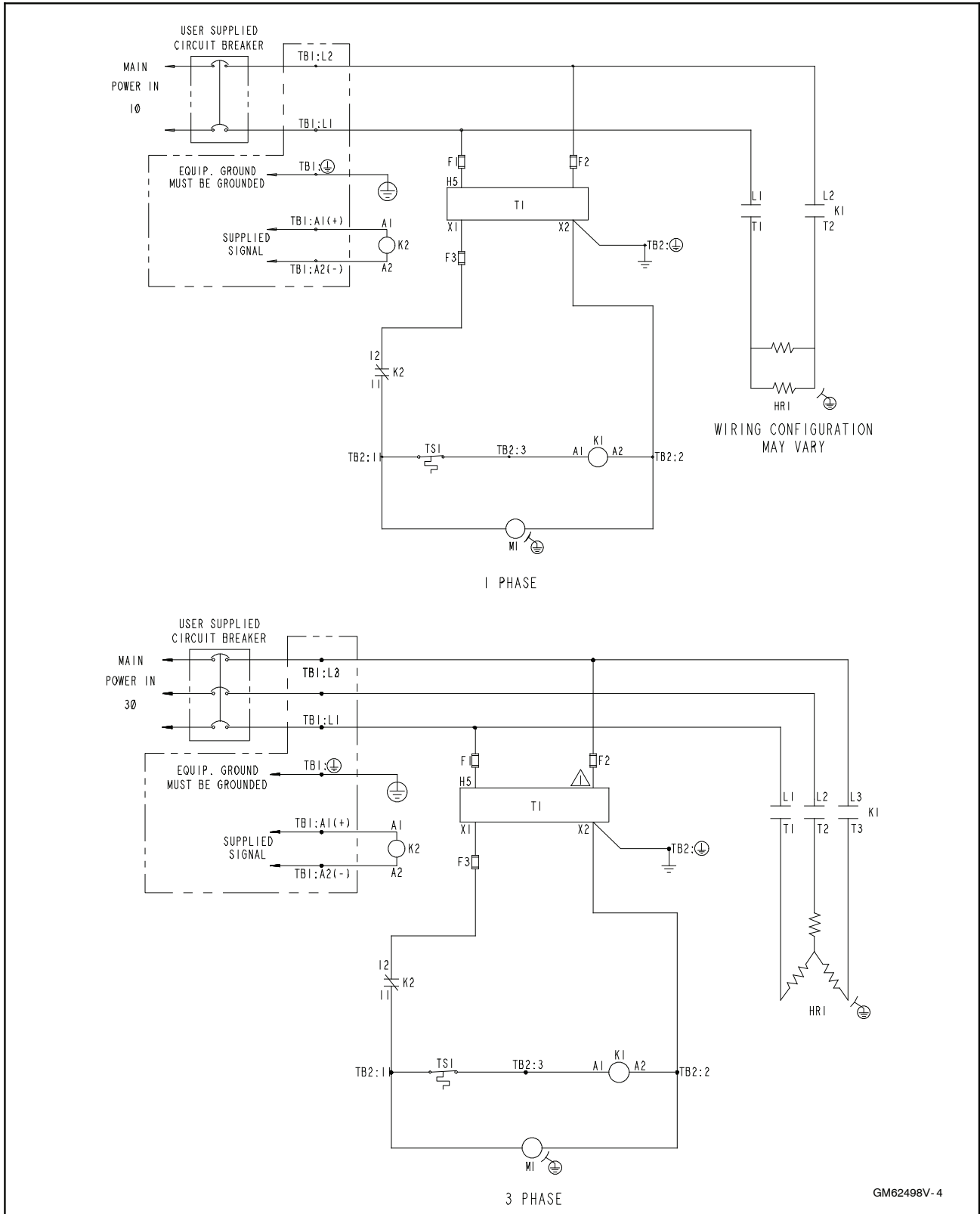
Block Heater Specifications

Heating Fluid	Engine Coolant (50% Glycol/50% Water)
Fixed Thermostat	49° - 60°C (120° - 140°F)
Flow	10 GPM (2.2m ³ /hr) @ 10 ft head (3 mWc)
Pump Power	70W (50 Hz), 97W (60 Hz)
Max. Pressure	125 psi (860 kPa)
Pressure Loss	0.2 psi (1.5 kPa)
Inlet Plumbing	1.0 in NPT
Outlet Plumbing	1.0 in NPT
Main Control Box Ingress Protection	NEMA 4 (IP66)
Motor Ingress Protection	IP44 (50 Hz), NEMA 2 (60 Hz)

Specifications

Block Heater Kit Number	Component	Watts	Voltage	Phase
10305000145- KA1	10305000200	6000	480	3
10305000145- KA2	10305000300	6000	240	1
10305000145- KA3	10305000400	6000	480	1
10305000145- KA4	10305000500	6000	240	3
10305000145- KA5	10305000600	6000	380	3
10305000145- KA6	10305000700	6000	208	1
10305000145- KA7	103050003100	6000	208	3
10305001400- KA1	10305001500	9000	480	3
10305001400- KA2	10305001600	9000	240	1
10305001400- KA3	10305001700	9000	480	1
10305001400- KA4	10305001800	9000	240	3
10305001400- KA5	10305001900	9000	380	3
10305001400- KA6	10305002000	9000	208	1
10305001400- KA7	10305003300	9000	208	3
10305002800- KA1	10305001800	9000	240	3
10305002800- KA2	10305001500	9000	480	3
10305002800- KA3	10305001600	9000	240	1
10305002800- KA4	10305001700	9000	480	1
10305002800- KA5	10305001900	9000	380	3
10305002800- KA6	10305002000	9000	208	1
10305002800- KA7	10305003300	9000	208	3
10305003501- KA1	10305001500	9000	480	3
10305003501- KA2	10305001600	9000	240	1
10305003501- KA3	10305001700	9000	480	1
10305003501- KA4	10305001800	9000	240	3
10305003501- KA5	10305001900	9000	380	3
10305003501- KA6	10305002000	9000	208	1
10305003501- KA7	10305003300	9000	208	3
10305003601- KA1	10305003804	12000	240	3
10305003601- KA2	10305003807	12000	480	3
10305003601- KA3	10305003803	12000	240	1
10305003601- KA4	10305003806	12000	480	1
10305003601- KA5	10305003805	12000	380	3
10305003601- KA6	10305003801	10500	208	1
10305003601- KA7	10305003802	12000	208	3
10305004001- KA1	10305003804	12000	240	3
10305004001- KA2	10305003807	12000	480	3
10305004001- KA3	10305003803	12000	240	1
10305004001- KA4	10305003806	12000	480	1
10305004001- KA5	10305003801	10500	208	1
10305004001- KA6	10305003802	12000	208	3

Wiring Diagram

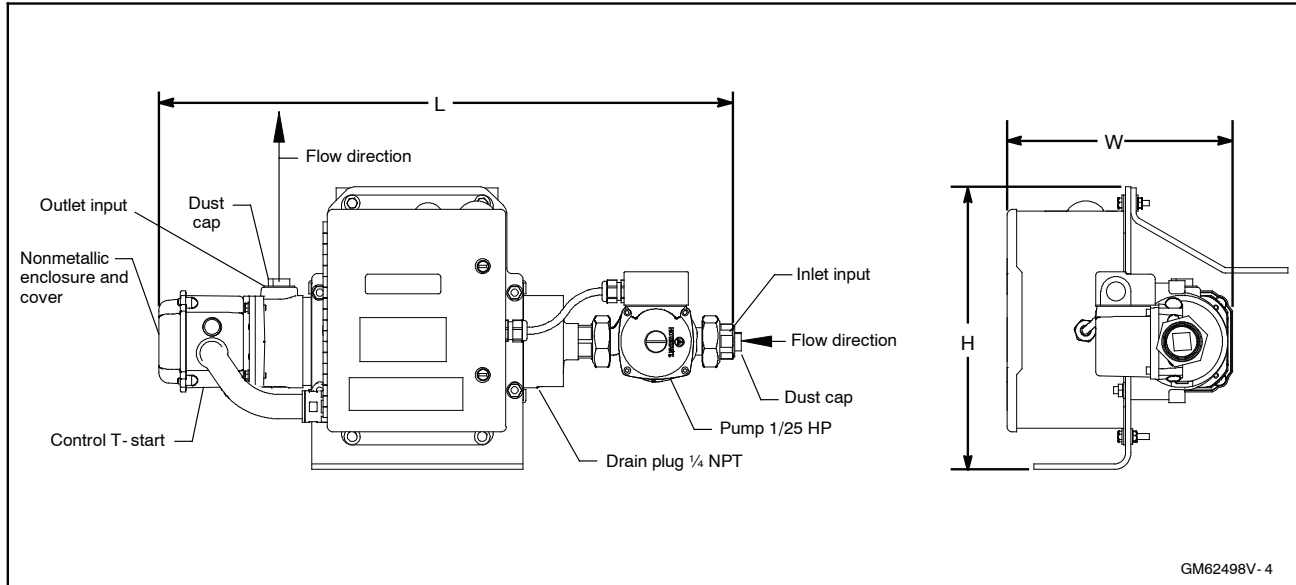


GM62498V-4

Dimensions and Weights

Overall Size, L x W x H, mm (in): 674 x 264 x 330 (26.53 x 10.4 x 12.9)

Weight, wet, kg (lb): 16.8 (37)



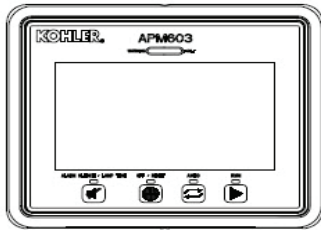
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Integral Voltage Regulator with Kohler® APM603 Controllers and Menu-Driven Selections (80-4000 kW Generator Set Models)



APM603 Controller with Integral Voltage Regulator

The voltage regulator is integral to the controller and uses patented high speed digital voltage regulator design providing ± 0.25% no-load to full-load regulation using root-mean-square (RMS) voltage sensing.

Voltage Regulators

The following information provides general features, specifications, and functions of available voltage regulators.

This information generally applies to a single generator set and multiple generator sets with paralleling applications. Refer to the respective generator set specification sheet and see your authorized distributor for information regarding specific voltage regulator applications and availability.

Integral Voltage Regulators with APM603

Calibration	Range Settings	Default Selection
Voltage Adjustment	± 10% of System Voltage	System Voltage
Controller Gain	40 to 70 Hz	P: 1.3 I: 1.0 D: 0.25
Underfrequency Unload or Frequency Setpoint	40 to 70 Hz	0.5 Hz Below System Frequency (ECM)
Underfrequency Unload Scope	0-10% of System Voltage (Volts per Cycle)	15 volts per Cycle at 480 Volts (3.1%)
Reactive Droop	0-10% of System Voltage	4% of System Voltage
VAR Control	-50% to 110%	0 kVAR
PF Adjust Control	-0.50 to 1.0 to 0.50	0.8 Lagging
VAR/PF Gain Adjustment	P: 0.3 to 3.00 I: 0.3 to 3.00 D: 0.3 to 3.00	P: 1.0 I: 1.0 D: 0.25



Specification/Feature	Integral with APM603
Generator Set Availability	80-4000 kW
Type	Patented Hybrid Design
Status and Shutdown Indicators	LEDs and Text LCD Display
Operating Temperature	-40 ° C to 70 ° C (-40 ° F to 158 ° F)
Storage Temperature	-40 ° C to 85 ° C (-40 ° F to 185 ° F)
Humidity	5-95% Non-Condensing
Circuit Protection	Solid-State, Redundant Software and Fuses
Sensing, Nominal	100-600 Volts (L-L), 50-60 Hz
Sensing Mode	RMS, Single- or 3-Phase
Input Requirements	8-36 VDC
Continuous Output	5.0 ADC with GM88453 Activator Board
Maximum Output	7.8 ADC with GM88453 Activator Board
Transition Frequency	50-70 Hz
Exciter Field Resistance	4-30 Ohms with GM88453 Activator Board
No-Load to Full-Load Voltage Regulation	± 0.25%
Thermal Drift	<0.5% (-40 ° C to 70 ° C) [-40 ° F to 158 ° F] Range
Response Time	3-phase: 1 mS 1-phase: 5 mS
System Voltage Adjust.	± 10%
Voltage Adjustment	Controller Display
Remote Voltage Adjustment	Analog 0-5 VDC (± 10%) Input Optional
Paralleling Capability	Full Load Share and Control plus Reactive Droop

Integral Voltage Regulator with APM603 Controller

- A 7.5-inch color TFT touchscreen provides access to data.
- The controller provides an interface between the generator set and switchgear for paralleling applications incorporating multiple generator set and/or utility feeds.
- The controller can control Fast Response™ II, Fast Responset™X, and PMG alternators using the GM88453 activator board.

Voltage Regulator Settings, APM603 Controller

- Voltage Regulator Configuration
 - Under Frequency Unload Settings
 - Single and Three Phase Sensing
 - Voltage Target
 - Voltage Regulator Gains

Paralleling Settings, APM603

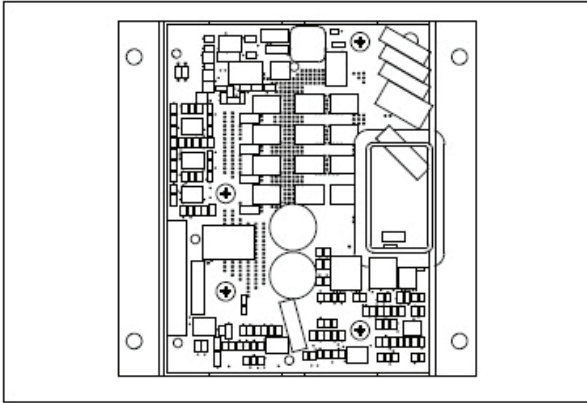
- Synchronizing parameters setup
 - Voltage matching
 - Frequency matching
 - Phase matching
 - Time delay
- Load sharing
 - kW sharing
 - kVAR sharing
 - Baseload settings
 - Droop

Paralleling Metering, APM603

- Paralleling State
- Paralleling Mode
- System Voltage
- System Frequency
- Connected Generators
- Sync Status
- Engine Speed

VAR/PF Control Input	VAR Control Mode, PF Control Mode, System VAR Control, System PF Control
----------------------	--

Activator Board GM88453



- Interfaces between the controller and alternator assembly using rotor field leads, auxiliary power windings, and optic board leads.
- Allows the Decision-Maker® controllers the ability to control a wound-field alternator using the same control signal as Fast Response
- Permits the generator set controller to control the current to the exciter field of a wound-field excited alternator.
- Contains two isolated relay driver outputs (RDO) rated at 250 mA. Provides RDO outputs indicating a field over-excitation condition and that the alternator is supplying voltage to the activator.

Modbus® is a registered trademark of Schneider Electric.

KOHLER®

Alternator Data

DATASHEET ALTERNATOR

Alternator ref. KH03450T
Alternator type KH03450TO4D



-GENERAL CHARACTERISTICS-

Voltage Type (V)	480/277	Altitude (m)	0-1000
Number of Phase	Three phase	AVR Regulation	Yes
Number of pole	4	Indication of protection	IP23
Capacity for maintaining short circuit at 3 In for 10 s		Yes	
Winding type		Standard	
Winding pitch		2/3	

Efficiency & Power

Frequency (Hz) 60 Hz Nominal voltage (V) 480

	Class H				Class F	Class B
	125°C / 40°C continuous	130°C / 25°C standby	150°C / 40°C standby	163°C / 27°C standby	105°C / 40°C continuous	80°C / 40°C continuous
Nominal Rating(kVA)	1116	1140	1170	1220	1020	893
Nominal Rating(kW)	893	912	936	976	816	714
Efficiency 100%	95,80	95,70	95,70	95,60	95,90	95,70

-ELECTRICAL CHARACTERISTICS-

Voltage regulation at established rating (+/- %)	0,50
Insulation class	H
T° class (H/125°), continuous 40°C	H / 125°K
T° class (H/163°C), standby 27°C	H / 163°K
Wave form : NEMA=TIF	<40
Unbalanced load acceptance ratio (%)	100
Number of wires	12
Total Harmonic Distortion in no-load DHT (%)	2,7
Wave form : CEI=FHT	<2
Total Harmonic Distortion, on linear load DHT (%)	2,0
Technology	Brushless
L-L Harmonic Maximum - Single (%)	<3
Deviation Factor (%)	6
Shaft Current	<80
Main Stator Capacitance to ground (mfd)	0,05

Reactances

Direct axis synchro reactance unsaturated (Xd) (%)	431
Direct axis transient reactance saturated (X'd) (%)	15,80
Direct axis subtransient reactance saturated (X''d) (%)	7,50
Quadra axis synchro reactance unsaturated (Xq) (%)	177,50
Quadra axis subtransient reactance saturated (X''q) (%)	18,50
Zero sequence reactance unsaturated (Xo) (%)	4,26
Negative sequence reactance saturated (X2) (%)	13

Short circuit ratio

Short circuit ratio (Kcc) 0,33

DATASHEET ALTERNATOR

Alternator ref. KH03450T
Alternator type KH03450TO4D

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Reactance desaturation coef	1,23
Exciter time constant (Te)	0,0180
Subtranscient time constant (T''d) (ms)	17
Short circuit transient time constant (T'd) (ms)	234
Open circuit time constant (T'do) (ms)	8300
Subtranscient time constant (T''q) (ms)	17
Leakage stator reactance (Xa)(%)	5,10
Stator Resistance (Ra)(%)	0,0830
Armature time constant (Ta) (ms)	22
No load excitation current (io) (A)	1,10
Full load excitation current (ic) (A)	4,10
Full load excitation voltage (uc) (V)	43,30
Heat rejection (W)	39150
No load losses (W)	15390
Stator resistance (for 20°C ambient) (Ω)	0,0090
Rotor resistance (for 20°C ambient) (Ω)	2,30
Exciter resistance - stator/inductor (for 20° ambient) (Ω)	10,63
Exciter resistance - rotor/armature (for 20° ambient) (Ω)	0,13
R0 resistor (homopolar)	
R2 resistor (reverse)	
X/R ratio	
Recovery time (Delta U = 20% transient) (ms)	200
Engine start (Delta U = 20% perm. or 30% trans.) (kVA)	2792,20
Transient dip (4/4 load) - PF : 0,8 AR (%)	14,50

Additional electrical characteristics-

Winding X1, X2 auxiliary resistance (for 20° ambient) (Ω)	0,4130
Auxiliary winding X1, X2 excitation voltage at no load (V)	226
Auxiliary winding X1, X2 excitation voltage on load (V)	246

-MECHANICAL CHARACTERISTICS-

Number of bearing	1
Overspeed (rpm)	2250
Coupling	Direct

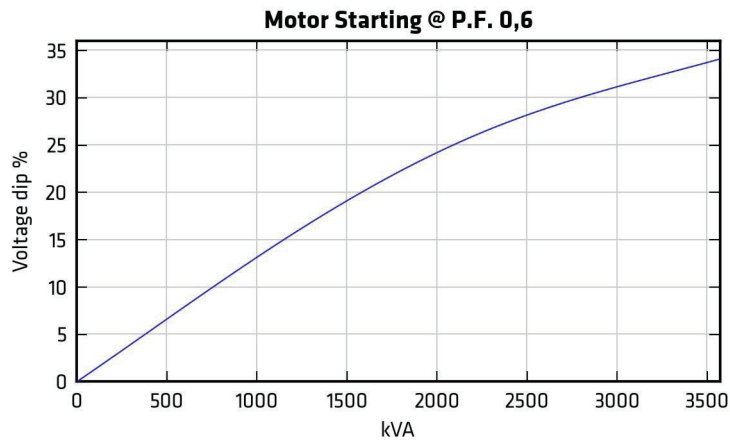
DATASHEET ALTERNATOR

Alternator ref. KH03450T
Alternator type KH03450TO4D

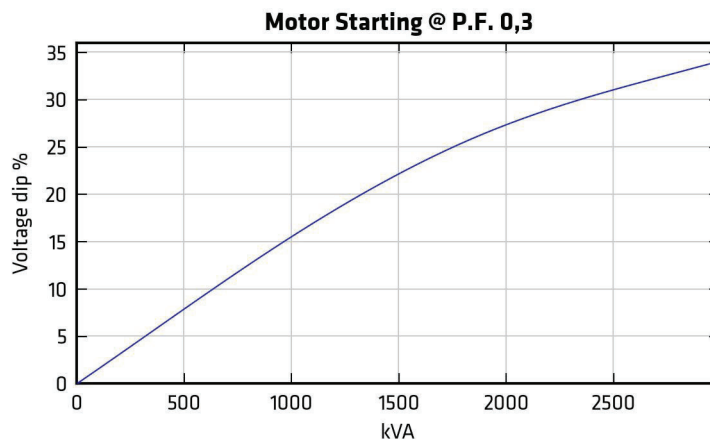


-TECHNICAL CURVES-

Motor starting curve locked rotor (0,6PF)



Motor starting curve locked rotor (0,3PF)

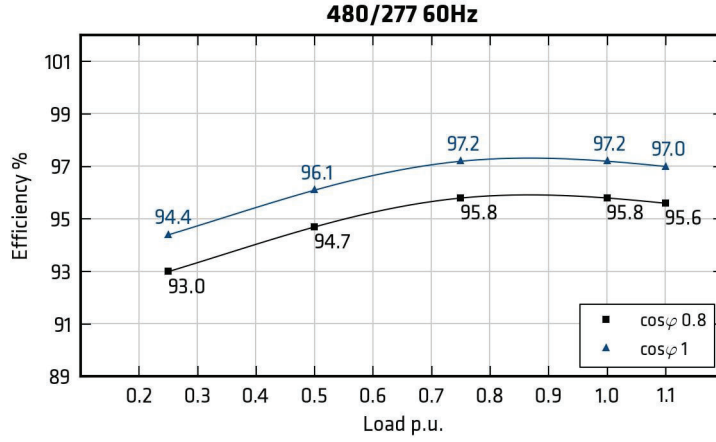


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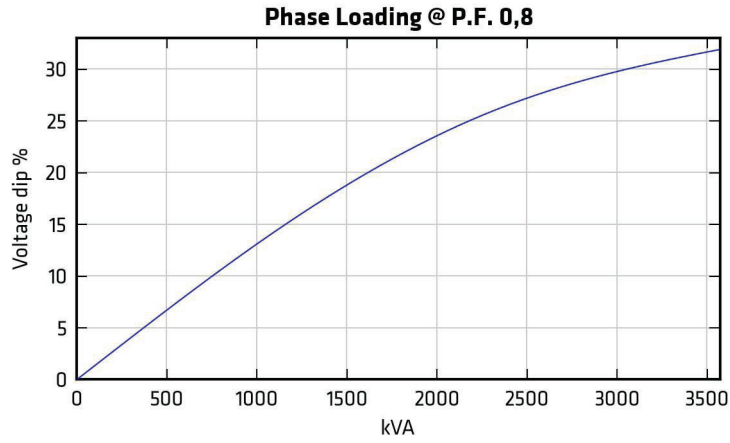
Alternator ref. KH03450T
Alternator type KH03450TO4D



Efficiencies curve (by excitation system)



Loading curve (by excitation system)

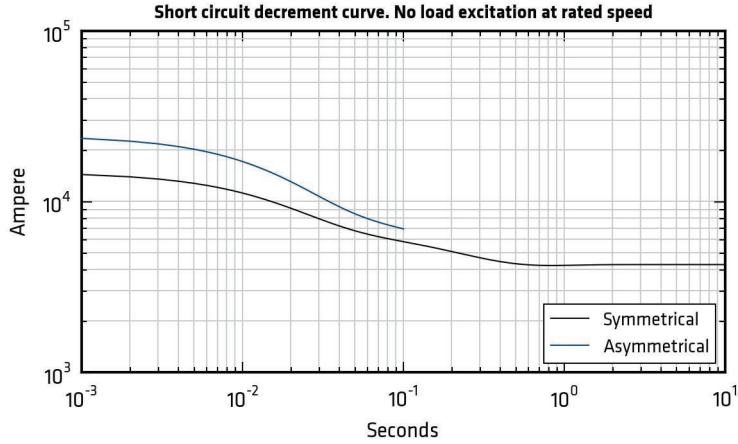


DATASHEET ALTERNATOR

Alternator ref. KH03450T
 Alternator type KH03450TO4D



Short circuit curve at no load and rated speed



Influence due to connection

Curves shown are for star (Y) connection

For other connections, use the following multiplication factors :

- Series to Parallel star : current value x 2
- Series to Series delta : current value x 1.72
- Series star to Parallel delta : current value x 3.44

Influence due to short-circuit

The indicated coefficient have to be used to correct the three phase short circuit curves values as a function of the type of short circuit voltage.

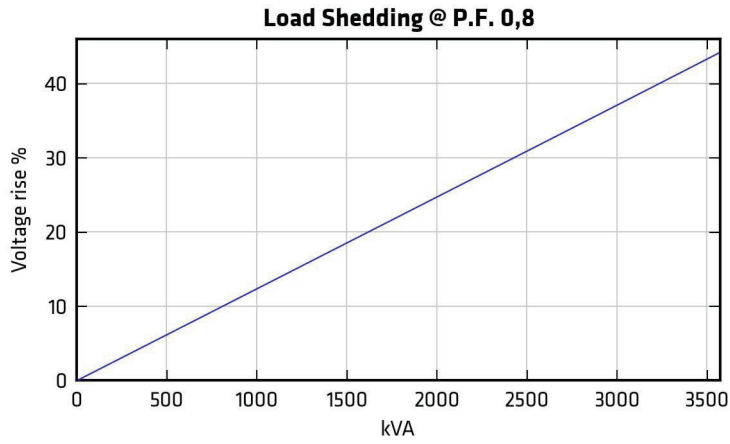
	3-phase	2-phase L/L	1-phase L/N
Instantané / Instantaneous (max)	1x	0.87x	1.3x
Minimum	1x	1.8x	3.2x
Sustained / Permanent	1x	1.5x	2.5x
Durée maximale/ Maximum duration (*)	20 sec.	10 sec.	4 sec.

DATASHEET ALTERNATOR

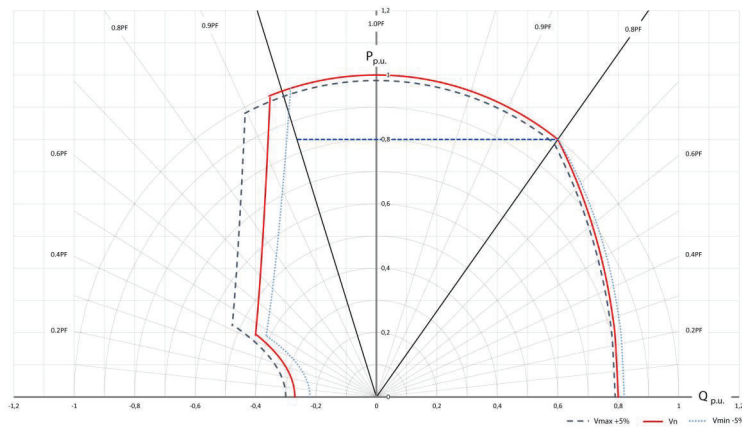
Alternator ref. KH03450T
Alternator type KH03450TO4D



Rejection curve (by excitation system)



Capability curve (PQ diagram)



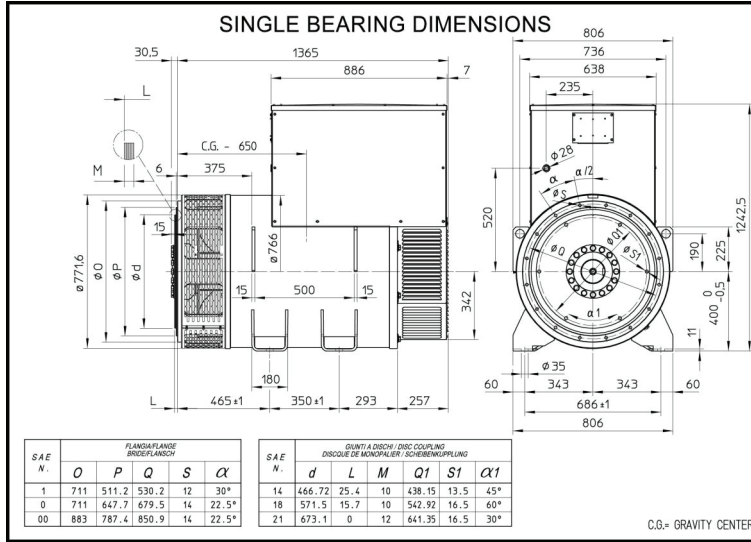
DATASHEET ALTERNATOR

Alternator ref. KH03450T
 Alternator type KH03450TO4D



DIMENSIONS-

Overall dimension drawing (Single bearing)

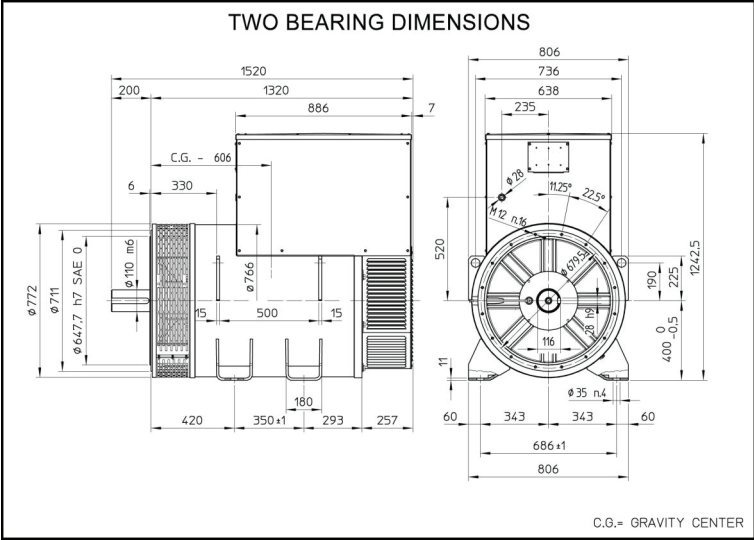


DATASHEET ALTERNATOR

Alternator ref. KH03450T
Alternator type KH03450TO4D



Overall dimension drawing (Two bearings)



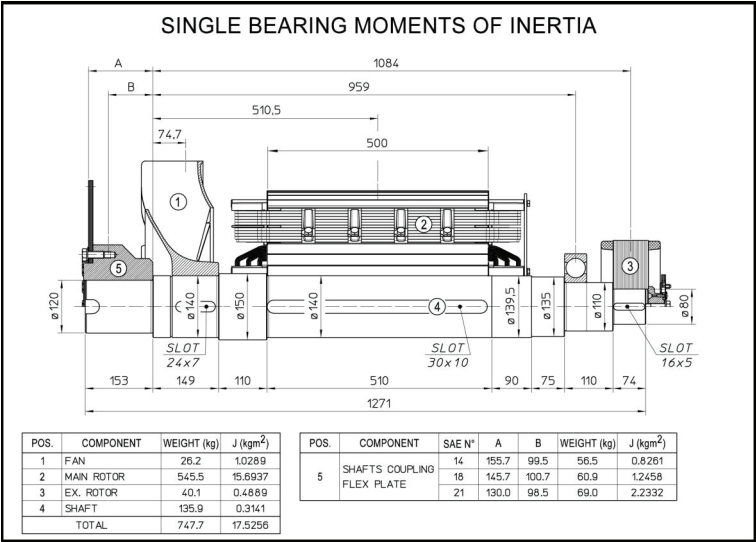
DATASHEET ALTERNATOR

Alternator ref. KH03450T
 Alternator type KH03450TO4D



-TORSIONAL ANALYSIS DATA-

Rotation part drawing for torsional vibration calculation (Single bearing)



DATASHEET ALTERNATOR

Alternator ref.

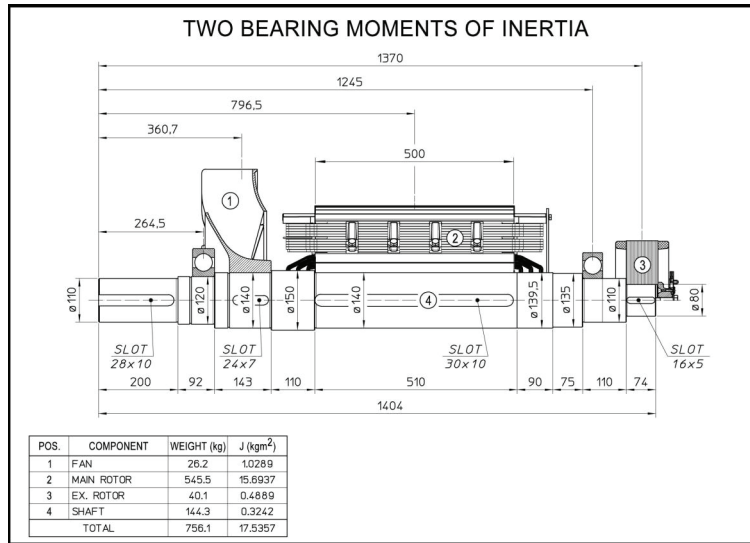
KH03450T

Alternator type

KH03450TO4D



Rotation part drawing for torsional vibration calculation (Two bearings)



KOHLER®

Cooling Data

TECHNICAL INFORMATION BULLETIN

Generator Set Cooling System Data Sheet

50°C Ambient Temperature Cooling System									
KD900 60Hz (Standby Duty)	Total external restriction on open unit	Pa (in.H ₂ O)	0 (0)	125 (0.5)	187 (0.75)	250 (1)	312 (1.25)	375 (1.5)	Enclosed Units
	Maximum allowable ambient temperature	°C (°F)	54 (129)	52 (126)	51.5 (125)	50.5 (123)	49 (120)	NA (NA)	47 (117)
	Cooling system airflow	m ³ /min (ft ³ /min)	1350 (47700)	1289 (45500)	1261 (44500)	1221 (43100)	1170 (41300)	NA (NA)	NA (NA)
40°C Ambient Temperature Cooling System									
KD900 60Hz (Standby Duty)	Total external restriction on open unit	Pa (in.H ₂ O)	0 (0)	125 (0.5)	187 (0.75)	250 (1)	312 (1.25)	375 (1.5)	Enclosed Units
	Maximum allowable ambient temperature	°C (°F)	48.5 (119)	47 (117)	46 (115)	45 (113)	43 (109)	NA (NA)	42 (108)
	Cooling system airflow	m ³ /min (ft ³ /min)	1212 (42800)	1165 (41100)	1134 (40000)	1102 (38900)	1060 (37400)	NA (NA)	NA (NA)

1. The data shown above is the anticipated cooling performance for a typical generator set when following proper installation techniques.
2. Cooling performance is based on operation at 100 m (328 ft.). For elevations higher than 100 m (328 ft.), typical cooling performance derate is 1°C (1.8°F) per 250 m (820 ft).
3. For high ambient conditions, check TIB-101 for the generator set power output derate schedule.
4. Incorrect installation, improper operation, fouling of the cooling system, and other variable conditions may reduce cooling performance.
5. Kohler manufactured sound enclosed models are rated in free air with no additional restriction. Consult factory for other variants or conditions.
6. Performance is based on a 50/50 water and ethylene glycol mixture.

KOHLER®

Sound Data

TECHNICAL INFORMATION BULLETIN

Generator Set Sound Data Sheet

Generator Set Model	Hz	Load	Sound Pressure Data in dB(A)			
			Raw Exhaust	Open Unit, Isolated Exhaust	Level 1 Sound Enclosure	Level 2 Sound Enclosure
KD900	60	100% Load	123.7	95.7	91.2	75.4
		No Load	111.3	92.8	88.6	72.1

Note: Sound pressure data is the logarithmic average of eight perimeter measurement points at a distance of 7 m (23 ft.), except Raw Exhaust data which is a single measurement point at 1 m (3.3 ft.) from the mouth of a straight pipe exhaust.

KD900	60 Hz
--------------	--------------

Load	Distance, m (ft)	Enclosure	Measurement Clock Position	Sound Pressure Levels, dB(A)								Overall Level
				Octave Band Center Frequency (Hz)								
				63	125	250	500	1000	2000	4000	8000	
100% Load	7 (23)	Level 2 Sound	3:00	61.1	67.7	67.7	70.9	67.9	63.7	57.0	55.6	75.4
			1:30	58.0	61.5	70.1	69.7	67.3	63.7	58.4	52.2	74.8
			12:00 - Engine	57.2	63.9	70.4	70.3	68.3	63.1	56.8	48.9	75.3
			10:30	55.7	60.7	75.8	72.1	69.3	66.8	60.6	54.7	78.5
			9:00	61.1	66.3	69.1	70.7	67.9	64.7	57.7	55.0	75.5
			7:30	60.7	67.5	66.6	69.6	66.3	62.5	56.0	56.1	74.4
			6:00 - Alternator	56.4	62.1	66.0	64.6	63.0	61.2	50.1	60.9	71.3
			4:30	64.1	69.4	70.2	68.7	62.0	62.5	56.3	57.3	75.2
8-pos. log avg.	60.1	65.9	70.6	70.0	67.1	63.8	57.3	56.3	75.4			

Load	Distance, m (ft)	Enclosure	Measurement Clock Position	Sound Pressure Levels, dB(A)								Overall Level
				Octave Band Center Frequency (Hz)								
				63	125	250	500	1000	2000	4000	8000	
100% Load	7 (23)	Level 1 Sound	3:00	63.9	73.0	75.7	80.0	76.9	74.2	70.7	63.3	84.0
			1:30	64.5	75.9	86.1	88.7	90.1	88.1	85.7	77.5	95.2
			12:00 - Engine	68.7	78.4	80.5	88.7	91.6	83.4	78.5	71.2	94.3
			10:30	61.9	77.3	86.3	88.1	90.8	89.0	86.4	77.6	95.6
			9:00	62.0	73.7	74.4	80.8	77.7	74.2	70.3	62.9	84.3
			7:30	56.3	69.9	76.5	73.6	78.3	74.4	66.6	60.0	82.5
			6:00 - Alternator	51.3	64.3	76.3	72.4	68.8	66.6	61.2	53.7	78.8
			4:30	59.9	69.6	75.6	75.9	76.0	76.3	69.3	65.6	82.6
8-pos. log avg.	63.4	74.5	81.5	84.8	86.9	83.5	80.6	72.3	91.2			

Load	Distance, m (ft)	Enclosure	Measurement Clock Position	Sound Pressure Levels, dB(A)								Overall Level
				Octave Band Center Frequency (Hz)								
				63	125	250	500	1000	2000	4000	8000	
100% Load	7 (23)	Open Unit, Isolated Exhaust	3:00	60.0	73.9	90.2	86.8	88.7	90.4	87.4	85.0	96.3
			1:30	52.9	69.7	91.8	90.7	91.0	91.3	87.9	84.6	97.9
			12:00 - Engine	55.4	73.1	78.6	87.3	88.2	87.6	83.4	77.9	93.3
			10:30	56.5	72.2	85.5	87.7	89.6	89.5	86.6	81.5	95.3
			9:00	57.0	74.0	85.5	87.4	88.7	90.3	88.0	84.7	95.6
			7:30	58.3	76.7	85.7	87.0	89.5	90.4	87.6	84.3	95.8
			6:00 - Alternator	57.4	72.8	85.4	81.8	84.3	85.8	83.6	80.6	91.8
			4:30	59.5	75.2	91.0	88.2	89.2	89.9	87.8	85.9	96.8
8-pos. log avg.	57.6	73.9	88.2	87.6	89.0	89.7	86.9	83.7	95.7			

The generator set manufacturer reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever. © 2017 by Kohler Co. All rights reserved.

Load	Distance, m (ft)	Exhaust	Sound Pressure Levels, dB(A)								Overall Level
			Octave Band Center Frequency (Hz)								
			63	125	250	500	1000	2000	4000	8000	
100% Load	1 (3.3)	Raw Exhaust (No Silencer)	97.2	104.9	111.3	117.0	115.9	118.3	116.3	112.4	123.7

KD900	60 Hz
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Load	Distance, m (ft)	Enclosure	Measurement Clock Position	Sound Pressure Levels, dB(A)								Overall Level
				Octave Band Center Frequency (Hz)								
				63	125	250	500	1000	2000	4000	8000	
No Load	7 (23)	Level 2 Sound	3:00	55.6	61.7	65.7	64.5	62.7	59.3	54.7	47.1	70.6
			1:30	53.4	60.8	68.5	64.4	63.3	56.9	50.4	44.1	71.5
			12:00 - Engine	54.4	60.7	67.9	63.7	65.7	57.5	50.9	45.6	71.6
			10:30	53.7	61.0	72.8	66.9	64.3	59.1	52.9	47.1	74.6
			9:00	53.7	61.4	65.8	66.8	63.3	56.5	51.7	45.0	71.1
			7:30	51.8	59.7	69.5	66.0	62.4	57.8	51.0	44.3	72.2
			6:00 - Alternator	52.7	57.6	67.9	62.7	59.2	54.1	49.1	42.9	70.0
			4:30	53.8	62.9	70.1	67.8	63.1	59.6	53.7	45.8	73.3
8-pos. log avg.	53.8	60.9	69.1	65.7	63.3	57.9	52.1	45.5	72.1			

Load	Distance, m (ft)	Enclosure	Measurement Clock Position	Sound Pressure Levels, dB(A)								Overall Level
				Octave Band Center Frequency (Hz)								
				63	125	250	500	1000	2000	4000	8000	
No Load	7 (23)	Level 1 Sound	3:00	61.0	68.2	72.3	73.9	74.7	69.4	61.5	55.6	79.5
			1:30	60.1	68.0	83.5	88.4	85.1	83.0	76.7	71.9	91.8
			12:00 - Engine	63.7	71.2	80.9	82.4	92.3	83.8	76.5	70.6	93.6
			10:30	59.7	67.1	83.4	84.7	88.1	84.3	76.8	70.8	91.7
			9:00	61.2	68.2	72.3	75.7	75.6	70.5	61.8	56.0	80.5
			7:30	54.3	63.1	75.9	71.8	77.9	73.4	63.9	54.8	81.5
			6:00 - Alternator	52.1	60.9	75.9	72.6	67.3	65.6	55.7	48.3	78.3
			4:30	56.3	64.6	73.4	72.9	76.3	74.9	66.2	58.9	80.9
8-pos. log avg.	59.9	67.4	79.4	82.0	85.5	79.9	72.7	67.1	88.6			

Load	Distance, m (ft)	Enclosure	Measurement Clock Position	Sound Pressure Levels, dB(A)								Overall Level
				Octave Band Center Frequency (Hz)								
				63	125	250	500	1000	2000	4000	8000	
No Load	7 (23)	Open Unit, Isolated Exhaust	3:00	58.0	75.7	86.4	84.9	87.4	86.9	84.4	76.8	93.3
			1:30	54.9	71.8	86.6	89.0	86.8	86.8	83.8	76.9	94.0
			12:00 - Engine	55.4	74.0	81.2	86.8	84.4	82.8	79.1	72.7	90.8
			10:30	53.3	71.5	82.7	85.3	86.7	86.9	82.9	74.5	92.4
			9:00	55.9	74.2	86.3	85.2	87.1	87.2	85.0	77.8	93.4
			7:30	55.8	75.2	85.2	84.7	87.5	87.3	84.4	77.7	93.2
			6:00 - Alternator	54.1	73.5	84.4	82.2	82.6	82.1	78.9	70.6	89.5
			4:30	57.4	75.9	89.0	85.2	87.0	86.4	84.3	77.9	93.9
8-pos. log avg.	55.8	74.2	85.8	85.8	86.4	86.2	83.3	76.2	92.8			

Load	Distance, m (ft)	Exhaust	Sound Pressure Levels, dB(A)								Overall Level
			Octave Band Center Frequency (Hz)								
			63	125	250	500	1000	2000	4000	8000	
No Load	1 (3.3)	Raw Exhaust (No Silencer)	86.9	94.6	108.2	102.0	104.9	100.9	95.6	91.9	111.3

KOHLER®

Emissions Data



KD900

60 Hz. Diesel Generator Set Tier 2 EPA Certified for Stationary Emergency Applications EMISSION OPTIMIZED DATA SHEET

ENGINE INFORMATION

Model:	KD27V12	Bore:	135 mm (5.31 in.)
Nameplate kW @ 1800 RPM:	1019	Stroke:	157 mm (6.18 in.)
Type:	4-Cycle, 12-V Cylinder	Displacement:	27 L (1648 cu. in.)
Aspiration:	Turbocharged, Charge Air Cooled	EPA Family:	PLHAL45.0ESP
Compression ratio:	15:0:1	EPA Certificate:	PLHAL45.0ESP-018
Emission Control Device:	Direct Diesel Injection, Engine Control Module, Turbocharger, Charge Air Cooler		

EXHAUST EMISSION DATA:

EPA D2 Cycle 5-mode weighted

HC	0.06 g/kWh
NO _x (Oxides of Nitrogen as NO ₂)	5.51 g/kWh
CO (Carbon Monoxide)	0.51 g/kWh
PM (Particulate Matter)	0.07 g/kWh

TEST METHODS AND CONDITIONS

Test Methods:

Steady-State emissions recorded per EPA CFR 40 Part 1065, and ISO8178-1 during operation at rated engine speed (+/-2%) and stated constant load (+/-2%) with engine temperatures, pressures and emission rates stabilized.

Fuel Specification:

40-48 Cetane Number, 0.05 Wt. % max. Sulfur; Reference ISO8178-5, 40CFR86.1313-98 Type 2-D and ASTM D975 No. 2-D.

Reference Conditions:

25 °C (77 °F) Air Inlet Temperature, 40 °C (104 °F) Fuel Inlet Temperature, 100 kPa (29.53 in Hg) Barometric Pressure; 10.7 g/kg (75 grains H₂O/lb.) of dry air Humidity (required for NO_x correction); Intake Restriction set to maximum allowable limit for clean filter; Exhaust Back pressure set to maximum allowable limit.

Data was taken from a single engine test according to the test methods, fuel specification and reference conditions stated above and is subjected to instrumentation and engine-to-engine variability. Tests conducted with alternate test methods, instrumentation, fuel or reference conditions can yield different results.

Data and specifications subject to change without notice.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
2023 MODEL YEAR
CERTIFICATE OF CONFORMITY
WITH THE CLEAN AIR ACT

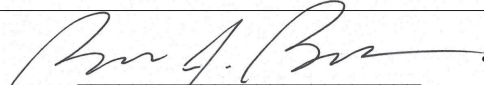
OFFICE OF TRANSPORTATION
AND AIR QUALITY
ANN ARBOR, MICHIGAN 48105

Certificate Issued To: **Liebherr Machines Bulle SA**
(U.S. Manufacturer or Importer)

Certificate Number: **PLHAL45.0ESP-018**

Effective Date:
12/06/2022

Expiration Date:
12/31/2023


Byron J. Bunker, Division Director
Compliance Division

Issue Date:
12/06/2022

Revision Date:
N/A

Model Year: 2023

Manufacturer Type: Original Engine Manufacturer

Engine Family: PLHAL45.0ESP

Mobile/Stationary Indicator: Stationary

Emissions Power Category: kW>560

Fuel Type: Diesel

After Treatment Devices: No After Treatment Devices Installed

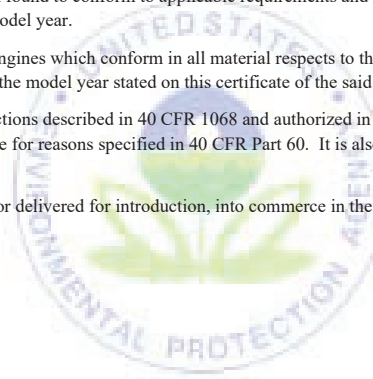
Non-after Treatment Devices: Electronic Control

Pursuant to Section 111 and Section 213 of the Clean Air Act (42 U.S.C. sections 7411 and 7547) and 40 CFR Part 60, and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following engines, by engine family, more fully described in the documentation required by 40 CFR Part 60 and produced in the stated model year.

This certificate of conformity covers only those new compression-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 60 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 60.

It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 1068 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to revocation or suspension of this certificate for reasons specified in 40 CFR Part 60. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void *ab initio* for other reasons specified in 40 CFR Part 60.

This certificate does not cover engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.



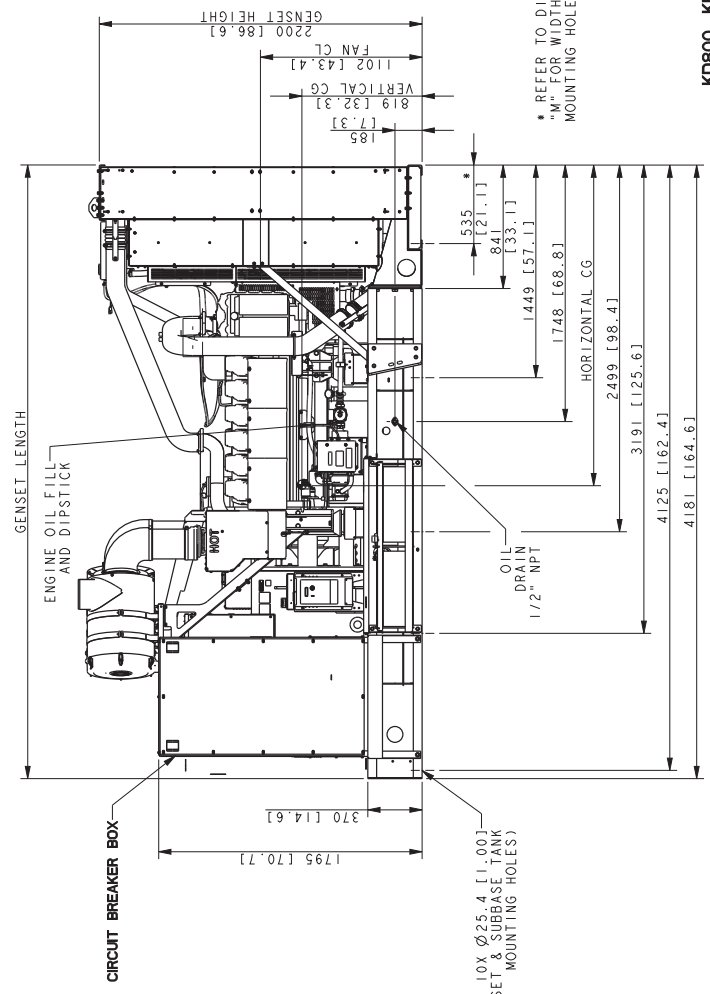
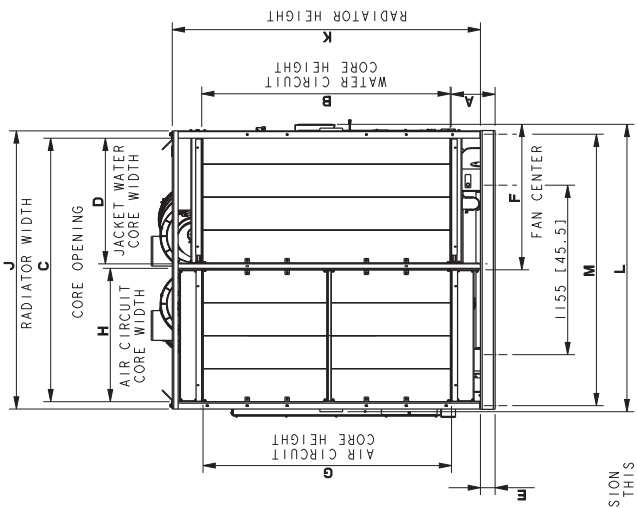
KOHLER®

Dimensional Drawings

MODEL	AL.T.	GENSET MAXIMUM WEIGHT (WET)	(HORIZONTAL CG)	GENSET LENGTH
KD800	KH02970T04D	6916 Kg [15248 LBS]	2185 [86]	4181 [164.6]
KD800/900	KH03450T04D	7155 Kg [15773 LBS]	2225 [87.6]	4181 [164.6]
KD800/900/1000	KH04070T04D	7457 Kg [16440 LBS]	2277 [89.6]	4181 [164.6]
KD900/1000	KH04830T04D	7770 Kg [17131 LBS]	2340 [92.1]	4181 [164.6]
KD1000	KH05520T04D	8083 Kg [17821 LBS]	2391 [94.1]	4224 [166.3]

* KH05520T04D ALTERNATOR EXTENDS PAST SKID

MODEL	A	B	C	D	E	F	G	H	J	K	L	M
KD800 50Hz FUEL OPT	400 [15.7]	587 [22.7]	1394 [54.8]	614 [24.2]	194 [7.6]	747 [29.4]	1487 [58.5]	674 [26.5]	1494 [58.8]	2030 [79.9]	1924 [75.7]	1850 [72.8]
KD900/1000 50Hz FUEL OPT	305 [12.0]	687 [26.9]	1618 [63.7]	899 [35.4]	100 [3.9]	859 [33.8]	1587 [62.5]	674 [26.5]	1718 [67.6]	2099 [82.6]	1941 [76.4]	1688 [66.4]
KD800 60Hz (50C COOLING)	400 [15.7]	587 [22.7]	1618 [63.7]	674 [26.5]	100 [3.9]	859 [33.8]	1487 [58.5]	899 [35.4]	1718 [67.6]	2135 [83.6]	1924 [75.7]	1850 [72.8]
KD900/1000 60Hz (50C COOLING)	306 [12.0]	1887 [74.7]	1844 [72.6]	899 [35.4]	100 [3.9]	948 [37.3]	1867 [66.4]	899 [35.4]	1896 [74.6]	2100 [82.6]	1986 [78.2]	1850 [72.8]

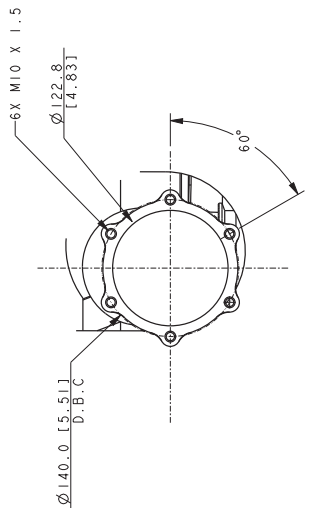
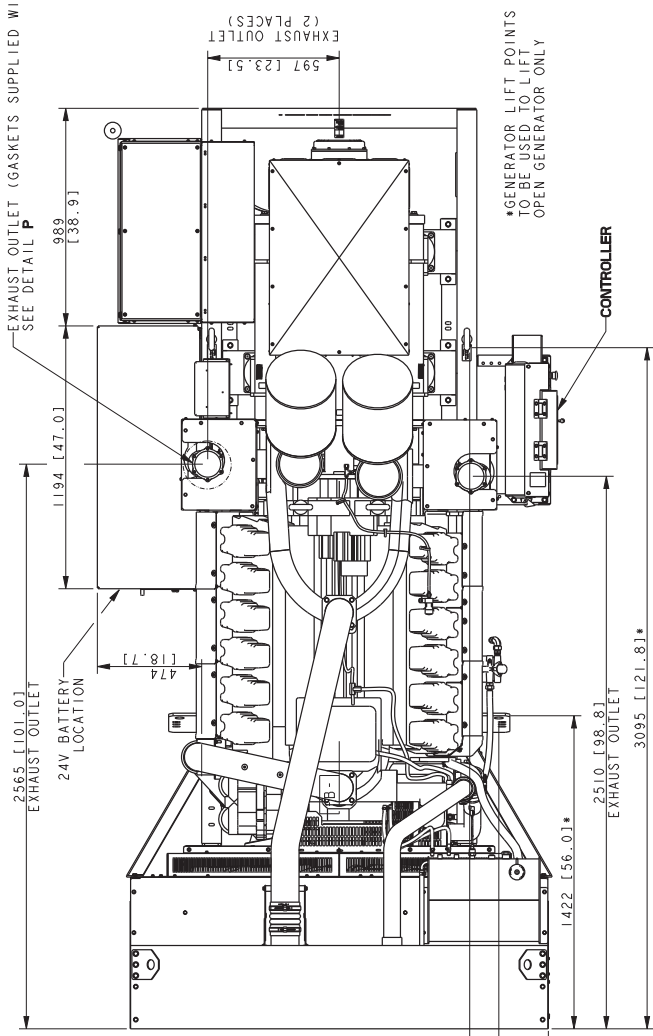


NOTES:
 1) DIMENSIONS IN [] ARE ENGLISH EQUIVALENTS.
 2) IF AN ENCLOSURE IS USED THE FUEL LINE MUST BE STUBBED UP FROM DIRECTLY UNDER THE UNIT. REFER TO ENCLOSURE ADV.
 3) IF IBC OR OSHPD CERTIFICATION IS REQUIRED SEE SEISMIC ADV FOR INSTALLATION INSTRUCTIONS.
 4) IF SUBBASE FUEL TANK AND/OR ENCLOSURE IS USED, REFER TO SUBBASE FUEL TANK/ENCLOSURE ADV TO DETERMINE MOUNTING LOCATION.

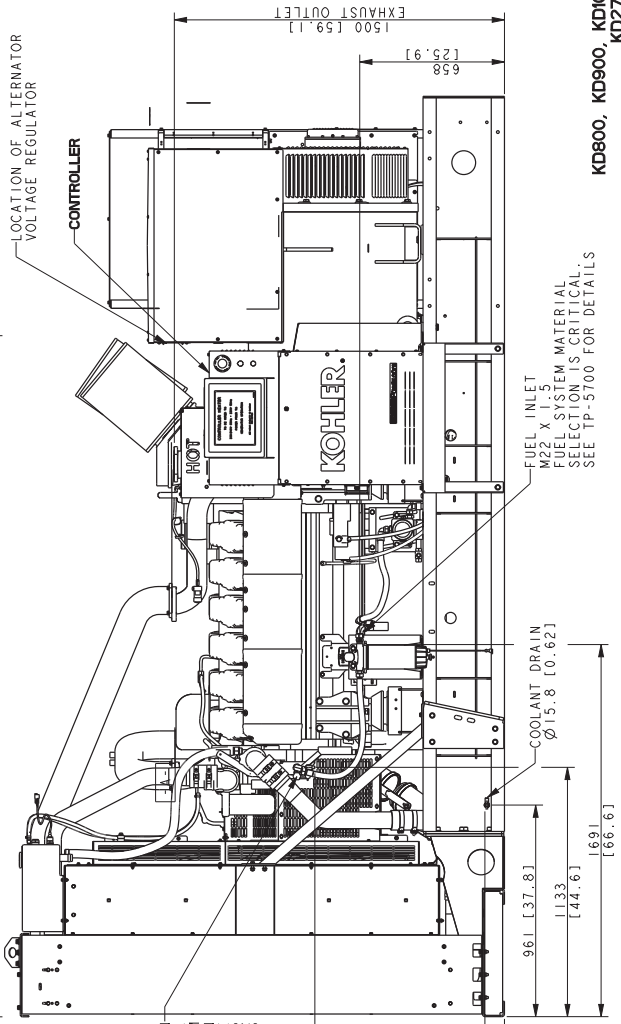
* REFER TO DIMENSION "M" FOR WIDTH OF THIS MOUNTING HOLE

REV.	DATE	ON COMPOSITE DWGS. SEE PART NO. FOR REVISION LEVEL	BY	DO NOT SCALE. REFERENCE THE MODEL FOR ALL UNSPECIFIED DIMENSIONS UNLESS OTHERWISE SPECIFIED
D	10-8-18	IMPERIAL DIMENSIONS ADDED TO ALL DIMENSIONS: SEE SHEET 2, 3, 4 & 5 (CT191046)	ADP	UNLESS OTHERWISE SPECIFIED: DIMENSIONS IN MILLIMETERS: 2.5, 5, 10 SURFACE FINISH: MAX. 12.5 μm (0.5 mil) MAX. 2.5 μm (0.1 mil) DIMENSIONS IN PARENTHESIS ARE NOT TO SCALE. DIMENSIONS OF DESIGN OR INVENTION ARE RESERVED.
E	2-19-20	(C-1,4) TABLE UPDATED: SEE SHEET 4 (CT202039)	DS	
F	3-MAY-2020	(B-8) CIRCUIT BREAKER BOX CALLOUT ADDED: (D-6, -7, -8) CONTROLLER CALLOUT: 1121 [44.1], 680 [26.8] & 335 [13.2] ADDED: SEE SHEET 2 (CT204162)	PAE	
G	22-AUG-2021	(D-11) 1850 [72.8] WAS 1688 [66.4] & 1688 [66.4] WAS 1850 [72.8] (CT213748)	ADP	

KD800, KD900, KD1000
KD27V12



DETAIL P
SCALE 0.40



**KD800, KD900, KD1000
KD27V12**

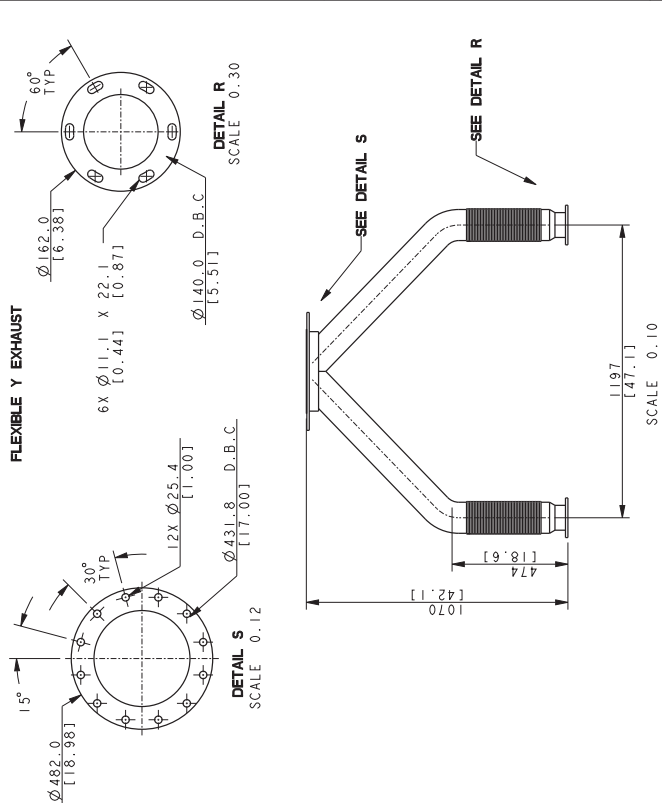
REV.	DATE	ON COMPOSITE DIMS. SEE PART NO. FOR REVISION LEVEL	BY	DO NOT SCALE. REFERENCE THE MODEL FOR ALL UNSPECIFIED DIMENSIONS
C	10-10-17	SEE SHEET 1 (CT180111)	BRT	UNLESS OTHERWISE SPECIFIED, TOLERANCES ARE:
D	10-8-18	IMPERIAL DIMENSIONS ADDED TO ALL DIMENSIONS:		GENERAL DIMENSIONS: 2.5, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0, 10.0, 12.0, 15.0, 20.0, 25.0, 30.0, 35.0, 40.0, 45.0, 50.0, 60.0, 70.0, 80.0, 90.0, 100.0, 120.0, 150.0, 200.0, 250.0, 300.0, 350.0, 400.0, 450.0, 500.0, 600.0, 700.0, 800.0, 900.0, 1000.0
		(D-5, 6) 474 WAS 476, 989 WAS 995; (A-4, 7)		2.5, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0, 10.0, 12.0, 15.0, 20.0, 25.0, 30.0, 35.0, 40.0, 45.0, 50.0, 60.0, 70.0, 80.0, 90.0, 100.0, 120.0, 150.0, 200.0, 250.0, 300.0, 350.0, 400.0, 450.0, 500.0, 600.0, 700.0, 800.0, 900.0, 1000.0
		658 WAS 644; (A-7) 1691 WAS 1730; SEE SHEET		2.5, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0, 10.0, 12.0, 15.0, 20.0, 25.0, 30.0, 35.0, 40.0, 45.0, 50.0, 60.0, 70.0, 80.0, 90.0, 100.0, 120.0, 150.0, 200.0, 250.0, 300.0, 350.0, 400.0, 450.0, 500.0, 600.0, 700.0, 800.0, 900.0, 1000.0
		1, 3, 4, 8, 5 (CT191046)	ADP	2.5, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0, 10.0, 12.0, 15.0, 20.0, 25.0, 30.0, 35.0, 40.0, 45.0, 50.0, 60.0, 70.0, 80.0, 90.0, 100.0, 120.0, 150.0, 200.0, 250.0, 300.0, 350.0, 400.0, 450.0, 500.0, 600.0, 700.0, 800.0, 900.0, 1000.0
E	2-19-20	SEE SHEET 1 & 4 (CT20239)	DS	2.5, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0, 10.0, 12.0, 15.0, 20.0, 25.0, 30.0, 35.0, 40.0, 45.0, 50.0, 60.0, 70.0, 80.0, 90.0, 100.0, 120.0, 150.0, 200.0, 250.0, 300.0, 350.0, 400.0, 450.0, 500.0, 600.0, 700.0, 800.0, 900.0, 1000.0
F	3MAY2001	(B, D-5) CONTROLLER CALLOUT ADDED; SEE SHEET	DS	2.5, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0, 10.0, 12.0, 15.0, 20.0, 25.0, 30.0, 35.0, 40.0, 45.0, 50.0, 60.0, 70.0, 80.0, 90.0, 100.0, 120.0, 150.0, 200.0, 250.0, 300.0, 350.0, 400.0, 450.0, 500.0, 600.0, 700.0, 800.0, 900.0, 1000.0
		1 (CT204162)	DS	2.5, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0, 10.0, 12.0, 15.0, 20.0, 25.0, 30.0, 35.0, 40.0, 45.0, 50.0, 60.0, 70.0, 80.0, 90.0, 100.0, 120.0, 150.0, 200.0, 250.0, 300.0, 350.0, 400.0, 450.0, 500.0, 600.0, 700.0, 800.0, 900.0, 1000.0
G	22AUG2007	SEE SHEET 1 (CT213748)	DS	2.5, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0, 10.0, 12.0, 15.0, 20.0, 25.0, 30.0, 35.0, 40.0, 45.0, 50.0, 60.0, 70.0, 80.0, 90.0, 100.0, 120.0, 150.0, 200.0, 250.0, 300.0, 350.0, 400.0, 450.0, 500.0, 600.0, 700.0, 800.0, 900.0, 1000.0

KOHLER
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APPROVALS
DATE: 9-8-16
SCALE: 0.09 [CR. NO.]
DWN: 9-8-16
APP: 9-8-16
DWG: 9-8-16
REV: 9-8-16

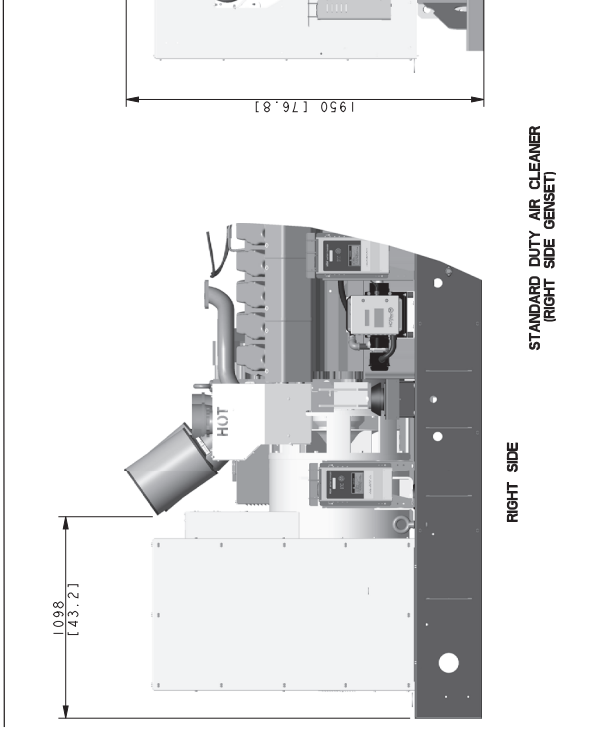
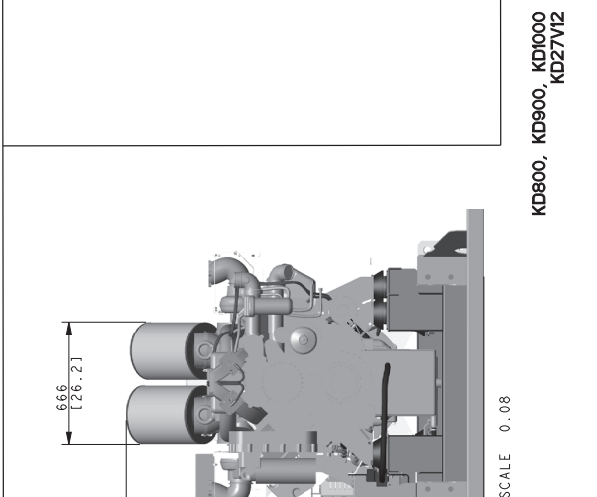
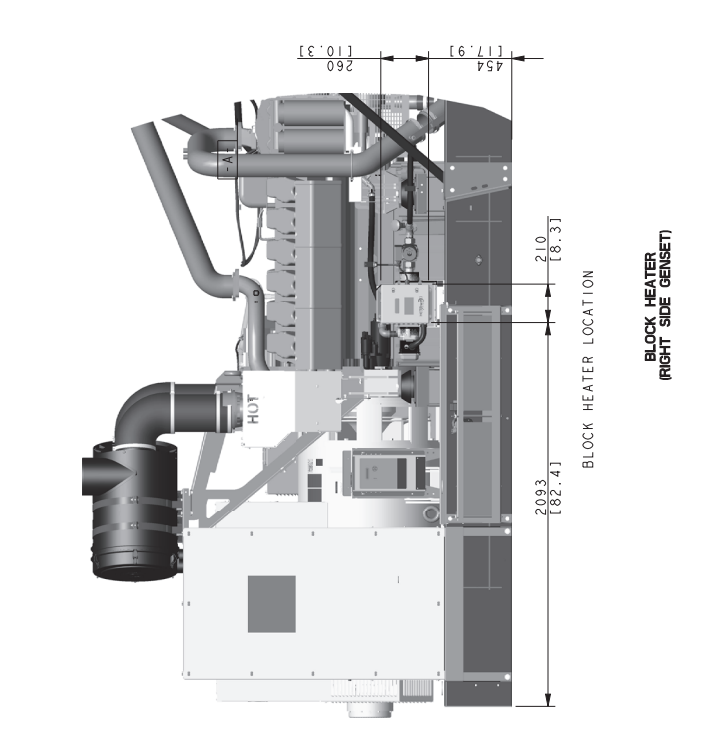
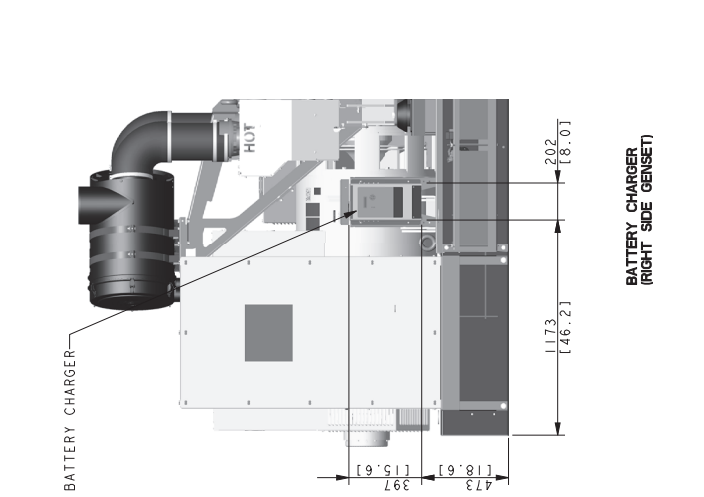
DIMENSION PRINT, KD800-1000
SHEET 2 OF 5

ADV-8868



NOTES:
 FLEXIBLE EXHAUST TO BE FULLY SUPPORTED BY EXTERNAL STRUCTURE (ALLOWED BENDING MOMENT AT EXHAUST FLANGE INTERFACE LESS THAN 19 Nm)

REV.	DATE	ON COMPOSITE DIMS. SEE PART NO. FOR REVISION LEVEL	BY	DO NOT SCALE. REFERENCE THE MODEL FOR ALL UNSPECIFIED DIMENSIONS
-	9-8-16	NEW DRAWING: ICT1604321	SSS	UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN MILLIMETERS.
A	11-3-16	SEE SHEET 1 (CT164321)	CEP	2.0 SURFACE FINISH
B	6-7-17	SEE SHEET 1 & 2 (CT175358)	RRT	3.0 SURFACE FINISH
C	10-10-17	SEE SHEET 1 (CT180111)	RRT	MAX. ANGLES 2°/3°
D	10-8-18	IMPERIAL DIMENSIONS ADDED TO ALL DIMENSIONS.	ADP	
E	2-19-20	SEE SHEET 1, 2, 4 & 5 (CT191046)	DS	
F	10-20-20	SEE SHEET 1 & 2 (CT202391)	PAR	
G	02/08/2021	SEE SHEET 1 & 2 (CT204182)	ADP	
		SEE SHEET 1 (CT213748)	ADP	



**KD800, KD900, KD1000
KD27V12**

**STANDARD DUTY AIR CLEANER
(RIGHT SIDE GENSET)**

RIGHT SIDE

DATE:

APPROVED BY:

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GENSET FOOTPRINT
78.2" X 164.6"

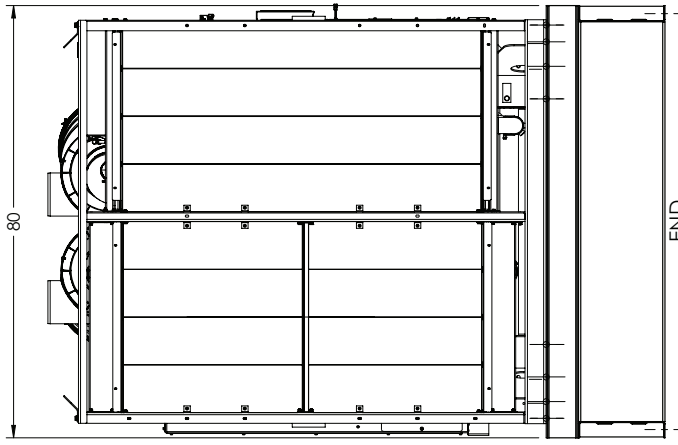
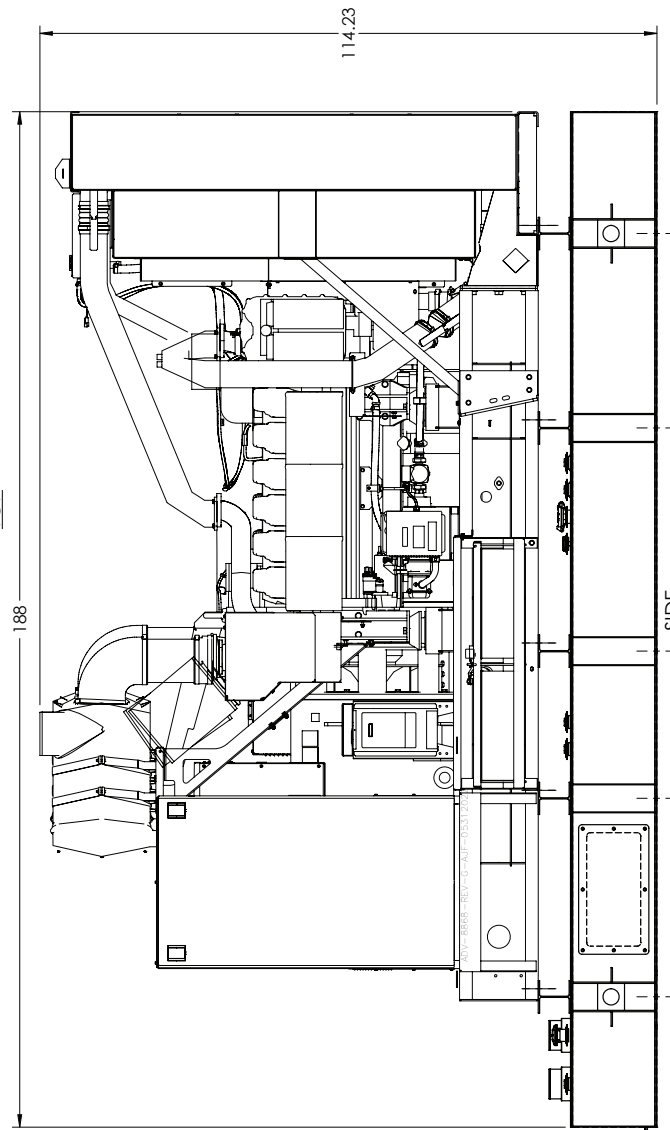
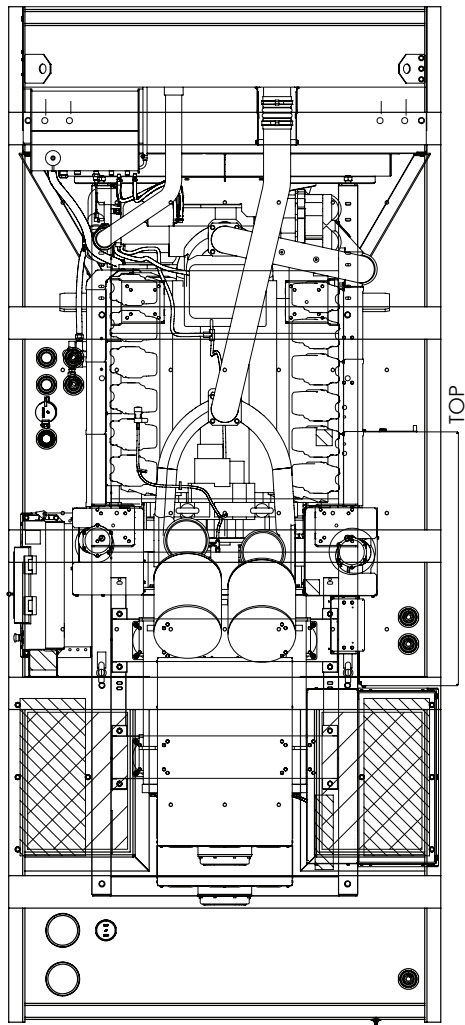
GENSET MODEL
KD900 OPU

TANK WEIGHT
3,375 LBS

TANK CAPACITY USEABLE
614 GAL

TANK CAPACITY ACTUAL
660 GAL

JOB #
38425



REV.	DESCRIPTION	DATE	BY

<p>GLOBAL POWER COMPONENTS™</p> <p>2000 W. 11th St. Muskegon, MI 49643 PH: 616.423.3000 FAX: 616.472.5441 www.globalpowercomponents.com</p>	<p>INFORMATIONS LABORATOIRES Libéro MHI (M8)</p> <p>FILE NO. M1462.43</p> <p>DATE: 3/9/2023</p> <p>SCALE: 1:25</p>	<p>THIRD ANGLE PROJECTION</p> <p>ISO 10110-1</p> <p>ISO 10110-2</p> <p>ISO 10110-3</p> <p>ISO 10110-4</p> <p>ISO 10110-5</p> <p>ISO 10110-6</p> <p>ISO 10110-7</p> <p>ISO 10110-8</p> <p>ISO 10110-9</p> <p>ISO 10110-10</p> <p>ISO 10110-11</p> <p>ISO 10110-12</p> <p>ISO 10110-13</p> <p>ISO 10110-14</p> <p>ISO 10110-15</p> <p>ISO 10110-16</p> <p>ISO 10110-17</p> <p>ISO 10110-18</p> <p>ISO 10110-19</p> <p>ISO 10110-20</p> <p>ISO 10110-21</p> <p>ISO 10110-22</p> <p>ISO 10110-23</p> <p>ISO 10110-24</p> <p>ISO 10110-25</p> <p>ISO 10110-26</p> <p>ISO 10110-27</p> <p>ISO 10110-28</p> <p>ISO 10110-29</p> <p>ISO 10110-30</p> <p>ISO 10110-31</p> <p>ISO 10110-32</p> <p>ISO 10110-33</p> <p>ISO 10110-34</p> <p>ISO 10110-35</p> <p>ISO 10110-36</p> <p>ISO 10110-37</p> <p>ISO 10110-38</p> <p>ISO 10110-39</p> <p>ISO 10110-40</p> <p>ISO 10110-41</p> <p>ISO 10110-42</p> <p>ISO 10110-43</p> <p>ISO 10110-44</p> <p>ISO 10110-45</p> <p>ISO 10110-46</p> <p>ISO 10110-47</p> <p>ISO 10110-48</p> <p>ISO 10110-49</p> <p>ISO 10110-50</p>	<p>CUSTOMER NAME: NICON POWER</p> <p>JOB REFERENCE: 93136 GENERATOR</p> <p>DRAWING REFERENCE: X</p>	<p>DATE 3/9/2023</p> <p>DESCRIPTION SUBBASE TANK WITH RUPTURE BASIN ASSEMBLY</p> <p>SCALE B</p> <p>DWG. NO. 15-38425</p>
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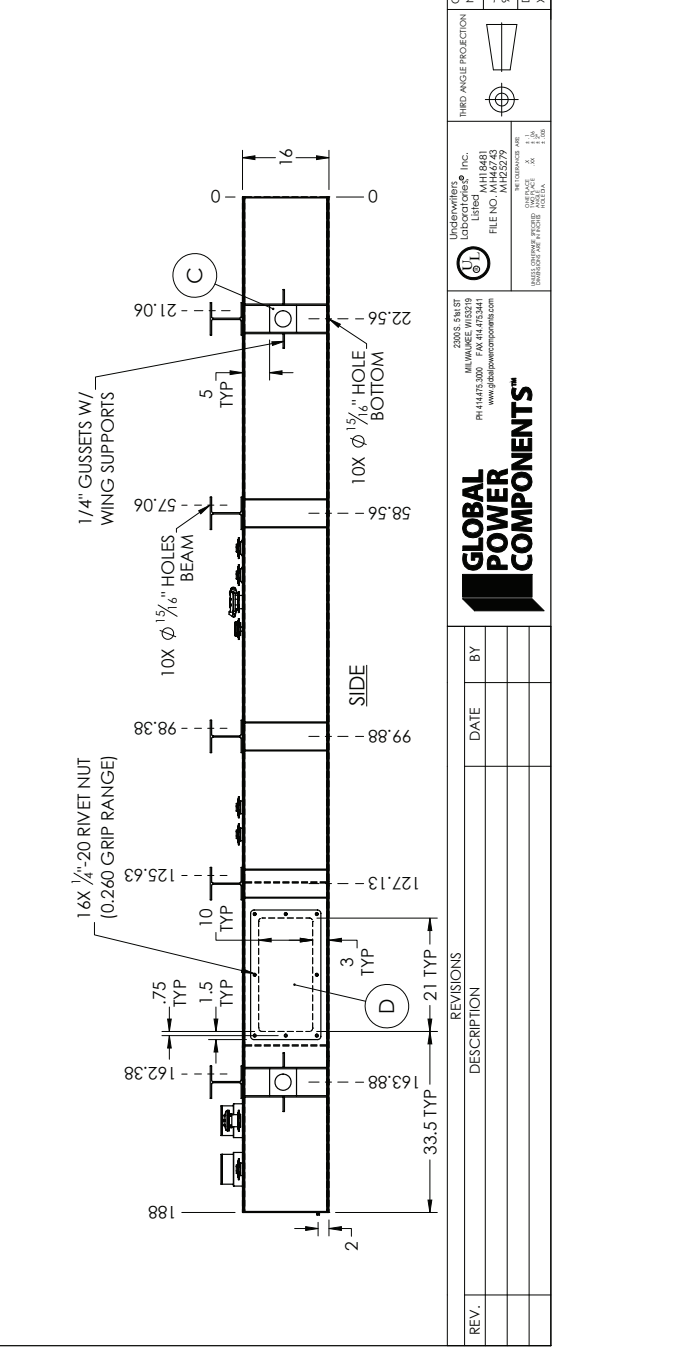
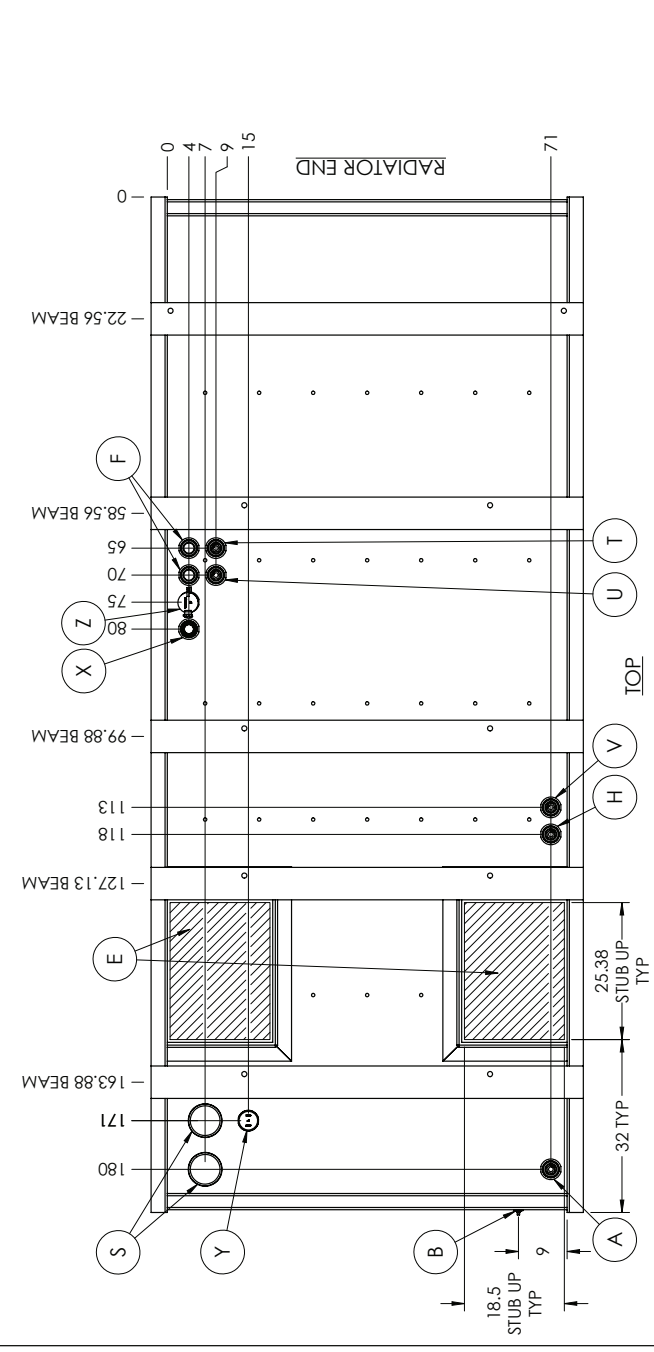
<p>REV. 1</p> <p>DATE</p> <p>BY</p>	<p>RDG</p>
-------------------------------------	------------

JOB # 38425 **TANK CAPACITY ACTUAL** 660 GAL **TANK CAPACITY USEABLE** 614 GAL **TANK WEIGHT** 3,375 LBS **GENSET MODEL** KD900 OPU **GENSET FOOTPRINT** 78.2" X 164.6" **APPROVED BY:** **DATE:**

NOTES:
 1. TERMINATE LOW, HIGH, CRITICAL HIGH, LEAK AND TWINSITE TO GEN PANEL

BILL OF MATERIALS

ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
S	3165	H. COUPLING, 5" EMERGENCY VENT	2
T	3650R	FLANGE, 2", FUEL RETURN W/ 1/2" DIP TUBE	1
U	3650S	FLANGE, 2", FUEL SUPPLY W/ 1/2" DIP TUBE	1
V	700-1065SS	1/2" STAINLESS STEEL SPRING CHECK VALVE	1
W	1000	FLANGE, 2", LOW LEVEL ALARM (SET AT 8")	1
X	1020	CRITICAL HIGH LEVEL ALARM (SET AT 1-3/4")	1
Y	1003	FLANGE, 2", FUEL LEVEL GAUGE	1
Z	1003-TS	ROCHESTER TWINSITE P/N P5648S02547	1
A	3152	FLANGE, 2", STANDARD VENT CAP	1
B	3005	FLANGE, 2", LOCKING FILL PORT	1
C	4300	FLANGE, 2", FUEL IN BASIN ALARM	1
D	3502	FLANGE, 1/2", BASIN DRAIN	1
E	8410	1/2" FLUSH MOUNT LIFTING PLATE	4
F	8002	REMOVABLE STUB UP ACCESS PANEL	2
G	4001	NOTCHED ELECTRICAL STUB UP AREA	2
H	3195	FLANGE, 2", EXTRA FITTING W/ PLUG	2
I	1010	FLANGE, 2", HIGH LEVEL ALARM (SET AT 2-1/2")	1
J	8303	6" I-BEAM GENSET SUPPORT (W6X15)	5
K		TANK TO BE SEISMICALLY RATED	1
L		3/4" BAR STOCK SUPPORT	7
M	DW-101	DOUBLE WALL SECONDARY CONTAINMENT	
N		PAINT COLOR	
O		GLOSS BLACK (P638)	



REV. DESCRIPTION DATE BY

REV.	DESCRIPTION	DATE	BY

REVISIONS

DESCRIPTION

DATE

BY

CUSTOMER NAME:

NIJON POWER

JOB REFERENCE:

93136 GENERATOR

DRAWING REFERENCE:

X

DATE:

3/9/2023

DRAWN BY:

B

RDG

SCALE: 1:25

DWG. NO.:

15-38425

REV.:

SHEET 2 OF 7

THIRD ANGLE PROJECTION

INCORPORATES LABORATORY INC. LIBRARY MHI18481 FILE NO. M1442 43 M1442 43 M1442 43

DATE OF ISSUE: 03/09/2023

ISSUED FOR: NIJON POWER

GLOBAL POWER COMPONENTS

PH: 444.833.3000 FAX: 444.472.5341 www.globalpowercomponents.com

3/9/2023

B

RDG

SCALE: 1:25

DWG. NO.:

15-38425

REV.:

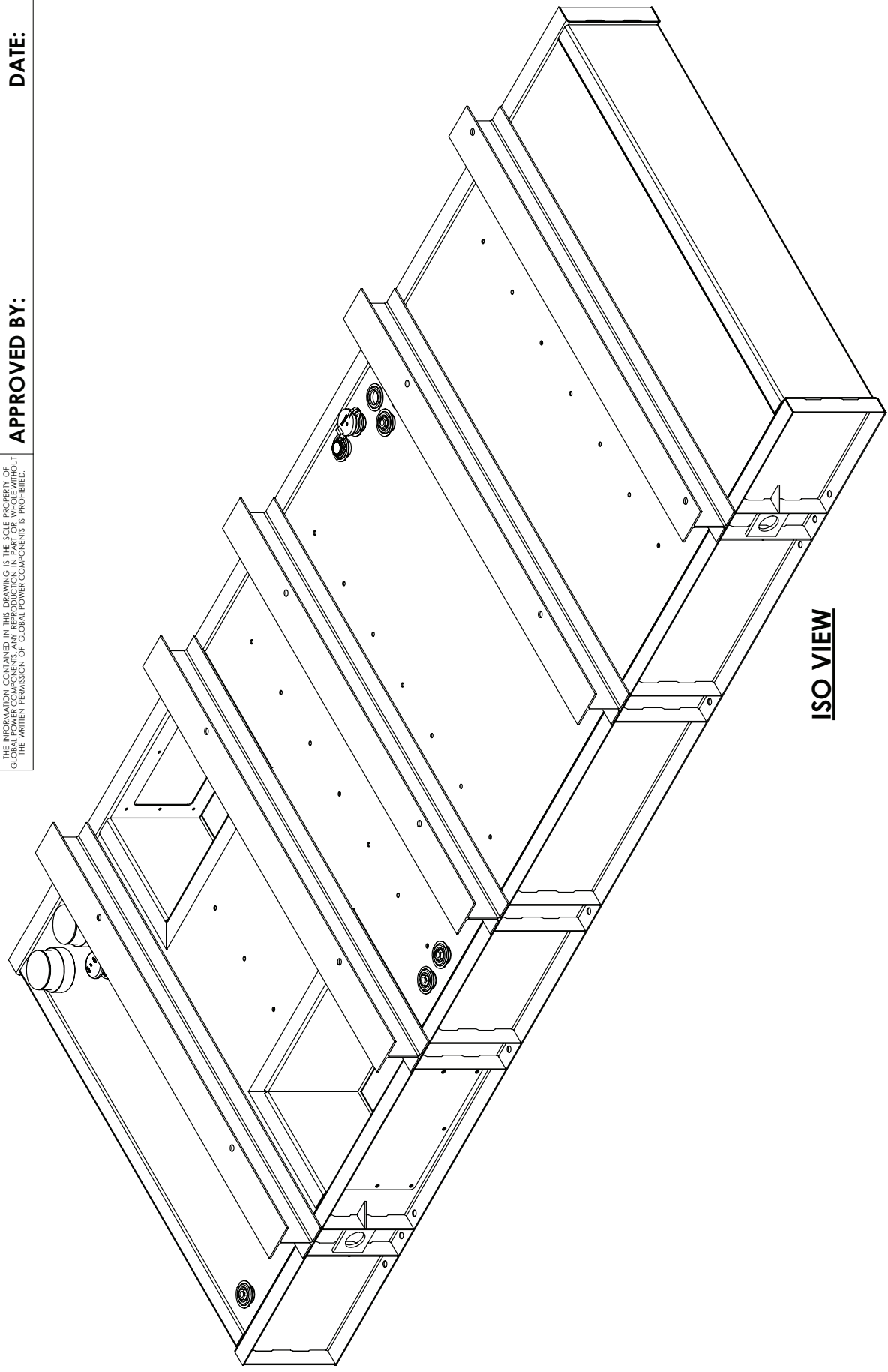
SHEET 2 OF 7

JOB #
38425

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APPROVED BY:

DATE:



ISO VIEW

GLOBAL POWER COMPONENTS™
SANTA ANITA
MILWAUKEE, WISCONSIN
PH: 414.443.3000 FAX: 414.472.5441
www.globalpowercomponents.com

INCORPORATED
LABORATORIES, INC.
Libbey MHI (848)
FILE NO. MH462.43
REVISED DATE: 08/11/2015
REVISED BY: J. J. J.
DESIGNED BY: J. J. J.
DRAWN BY: J. J. J.
CHECKED BY: J. J. J.
APPROVED BY: J. J. J.

THIRD ANGLE PROJECTION

CUSTOMER NAME:
NICON POWER
JOB REFERENCE:
93136 GENERATOR
DRAWING REFERENCE:
X

DATE: 3/9/2023
DESCRIPTION: ISO VIEW
DRAWN BY: RDG
SCALE: 1:1.5

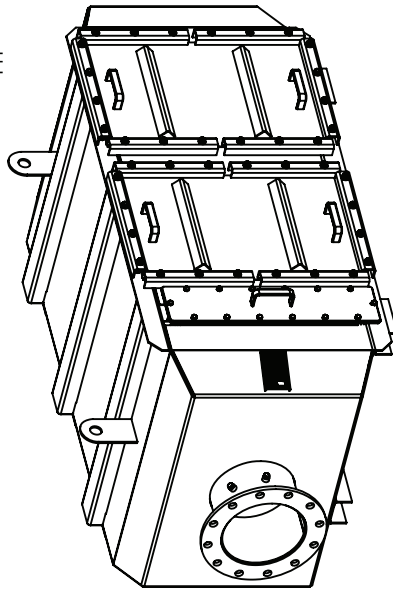
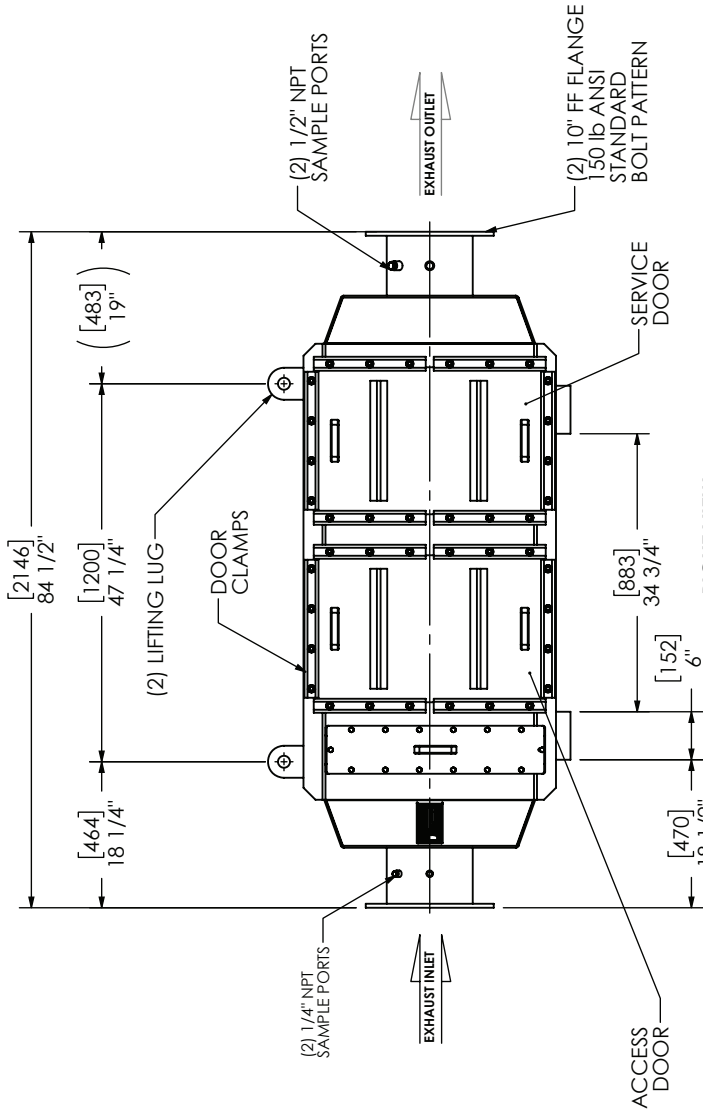
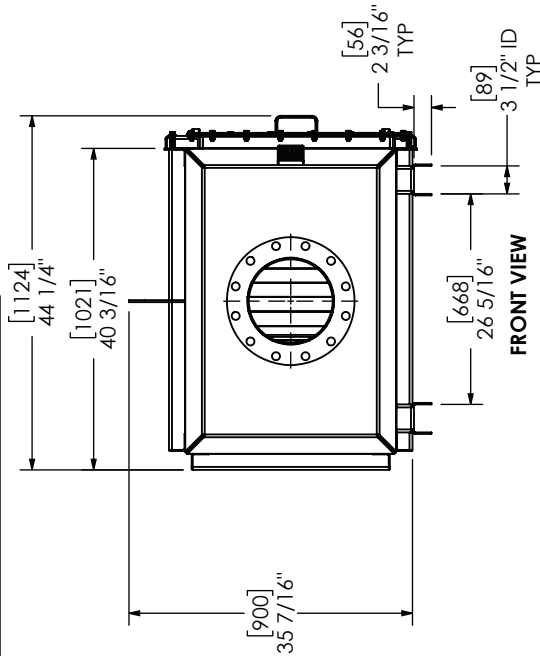
SIZE: B
DWG. NO.: 15-38425

REV. 7
SHEET 3 OF 7

KOHLER®

DPF DRAWINGS

WEIGHTS (APPROXIMATE)	
EMPTY HOUSING	891 lb
ONE (1) FULL DPF CATALYST LAYER	437 lb
ONE (1) OXIDATION ELEMENT	53 lb
• HOUSING HAS CAPACITY FOR ONE(1) FULL DPF CATALYST LAYERS	
• HOUSING HAS CAPACITY FOR ONE(1) OXIDATION ELEMENT	



NOTES:

- DO NOT USE EQUIPMENT TO SUPPORT OTHER PARTS OF THE EXHAUST SYSTEM WITHOUT PROPER REINFORCEMENT

MATERIAL CONSTRUCTION:

- CARBON STEEL

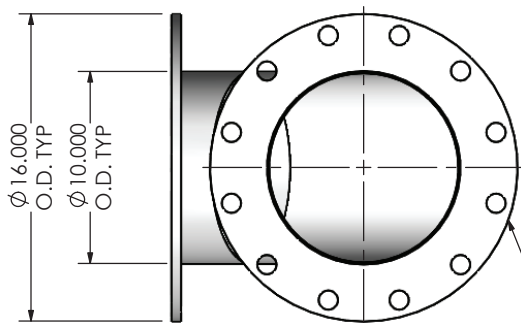
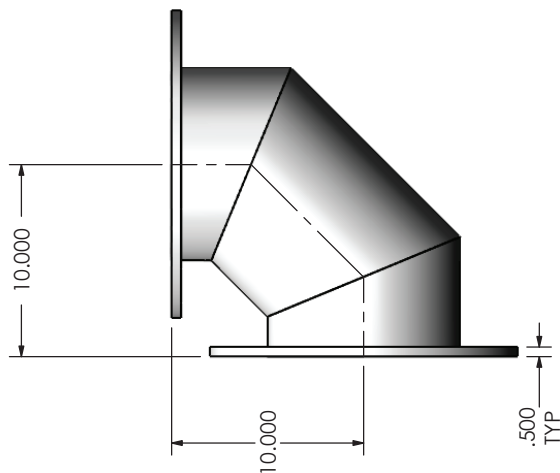
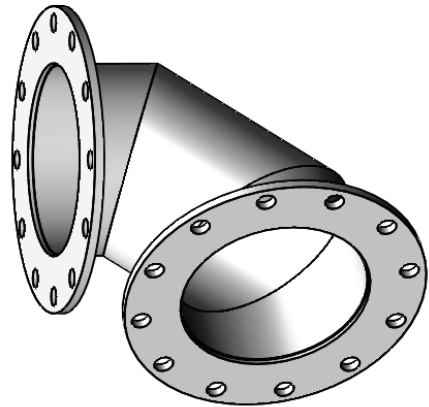
PAINT:

- HIGH TEMPERATURE GRAY (MIRATECH COATING SYSTEM 2)



SP-LTRV24-23020078
Sales Drawing

DIMENSIONS ARE APPROXIMATE IN INCHES UNLESS OTHERWISE SPECIFIED		DRAWING		REV
DO NOT SCALE DRAWING	DATE	SCALE	SIZE	SHEET
JFH	02/16/2023	1:24	A	1 OF 1
REVIEWED BY	DATE			
MSC	02/16/2023			
PROPRIETARY AND CONFIDENTIAL THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF MIRATECH CORPORATION. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF MIRATECH CORPORATION IS PROHIBITED.				
PROJECT NAME				
PROPOSAL NUMBER				
SALES ORDER NO.				
CUSTOMER P.O.				



(2) 10" FF FLANGE
150 lb ANSI
STANDARD
BOLT PATTERN

NOTES:

- DO NOT USE EQUIPMENT TO SUPPORT OTHER PARTS OF THE EXHAUST SYSTEM WITHOUT PROPER REINFORCEMENT

MATERIAL CONSTRUCTION:

- CARBON STEEL

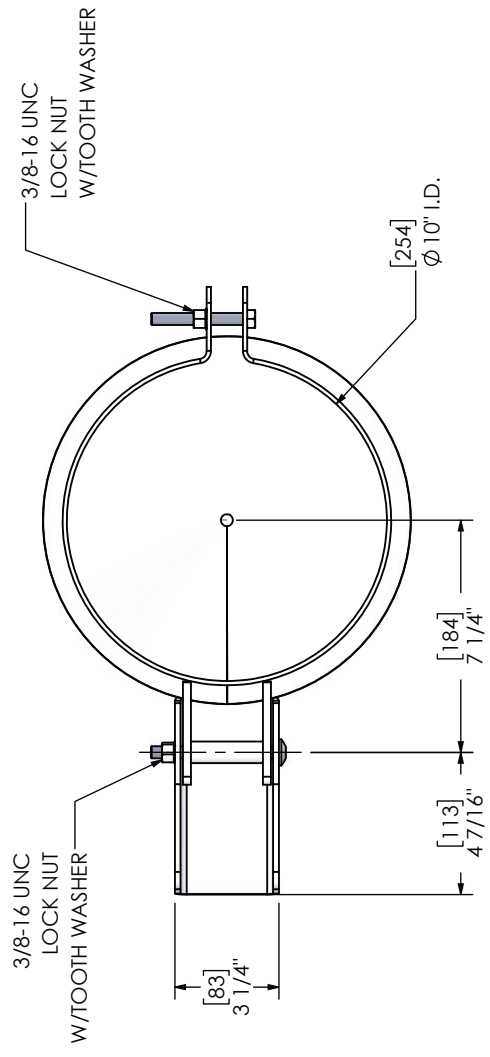
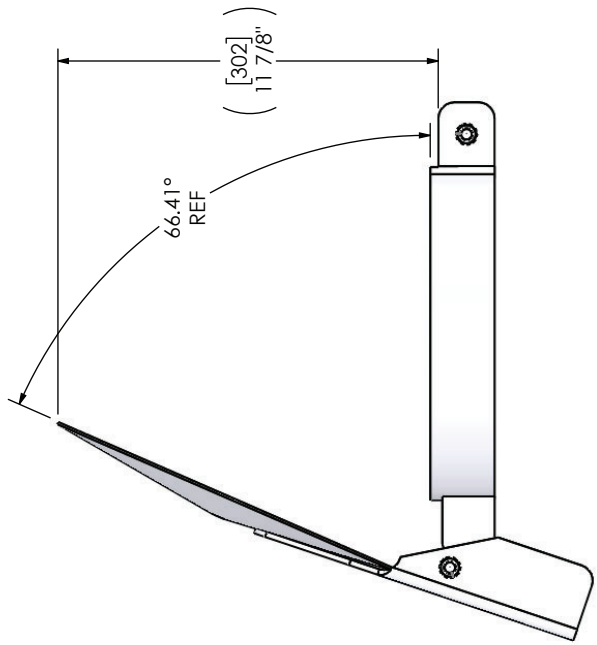
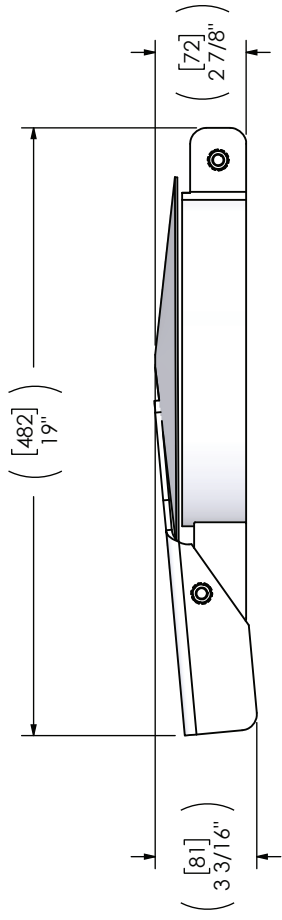
PAINT:

- HIGH TEMPERATURE BLACK (MIRATECH COATING SYSTEM 5)



EL-10TF1-10TF1-100X0100-2
Sales Drawing

PROJECT NAME		DIMENSIONS ARE IN INCHES UNLESS OTHERWISE SPECIFIED	
PROPOSAL NUMBER	INCHES: \$0.125	MILLIMETERS: \$2	SCALE: \$1:1
SALES ORDER NO.	DO NOT SCALE DRAWING	DATE	DATE
CUSTOMER P.O.	DRAWN CSF	11/28/2016	11/28/2016
	REVIEWED BY	AJM	AJM
<p>PROPRIETARY AND CONFIDENTIAL</p> <p>THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF MIRATECH GROUP, LLC. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF MIRATECH GROUP, LLC IS PROHIBITED.</p>		<p>SIZE A</p> <p>SCALE 1:10</p> <p>WEIGHT: 42 lb</p>	



- NOTES:**
- STACK SHOULD EXTEND ABOVE CLAMP APPROXIMATELY 0.25" WHEN PROPERLY INSTALLED
- MATERIAL CONSTRUCTION:**
- CARBON STEEL
- PAINT:**
- HIGH TEMP BLACK (MIRATECH COATING SYSTEM 1)

		RC-1000 Sales Drawing	
DIMENSIONS ARE APPROXIMATE IN INCHES UNLESS OTHERWISE SPECIFIED DIMENSIONAL TOLERANCES UNLESS OTHERWISE SPECIFIED MACH: ±.2° ANGLES: ±1/8 INCHES BEND: ±.5° MILLIMETERS: ±.5		DO NOT SCALE DRAWING DRAWN: JCO DATE: 03/28/2019 REVIEWED BY: CAC	
PROPRIETARY AND CONFIDENTIAL THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF MIRATECH GROUP, LLC. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF MIRATECH GROUP, LLC IS PROHIBITED.		DRAWING: RC-1000 SD REV: 0 SCALE: 1:6 WEIGHT: 8.49 lb SHEET 1 OF 1	
PROJECT NAME	PROPOSAL NUMBER	SALES ORDER NO.	CUSTOMER P.O.

KOHLER®

LOAD BANK DRAWINGS

Trystar
15765 Acorn Trail
Faribault MN 55021
United States

www.trystar.com

Date: 2/7/2023

Expired: 2/7/2023

Quote Number: 198603

QUOTE

Page: 1 of 2

Quote To:

Nixon Power Services
5038 Thoroughbred Lane A/P
Brentwood, TN 37027
United States

Sam Anderson
Phone: 615-244-0650
sanderson@nixonpower.com

Ship To:

Nixon Power Services
5038 Thoroughbred Lane A/P
Brentwood, TN 37027
502-267-0474

Sales Person: Connor Dalton
cdalton@themcmgroup.com

Ship Terms: Prepaid & Charge

Terms: Net 30 Days

Line	Part	Description	Quantity	Unit Price	Ext. Price
1	LS900-480-25AT	Model LS900-480-25AT 900 KW at 480 Volts AC, 3-phase, 60 Hertz, 1082 Amps per Phase	1 EA		

We value your input.
Please take this one question
anonymous
Trystar Survey (link below):
[Survey](#)

Trystar
15765 Acorn Trail
Faribault MN 55021
United States

www.trystar.com

Date: 2/7/2023


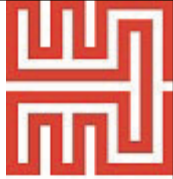
Expired: 2/7/2023

Quote Number: 198603

QUOTE

Page: 2 of 2

Line	1	Specifications:	LS900-480-25ART
Part Description			
Model LS900-480-25AT			
900 KW at 480 Volts AC, 3-phase, 60 Hertz, 1082 Amps per Phase			
25 KW minimum load step resolution provided			
Automatic Load Level Controller			
Remote Operator Control			
Control Power Transformer			
Stationary, Outdoor Resistive Load Bank, UL listed			
Approximate Dimensions:			
40"W x 52"D x 92"H [1020 x 1310 x 2340 mm]			
Approximate Weight:			
1700 pounds [770 kg]			





15765 Acorn Trail
Faribault, MN 55021
U.S.A.
Toll Free 855.LBD.CALL (523.2255)
Fax 859.554.2530
www.Trystar.com
www.LoadBanksDirect.com

Stationary Load Banks

Duty Cycle: Forced Air-Cooled, rated for continuous operation.

Power Factor: 1.0

Cooling System: Integrally mounted blower motor with high-performance, direct-driven fan blade delivers the required airflow volume (CFM) for cooling resistor load elements. Blower motor can be powered from an external 3-phase supply source, or internally from the main input load bus (source under test).

Remote Operator Control Panel Including: Emergency Stop (E-STOP) push button, Main Power On/Off switch, Blower Start/Stop push buttons, Master Load On/Off switch, and Individual Load Step switches (KW On/Off) provided for each load step. *Illuminated indicators provided for Power On, Blower On, Motor Overload, Air-Flow Failure, Over-Temperature, and Load Dump.*

Automatic Load Dump circuit provides user interface provisions to the generator controls, automatic transfer switch, or building management system, to disconnect and disable all load steps from a normally closed (NC) set of auxiliary contacts. In the event of an actual power failure, all load bank load is removed from the source under test.

Remote Indication and Alarm contact closure [form-c-type normally open and normally closed] provides user interface to building management system for indication, detection, and alarm of "Air-Flow Failure", "Over-Temperature", and "Load Dump".

Operator Protection and Safety Features:

- A Control Power Emergency-Stop (E-STOP) push button is provided to disable control power voltage to all operator control power circuits, including blower circuit and load application circuits.
- Operator control panel provides detection and display of Main Power On, Blower Motor On, Motor Overload, Air-Flow Failure, Over-Temperature, and Load Dump.
- Branch circuit fuse protection provides short-circuit fault protection of all load steps. Fuses are fast-acting, current-limiting type with an interrupting rating of 200K A.I.C.
- Blower Motor is short-circuit protected by current-limiting fuses and thermally protected by overload relay.
- A differential air pressure switch provides protection from loss of cooling air or insufficient airflow. The switch automatically removes all load if an airflow problem is detected. Load cannot be reapplied until sufficient airflow is present.
- An over-temperature switch is provided to monitor load bank exhaust temperature. The switch automatically removes all load if an over-temperature condition is detected. Load cannot be reapplied until the over-temperature condition is corrected.
- Operator warning and caution statements are located on appropriate access panels.

LBD-PowerDyne™ Resistor load elements provide the necessary KW load rating for each load step. **PowerDyne™** Resistors are fully supported across their entire length within the air stream by stainless steel support rods which are insulated with heavy-duty, high-temperature ceramic insulators. Change in resistance is minimized by maintaining conservative resistor designs, thermally derated resistor designs and by utilizing a high-quality nickel chrome alloy. Tolerance is 5%.

Load Bank Construction and Power Connections:

- The load bank enclosure is constructed of galvanized steel with powder coat paint finish with exterior stainless-steel fasteners. Bolt on access panels provide a dead-front enclosure, safely enclosing all electrical and mechanical connections.
- The load bank is designed for installation and operation in an outdoor environment with sufficient fresh intake air available, while secured to a flat surface such as a roof, finished floor, or concrete pad. Cooling airflow is drawn in from the screened air-intake sides, with hot air vertically exhausted from the top of the unit away from personnel. An integrated gravity exhaust louver top provides a superior all-weather protected enclosure.

***Our load banks.
Your reliable electric power.***



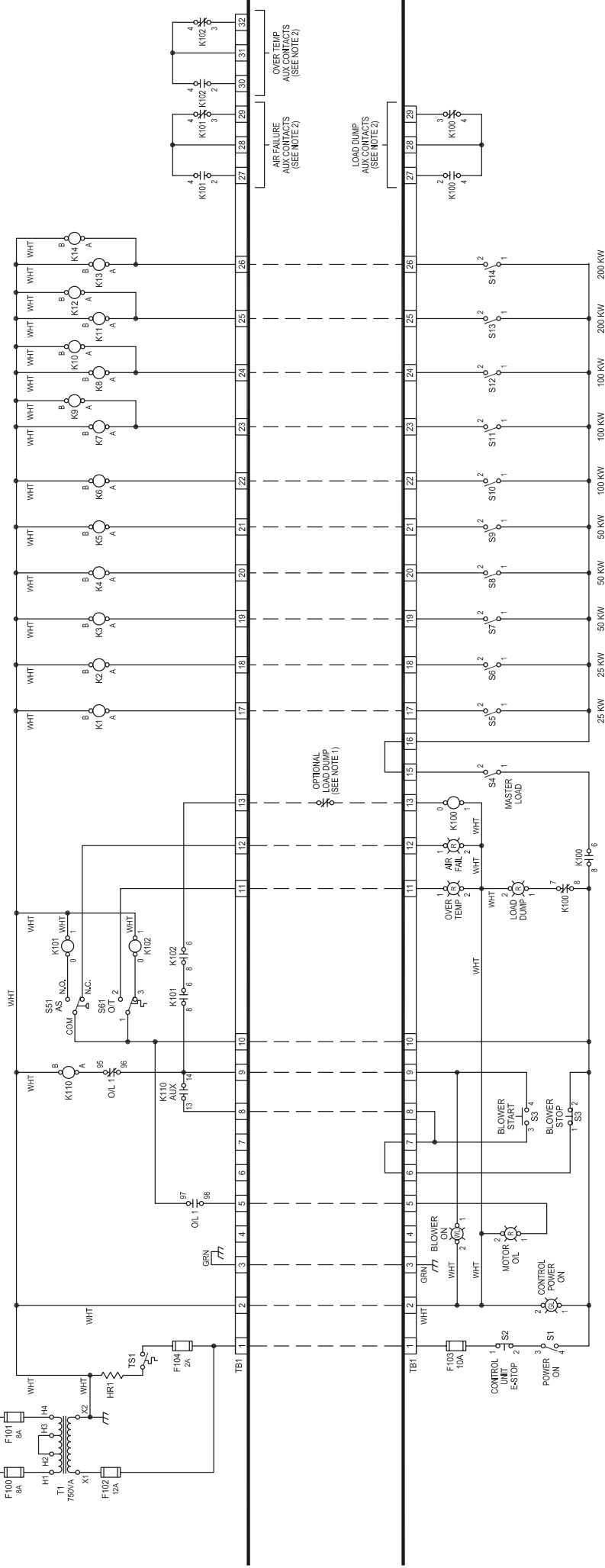
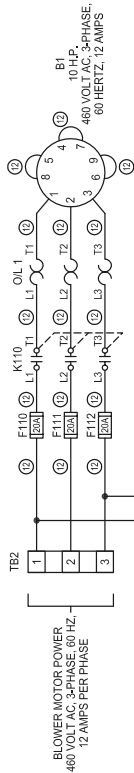
- Fork-lift channels are provided in the base for ease of lifting and handling during installation.
- All power connections including main-input load bus, external blower power, external control power, operator remote control, instrumentation, and customer interface connections are made within the enclosed relay/connection compartment. Bottom access with a removable gland plate provides “safe and sealed” ease of installation of all conduit entry cable.
- Load connections are made directly to the main input load bus bars or power distribution block. A standard NEMA 4-hole pattern is provided for customer load cable connections. All copper bus bar load connections are plated for superior oxidation resistance.
- Relay/connection compartment is heated and thermostatically controlled to limit any harmful effects of condensation.



LOAD BANK LS900-480-25T

- NOTES:**
- OPTIONAL REMOTE LOAD DUMP - CONNECT NORMALLY CLOSED (N.C.) SET OF AUX CONTACTS FOR REMOTE LOAD DUMP.
 - AUX CONTACTS PROVIDED FOR REMOTE INDICATION AND/OR ALARM.

NOTE:
 This is a wiring diagram for a LS900-480-25T, we will supply an as built diagram for an LS900-480-25AT on release of the order.



REMOTE CONTROL UNIT LS900-480-25-CU

- 1 - DENOTES #2 AWG HIGH TEMP 150 °C, 600 VAC INSULATED UL 3321 OR UL 3374.
 - 2 - DENOTES #6 AWG HIGH TEMP 150 °C, 600 VAC INSULATED UL 3321 OR UL 3374.
 - 3 - DENOTES #8 AWG HIGH TEMP 150 °C, 600 VAC INSULATED UL 3321 OR UL 3374.
 - 4 - DENOTES #10 AWG HIGH TEMP 150 °C, 600 VAC INSULATED UL 3321 OR UL 3374.
 - 5 - DENOTES #12 AWG HIGH TEMP 150 °C, 600 VAC INSULATED UL 3321 OR UL 3374.
 - 6 - DENOTES #14 AWG HIGH TEMP 150 °C, 600 VAC INSULATED UL 3321 OR UL 3374.
 - 7 - DENOTES #16 AWG HIGH TEMP 150 °C, 600 VAC INSULATED UL 3321 OR UL 3374.
 - 8 - DENOTES #18 AWG HIGH TEMP 150 °C, 600 VAC INSULATED UL 3321 OR UL 3374.
 - 9 - DENOTES #20 AWG HIGH TEMP 150 °C, 600 VAC INSULATED UL 3321 OR UL 3374.
 - 10 - DENOTES #22 AWG HIGH TEMP 150 °C, 600 VAC INSULATED UL 3321 OR UL 3374.
 - 11 - DENOTES #24 AWG HIGH TEMP 150 °C, 600 VAC INSULATED UL 3321 OR UL 3374.
 - 12 - DENOTES #26 AWG HIGH TEMP 150 °C, 600 VAC INSULATED UL 3321 OR UL 3374.
 - 13 - DENOTES #28 AWG HIGH TEMP 150 °C, 600 VAC INSULATED UL 3321 OR UL 3374.
 - 14 - DENOTES #30 AWG HIGH TEMP 150 °C, 600 VAC INSULATED UL 3321 OR UL 3374.
 - 15 - DENOTES #32 AWG HIGH TEMP 150 °C, 600 VAC INSULATED UL 3321 OR UL 3374.
 - 16 - DENOTES #34 AWG HIGH TEMP 150 °C, 600 VAC INSULATED UL 3321 OR UL 3374.
 - 17 - DENOTES #36 AWG HIGH TEMP 150 °C, 600 VAC INSULATED UL 3321 OR UL 3374.
 - 18 - DENOTES #38 AWG HIGH TEMP 150 °C, 600 VAC INSULATED UL 3321 OR UL 3374.
 - 19 - DENOTES #40 AWG HIGH TEMP 150 °C, 600 VAC INSULATED UL 3321 OR UL 3374.
 - 20 - DENOTES #42 AWG HIGH TEMP 150 °C, 600 VAC INSULATED UL 3321 OR UL 3374.
 - 21 - DENOTES #44 AWG HIGH TEMP 150 °C, 600 VAC INSULATED UL 3321 OR UL 3374.
 - 22 - DENOTES #46 AWG HIGH TEMP 150 °C, 600 VAC INSULATED UL 3321 OR UL 3374.
 - 23 - DENOTES #48 AWG HIGH TEMP 150 °C, 600 VAC INSULATED UL 3321 OR UL 3374.
 - 24 - DENOTES #50 AWG HIGH TEMP 150 °C, 600 VAC INSULATED UL 3321 OR UL 3374.
 - 25 - DENOTES #52 AWG HIGH TEMP 150 °C, 600 VAC INSULATED UL 3321 OR UL 3374.
 - 26 - DENOTES #54 AWG HIGH TEMP 150 °C, 600 VAC INSULATED UL 3321 OR UL 3374.
 - 27 - DENOTES #56 AWG HIGH TEMP 150 °C, 600 VAC INSULATED UL 3321 OR UL 3374.
 - 28 - DENOTES #58 AWG HIGH TEMP 150 °C, 600 VAC INSULATED UL 3321 OR UL 3374.
 - 29 - DENOTES #60 AWG HIGH TEMP 150 °C, 600 VAC INSULATED UL 3321 OR UL 3374.
 - 30 - DENOTES #62 AWG HIGH TEMP 150 °C, 600 VAC INSULATED UL 3321 OR UL 3374.
 - 31 - DENOTES #64 AWG HIGH TEMP 150 °C, 600 VAC INSULATED UL 3321 OR UL 3374.
 - 32 - DENOTES #66 AWG HIGH TEMP 150 °C, 600 VAC INSULATED UL 3321 OR UL 3374.
- ALL UNBARRERED WIRE TO BE #16 AWG BLACK, UL TYPE 1015 (CSA TYPE TEW OR AWMI), WIRE TYPE MTW/THHN, 105 °C, 600 VAC INSULATED.
- ALL WIRE TO BE BLACK UNLESS SPECIFIED.

GENERAL NOTES:

- UNLESS OTHERWISE NOTED:
 - ALL DIMENSIONS ARE IN INCHES.

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Load Banks Direct
 www.LoadBanksDirect.com

SCHEMATIC, LOAD BANK

DWS. NO. **LS900-480-25T-W**

REV. **-**

DATE **12-16-15**

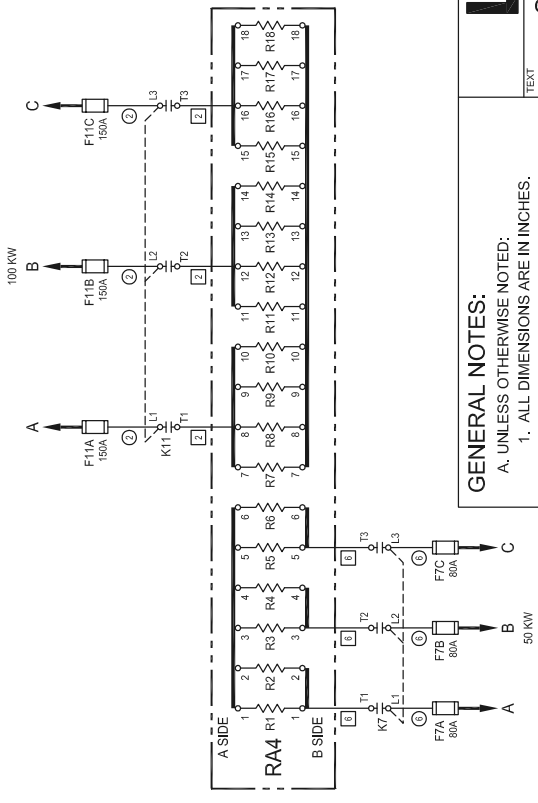
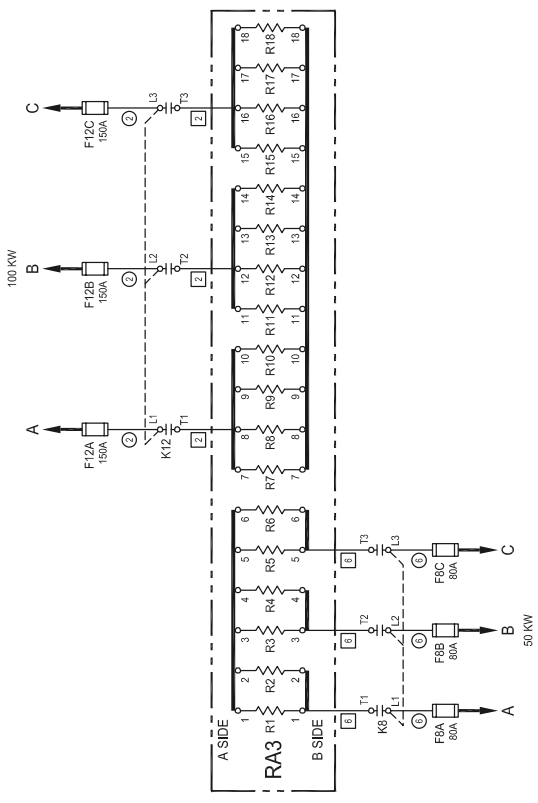
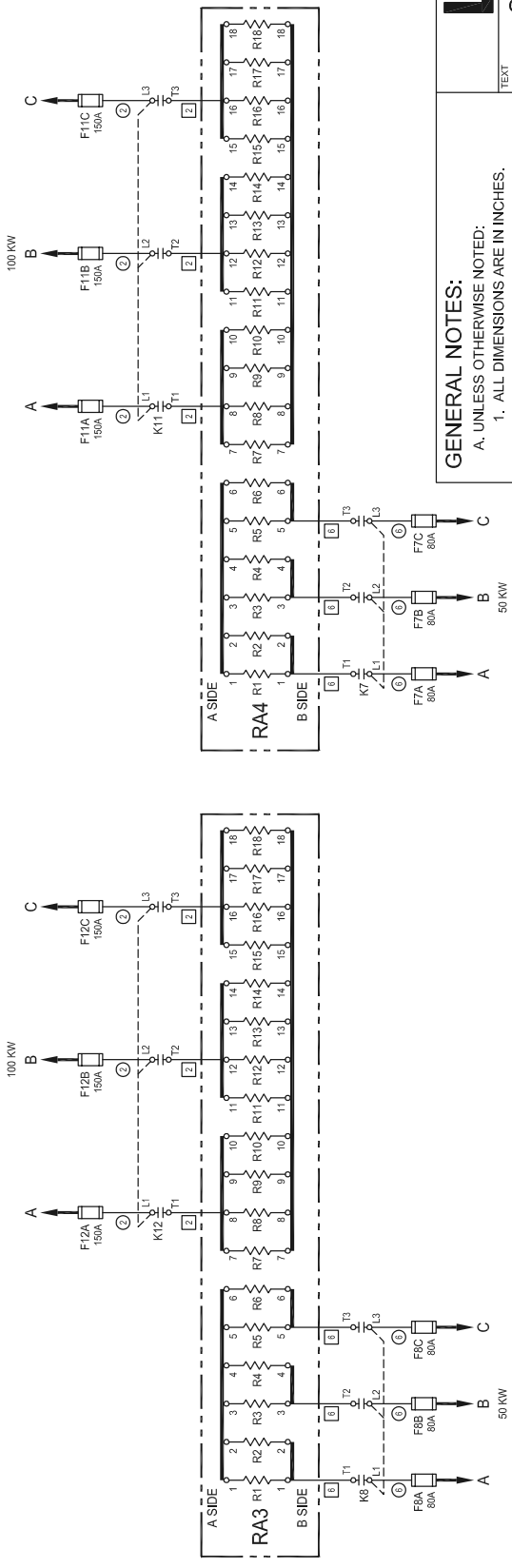
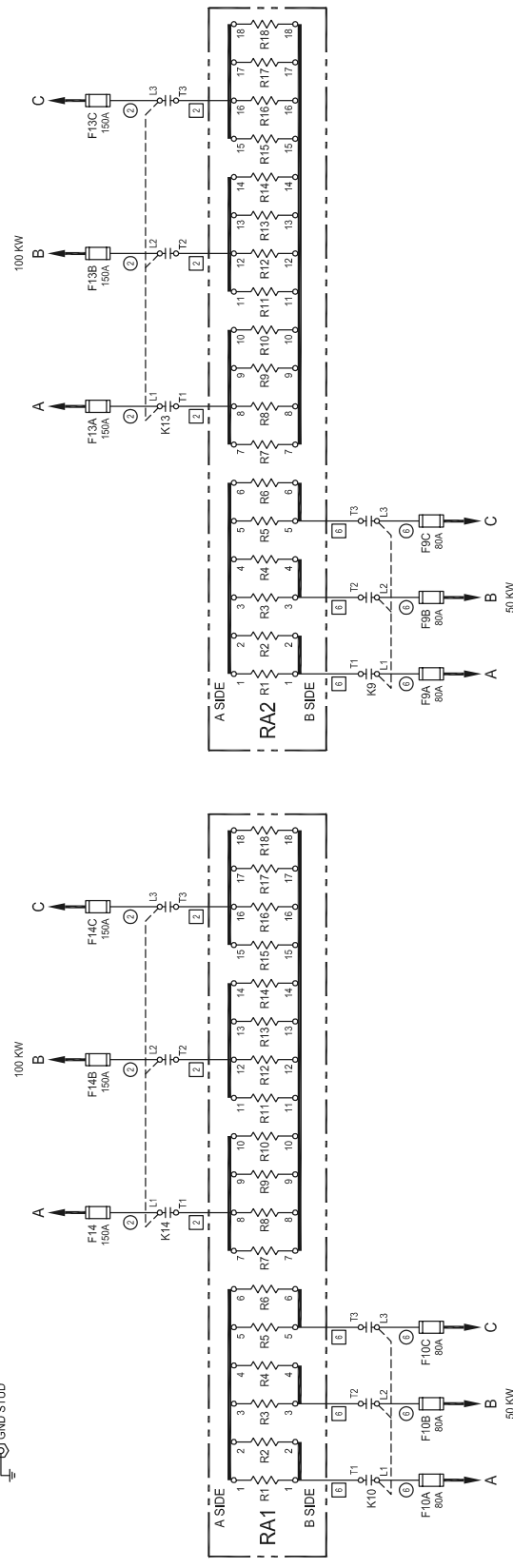
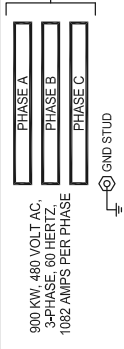
DRAWN BY **JJF**

CHECKED BY **MMP**

SHEET **1 of 3**

SIZE **D**

LOAD BANK LS900-480-25T

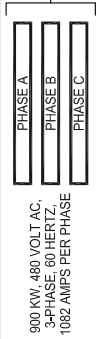


GENERAL NOTES:
 A. UNLESS OTHERWISE NOTED,
 1. ALL DIMENSIONS ARE IN INCHES.

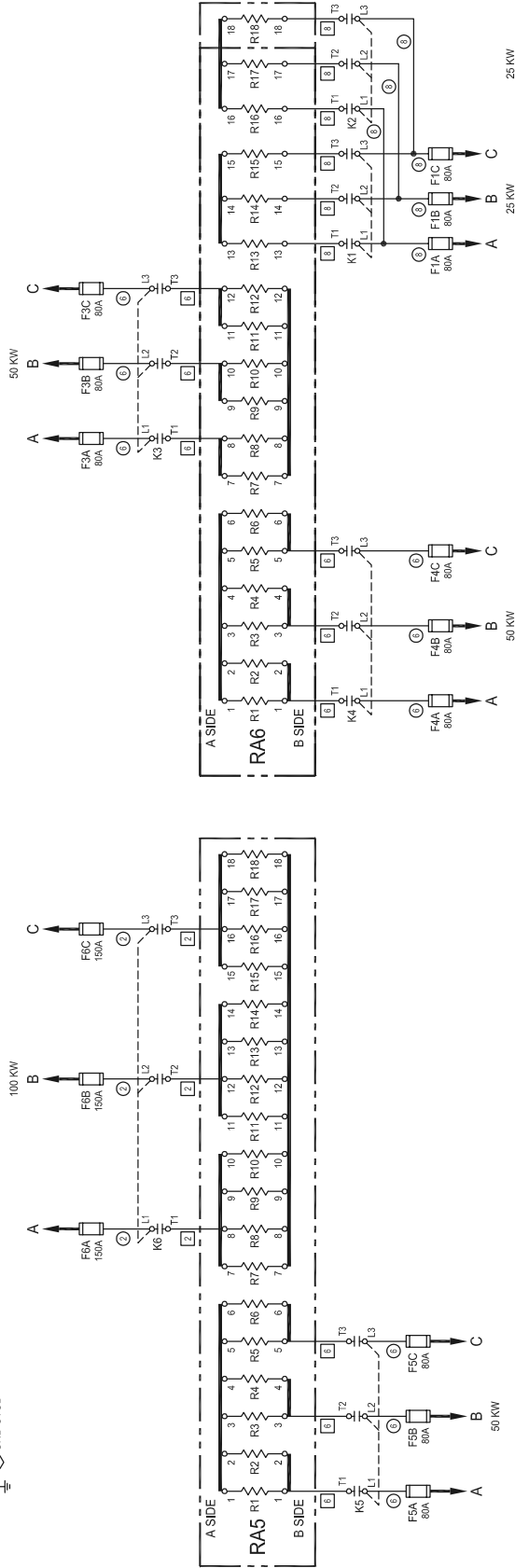
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Load Banks Direct www.LoadBanksDirect.com		TEXT	SCHEMATIC, LOAD BANK
DWG. NO.	REV.	SHEET	SIZE
LS900-480-25T-W	-	2 of 3	D
DRAWN BY	DATE	CHECKED BY	
JJF	MMP	JJF	

LOAD BANK LS900-480-25T



900 KW, 480 VOLT AC,
3-PHASE, 60 HERTZ,
1052 AMPS PER PHASE



GENERAL NOTES:
 A. UNLESS OTHERWISE NOTED:
 1. ALL DIMENSIONS ARE IN INCHES.
 THIS DRAWING IS PROPERTY OF LOAD BANKS DIRECT AND SHALL REMAIN SO WHILE IN USER'S POSSESSION. THE TECHNOLOGY SHOWN HERE IS STRICTLY PROPRIETARY AND IS NOT TO BE DISCLOSED TO ANY 3RD PARTY WITHOUT LOAD BANKS DIRECT PRIOR CONSENT.

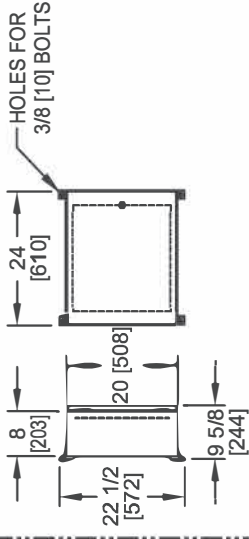
Load Banks Direct
 www.LoadBanksDirect.com

SCHEMATIC, LOAD BANK

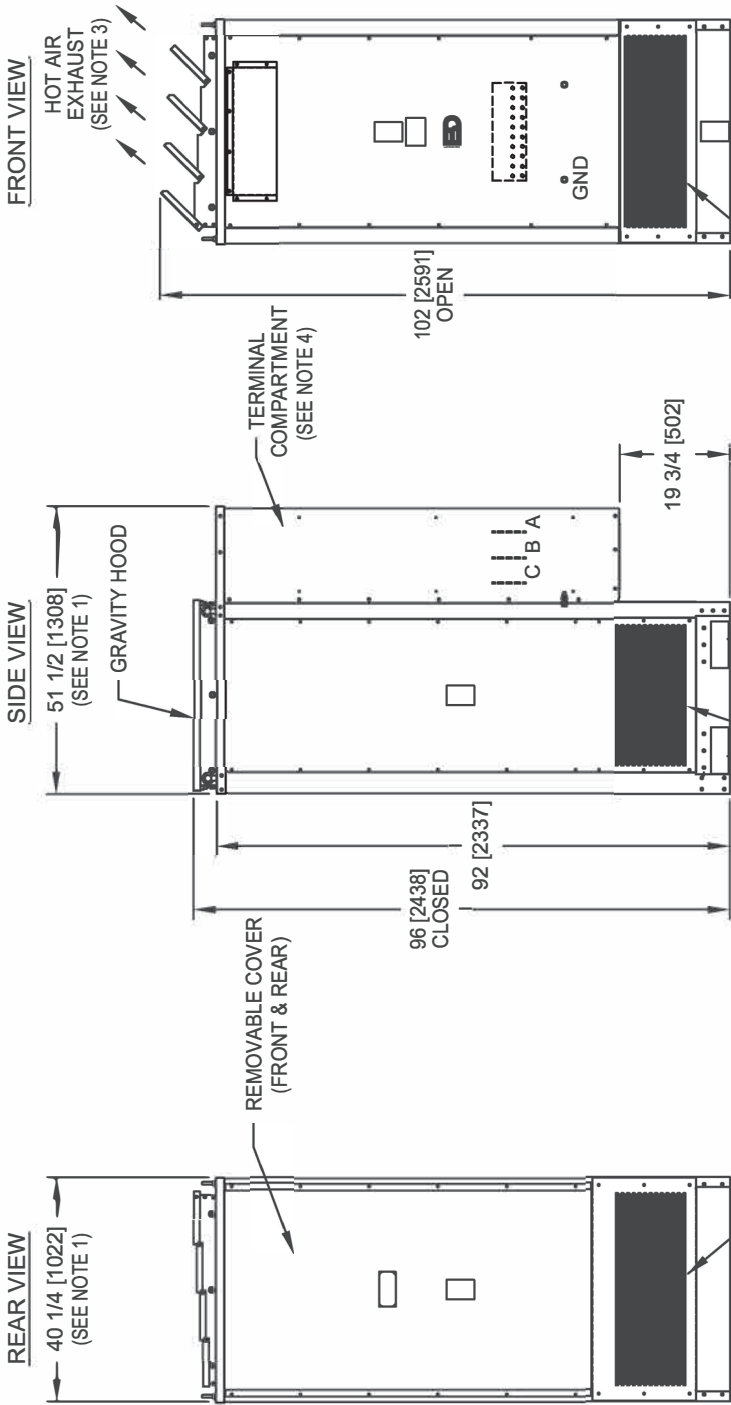
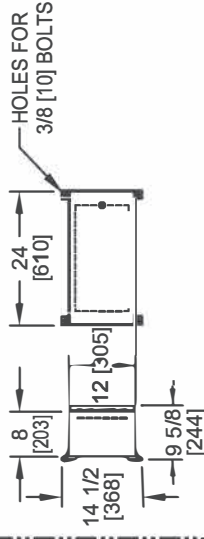
TEXT
 DWS. NO. LS900-480-25T-W
 REV. -
 SHEET 3 of 3

DRAWN BY JJF
 CHECKED BY MMP
 DATE 12-16-15
 SIZE D

**OPERATOR REMOTE CONTROL UNIT
FOR DUAL VOLTAGE LOAD BANKS**

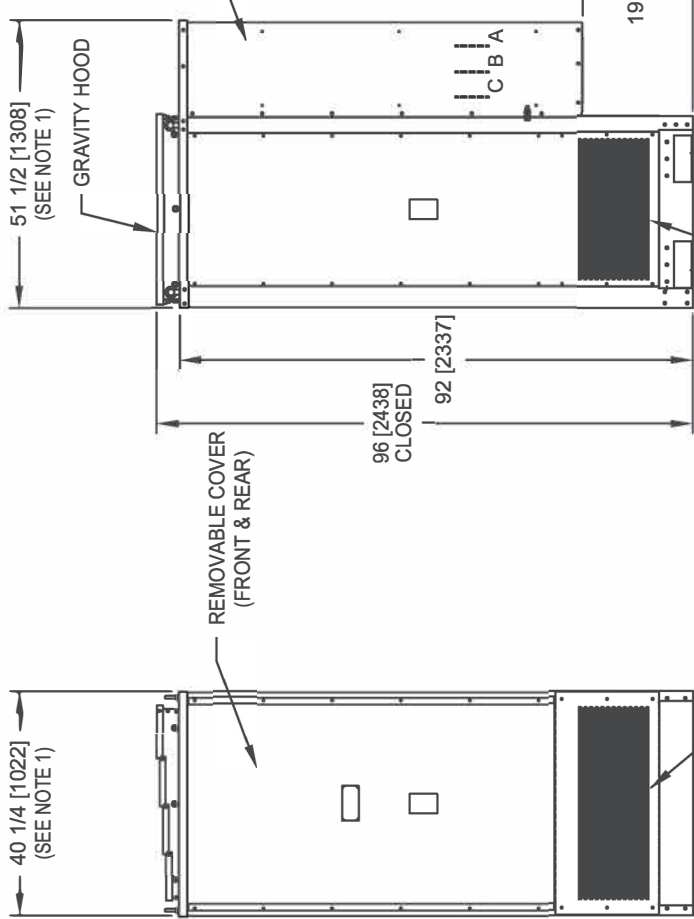


**OPERATOR REMOTE CONTROL UNIT
FOR SINGLE VOLTAGE LOAD BANKS**



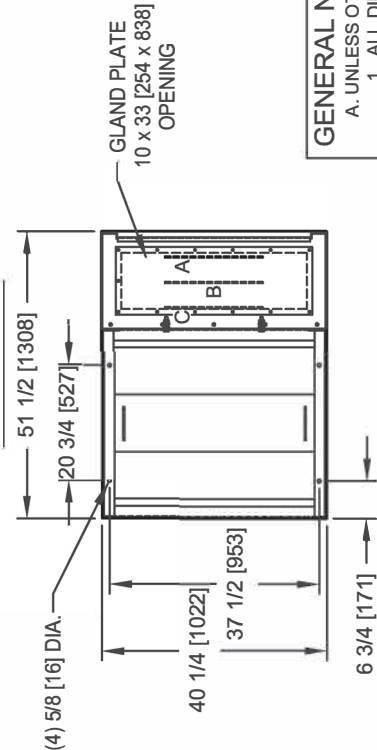
COLD FRONT
AIR INTAKE
(SEE NOTE 2)

SIDE VIEW



COLD SIDE
AIR INTAKE
(BOTH SIDES)
(SEE NOTE 2)

BOTTOM VIEW



(4) 5/8 [16] D.I.A.

GLAND PLATE
10 x 33 [254 x 838]
OPENING

RECOMMENDED MINIMUM CLEARANCES
(SEE O & M MANUAL FOR INSTALLATION DETAILS)

- NOTE 1) 36" [914] ALL 4 SIDES FOR MAINTENANCE.
- NOTE 2) 36" - 48" [914-1219] ALL 4 SIDES FOR AIR INTAKE.
- NOTE 3) 12-14 FT [3658-4267] FOR TOP HOT AIR EXHAUST.
- NOTE 4) LOAD BANK IS SUPPLIED WITH OUTDOOR WEATHERPROOF NEMA-3R-TYPE ENCLOSURE.

GENERAL NOTES:

- A. UNLESS OTHERWISE NOTED:
1. ALL DIMENSIONS ARE IN INCHES.
EXCEPT " [xxx]" = mm.
- B. APPROX WEIGHT: 1600 - 1900 LBS [726-862 KG].
- C. SEE ELECTRICAL SCHEMATIC FOR LOAD CAPACITY (KW) RATINGS, VOLTAGE RATINGS, AND BLOWER MOTOR RATING (H.P.)

LB Load Banks Direct
www.LoadBanksDirect.com

TEXT LOAD BANK, 800 THRU 1250KW
(WITH GRAVITY HOOD)

DWG. NO. LS800-1250G-OL REV. - SHEET 1 of 1

DRAWN BY JJJ CHECKED BY MMP DATE 3/26/13 SIZE A

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LS Series Stationary Load Banks

Load Banks Direct, LLC is a leading manufacturer of high-capacity Load Banks. The LS Series of Stationary Outdoor Load Banks offers the most robust, high-capacity, outdoor designs in the industry. LBD is setting the standard with intelligent operator controls, safety indication layouts, adjustable load step resolution, and ease of installation. The LS Series of Stationary products is the perfect solution for regularly scheduled testing and commissioning of mission-critical standby emergency power systems.

- > Outdoor Weatherproof Construction
- > Rated for continuous duty with no cool-down period
- > Highest Capacity in the smallest installed footprint
- > Branch circuit fusing virtually eliminates catastrophic failure
- > Slide Out Resistor Case Assemblies
- > Intelligent Safety Circuits, Indicators, and Operator Controls

Construction | Built to Last

LBD products are constructed of galvanized steel with the highest quality durable powder-coat paint finish and external stainless steel fasteners. All power, motor, and control connections are provided in a sealed thermostatically controlled heated compartment to limit any harmful effects of moisture and condensation.

Vertical airflow provides the highest capacity in the smallest installed footprint, and exhausts hot-air away from personnel and other installed equipment.

The enclosure is stationary-type, outdoor construction, installed and operated on a floor, roof-top, or concrete pad. Forklift channels are provided within the base for ease of lifting and handling during installation.



PowerDyne™ | When Quality Matters

PowerDyne™ Resistors are the most rugged in the industry. The non-corrosive resistance alloy can fully handle the effects of an outdoor installation. They are completely supported across their entire length within the air stream by stainless steel support rods which are insulated with heavy-duty, high-temperature ceramic insulators. Change in resistance is minimized by maintaining conservative resistor designs.

Operator Protection | When Safety Matters

LS Series Stationary Load Banks come equipped with an Emergency-Stop push button allowing the operator to take the unit off-line should a critical hard-stop condition occur. Branch circuit fuse protection provides short-circuit fault protection of all load steps eliminating the potential for catastrophic failure. Blower On, Motor Overload, Air-Flow Failure, and Over-temperature circuits disable all load steps during a fault condition with operator visual indicators. Dual Voltage units feature a Wrong Voltage Applied protection circuit which prevents the application of 480 VAC with the Load Voltage Selector switch in the 240 VAC position. The Load Dump circuit provides the operator visual indication if all load steps have been removed.

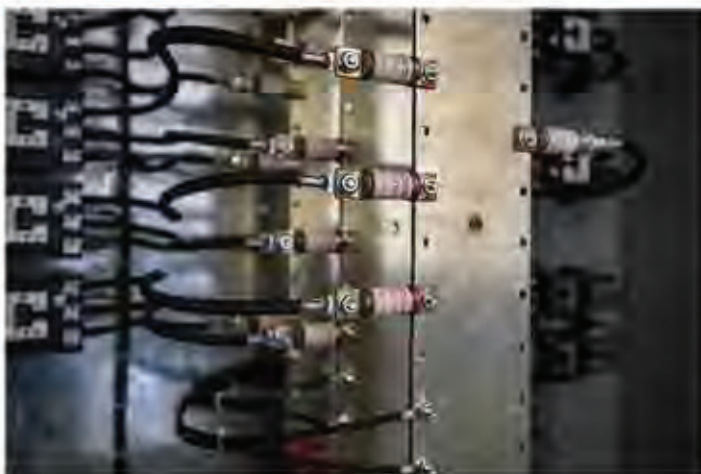
Operator Controls

- > Emergency Stop (E-Stop)
- > Illuminated Main Power On/Off switch
- > Illuminated Blower Start/Stop Push Button
- > Load Voltage Selector switch (dual voltage units)
- > Master Load On/Off switch
- > Individual Load Step Switches
- > Fault condition smart indicators provide operator display and load disconnect during Air-Flow Failure, Over-temperature, Motor Overload, Load Dump, and Wrong Voltage Applied



Digital Power Meter

A fully equipped, 3-phase Digital Power Metering System that measures a standard range of 16 load parameters. Includes RS485 (Modbus protocol) for remote reading - compatible with PC, PLC, and data loggers.



Control Power

External 120 Volt AC, 1-phase, 60 Hertz power required for control circuit operation. When 120 VAC control power is not readily available, units can be provided with a control power transformer.



Automatic Load Step Controller

Optional load level control provides automatic load regulation helping to minimize engine wet-stacking.

Your Complete Solutions Provider

Model	Power Rating (kw)	Voltage Ratings			Load Step Resolution (kw)	Dimensions (W x D x H) (inches)	Weight Total (lbs)
		240/480V 3 Phase	480V 3 Phase	600V 3 Phase			
LS50 - LS200	50 - 200	✓	✓	✓	10 or 25	27 x 31 x 52	400 - 500
LS250, LS300 & LS400	250 - 400	✓	✓	✓	10 or 25	40.25 x 52.5 x 57	800 - 1100
LS500, LS600, LS700 & LS750	500 - 750	✓	✓	✓	10 or 25	40.25 x 52.5 x 69	1300 - 1500
LS800	800		✓	✓	10 or 25	40.25 x 52.5 x 69	1400
LS900, LS1000 & LS1100	900 - 1100		✓	✓	10 or 25	40.25 x 52.5 x 92	1700 - 1900
LS1200 & LS1250	1200 - 1250		✓	✓	25	40.25 x 52.5 x 92	2100
LS1500, LS2000, LS2400 & LS2500	1500 - 2500		✓	✓	25	40.25 x 88 x 69	2600 - 4000

Cooling System

> Integrally mounted blower motor with high-performance, direct-driven fan blade delivers the required airflow volume (CFM) for cooling resistor load elements

> Blower motors can be wired to operate internally off the main input load bus or from an external 3-phase power source

> Motor circuits are short-circuit protected by current-limiting fuses and thermally y protected by overload rela

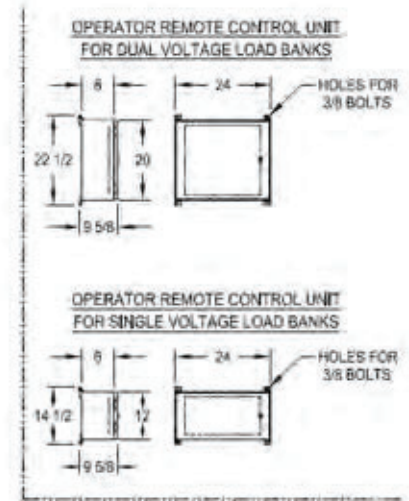
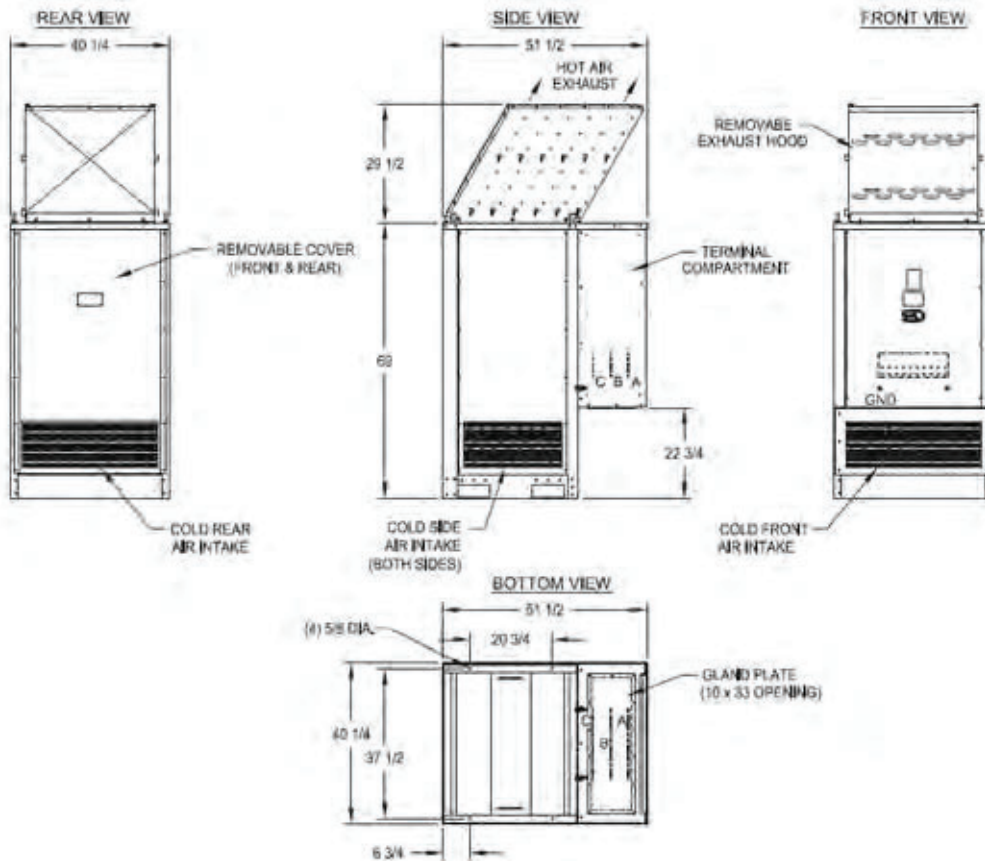


Remote Indication and Alarm contact closure [form-c-type normally open and normally closed] provides user interface to your building management system for indication, detection, and alarm of "Air-Flow Failure," "Over-Temperature", and "Load Dump".

Automatic Load Dump circuit provides user interface provisions to the generator controls, automatic transfer switch, or building management system, to disconnect and disable all load steps from a normally closed (NC) set of auxiliary contacts. In the event of an actual power failure, all load bank load is removed from the source under test.

Typical Layout

400kw-800kw shown here



Your Complete Solutions Provider

LBD's complete line of portable and stationary Load Bank products offers industry exclusive load testing solutions for generator set dealer/distributor networks, service arms, rental companies, end users, and original equipment manufacturers of generator sets, UPS systems, turbines, fuel cells, wind power, and battery systems.

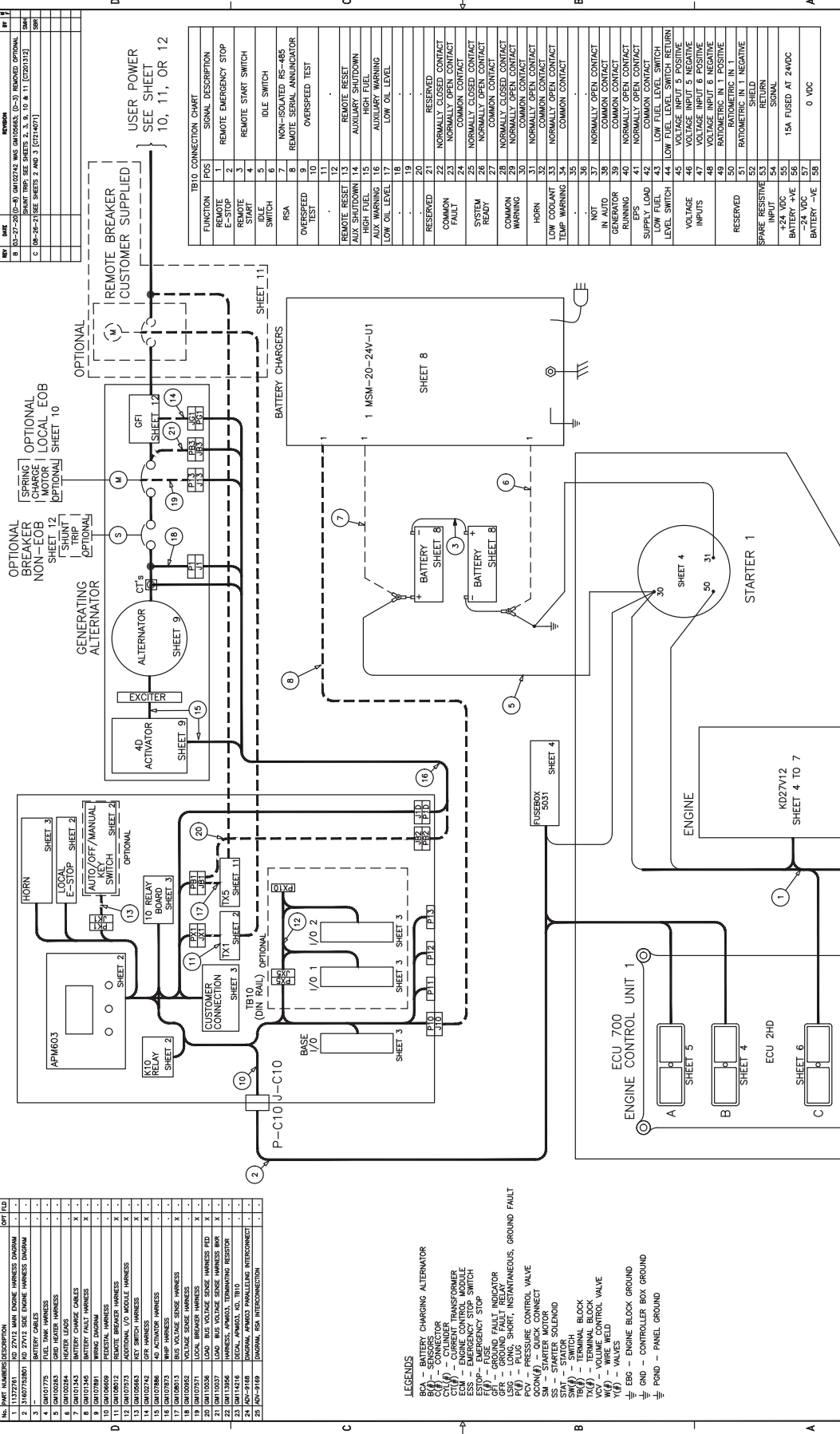
LBD is your complete solutions partner.



KOHLER®

Wiring Schematics

1 2 3 4 5 6 7



NO.	DATE	DESCRIPTION	BY	CHKD.
1	11/13/2001	NO 27V12 SIZE ENGINE HARNESS DIAGRAM		
2	11/07/2001	NO 27V12 SIZE ENGINE HARNESS DIAGRAM		
3	04/01/75	BATTERY CABLES		
4	04/01/75	FUEL TANK HARNESS		
5	04/01/75	WATER PUMP HARNESS		
6	04/01/75	WATER PUMP HARNESS		
7	04/01/75	BATTERY CHARGE CABLES		
8	04/01/75	BATTERY CHARGE CABLES		
9	04/01/75	WIRING DIAGRAM		
10	04/01/75	WIRING DIAGRAM		
11	04/01/75	REMOTE BREAKER HARNESS		
12	04/01/75	ADDITIONAL I/O HARNESS		
13	04/01/75	KEY SWITCH HARNESS		
14	04/01/75	KEY SWITCH HARNESS		
15	04/01/75	IMP HARNESS		
16	04/01/75	BIG VOLTAGE SENSE HARNESS		
17	04/01/75	VOLUME SENSE HARNESS		
18	04/01/75	LOCK BREAKER HARNESS		
19	04/01/75	LOCK BREAKER HARNESS		
20	04/01/75	LOCK BUS VOLTAGE SENSE HARNESS		
21	04/01/75	LOCK BUS VOLTAGE SENSE HARNESS		
22	04/01/75	WATER PUMP HARNESS		
23	04/01/75	WATER PUMP HARNESS		
24	04/01/75	WATER PUMP HARNESS		
25	04/01/75	WATER PUMP HARNESS		
26	04/01/75	WATER PUMP HARNESS		
27	04/01/75	WATER PUMP HARNESS		
28	04/01/75	WATER PUMP HARNESS		
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31	04/01/75	WATER PUMP HARNESS		
32	04/01/75	WATER PUMP HARNESS		
33	04/01/75	WATER PUMP HARNESS		
34	04/01/75	WATER PUMP HARNESS		
35	04/01/75	WATER PUMP HARNESS		
36	04/01/75	WATER PUMP HARNESS		
37	04/01/75	WATER PUMP HARNESS		
38	04/01/75	WATER PUMP HARNESS		
39	04/01/75	WATER PUMP HARNESS		
40	04/01/75	WATER PUMP HARNESS		
41	04/01/75	WATER PUMP HARNESS		
42	04/01/75	WATER PUMP HARNESS		
43	04/01/75	WATER PUMP HARNESS		
44	04/01/75	WATER PUMP HARNESS		
45	04/01/75	WATER PUMP HARNESS		
46	04/01/75	WATER PUMP HARNESS		
47	04/01/75	WATER PUMP HARNESS		
48	04/01/75	WATER PUMP HARNESS		
49	04/01/75	WATER PUMP HARNESS		
50	04/01/75	WATER PUMP HARNESS		
51	04/01/75	WATER PUMP HARNESS		
52	04/01/75	WATER PUMP HARNESS		
53	04/01/75	WATER PUMP HARNESS		
54	04/01/75	WATER PUMP HARNESS		
55	04/01/75	WATER PUMP HARNESS		
56	04/01/75	WATER PUMP HARNESS		
57	04/01/75	WATER PUMP HARNESS		
58	04/01/75	WATER PUMP HARNESS		

FUNCTION	POS.	SIGNAL DESCRIPTION
1	1	RESERVED
2	2	RESERVED
3	3	RESERVED
4	4	RESERVED
5	5	RESERVED
6	6	RESERVED
7	7	RESERVED
8	8	RESERVED
9	9	RESERVED
10	10	RESERVED
11	11	RESERVED
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50	50	RESERVED
51	51	RESERVED
52	52	RESERVED
53	53	RESERVED
54	54	RESERVED
55	55	RESERVED
56	56	RESERVED
57	57	RESERVED
58	58	RESERVED

APM603 CONTROLLER W/ ENHANCED I/O HARNESS
 K027V12 12V/100A
 <800V STANDARD STARTER

APM603 CONTROLLER W/ ENHANCED I/O HARNESS
 K027V12 12V/100A
 <800V STANDARD STARTER

1 2 3 4 5 6 7 8

APM603 CONTROLLER W/ ENHANCED I/O HARNESS
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 <800V STANDARD STARTER

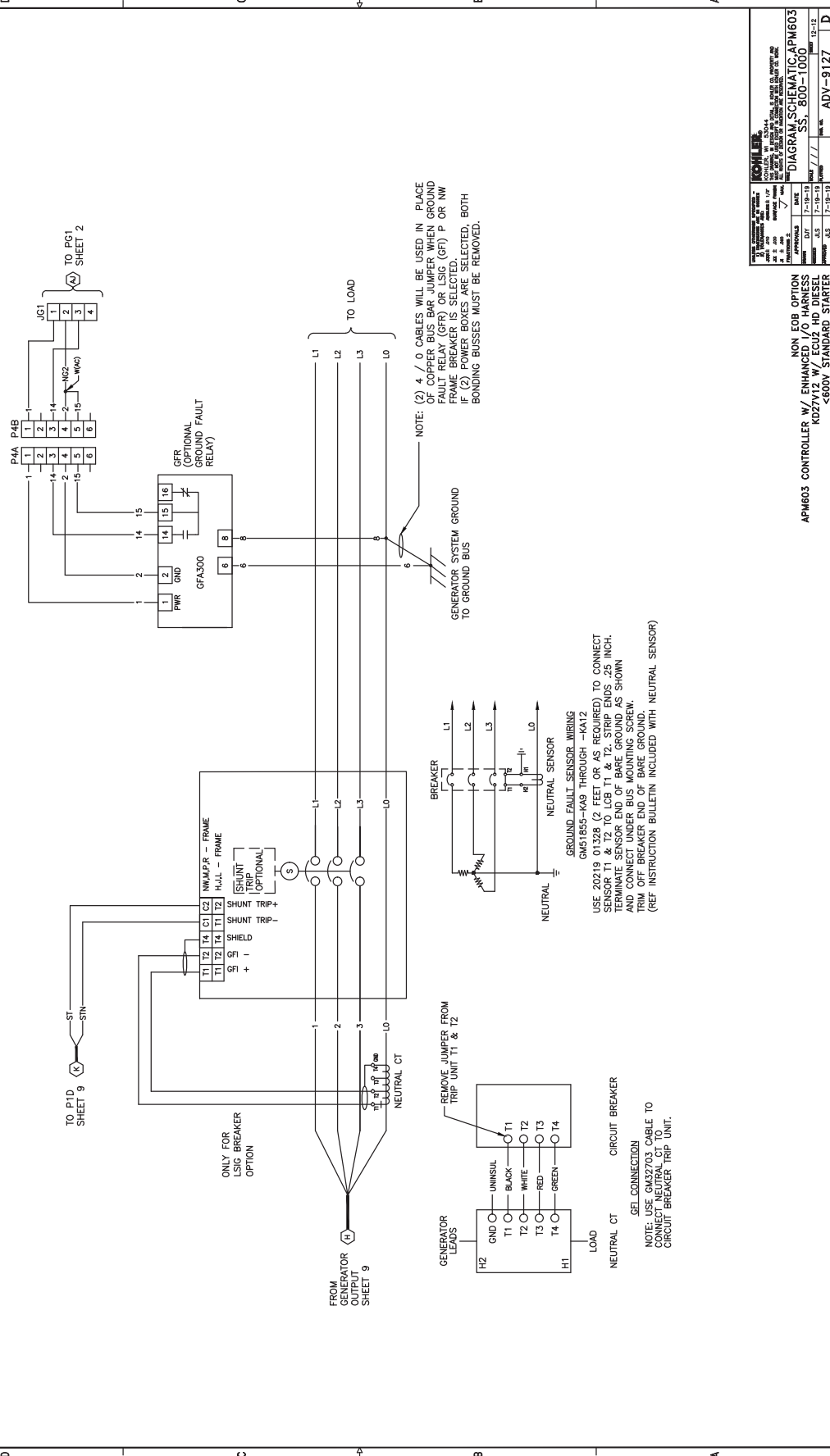
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2	12-15-19	REVISED PER REVISED SCHEMATIC
3	12-15-19	REVISED PER REVISED SCHEMATIC
4	12-15-19	REVISED PER REVISED SCHEMATIC
5	12-15-19	REVISED PER REVISED SCHEMATIC

REV	DATE	DESCRIPTION
1	12-15-19	REVISED PER REVISED SCHEMATIC
2	12-15-19	REVISED PER REVISED SCHEMATIC
3	12-15-19	REVISED PER REVISED SCHEMATIC
4	12-15-19	REVISED PER REVISED SCHEMATIC
5	12-15-19	REVISED PER REVISED SCHEMATIC

REV	DATE	DESCRIPTION
1	12-15-19	REVISED PER REVISED SCHEMATIC
2	12-15-19	REVISED PER REVISED SCHEMATIC
3	12-15-19	REVISED PER REVISED SCHEMATIC
4	12-15-19	REVISED PER REVISED SCHEMATIC
5	12-15-19	REVISED PER REVISED SCHEMATIC

REV	DATE	DESCRIPTION
1	12-15-19	REVISED PER REVISED SCHEMATIC
2	12-15-19	REVISED PER REVISED SCHEMATIC
3	12-15-19	REVISED PER REVISED SCHEMATIC
4	12-15-19	REVISED PER REVISED SCHEMATIC
5	12-15-19	REVISED PER REVISED SCHEMATIC

REV	DATE	DESCRIPTION
1	12-15-19	REVISED PER REVISED SCHEMATIC
2	12-15-19	REVISED PER REVISED SCHEMATIC
3	12-15-19	REVISED PER REVISED SCHEMATIC
4	12-15-19	REVISED PER REVISED SCHEMATIC
5	12-15-19	REVISED PER REVISED SCHEMATIC



REV 1 2 3 4 5	DATE 12-15-19 12-15-19 12-15-19 12-15-19 12-15-19	DESCRIPTION REVISED PER REVISED SCHEMATIC REVISED PER REVISED SCHEMATIC REVISED PER REVISED SCHEMATIC REVISED PER REVISED SCHEMATIC REVISED PER REVISED SCHEMATIC
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REV 1 2 3 4 5	DATE 12-15-19 12-15-19 12-15-19 12-15-19 12-15-19	DESCRIPTION REVISED PER REVISED SCHEMATIC REVISED PER REVISED SCHEMATIC REVISED PER REVISED SCHEMATIC REVISED PER REVISED SCHEMATIC REVISED PER REVISED SCHEMATIC
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REV 1 2 3 4 5	DATE 12-15-19 12-15-19 12-15-19 12-15-19 12-15-19	DESCRIPTION REVISED PER REVISED SCHEMATIC REVISED PER REVISED SCHEMATIC REVISED PER REVISED SCHEMATIC REVISED PER REVISED SCHEMATIC REVISED PER REVISED SCHEMATIC
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REV 1 2 3 4 5	DATE 12-15-19 12-15-19 12-15-19 12-15-19 12-15-19	DESCRIPTION REVISED PER REVISED SCHEMATIC REVISED PER REVISED SCHEMATIC REVISED PER REVISED SCHEMATIC REVISED PER REVISED SCHEMATIC REVISED PER REVISED SCHEMATIC
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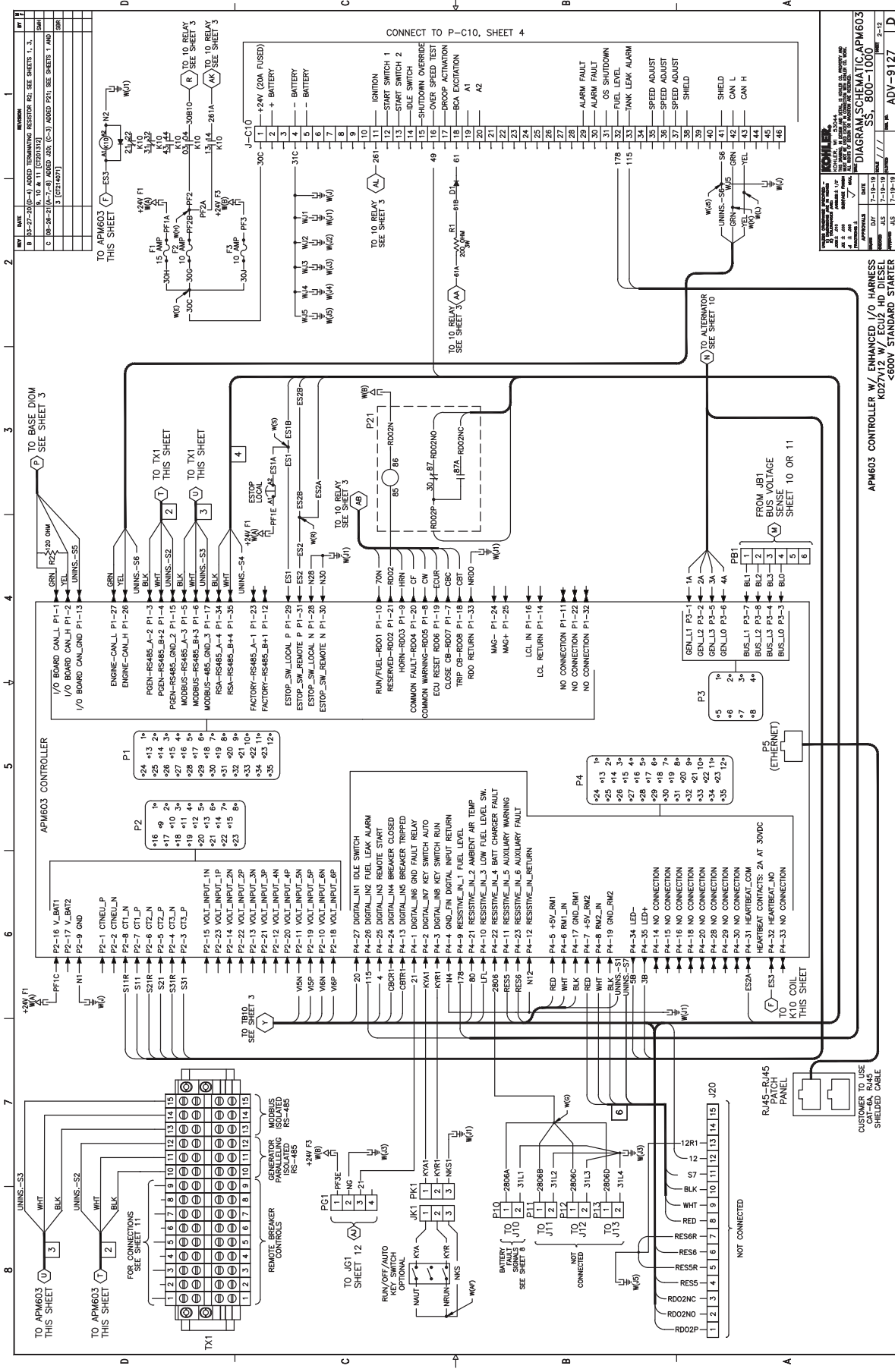
REV 1 2 3 4 5	DATE 12-15-19 12-15-19 12-15-19 12-15-19 12-15-19	DESCRIPTION REVISED PER REVISED SCHEMATIC REVISED PER REVISED SCHEMATIC REVISED PER REVISED SCHEMATIC REVISED PER REVISED SCHEMATIC REVISED PER REVISED SCHEMATIC
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APM603 CONTROLLER W/ ENHANCED I/O HARNESS
 KD27V12 W/ ECU2 HD DIESEL
 <600V STANDARD STARTER

NON EOB OPTION
 SS-800-1000

DIAGRAM SCHEMATIC-APM603

ADV-9127



REV	DATE	DESCRIPTION
1		NEW
2	12-13-11	ADDED TERMINATING RESISTOR R2. SEE SHEETS L. 3.
3	03-23-11	ADDED W(5) TO J1 AND W(5) TO J2
4	03-23-11	ADDED PF1. SEE SHEETS L AND SRK
5	03-23-11	ADDED PF2. SEE SHEETS L AND SRK
6	03-23-11	ADDED PF3. SEE SHEETS L AND SRK

REV	DATE	DESCRIPTION
1		NEW
2	12-13-11	ADDED W(5) TO J1 AND W(5) TO J2
3	03-23-11	ADDED PF1. SEE SHEETS L AND SRK
4	03-23-11	ADDED PF2. SEE SHEETS L AND SRK
5	03-23-11	ADDED PF3. SEE SHEETS L AND SRK

REV	DATE	DESCRIPTION
1		NEW
2	12-13-11	ADDED W(5) TO J1 AND W(5) TO J2
3	03-23-11	ADDED PF1. SEE SHEETS L AND SRK
4	03-23-11	ADDED PF2. SEE SHEETS L AND SRK
5	03-23-11	ADDED PF3. SEE SHEETS L AND SRK

REV	DATE	DESCRIPTION
1		NEW
2	12-13-11	ADDED W(5) TO J1 AND W(5) TO J2
3	03-23-11	ADDED PF1. SEE SHEETS L AND SRK
4	03-23-11	ADDED PF2. SEE SHEETS L AND SRK
5	03-23-11	ADDED PF3. SEE SHEETS L AND SRK

REV	DATE	DESCRIPTION
1		NEW
2	12-13-11	ADDED W(5) TO J1 AND W(5) TO J2
3	03-23-11	ADDED PF1. SEE SHEETS L AND SRK
4	03-23-11	ADDED PF2. SEE SHEETS L AND SRK
5	03-23-11	ADDED PF3. SEE SHEETS L AND SRK

REV	DATE	DESCRIPTION
1		NEW
2	12-13-11	ADDED W(5) TO J1 AND W(5) TO J2
3	03-23-11	ADDED PF1. SEE SHEETS L AND SRK
4	03-23-11	ADDED PF2. SEE SHEETS L AND SRK
5	03-23-11	ADDED PF3. SEE SHEETS L AND SRK

APM603 CONTROLLER W/ ENHANCED I/O HARNESS K027Y12 W/ ECU2 HD DIESEL <600V STANDARD STARTER ADV-9127

DIAGRAM SCHEMATIC APM603 SS-800-1000

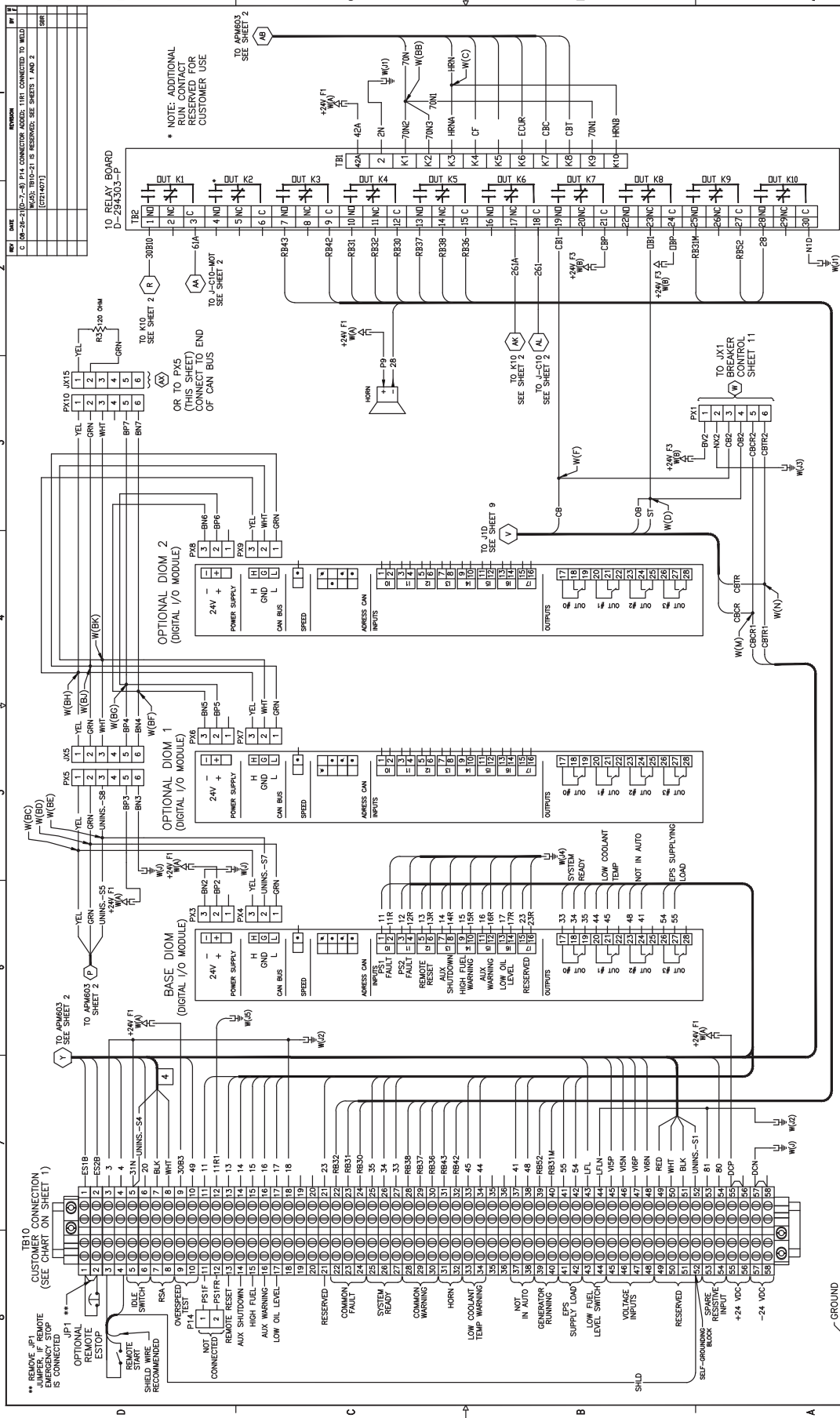


DIAGRAM SCHEMATIC APM603
SS, 800-1000
 DATE: 7-18-19
 DRAWN BY: JSS
 CHECKED BY: JSS
 APPROVED BY: JSS
 PART NO.: ADV-9127

APM603 CONTROLLER W/ ENHANCED I/O HARNESS
KOZEK/ENHANCED I/O HARNESS
800-1000 STANDARD STARTER

REVISION

REV	DATE	DESCRIPTION
1	08-28-21	(0-7-8) P14 CONNECTOR MOVED; 11R1 CONNECTED TO W(10) (07/20/21)
2		
3		
4		
5		
6		
7		
8		

*** NOTE: ADDITIONAL WIRING IS RESERVED FOR CUSTOMER USE.**

TO RELAY BOARD D-234305-P

TO APM603 SHEET 2

TO J-CID-MOT SEE SHEET 2

TO M10 SEE SHEET 2

TO JX10 (THIS SHEET) CONNECT TO END OF CAN BUS

TO JX11 (THIS SHEET) CONNECT TO END OF CAN BUS

TO JX12 (THIS SHEET) CONNECT TO END OF CAN BUS

TO JX13 (THIS SHEET) CONNECT TO END OF CAN BUS

TO JX14 (THIS SHEET) CONNECT TO END OF CAN BUS

TO JX15 (THIS SHEET) CONNECT TO END OF CAN BUS

TO JX16 (THIS SHEET) CONNECT TO END OF CAN BUS

TO JX17 (THIS SHEET) CONNECT TO END OF CAN BUS

TO JX18 (THIS SHEET) CONNECT TO END OF CAN BUS

TO JX19 (THIS SHEET) CONNECT TO END OF CAN BUS

TO JX20 (THIS SHEET) CONNECT TO END OF CAN BUS

TO JX21 (THIS SHEET) CONNECT TO END OF CAN BUS

TO JX22 (THIS SHEET) CONNECT TO END OF CAN BUS

TO JX23 (THIS SHEET) CONNECT TO END OF CAN BUS

TO JX24 (THIS SHEET) CONNECT TO END OF CAN BUS

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TO JX26 (THIS SHEET) CONNECT TO END OF CAN BUS

TO JX27 (THIS SHEET) CONNECT TO END OF CAN BUS

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TO JX90 (THIS SHEET) CONNECT TO END OF CAN BUS

TO JX91 (THIS SHEET) CONNECT TO END OF CAN BUS

TO JX92 (THIS SHEET) CONNECT TO END OF CAN BUS

TO JX93 (THIS SHEET) CONNECT TO END OF CAN BUS

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TO JX95 (THIS SHEET) CONNECT TO END OF CAN BUS

TO JX96 (THIS SHEET) CONNECT TO END OF CAN BUS

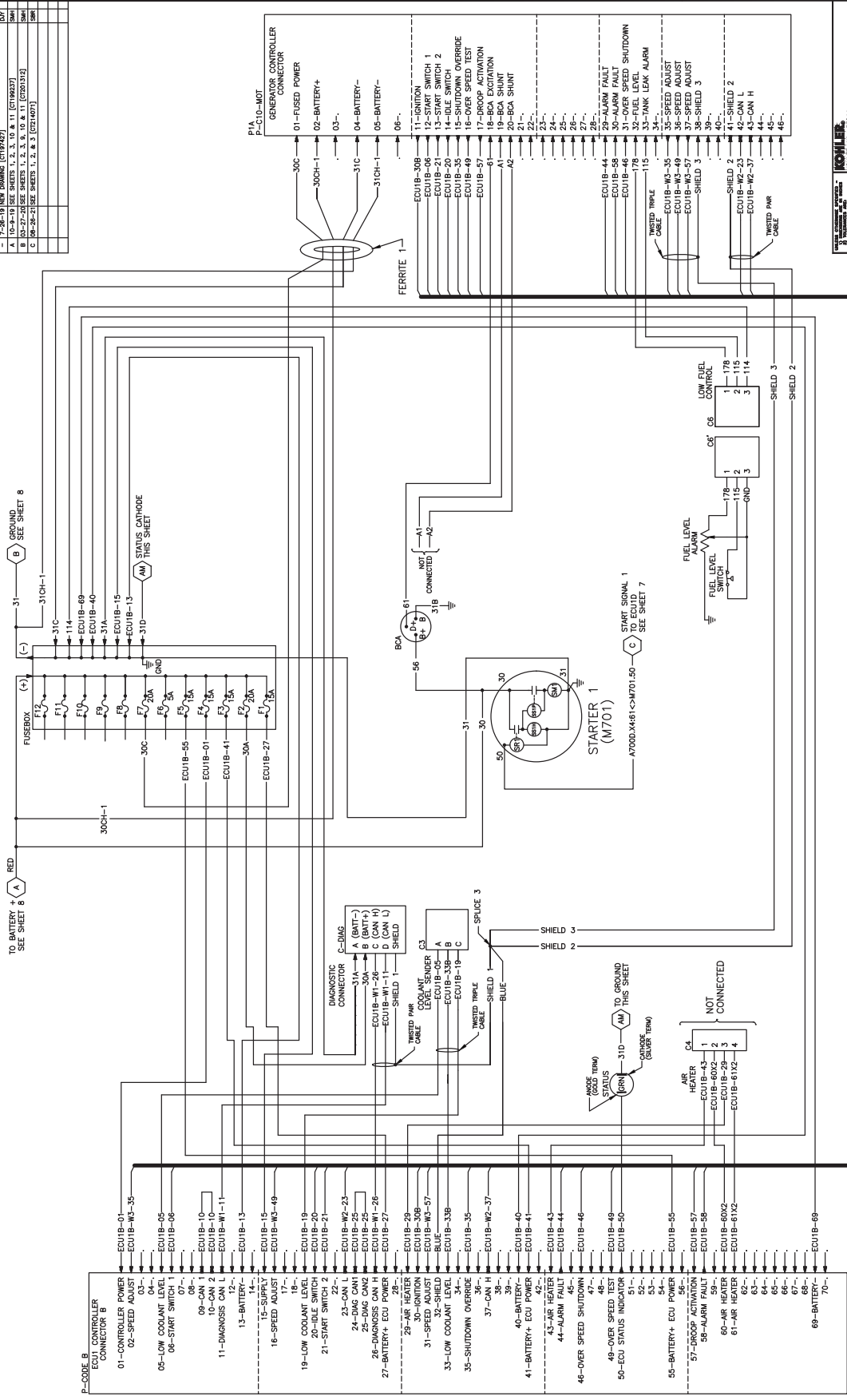
TO JX97 (THIS SHEET) CONNECT TO END OF CAN BUS

TO JX98 (THIS SHEET) CONNECT TO END OF CAN BUS

TO JX99 (THIS SHEET) CONNECT TO END OF CAN BUS

TO JX100 (THIS SHEET) CONNECT TO END OF CAN BUS

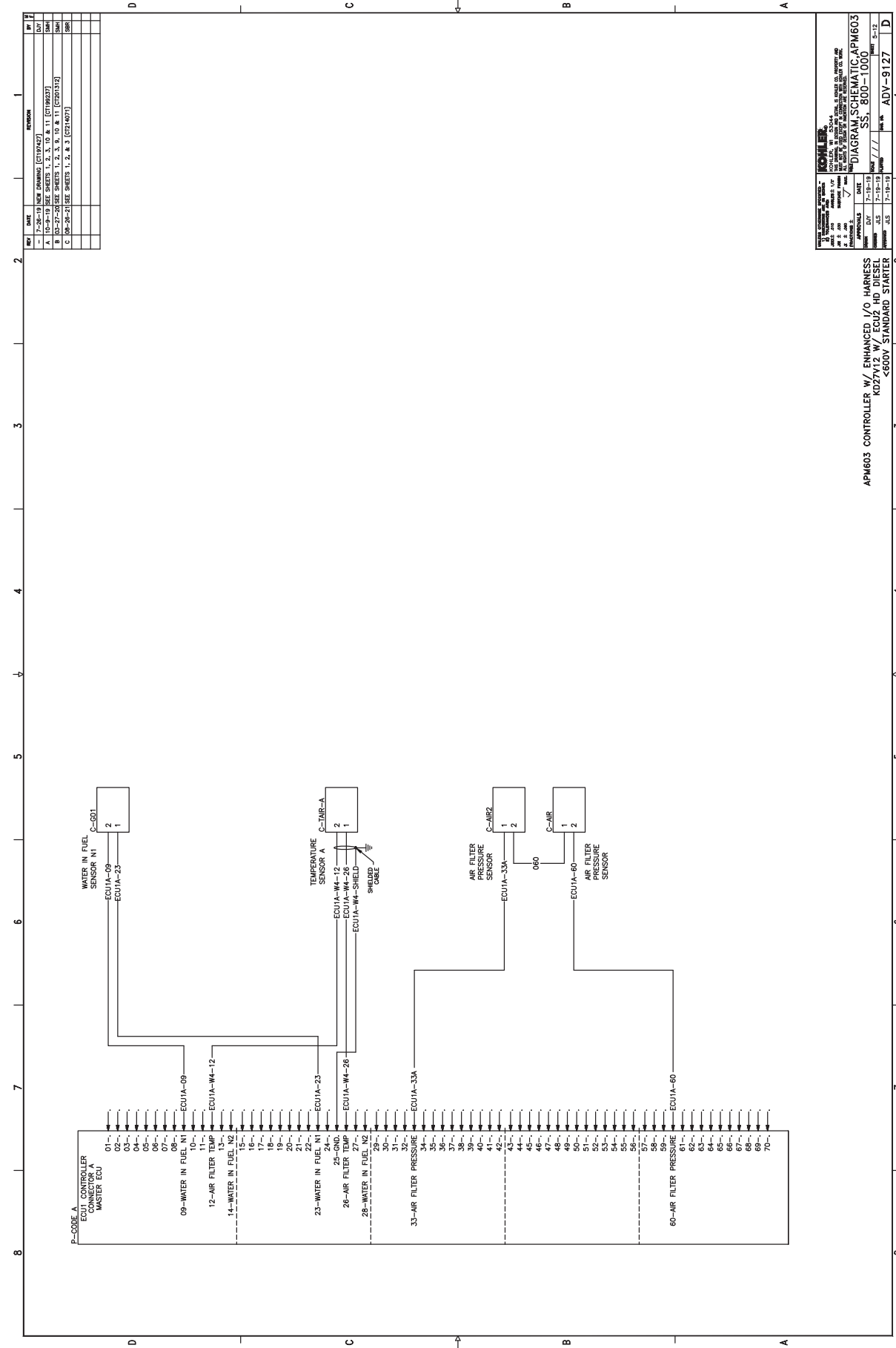
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1	7-20-19	NEW	PHAMING	(719747)
2	10-3-19	SEE SHEETS 1, 2, 3, 10 & 11	(7199237)	
3	10-3-19	SEE SHEETS 1, 2, 3, 10 & 11	(7199237)	
4	10-3-19	SEE SHEETS 1, 2, 3, 10 & 11	(7199237)	
5	10-3-19	SEE SHEETS 1, 2, 3, 10 & 11	(7199237)	



NO.	DATE	BY	CHK	DESCRIPTION
1	7-15-19	PHAMING	AS	(7199237)
2	7-15-19	PHAMING	AS	(7199237)
3	7-15-19	PHAMING	AS	(7199237)
4	7-15-19	PHAMING	AS	(7199237)
5	7-15-19	PHAMING	AS	(7199237)

APM603 CONTROLLER W/ ENHANCED I/O HARNESS
 RD7000.4481 <M701.50
 <680V STANDARD STARTER

DIAGRAM SCHEMATIC: APM603
 SS-800-UD-APM603
 ADV-9127



REV	DATE	REVISION
1	7-25-19	NEW DRAWING (C191242)
2	7-25-19	SEE SHEETS 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70
3	7-25-19	SEE SHEETS 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70
4	7-25-19	SEE SHEETS 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70

APPROVALS	DATE
DESIGNED BY: [Signature]	7-15-19
CHECKED BY: [Signature]	7-15-19
APPROVED BY: [Signature]	7-15-19

APM603 CONTROLLER W/ ENHANCED I/O HARNESS
KOZYAKI 1.6L I4 16V
4800V STANDARD STARTER

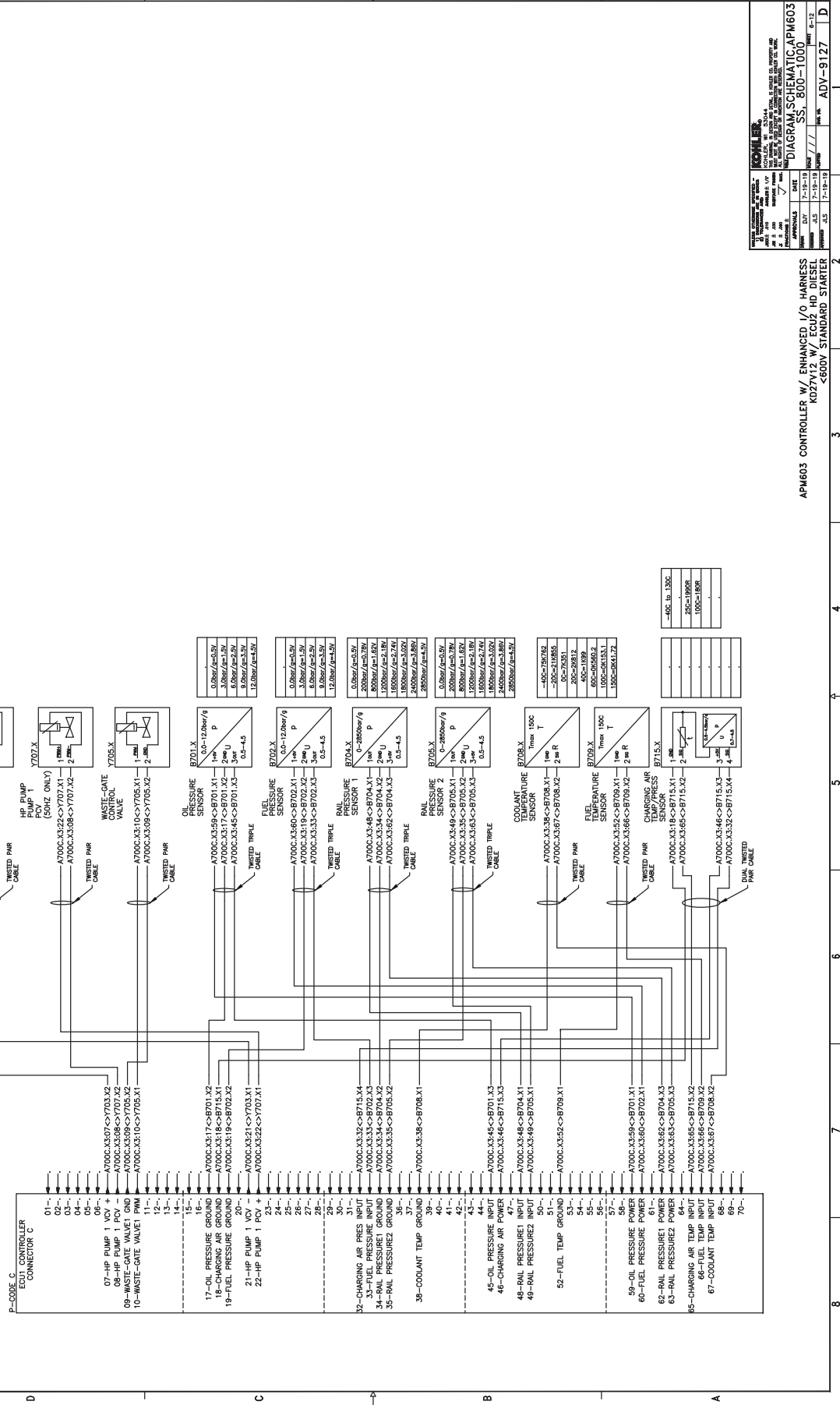
DIAGRAM SCHEMATIC	DATE
APM603	7-15-19

ADV-9127

REV	DATE	DESCRIPTION
1	7-28-19	NEW DRAWING (07/19/17)
2	10-23-19	SEE SHEETS 1, 2, 3, 10 & 11 (07/19/17)
3	10-23-19	SEE SHEETS 1, 2, 3, 10 & 11 (07/19/17)
4	10-23-19	SEE SHEETS 1, 2, 3, 10 & 11 (07/19/17)
5	10-23-19	SEE SHEETS 1, 2, 3, 10 & 11 (07/19/17)

REV	DATE	DESCRIPTION
1	7-28-19	NEW DRAWING (07/19/17)
2	10-23-19	SEE SHEETS 1, 2, 3, 10 & 11 (07/19/17)
3	10-23-19	SEE SHEETS 1, 2, 3, 10 & 11 (07/19/17)
4	10-23-19	SEE SHEETS 1, 2, 3, 10 & 11 (07/19/17)
5	10-23-19	SEE SHEETS 1, 2, 3, 10 & 11 (07/19/17)

REV	DATE	DESCRIPTION
1	7-28-19	NEW DRAWING (07/19/17)
2	10-23-19	SEE SHEETS 1, 2, 3, 10 & 11 (07/19/17)
3	10-23-19	SEE SHEETS 1, 2, 3, 10 & 11 (07/19/17)
4	10-23-19	SEE SHEETS 1, 2, 3, 10 & 11 (07/19/17)
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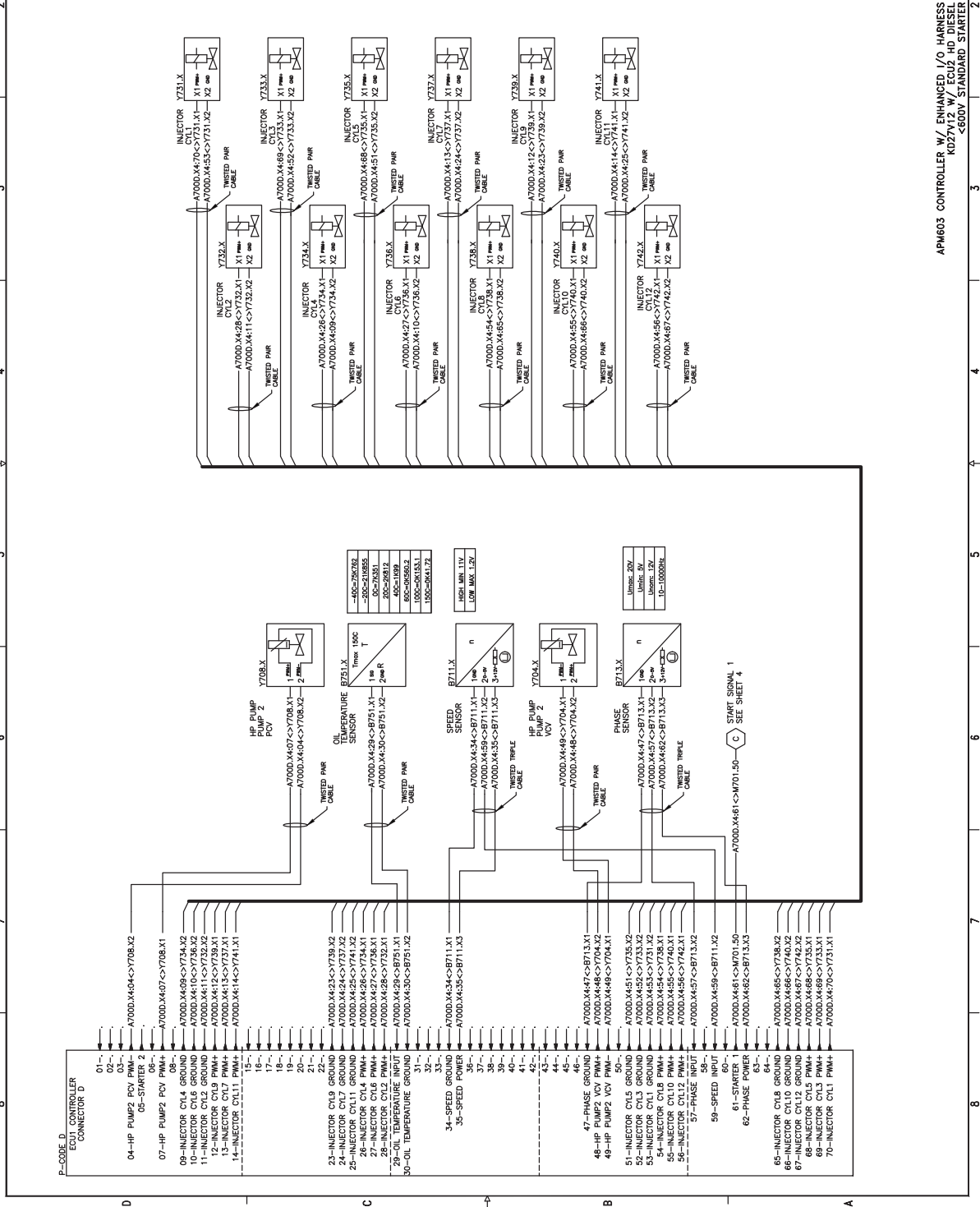


APPROVALS	DATE
DESIGNED BY	7-18-19
CHECKED BY	7-18-19
APPROVED BY	7-18-19

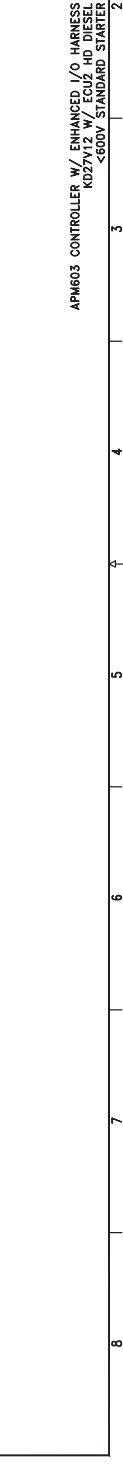
DIAGRAM SCHEMATIC APM603
 SS, 800-100
 ADV-9127

REV	DATE	DESCRIPTION
1	7-28-19	NEW DRAWING (07/19/17)
2	10-23-19	SEE SHEETS 1, 2, 3, 10 & 11 (07/19/17)
3	10-23-19	SEE SHEETS 1, 2, 3, 10 & 11 (07/19/17)
4	10-23-19	SEE SHEETS 1, 2, 3, 10 & 11 (07/19/17)
5	10-23-19	SEE SHEETS 1, 2, 3, 10 & 11 (07/19/17)

REV	DATE	DESCRIPTION
1	7-26-19	NEW DRAWING (1719127)
2	10-23-19	SEE SHEETS 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100
3	10-23-19	SEE SHEETS 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100
4	10-23-19	SEE SHEETS 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100

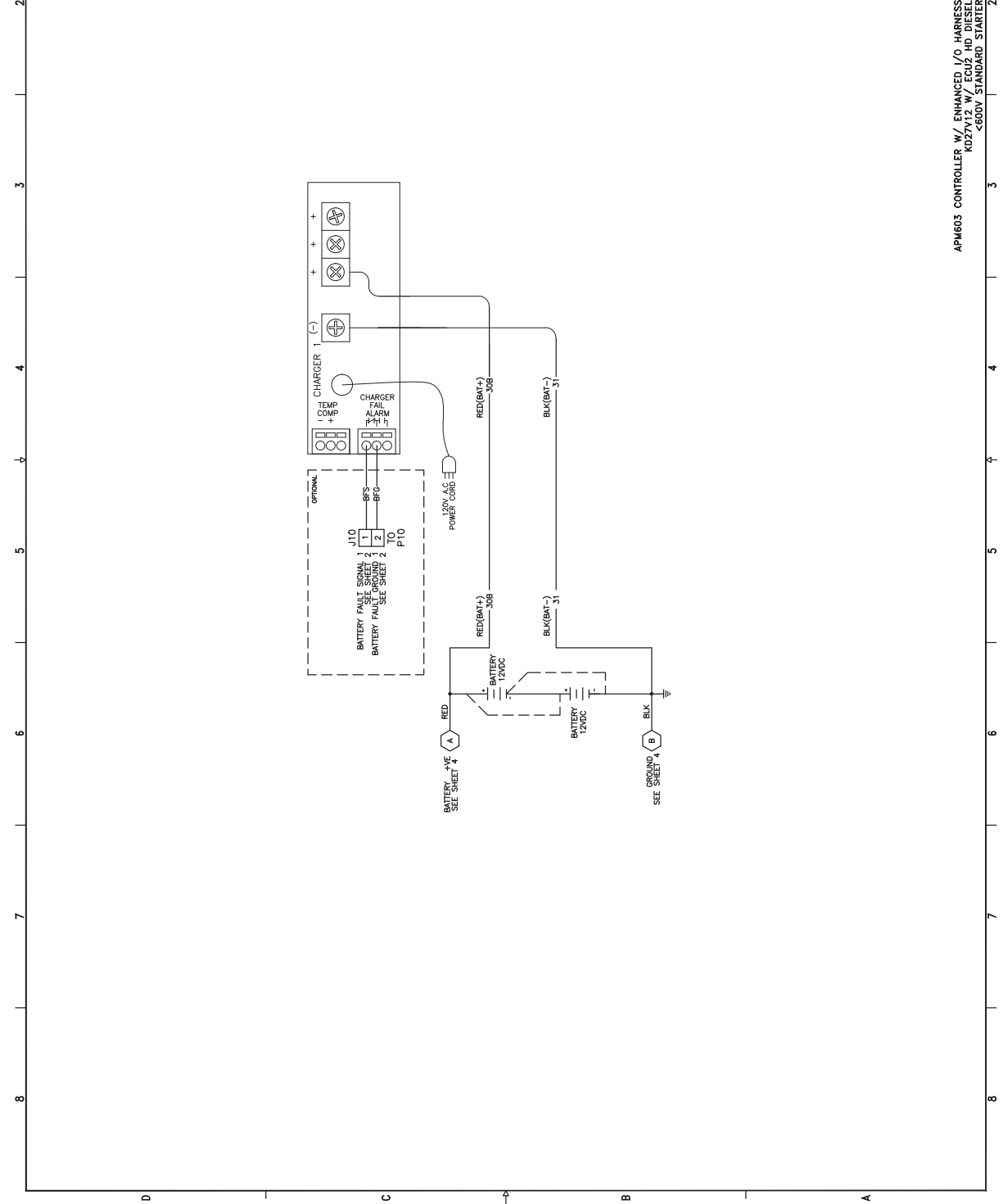


REV	DATE	DESCRIPTION
1	7-26-19	NEW DRAWING (1719127)
2	10-23-19	SEE SHEETS 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100
3	10-23-19	SEE SHEETS 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100
4	10-23-19	SEE SHEETS 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100



REV	DATE	DESCRIPTION
1	7-26-19	NEW DRAWING (1719127)
2	10-23-19	SEE SHEETS 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100
3	10-23-19	SEE SHEETS 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100
4	10-23-19	SEE SHEETS 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100

REV	DATE	DESCRIPTION	BY	CHK
1	7-26-19	NEW DRAWING (C197427)		
2	10-23-19	SEE SHEETS 1, 2, 3, 4 & 5 (C196527)		
3	10-23-19	SEE SHEETS 1, 2, 3, 4 & 5 (C197427)		
4	10-23-19	SEE SHEETS 1, 2, 3, 4 & 5 (C197427)		
5	10-23-19	SEE SHEETS 1, 2, 3, 4 & 5 (C197427)		
6	10-23-19	SEE SHEETS 1, 2, 3, 4 & 5 (C197427)		
7	10-23-19	SEE SHEETS 1, 2, 3, 4 & 5 (C197427)		
8	10-23-19	SEE SHEETS 1, 2, 3, 4 & 5 (C197427)		



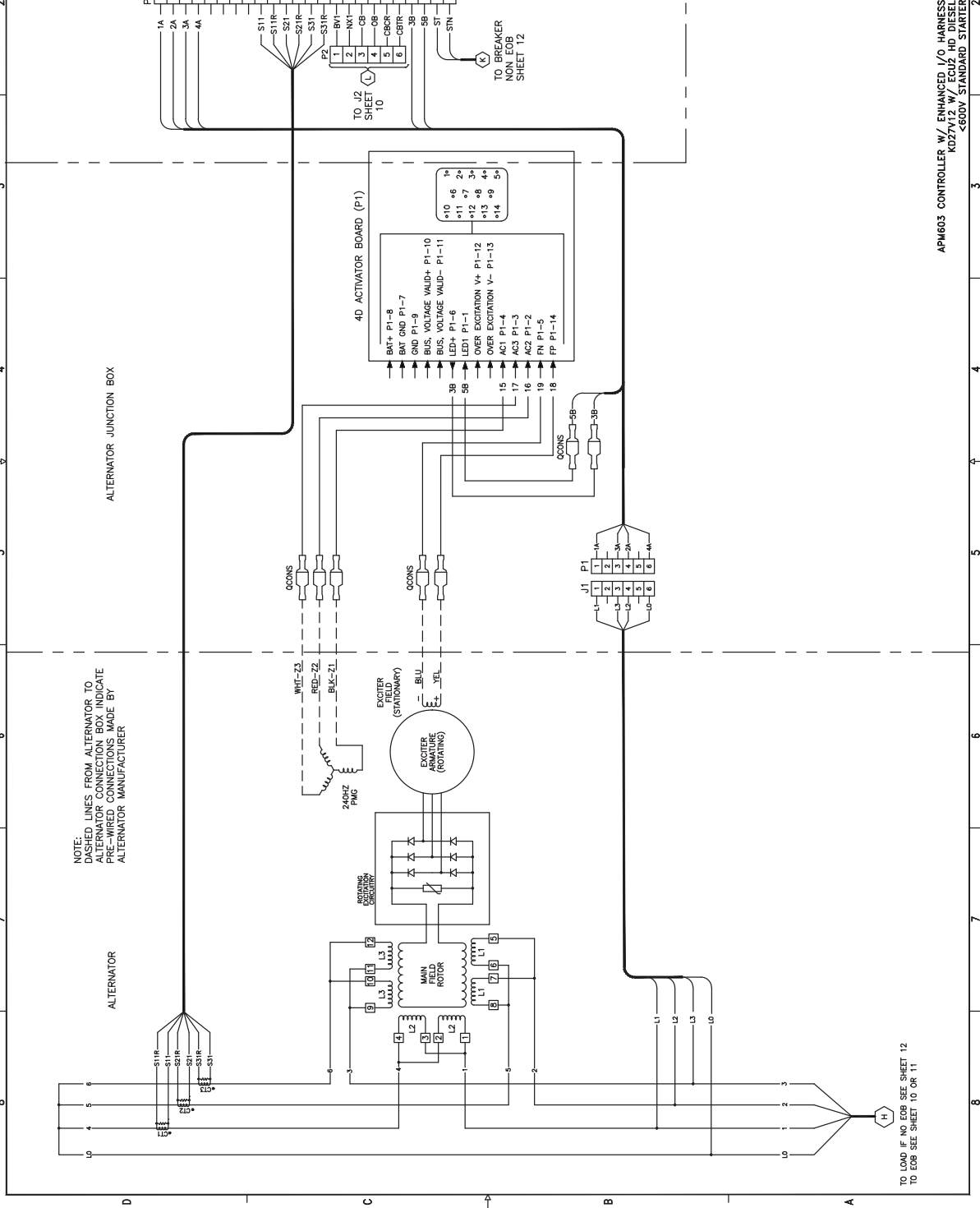
APPROVALS	DATE	DATE
DESIGNED BY: JCS	7-18-19	7-18-19
CHECKED BY: JCS	7-18-19	7-18-19
APPROVED BY: JCS	7-18-19	7-18-19

KOHLER
 10000 W. BROADWAY
 MILWAUKEE, WI 53224
 TEL: 414.754.4000
 FAX: 414.754.4001
 WWW.KOHLER.COM

DIAGRAM SCHEMATIC APM603
 SS, 800-1001
 PART # 12
 ADV-9127

APM603 CONTROLLER W/ ENHANCED I/O HARNESS
 KOZYAK
 4800V STANDARD STARTER

REV	SHEET	REVISION
-	7-28-19	NEW DRAWING (C191242)
A	10-10-19	SEE SHEETS 1, 2, 3, 10, 11 (C196227) TO SHEET 12, SEE DIM
B	08-27-19	SEE SHEETS 1, 2, 3, 10 & 11 (C192133) TO SHEET 12, SEE DIM
C	08-28-19	SEE SHEETS 1, 2, & 3 (C191407) DIM



REV	SHEET	REVISION
-	7-28-19	NEW DRAWING (C191242)
A	10-10-19	SEE SHEETS 1, 2, 3, 10, 11 (C196227) TO SHEET 12, SEE DIM
B	08-27-19	SEE SHEETS 1, 2, 3, 10 & 11 (C192133) TO SHEET 12, SEE DIM
C	08-28-19	SEE SHEETS 1, 2, & 3 (C191407) DIM

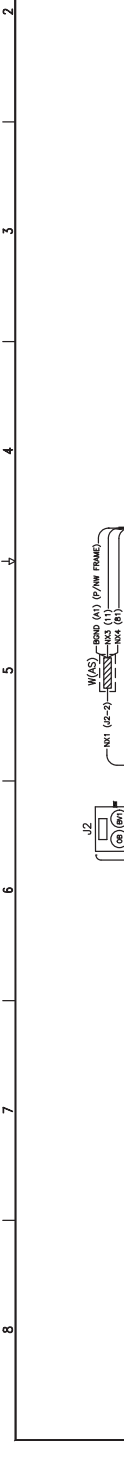
APPROVALS	DATE	BY	FOR
DESIGNED BY	7-18-19	JOS	APM603
CHECKED BY	7-18-19	JOS	APM603
APPROVED BY	7-18-19	JOS	APM603

APM603 CONTROLLER W/ ENHANCED I/O HARNESS
 KOZYAKI 1250V 600V STANDARD STARTER

DIAGRAM SCHEMATIC: APM603
 SS, 800-100603
 ADV-9127

TO LOAD IF NO EOB SEE SHEET 12
 TO EOB SEE SHEET 10 OR 11

REV	DATE	REVISION
B	3-16-20	(B-C-5, 6) REMOVED SHUNT TRIP CONNECTIONS & NEW FRAME CONNECTIONS UPDATED. SEE SHEETS 1, 2, 3, 8 & 11 FOR DATE SHM
C	8-28-21	SEE SHEETS 1, 2, AND 3 FOR DATE SHM



J2 CONNECTIONS

PN #	1	2	3	4	5	6
BV1	(A4)	(A5)	(A6)	(A7)	(A8)	(A9)
CB	(A1)	(A2)	(A3)	(A4)	(A5)	(A6)
CBTR	(A1)	(A2)	(A3)	(A4)	(A5)	(A6)

J2 CONNECTIONS

PN #	1	2	3	4	5	6
BV1	(A2-1)	(A2-2)	(A2-3)	(A2-4)	(A2-5)	(A2-6)
CB	(A2-1)	(A2-2)	(A2-3)	(A2-4)	(A2-5)	(A2-6)
BND	(W(AS))	(W(AS))	(W(AS))	(W(AS))	(W(AS))	(W(AS))

CELL SWITCHES

COM	UC1	UC2	UC3	UC4	UC5	UC6	UC7	UC8	UC9	UC10
0	0	0	0	0	0	0	0	0	0	0

TRIP UNIT

TRIP UNIT	UC1	UC2	UC3	UC4	UC5	UC6	UC7	UC8	UC9	UC10
0	0	0	0	0	0	0	0	0	0	0

CELL SWITCHES

CE1	CE2	CE3	CE4	CE5	CE6	CE7	CE8	CE9	CE10
0	0	0	0	0	0	0	0	0	0

REMOTE OPERATION

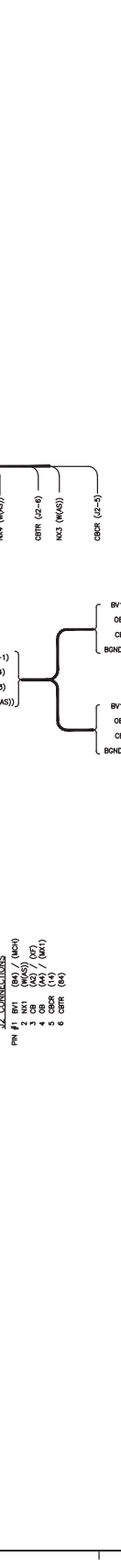
MV/MCZ	MV1	MV16	XF	YFS
0	0	0	0	0

AUXILIARY CONTACTS

OP24	OP23	OP22	OP21	OP14	OP13	OP12	OP11
0	0	0	0	0	0	0	0

P FRAME CONTACTS

N	1	2	3	4	5	6
0	0	0	0	0	0	0



JB1 CONNECTIONS

PN #	1	2	3	4	5	6
B1	(A2-1)	(A2-2)	(A2-3)	(A2-4)	(A2-5)	(A2-6)
B2	(A2-1)	(A2-2)	(A2-3)	(A2-4)	(A2-5)	(A2-6)
B3	(A2-1)	(A2-2)	(A2-3)	(A2-4)	(A2-5)	(A2-6)
B4	(A2-1)	(A2-2)	(A2-3)	(A2-4)	(A2-5)	(A2-6)

JB2 CONNECTIONS

PN #	1	2	3	4	5	6
B1	(A3-1)	(A3-2)	(A3-3)	(A3-4)	(A3-5)	(A3-6)
B2	(A3-1)	(A3-2)	(A3-3)	(A3-4)	(A3-5)	(A3-6)
B3	(A3-1)	(A3-2)	(A3-3)	(A3-4)	(A3-5)	(A3-6)
B4	(A3-1)	(A3-2)	(A3-3)	(A3-4)	(A3-5)	(A3-6)

JB3 CONNECTIONS

PN #	1	2	3	4	5	6
B1	(A3-1)	(A3-2)	(A3-3)	(A3-4)	(A3-5)	(A3-6)
B2	(A3-1)	(A3-2)	(A3-3)	(A3-4)	(A3-5)	(A3-6)
B3	(A3-1)	(A3-2)	(A3-3)	(A3-4)	(A3-5)	(A3-6)
B4	(A3-1)	(A3-2)	(A3-3)	(A3-4)	(A3-5)	(A3-6)

PB1 CONNECTIONS

PN #	1	2	3	4	5	6
L1	(OPB-1)	(OPB-2)	(OPB-3)	(OPB-4)	(OPB-5)	(OPB-6)
L2	(OPB-1)	(OPB-2)	(OPB-3)	(OPB-4)	(OPB-5)	(OPB-6)
L3	(OPB-1)	(OPB-2)	(OPB-3)	(OPB-4)	(OPB-5)	(OPB-6)
L4	(OPB-1)	(OPB-2)	(OPB-3)	(OPB-4)	(OPB-5)	(OPB-6)

PB2 CONNECTIONS

PN #	1	2	3	4	5	6
L1	(OPB-1)	(OPB-2)	(OPB-3)	(OPB-4)	(OPB-5)	(OPB-6)
L2	(OPB-1)	(OPB-2)	(OPB-3)	(OPB-4)	(OPB-5)	(OPB-6)
L3	(OPB-1)	(OPB-2)	(OPB-3)	(OPB-4)	(OPB-5)	(OPB-6)
L4	(OPB-1)	(OPB-2)	(OPB-3)	(OPB-4)	(OPB-5)	(OPB-6)

PB3 CONNECTIONS

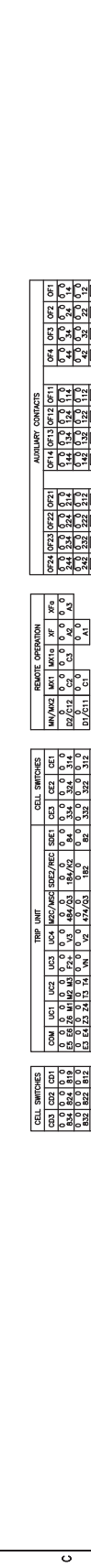
PN #	1	2	3	4	5	6
L1	(OPB-1)	(OPB-2)	(OPB-3)	(OPB-4)	(OPB-5)	(OPB-6)
L2	(OPB-1)	(OPB-2)	(OPB-3)	(OPB-4)	(OPB-5)	(OPB-6)
L3	(OPB-1)	(OPB-2)	(OPB-3)	(OPB-4)	(OPB-5)	(OPB-6)
L4	(OPB-1)	(OPB-2)	(OPB-3)	(OPB-4)	(OPB-5)	(OPB-6)

FROM MOTOR OUTPUT

LINE	1	2	3	4	5	6
0	0	0	0	0	0	0

OPTIONAL TO OTHER DISCS ON BUS

LINE	1	2	3	4	5	6
0	0	0	0	0	0	0



NOTE
BUS DISCONNECT REQUIRED TO BE TO MAINTENANCE ON THE GENERATOR

LOCAL EOB BREAKER OPTION

LINE	1	2	3	4	5	6
0	0	0	0	0	0	0

APM603 CONTROLLER W/ENHANCED I/O HARNESS

LINE	1	2	3	4	5	6
0	0	0	0	0	0	0

DIAGRAM, WIRING, APM603

LINE	1	2	3	4	5	6
0	0	0	0	0	0	0

SS 800-1000

LINE	1	2	3	4	5	6
0	0	0	0	0	0	0

W/A

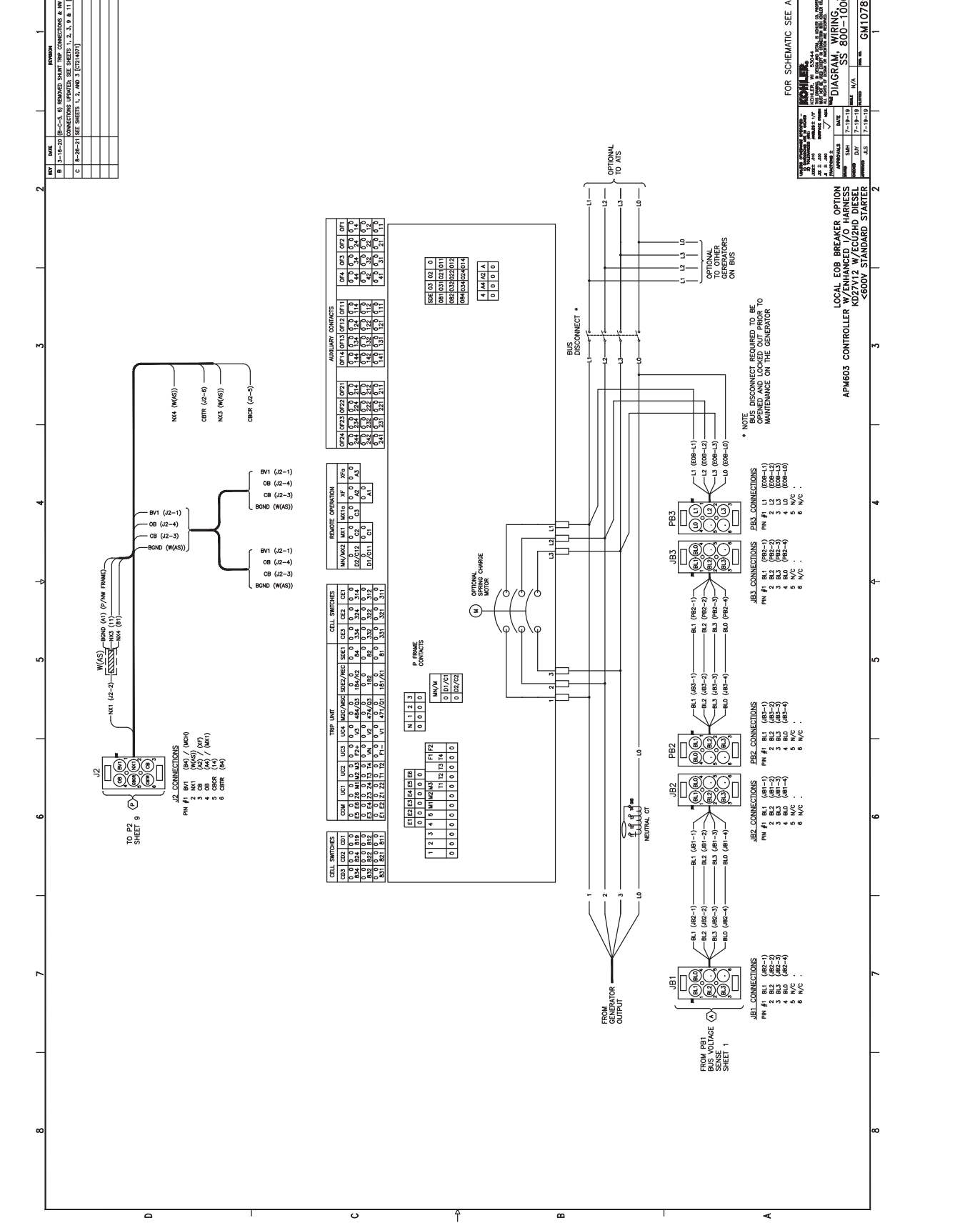
LINE	1	2	3	4	5	6
0	0	0	0	0	0	0

GM107891

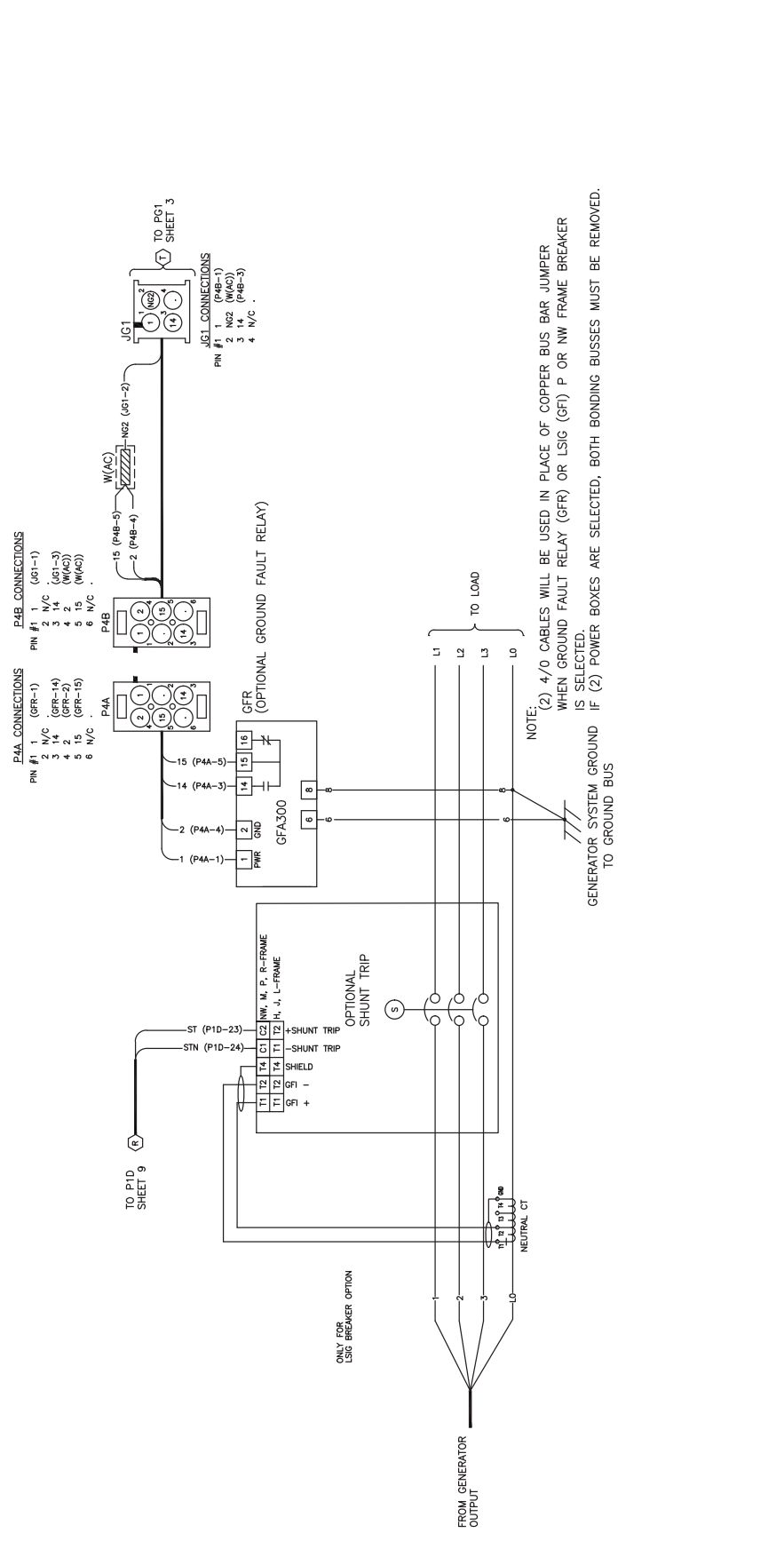
LINE	1	2	3	4	5	6
0	0	0	0	0	0	0

FOR SCHEMATIC SEE ADV-9127

LINE	1	2	3	4	5	6
0	0	0	0	0	0	0



REV	DATE	DESCRIPTION	BY	CHK
B	11-14-20	SEE SHEETS 1, 2, 3, 8, 10, & 11 (202013)		
C	8-26-21	SEE SHEETS 1, 2, AND 3 (202107)		



FOR SCHEMATIC SEE ADV-9127

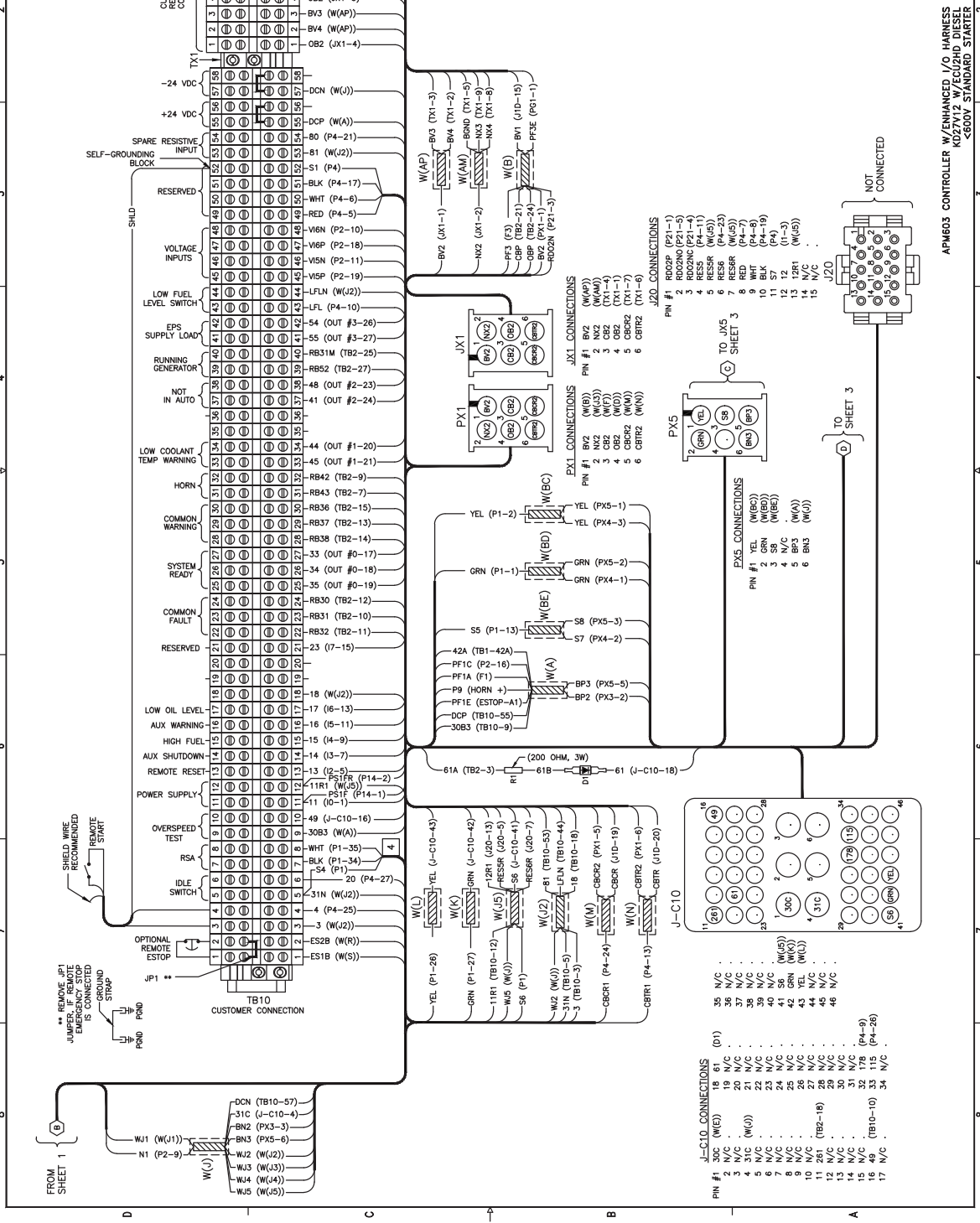
REV	DATE	DESCRIPTION	BY	CHK
B	11-14-20	SEE SHEETS 1, 2, 3, 8, 10, & 11 (202013)		
C	8-26-21	SEE SHEETS 1, 2, AND 3 (202107)		

GM107891

DIAGRAM, WIRING, APM603
 SS 800-1000

APM603 CONTROLLER W/ENHANCED I/O HARNESS
 KD27V12 W/ECU2HD DIESEL
 <6600V STANDARD STARTER

REV	DATE	BY	CHKD	DESCRIPTION
B	12-16-20	[S]	[S]	LOADS CONNECTING BEYOND BOARD & THIS ARE PROVIDED
C	8-29-21	[M]	[M]	WHT, RES (C-4) RSTN (TB2-20) WHT 3IN (TB2-20); R-2-2)
D	8-29-21	[M]	[M]	WHT, RES (C-4) RSTN (TB2-20) WHT 3IN (TB2-20); R-2-2)
E	8-29-21	[M]	[M]	WHT, RES (C-4) RSTN (TB2-20) WHT 3IN (TB2-20); R-2-2)
F	8-29-21	[M]	[M]	WHT, RES (C-4) RSTN (TB2-20) WHT 3IN (TB2-20); R-2-2)

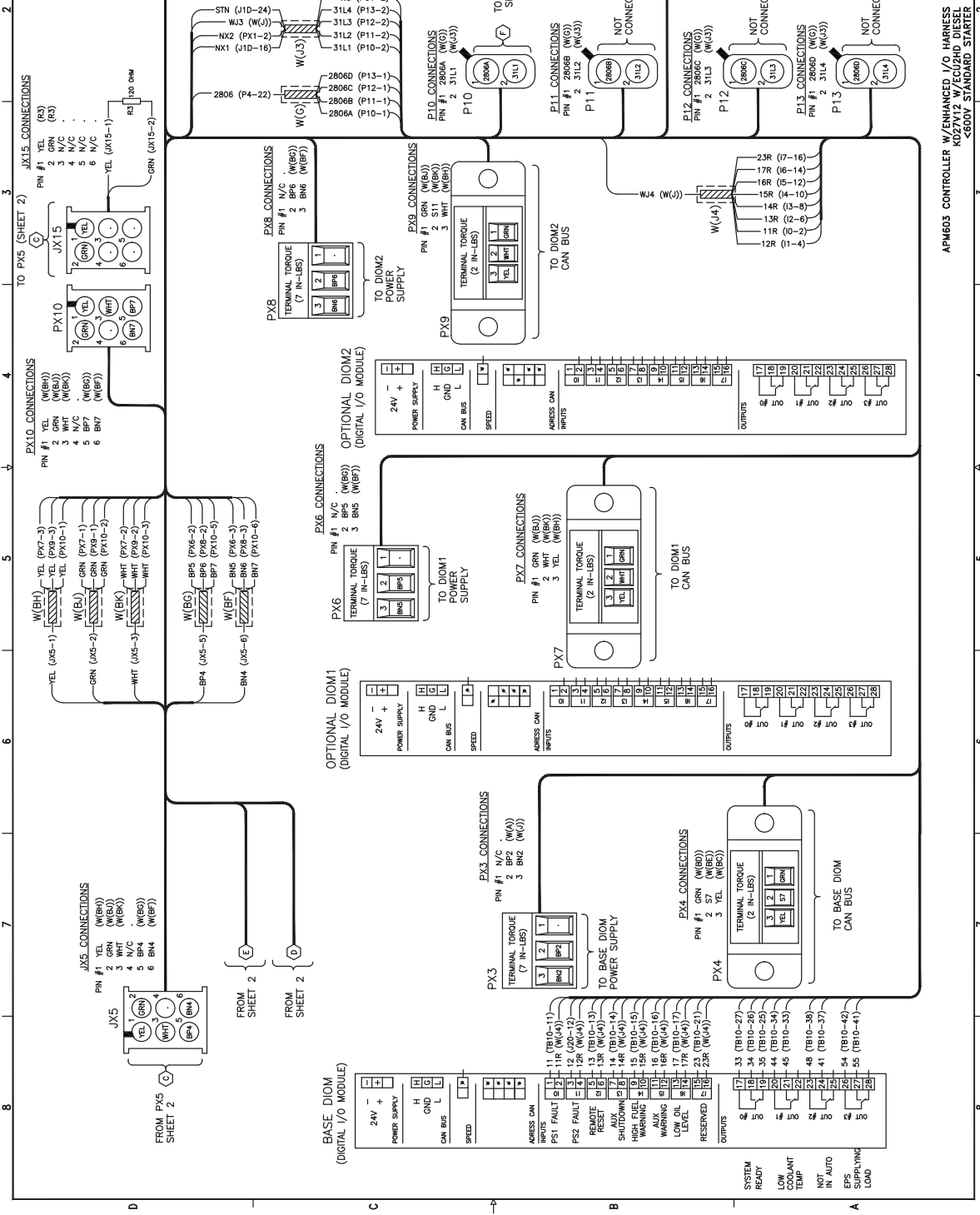


FOR SCHEMATIC SEE ADV-9127

APM603 CONTROLLER W/ENHANCED I/O HARNESS K027V12 W/ECU2HD DIESEL <600V STANDARD STARTER

REV	DATE	BY	CHKD	DESCRIPTION
1	7-10-19	[M]	[M]	INITIAL RELEASE
2	7-10-19	[M]	[M]	INITIAL RELEASE
3	7-10-19	[M]	[M]	INITIAL RELEASE
4	7-10-19	[M]	[M]	INITIAL RELEASE
5	7-10-19	[M]	[M]	INITIAL RELEASE
6	7-10-19	[M]	[M]	INITIAL RELEASE
7	7-10-19	[M]	[M]	INITIAL RELEASE
8	7-10-19	[M]	[M]	INITIAL RELEASE
9	7-10-19	[M]	[M]	INITIAL RELEASE
10	7-10-19	[M]	[M]	INITIAL RELEASE
11	7-10-19	[M]	[M]	INITIAL RELEASE
12	7-10-19	[M]	[M]	INITIAL RELEASE
13	7-10-19	[M]	[M]	INITIAL RELEASE
14	7-10-19	[M]	[M]	INITIAL RELEASE
15	7-10-19	[M]	[M]	INITIAL RELEASE
16	7-10-19	[M]	[M]	INITIAL RELEASE
17	7-10-19	[M]	[M]	INITIAL RELEASE
18	7-10-19	[M]	[M]	INITIAL RELEASE
19	7-10-19	[M]	[M]	INITIAL RELEASE
20	7-10-19	[M]	[M]	INITIAL RELEASE
21	7-10-19	[M]	[M]	INITIAL RELEASE
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98	7-10-19	[M]	[M]	INITIAL RELEASE
99	7-10-19	[M]	[M]	INITIAL RELEASE
100	7-10-19	[M]	[M]	INITIAL RELEASE

REV	DATE	DESCRIPTION
B	12-14-20	(4-25-5, 6) EXT. WIRING DIAG. CHANGES REMOVED (B-4 TO B) B
A	12-14-20	WIRING & CAN ADDRESS CONNECTIONS UPDATED (B-5, 6) WRT
C	8-28-21	ADD P14; SEE SHEETS 1, 8, 10 & 11 (EPO1312) SHM
D	8-28-21	ADD P14; SEE SHEETS 1, 2 (EPO1071) SHM



REV	DATE	DESCRIPTION
B	12-14-20	(4-25-5, 6) EXT. WIRING DIAG. CHANGES REMOVED (B-4 TO B) B
A	12-14-20	WIRING & CAN ADDRESS CONNECTIONS UPDATED (B-5, 6) WRT
C	8-28-21	ADD P14; SEE SHEETS 1, 8, 10 & 11 (EPO1312) SHM
D	8-28-21	ADD P14; SEE SHEETS 1, 2 (EPO1071) SHM

REV	DATE	DESCRIPTION
B	12-14-20	(4-25-5, 6) EXT. WIRING DIAG. CHANGES REMOVED (B-4 TO B) B
A	12-14-20	WIRING & CAN ADDRESS CONNECTIONS UPDATED (B-5, 6) WRT
C	8-28-21	ADD P14; SEE SHEETS 1, 8, 10 & 11 (EPO1312) SHM
D	8-28-21	ADD P14; SEE SHEETS 1, 2 (EPO1071) SHM

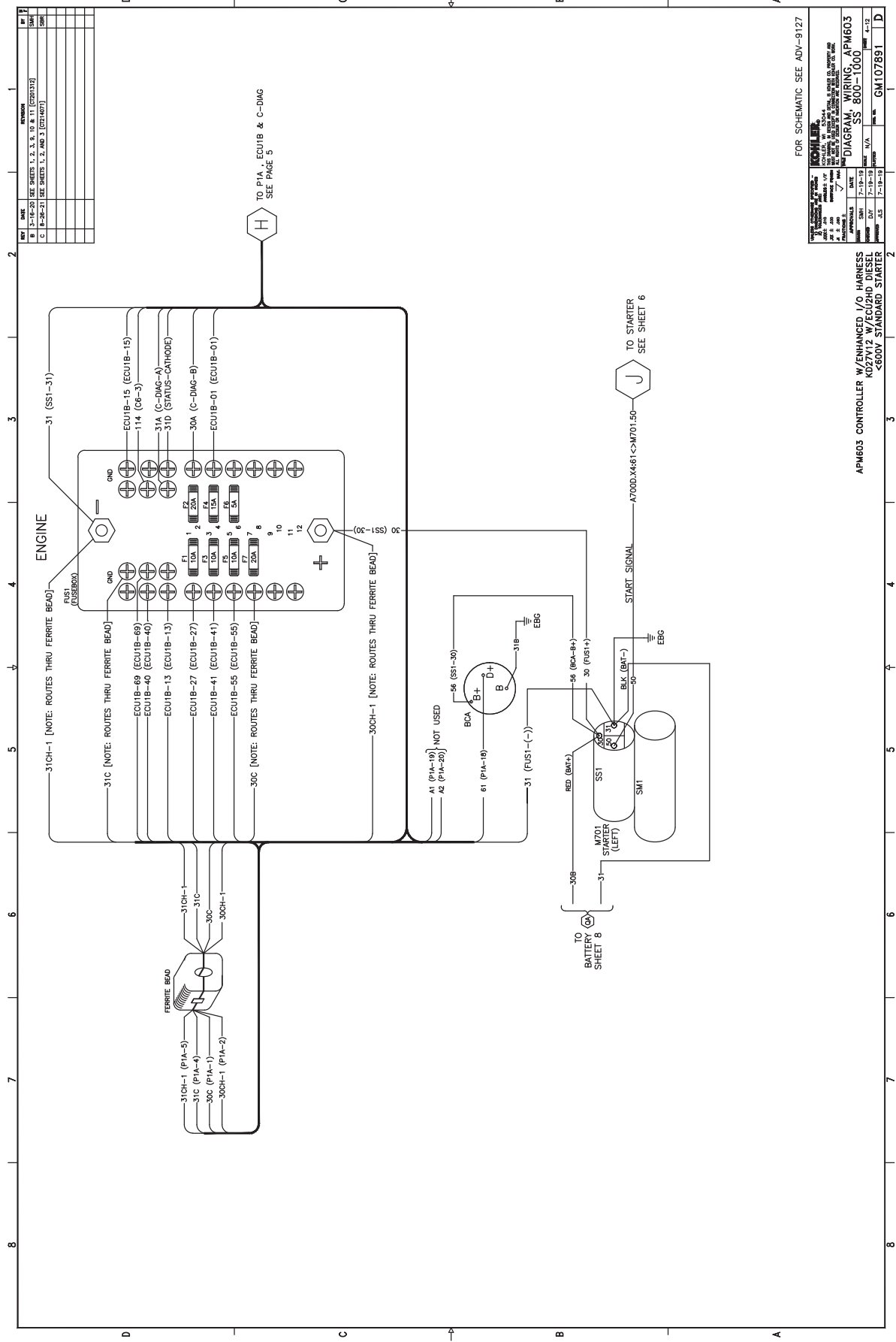
FOR SCHEMATIC SEE ADV-9127

APM603 CONTROLLER W/ENHANCED I/O HARNESS
 KD27Y12 W/ECU2HD DIESEL
 <6600V STANDARD STARTER

DIAGRAM, WIRING, APM603
 SS 800-1000

DATE: 7-10-19
 DRAWN: DMK
 CHECKED: JLS
 APPROVED: JLS

W/A: 7-10-19
 PART NO: GM107891



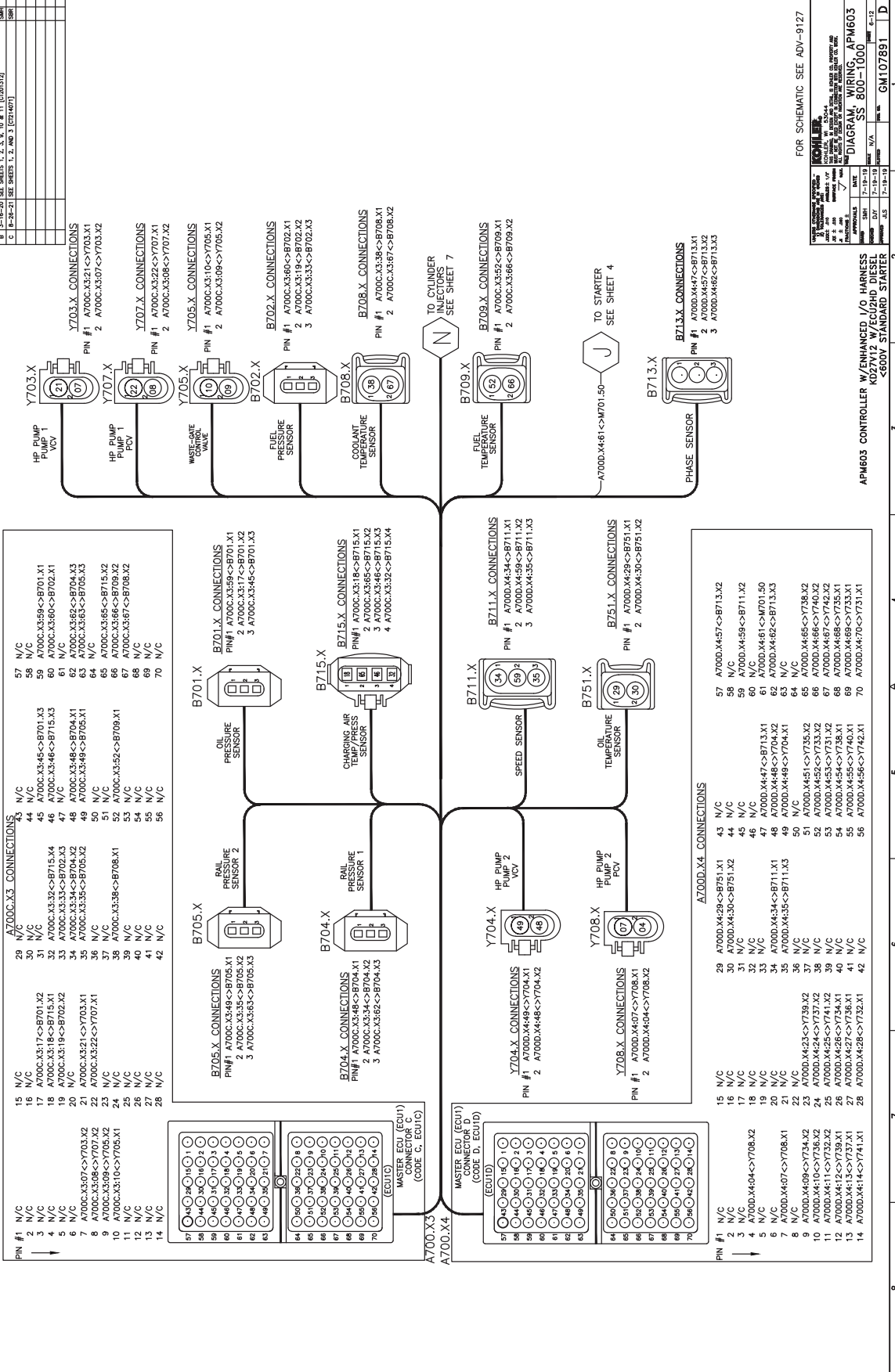
REV	DATE	DESCRIPTION	BY
B	5-16-20	SEE SHEETS 1, 2, 3, 8, 10 & 11 (C20D312)	SM
C	8-26-21	SEE SHEETS 1, 2, AND 3 (R21M07)	SM

FOR SCHEMATIC SEE ADV-9127

APM603 CONTROLLER W/ENHANCED I/O HARNESS
K027V12 W/ECU2HD DIESEL
<600V STANDARD STARTER

DIAGRAM, WIRING, APM603
SS 800-1000

REV	DATE	DESCRIPTION	BY
1	7-10-19		
2	7-10-19		
3	7-10-19		
4	7-10-19		
5	7-10-19		
6	7-10-19		
7	7-10-19		
8	7-10-19		



REV.	DATE	DESCRIPTION
1	1.14-15-00	SEE SHEETS 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12 (200313)
2	8-26-21	SEE SHEETS 1, 2, AND 3 (2021M07)

REV.	DATE	DESCRIPTION
1	7-10-19	ISSUE FOR GM 107891
2	7-10-19	ISSUE FOR GM 107891
3	7-10-19	ISSUE FOR GM 107891
4	7-10-19	ISSUE FOR GM 107891
5	7-10-19	ISSUE FOR GM 107891
6	7-10-19	ISSUE FOR GM 107891
7	7-10-19	ISSUE FOR GM 107891
8	7-10-19	ISSUE FOR GM 107891
9	7-10-19	ISSUE FOR GM 107891
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100	7-10-19	ISSUE FOR GM 107891

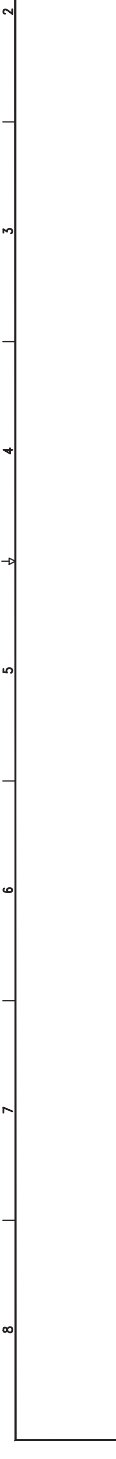
FOR SCHEMATIC SEE ADV-9127

APM603 CONTROLLER W/ENHANCED I/O HARNESS
KD27Y12 W/ECU2HD DIESEL
<600V STANDARD STARTER

DIAGRAM, WIRING, APM603
SS 800-1000

GM 107891

REV	DATE	DESCRIPTION
B	5-14-00	SEE SHEETS 1, 8, 9, 10 & 11 (2003152)
C	8-26-21	SEE SHEETS 1, 2, AND 3 (2124097)



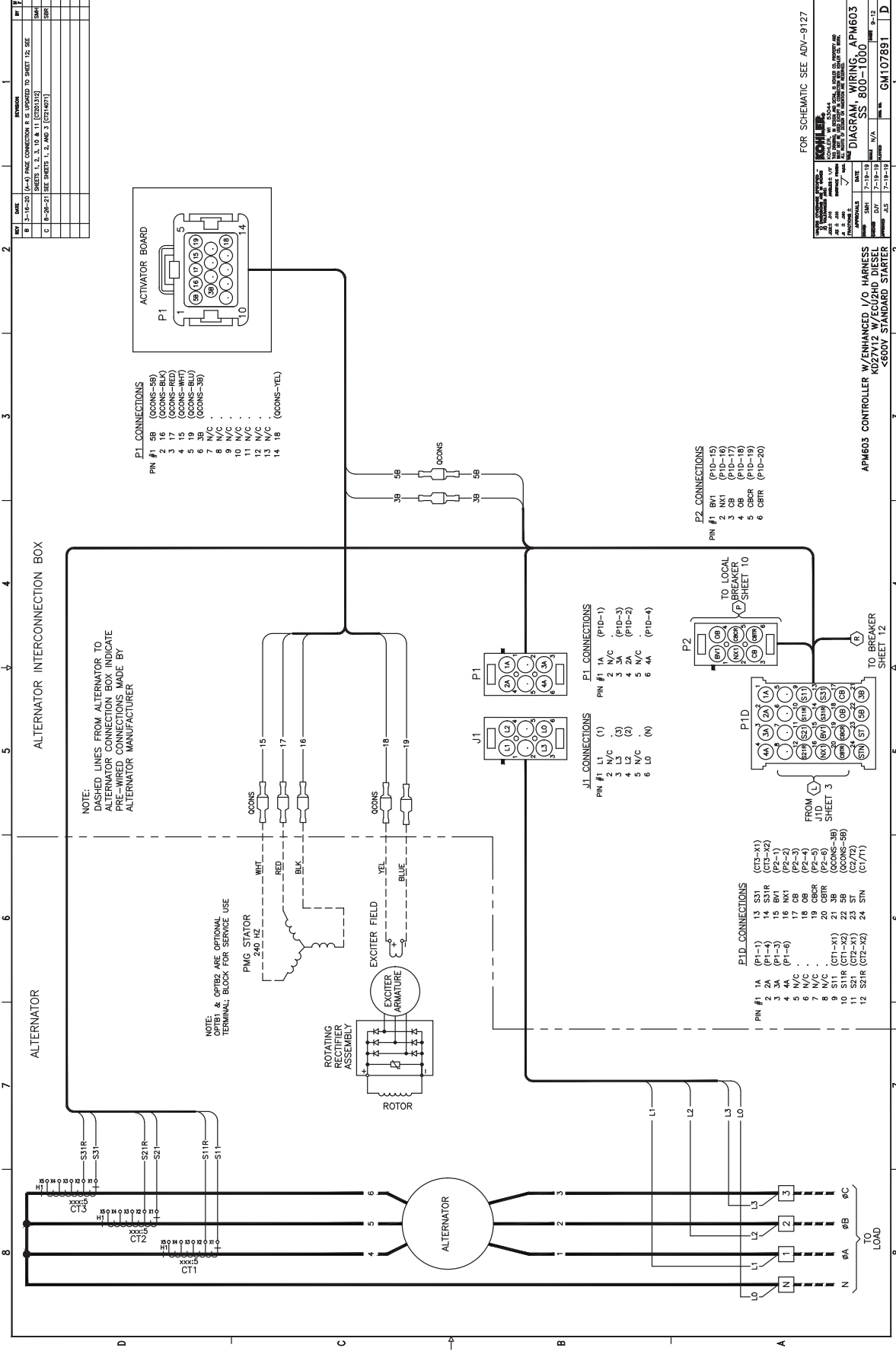
J10 CONNECTIONS
 PIN #1 BFS (BATTERY CHARGER 1 NC)
 PIN #2 BFG (BATTERY CHARGER 1 COM)

REV	DATE	DESCRIPTION
B	5-14-00	SEE SHEETS 1, 8, 9, 10 & 11 (2003152)
C	8-26-21	SEE SHEETS 1, 2, AND 3 (2124097)

FOR SCHEMATIC SEE ADV-9127

APM603 CONTROLLER W/ENHANCED I/O HARNESS
 KD27V12 W/ECU2HD DIESEL
 <600V STANDARD STARTER

GM107891



FOR SCHEMATIC SEE ADV-9127

GM 107891

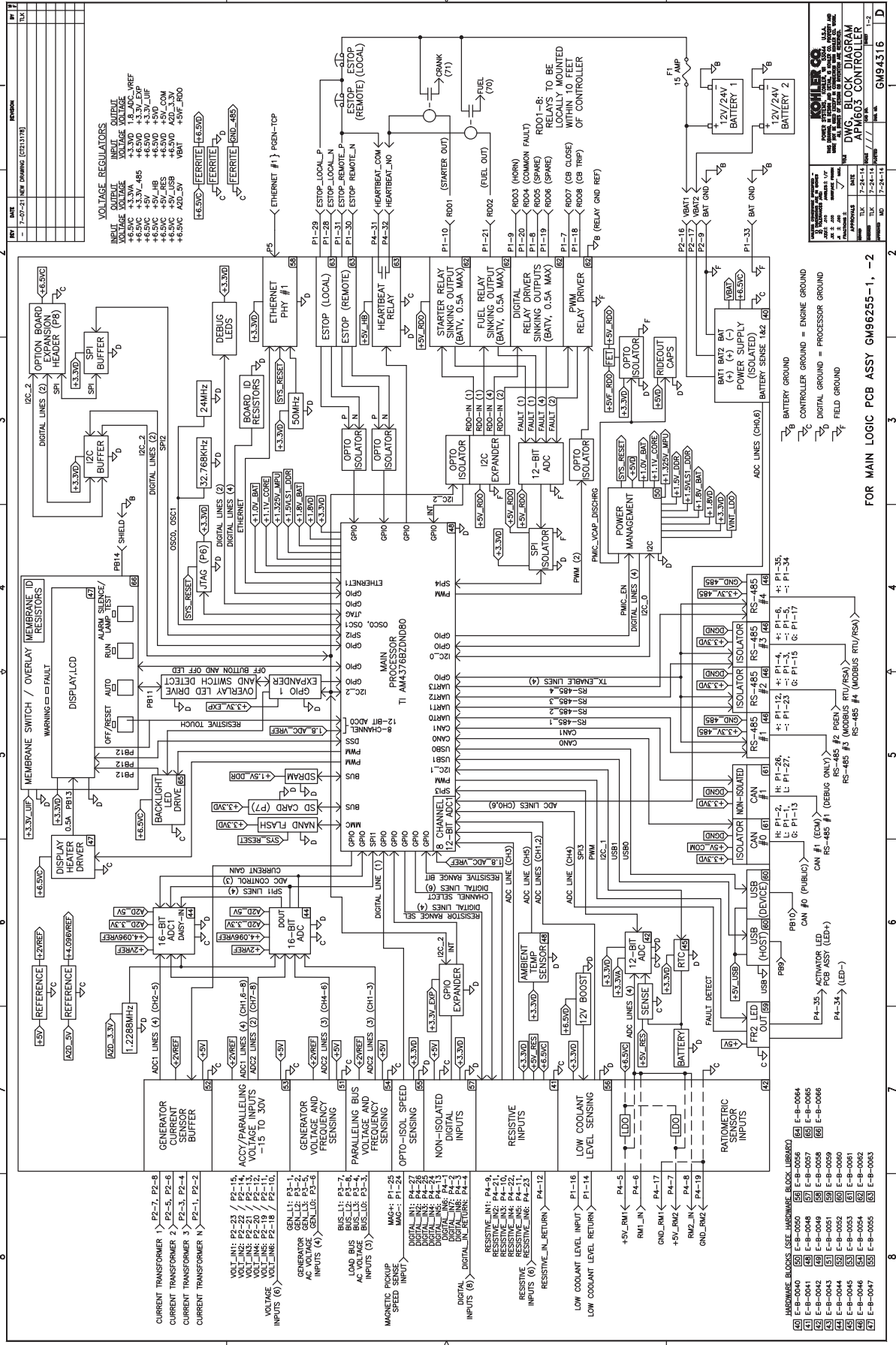
APM603 CONTROLLER W/ENHANCED I/O HARNESS
KD27V12 W/ECU2HD DIESEL
<600V STANDARD STARTER

DIAGRAM, WIRING, APM603
SS 800-1000

DATE: 7-19-13
DRAWN: DMK
CHECKED: JLS
APPROVED: JLS

REV. NO. 4.5

REV.	DATE	DESCRIPTION	BY
B	12-14-20	(A-3) PHASE CONNECTION R IS UPDATED TO SHEET 12, SEE SHEETS 1, 2, 3, 10 & 11 (C13/31)	DMK
C	8-26-21	SEE SHEETS 1, 2, AND 3 (C21/07)	DMK



VOLTAGE REGULATORS

INPUT VOLTAGE	OUTPUT VOLTAGE
+5.5V	+3.3V
+5.5V	+1.8V
+5.5V	+1.2V
+5.5V	+3.3V
+5.5V	+3.3V
+5.5V	+5V
+5.5V	+5V
+5.5V	+5V
+5.5V	+5V
+5.5V	+5V
+5.5V	+5V
+5.5V	+5V

FOR MAIN LOGIC PCB ASSY GM96255-1, -2

DATE: 7-24-14
 DRAWN BY: J. H. ...
 CHECKED BY: ...
 APPROVED BY: ...

LEGEND

(1) BOARD BLOCKS USE JUNCTION BLOCK (SHEET 2)
 (2) BOARD BLOCKS USE JUNCTION BLOCK (SHEET 2)
 (3) BOARD BLOCKS USE JUNCTION BLOCK (SHEET 2)
 (4) BOARD BLOCKS USE JUNCTION BLOCK (SHEET 2)
 (5) BOARD BLOCKS USE JUNCTION BLOCK (SHEET 2)
 (6) BOARD BLOCKS USE JUNCTION BLOCK (SHEET 2)
 (7) BOARD BLOCKS USE JUNCTION BLOCK (SHEET 2)
 (8) BOARD BLOCKS USE JUNCTION BLOCK (SHEET 2)

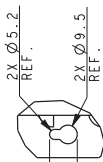
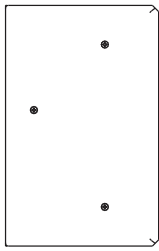
FOR MAIN LOGIC PCB ASSY GM96255-1, -2

DATE: 7-24-14
 DRAWN BY: J. H. ...
 CHECKED BY: ...
 APPROVED BY: ...

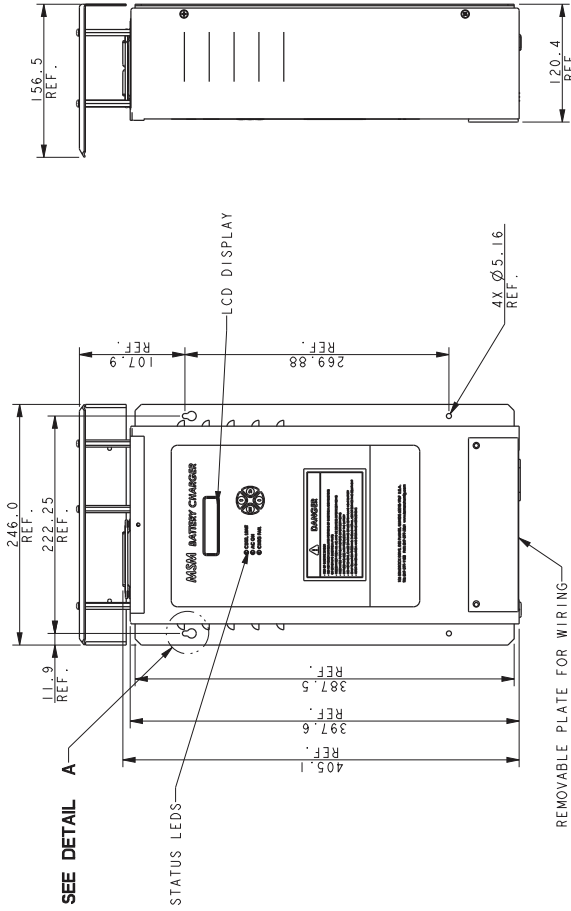
KOHLER®

Miscellaneous

PART NO.	REV.
10702002600	B



DETAIL A
SCALE 0.80



⊗ DENOTES A CRITICAL CHARACTERISTIC THAT MUST BE ADDRESSED IN THE PRODUCTION CONTROL PLAN. TOTAL QUANTITY OF MAJOR CHARACTERISTICS ON THIS DRAWING = 0

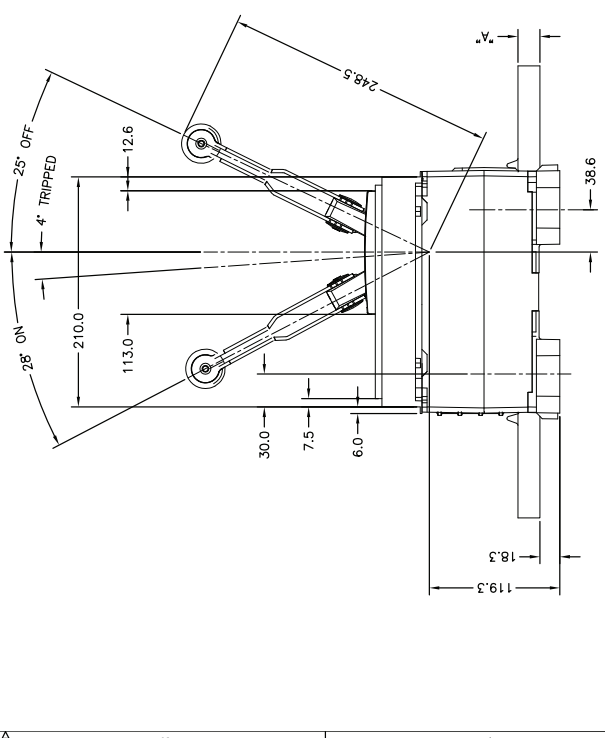
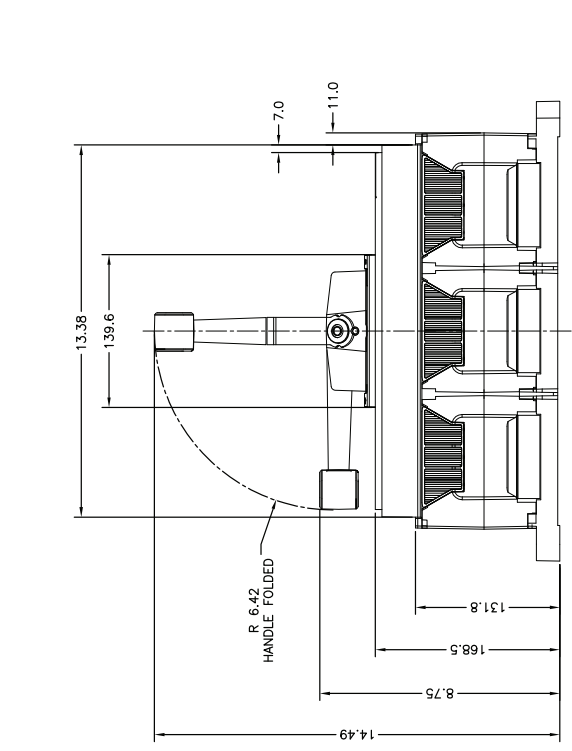
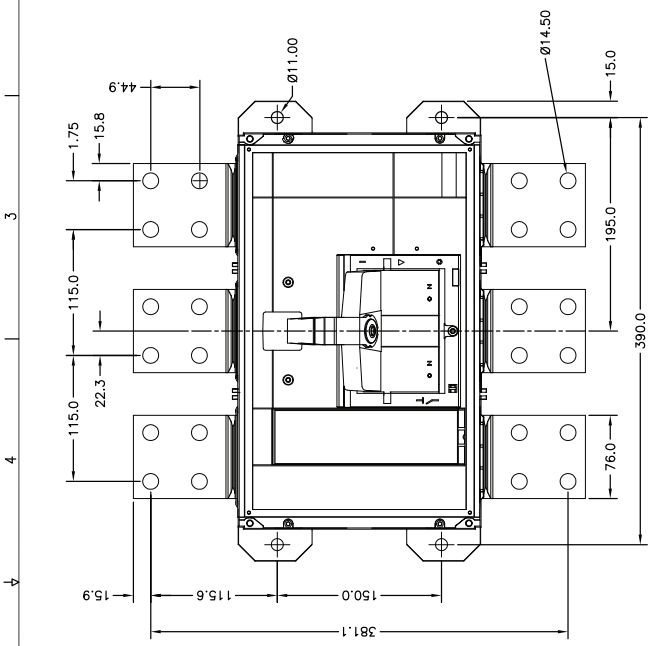
⊙ DENOTES A MAJOR CHARACTERISTIC THAT MUST BE ADDRESSED IN THE PRODUCTION CONTROL PLAN. TOTAL QUANTITY OF MAJOR CHARACTERISTICS ON THIS DRAWING = 0

NOTES:
UNAPPROVED P/N: MSM-20-24V-UI
SEE SPECIFICATION SHEET FOR PURCHASED / INSTALLATION DATA

REV	DATE	ON COMPOSITE DWGS. SET PART NO. FOR REVISION LEVEL	BY	UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN MILLIMETERS								
A	4-29-16	NEW DRAWING (CT145512)	BGM	2.5 1.0								
B	4-20-17	(B-5), 269.88 REF WAS 286.56 REF (CT173601)	BGM	3.0 SURFACE FINISH								
<table border="1"> <tr> <td>TITLE</td> <td>DESCRIPTION</td> </tr> <tr> <td>DWG. BATTERY CHARGER 24V</td> <td></td> </tr> </table>					TITLE	DESCRIPTION	DWG. BATTERY CHARGER 24V					
TITLE	DESCRIPTION											
DWG. BATTERY CHARGER 24V												
<table border="1"> <tr> <td>APPROVALS</td> <td>DATE (M-D-Y)</td> </tr> <tr> <td>DESIGNER</td> <td>03/14/23-18</td> </tr> <tr> <td>CHECKER</td> <td>03/14/23-18</td> </tr> <tr> <td>APPROVED</td> <td>02/14/23-18</td> </tr> </table>					APPROVALS	DATE (M-D-Y)	DESIGNER	03/14/23-18	CHECKER	03/14/23-18	APPROVED	02/14/23-18
APPROVALS	DATE (M-D-Y)											
DESIGNER	03/14/23-18											
CHECKER	03/14/23-18											
APPROVED	02/14/23-18											
<table border="1"> <tr> <td>SCALE</td> <td>0.40</td> </tr> <tr> <td>CAD NO.</td> <td></td> </tr> <tr> <td>DWG. NO.</td> <td>107020026XX</td> </tr> </table>				SCALE	0.40	CAD NO.		DWG. NO.	107020026XX	<table border="1"> <tr> <td>SHEET 1 OF 1</td> </tr> </table>	SHEET 1 OF 1	
SCALE	0.40											
CAD NO.												
DWG. NO.	107020026XX											
SHEET 1 OF 1												

KD27V12
KD45V20
KD36V16
KD62V12
KD83V16
KD103V20

MICROLOGIC CIRCUIT BREAKERS							
PART NO.	REV	DIM "A" RATING	AMPS % RATING	GFI	VENDOR NO.		
GM48156-1	A	80	1600	NO	RJF36160U33A		
GM48156-2	A	12.7	1600	YES	RJF36160U44A		
GM48156-3	A	100	1600	NO	RJF36160U33A		
GM48156-4	A	100	1600	YES	RJF36160U44A		
GM48156-5	A	80	2000	YES	RJF36200U33A		
GM48156-6	A	16.0	2000	NO	RJF36200U44A		
GM48156-7	A	100	2500	NO	RJF36250U33A		
GM48156-8	A	100	2500	YES	RJF36250U44A		
GM48156-9	A	80	1200	NO	RJF36120U33A		
GM48156-10	A	20.0	1200	YES	RJF36120U44A		
GM48156-11	A	12.7	1200	NO	RJF36120U33A		
GM48156-12	A	12.7	1200	YES	RJF36120U44A		
GM48156-13	A	12.7	1200	NO	RJF36120U33A		
GM48156-14	B	12.7	1200	YES	RJF36120U44A		
GM48156-15	B						
GM48156-16	B						



REV	DATE	DESCRIPTION	BY
1	1-13-06	NEW DRAWING (27272)	MAC
2	2-13-06	REVISED (16383)	MAC
3	2-1-07	(C-3) GM48156-14, -15 & -16 ADDED (29277)	MAC

REVISION BLOCK INDICATES REVISION LEVEL OF DRAWING NOT PART OF CURRENT PART REVISION LEVEL.
REVISION BLOCK INDICATES REVISION LEVEL BEHIND PART NUMBER FOR CURRENT PART REVISION LEVEL.

NOTE: KOHLER PART # TO BE CLEARLY VISIBLE ON CIRCUIT BREAKER AND ON INDIVIDUAL PACKAGING.

METRIC CAD FILE

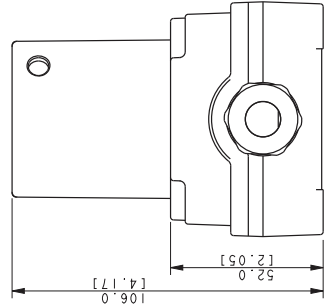
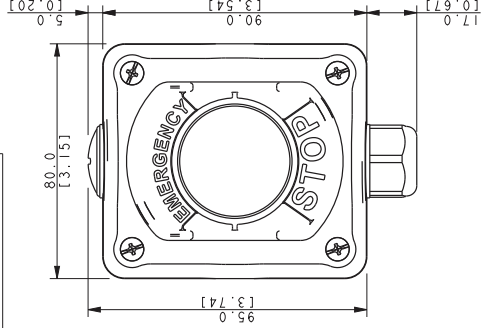
KOHLER CO.
 170 WASHINGTON ST., MILWAUKEE, WI 53233
 414.224.2000
 FAX 414.224.2001
 WWW.KOHLER.COM

DWG. CIRCUIT BREAKER
 PART: L-1
 SHEET: 1
 DATE: 2-1-06
 DRAWN BY: JAH
 CHECKED BY: JAH
 SCALE: 1:1
 FILE NO: GM48156.DWG
 PART NO: GM48156

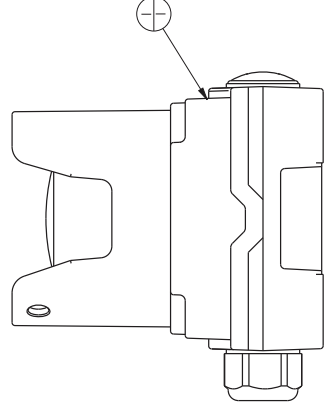
SQUARE D R-FRAME CIRCUIT BREAKER
3 POLE ELECTRONIC TRIP

KIT NO.	ITEM	PART NO	QTY	DESCRIPTION
GM103743				
	1	GM103743-1	1	E-STOP, NEC REMOTE
	2	GM103743-2	4	E-STOP W/ YELLOW SHROUD, LOTO
	3	GM103743-3	1	#10 X 1.250 Sheetmetal Screw
	4	GM103743-4	1	TERMINAL, FAST-ON, MALE, 18-22 AWG
	5	GM103743-5	1	TERMINAL, FAST-ON, FEMALE, 18-22 AWG
	6	GM103743-6	2	TERMINAL, SPADE, 22-16 AWG
				LITERATURE, TT-1736

THIS IS AN AUTOMATED TABLE. ALL UPDATES MUST BE MADE IN THE ASSEMBLY.



SCALE 1:50



NOTE:

DIMENSIONS IN [] ARE IN INCH EQUIVALENTS.
SCREWS AND TERMINALS ARE TO BE BAGGED AND PLACED IN THE BOX

REV	DATE	DESCRIPTION	BY	APPROVED	DATE	SCALE	TITLE
1	2-12-18	NEW DRAWING [CT176728]	CCL		2-12-18	1:50	E-STOP, NEC REMOTE
2	2-12-18	ON COMPOSITE DIMS. SEE PART NO. FOR REVISION LEVEL	CCL		2-12-18	1:50	E-STOP, NEC REMOTE
3	2-12-18						
4	2-12-18						
5	2-12-18						
6	2-12-18						
7	2-12-18						
8	2-12-18						

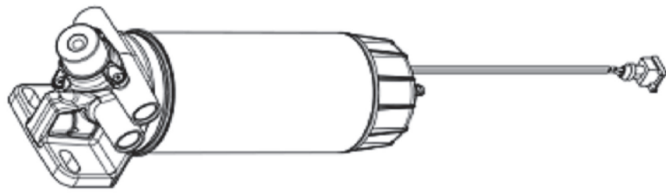
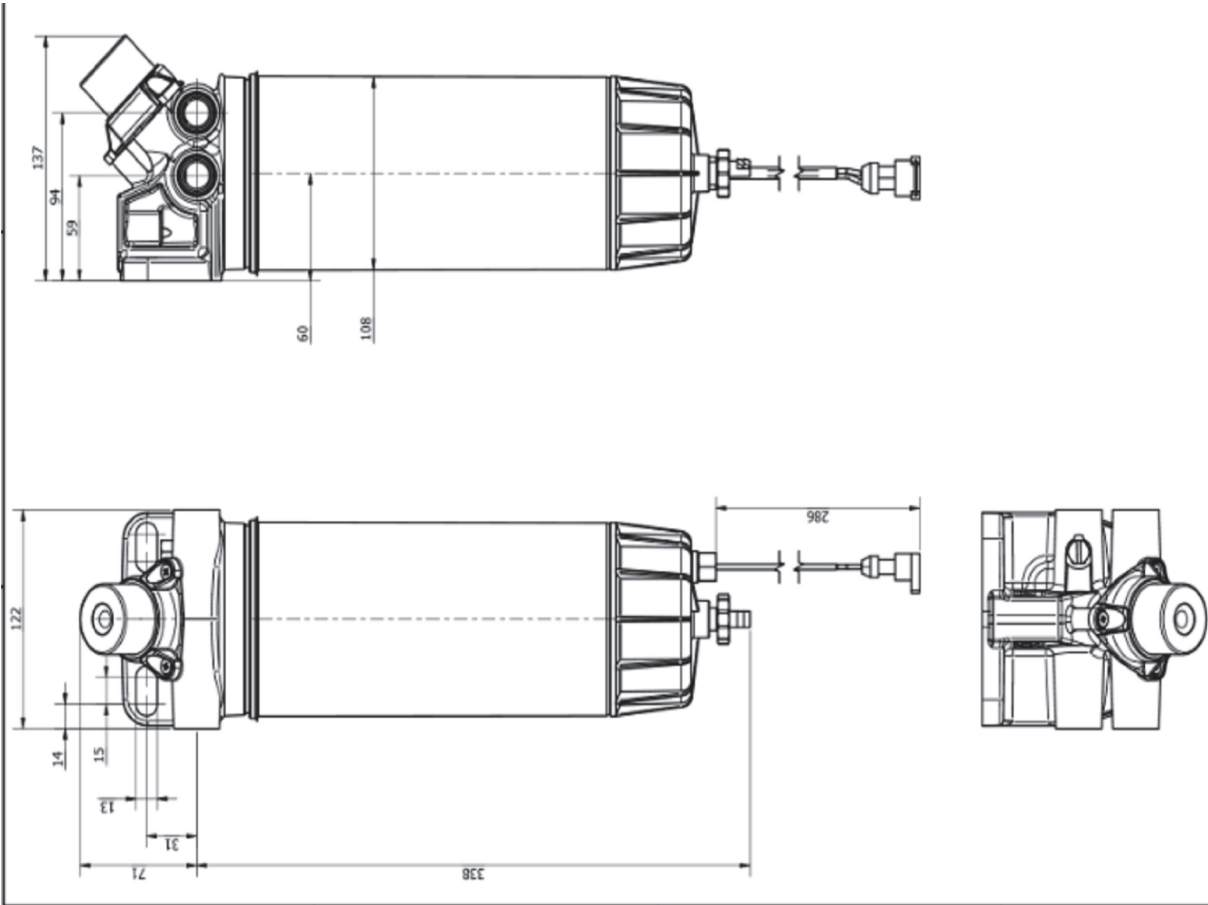
UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN MILLIMETERS.
DIMENSIONS IN [] ARE IN INCH EQUIVALENTS.
THIS DRAWING IS THE PROPERTY OF KOHLER CO. AND SHALL BE KEPT IN CONFIDENCE.
THIS DRAWING IS NOT TO BE REPRODUCED OR TRANSMITTED IN ANY FORM OR BY ANY MEANS, ELECTRONIC OR MECHANICAL, INCLUDING PHOTOCOPYING, RECORDING, OR BY ANY INFORMATION STORAGE AND RETRIEVAL SYSTEM.
ALL RIGHTS OF DESIGN OR INVENTION ARE RESERVED.

KOHLER CO. METRIC PROE

DATE: 2-12-18
SCALE: 1:50
PART NO: GM103743

APPROVED: [Signature]
DATE: 2-12-18
SCALE: 1:50
TITLE: E-STOP, NEC REMOTE

SHEET 1 OF 1



NOTE:

- 1. ALL DIMENSIONS ARE FOR REFERENCE ONLY
- 2. INLET AND OUTLET PORTS SEAL FEATURE MACHINED TO ISO 6149-1
- 3. THREAD M22 X 1.5-6H ± 0.016mm
- 4. WATER IN FUEL SENSOR - 12KG INTERNAL RESISTER TYCO AMP 282189-1 CONNECTOR
- 5. BOWL ORIENTATION WILL VARY
- 6. 2 OFF M22 PORT PLUGS TO BE SUPPLIED IN PACKAGING BOX
- 7. ALLOW 50mm MIN CLEARANCE BELOW FUEL FILTER FOR REMOVAL OF ELEMENT DURING SERVICE
- 8. REPLACEMENT CANISTER RACOR P/N - R160TSDMO SDMO P/N - 330510016

REV	DATE	ON COMPOSITE DRGS. SET PART NO. FOR REVISION LEVEL	BY	UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN MILLIMETERS AND DECIMALS ARE TO 0.1	 SCALE: 1:2 UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN MILLIMETERS AND DECIMALS ARE TO 0.1 ALL DIMENSIONS ARE TO UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN MILLIMETERS AND DECIMALS ARE TO 0.1 DIMENSIONS TO UNLESS OTHERWISE SPECIFIED, DIMENSIONS ARE IN MILLIMETERS AND DECIMALS ARE TO 0.1	 KOHLER CO. / SDMO FUEL FILTER / WATER SEPARATOR	METRIC PRO-E
A	12-14-15	NEW DRAWING (C1145648)	CEM				
APPROVALS		DATE (M-D-YY)	INITIALS				
		CEM	12-14-15		DESIGN		
					CHECKED		
					DATE		
					BY		
					DATE		
					BY		
					DATE		
					BY		
					DATE		
					BY		
					DATE		

KOHLER®

Warranty

Stationary Standby Industrial Generator Set Three-Year or One Thousand (1000)-Hour Limited Warranty for KD Model Generator Sets

Your Kohler product has been manufactured and inspected with care by experienced craftsmen. If you are the original end user, Kohler Co. warrants, for the period indicated below, each product to be free from defects in materials and workmanship. In the event of a defect in materials or workmanship, Kohler Co. will repair, replace, or make appropriate adjustment at Kohler Co.'s option if the product, upon Kohler Co.'s inspection, is found to be properly installed, maintained, and operated in accordance with Kohler Co.'s instruction manuals. A Kohler distributor, dealer, or authorized service representative must perform startup.

Kohler Product

Stationary Standby Generator Set & Accessories

Warranty Coverage

Three (3) years from registered startup or one thousand (1000) hours* (whichever occurs first). In any event, the warranty period will expire not later than fifty-four (54) months from the date of shipment from Kohler Co.'s factory. If the unit is not registered within 18 months from the factory ship date the warranty will start from the date of shipment from Kohler Co.'s factory.

* Unlimited hours are allowed for standby applications within the U.S.

The following will **not** be covered by the warranty:

1. Normal wear, routine tuneups, tuneup parts, adjustments, and periodic service.
2. Damage, including but not limited to damage caused by accidents, improper installation or handling, faulty repairs not performed by an authorized Kohler service representative, improper storage, or acts of God.
3. Damage caused by operation at speeds, or with fuel, loads, conditions, modifications or installation contrary to published specifications.
4. Damage caused by negligent maintenance such as:
 - a. Failure to provide the specified type and sufficient quantity of lubricating oil.
 - b. Failure to keep the air intake and cooling fin areas clean.
 - c. Failure to service the air cleaner.
 - d. Failure to provide sufficient coolant and/or cooling air.
 - e. Failure to perform scheduled maintenance as prescribed in supplied manuals.
 - f. Failure to regularly exercise the generator set under load (stationary applications only).
5. Original installation charges and startup costs.
6. Starting batteries and the following related expenses:
 - a. Labor charges related to battery service.
 - b. Travel expenses related to battery service.
7. Engine coolant heaters, heater controls, and circulating pumps after the first year of the warranty period.
8. Additional expenses for repairs performed after normal business hours, i.e. overtime or holiday labor rates.
9. Rental of equipment during the performance of warranty repairs.
10. Removal and replacement of non-Kohler-supplied options and equipment.
11. Non-Kohler replacement parts. Replacement of a failed Kohler part with a non-Kohler part voids the warranty on that part.
12. Radiators replaced rather than repaired.
13. Fuel injection pumps not repaired by an authorized Kohler service representative.
14. Non-Kohler-authorized repair shop labor without prior approval from Kohler Co. Warranty Department.
15. Engine fluids such as fuel, oil, or coolant/antifreeze.
16. Shop supplies such as adhesives, cleaning solvents, and rags.
17. Expenses incurred investigating performance complaints unless the problem is caused by defective Kohler materials or workmanship.
18. Maintenance items such as fuses, lamps, filters, spark plugs, loose or leaking clamps, and adjustments.
19. Travel time and mileage exceeding 300 miles round trip.

To obtain warranty service, call 1-800-544-2444 for your nearest authorized Kohler service representative or write Kohler Co., Service Department, MS072, Kohler, WI 53044 USA.

KOHLER CO. SHALL NOT BE LIABLE FOR SPECIAL, INCIDENTAL, AND/OR CONSEQUENTIAL DAMAGES OF ANY KIND including, but not limited to, incidental and/or consequential labor costs, installation charges, telephone charges, or transportation charges in connection with the replacement or repair of defective parts.

This is our exclusive written warranty. We make no other express warranty nor is anyone authorized to make any on our behalf.

ANY IMPLIED OR STATUTORY WARRANTY, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, IS EXPRESSLY LIMITED TO THE DURATION OF THIS WARRANTY. Some states do not allow limitations on how long an implied warranty lasts, or the exclusion or limitation of incidental and/or consequential damages, so the above limitation or exclusion may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

KOHLER®

KOHLER CO., Kohler, Wisconsin 53044
Phone 920-457-4441, Fax 920-459-1646
For the nearest sales/service outlet in the
US and Canada, phone 1-800-544-2444
KOHLERPower.com

TP-7048 2/17c

KOHLER®

Certification



THE VMC GROUP

The Power of Together™

KOHLER® Power Systems

CERTIFICATE OF COMPLIANCE

SEISMIC DESIGN OF NONSTRUCTURAL COMPONENTS AND SYSTEMS



Certification No.

VMA-50771-01C (REVISION 04)

Expiration Date: 12/31/2019

Certification Parameters:

The nonstructural products (mechanical and/or electrical components) listed on this certificate are CERTIFIED¹ FOR SEISMIC APPLICATIONS in accordance with the following building code² releases.

IBC 2006, 2009, 2012, 2015

The following model designations, options, and accessories are included in this certification. Reference report number **VMA-50771-01** as issued by The VMC Group for a complete list of certified models, included accessories/options, and certified installation methods.

Kohler Diesel Generator Sets KD Series 800kW – 3250kW

The above referenced equipment is **APPROVED** for seismic application when properly installed³, used as intended, and contains a Seismic Certification Label referencing this Certificate of Compliance⁴. As limited by the tabulated values, below grade, grade, and roof-level installations, installations in essential facilities, for life safety applications, and/or of equipment containing hazardous contents are permitted and included in this certification with an Equipment Importance Factor assigned as $I_p=1.5$. The equipment is qualified by successful seismic shake table testing at the nationally recognized Construction Engineering Research Laboratory under the witness of the ISO Accredited Product Certification Agency, The VMC Group.

Certified Seismic Design Levels

Certified IBC	Importance $I_p \leq 1.5$ Soil Classes A-E Risk Categories I-IV Design Categories A-F	$S_{DS} \leq 2.000 \text{ g}$ $z/h = 0.0$		$S_{DS} \leq .667 \text{ g}$ $z/h \leq 1.0$	
		Horizontal Design ⁵	F	—(-)	1.500 g
Test Datum AC156	ISO 17025 Laboratory Pre/Post-Shake Functionality Tri-axial, 5% Damping SRS	$A_{FLEX-H} \leq 2.000 \text{ g}$		$A_{FLEX-V} \leq 1.333 \text{ g}$	
		$A_{RIG-H} \leq 0.800 \text{ g}$		$A_{RIG-V} \leq 0.533 \text{ g}$	
		$ZPA_H \leq 0.720 \text{ g}$		$ZPA_V \leq 0.480 \text{ g}$	

Certified Seismic Installation Methods⁸

Rigid mounting from unit base to rigid structure	External isolation mounting from unit base to rigid structure
Rigid mounting from unit base to fuel tank	External isolation mounting from unit base to fuel tank



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CERTIFICATE OF COMPLIANCE

SEISMIC DESIGN OF NONSTRUCTURAL COMPONENTS AND SYSTEMS

Certified Product Table:

Model*	Max Rating [kW]	EPA Rating	Enclosure Options**	Fuel Tank Capacities** [gal]	Max Dimensions [in]			Open Genset Max Weight [lbs]	Enclosed Genset on Tank Max Weight [lbs]
					Length	Width	Height		
KD800	800	Tier 2	Aluminum Sound Level 1 Aluminum Sound Level 2	829 – 4973	360.0	103.0	171.9	16,440	67,881
KD900	900	Tier 2			435.0	103.0	171.9	17,131	77,928
KD1000	1000	Tier 2			435.0	103.0	171.9	17,821	78,618
KD1250	1250	Tier 2		1411 – 5641	438.9	119.2	180.9	30,191	104,120
KD1250-A	1250	Tier 2			438.9	119.2	180.9	30,191	104,120
KD1350	1350	Tier 2			438.9	119.2	180.9	30,191	104,120
KD1500	1500	Tier 2			438.9	119.2	180.9	30,191	104,120
KD1600	1600	Tier 2			438.9	119.2	180.9	30,191	104,120
KD1750	1750	Tier 2		438.9	119.2	180.9	30,191	104,120	
KD2000	2000	Tier 2		2072 – 4143	535.5	137.0	207.0	53,000	120,603
KD2250	2250	Tier 2			535.5	137.0	207.0	53,000	120,603
KD2500	2500	Tier 2			535.5	137.0	207.0	56,000	120,603
KD2800	2800	Tier 2			301.1	125.0	136.0	71,212	
KD3000	3000	Tier 2			301.1	125.0	136.0	71,212	
KD3250	3250	Tier 2			301.1	125.0	136.0	71,212	

*Note: All models are certified in the Standard and Remote Radiator Configuration

**Note: Remote Radiator Configuration does not allow for the use of Tanks & Enclosures

For models KD800 through KD2500, this certification **includes** the open generator set and the enclosed generator set when installed with or without the sub-base tank. For models KD2800 through KD3250, this certification **includes** the open generator set only. This certification also includes the sub-base tank as a stand-alone accessory. The generator set and included options shall be a catalogue design and factory supplied. The generator set and applicable options shall be installed and attached to the building structure per the manufacturer supplied seismic installation instructions. This certification **excludes** all non-factory supplied accessories, including but not limited to mufflers, isolation/restraint devices, remote control panels, remote radiators, pumps and other electrical/mechanical components.



VMA-50771-01C (Revision 04)
Issue Date: December 29, 2016
Revision Date: August 28, 2018
Expiration Date: December 31, 2019



THE VMC GROUP

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KOHLER® Power Systems

CERTIFICATE OF COMPLIANCE

SEISMIC DESIGN OF NONSTRUCTURAL COMPONENTS AND SYSTEMS

Notes and Comments:

1. All equipment listed herein successfully passed the seismic acceptance criteria for shake testing non-structural components and systems as set forth in the ICC AC-156. The Test Response Spectrum (TRS) enveloped the Required Response Spectrum (RRS) for all units tested. The units cited in this certification were representative sample(s) of a contingent of models and all remained captive and structurally sound after the seismic shake simulation. The units also remained functionally operational after the simulation testing as functional testing was completed by the equipment manufacturer before and after the seismic simulations. Although a seismic qualified unit inherently contains some wind resisting capacity, that capacity is undetermined and is excluded from this certification. Snow/Ice loads have been neglected and thus limit the unit to be installed both indoors (covered by an independent protective structure) and out of doors (exposed to accumulating snow/ice) for ground snow loads no greater than 30 psf for all applications.
2. The following building codes are addressed under this certification:
IBC 2006 – referencing ASCE7-05 and ICC AC-156
IBC 2009 – referencing ASCE7-05 and ICC AC-156
IBC 2012 – referencing ASCE7-10 and ICC AC-156
IBC 2015 – referencing ASCE7-10 and ICC AC-156
3. Refer to the manufacturer supplied installation drawings for anchor requirements and mounting considerations for seismic applications. Required anchor locations, size, style, and load capacities (tension and shear) may be specified on the installation drawings or specified by a 3rd party. Mounting requirement details such as anchor brand, type, embedment depth, edge spacing, anchor-to-anchor spacing, concrete strength, special inspection, wall design, and attachment to non-building structures must be outlined and approved by the Engineer of Record for the project or building. Structural walls, structural floors, and housekeeping pads must also be seismically designed and approved by the project or building Structural Engineer of Record to withstand the seismic anchor loads as defined on the installation drawings. The installing contractor is responsible for observing the installation detailed in the seismic installation drawings and the proper installation of all anchors and mounting hardware.
4. For this certificate and certification to remain valid, this certificate must correspond to the "Seismic Certification Label" found affixed to the unit by the factory. The label ensures the manufacturer built the unit in conformance to the IBC seismic design criteria set forth by the Certified Seismic Qualification Agency, The VMC Group, and meets the seismic design levels claimed by this certificate.
5. Mechanical, Electrical, and Plumbing connections to the equipment must be flexibly attached as to not transfer load through the connection. The structural integrity of any conduit, cable trays, piping, ductwork and/or flexible connections is the responsibility of others. This certification does not guarantee the equipment will remain compliant to NEMA, IP, UL, or CSA standards after a seismic event.
6. This certificate applies to units manufactured at:
Kohler Power Systems, N7650 Lakeshore Road, Sheboygan, WI 53083
7. This project follows The VMC Group's ISO-17065 Scheme for Product Certification of Nonstructural Components.
8. The certified seismic installation methods states are a summary for all series this certificate covers, for more detailed information on the certified seismic installation methods, see the certified product tables.



John P. Giuliano, PE
President, The VMC Group



VMA-50771-01C (Revision 04)
Issue Date: December 29, 2016
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Certificate of Registration

QUALITY MANAGEMENT SYSTEM - ISO 9001:2015

This is to certify that:

Kohler Power Systems
N7650 Lakeshore Road
Sheboygan
Wisconsin
53083
USA


Holds Certificate No:

FM 727336

and operates a Quality Management System which complies with the requirements of ISO 9001:2015 for the following scope:

Design, manufacture, and distributor support for electrical generators, alternators, fuel tanks, automatic transfer switches and switchgear.

For and on behalf of BSI:


Carlos Pitanga, Chief Operating Officer Assurance – Americas

Original Registration Date: 1995-02-28

Latest Revision Date: 2021-10-29

Effective Date: 2021-11-07

Expiry Date: 2024-11-06

Page: 1 of 2



...making excellence a habit.™

Certificate No: **FM 727336**

Location	Registered Activities
Kohler Power Systems - GK 900 Highland Drive Bldg 604 Kohler Wisconsin 53004 USA	Manufacture of leads and harness, automatic transfer switches and switchgear. Distribution of generator sets.
Kohler Power Systems N7650 Lakeshore Road Sheboygan Wisconsin 53083 USA	Design, manufacture, and distributor support for electrical generators, automatic transfer switches and switchgear.
Kohler Power Systems 300 N Dekora Woods Blvd Saukville Wisconsin 53080 USA	Manufacture of fuel tanks, skids, fabricated components and generators.
Kohler Power Systems Muth Warehouse 2821 Muth Court Sheboygan Wisconsin 53083 USA	The distribution of generator sets.
Kohler Power Systems KWIP Warehouse 4327 County EE Sheboygan Wisconsin 53081 USA	Receiving, sequencing and warehousing of generator components.

Original Registration Date: 1995-02-28

Latest Revision Date: 2021-10-29

Effective Date: 2021-11-07

Expiry Date: 2024-11-06

Page: 2 of 2

This certificate remains the property of BSI and shall be returned immediately upon request.

An electronic certificate can be authenticated [online](https://www.bsigroup.com/ClientDirectory). Printed copies can be validated at www.bsigroup.com/ClientDirectory. To be read in conjunction with the scope above or the attached appendix.

Information and Contact: BSI, Kitemark Court, Davy Avenue, Knowlhill, Milton Keynes MK5 8PP. Tel: + 44 345 080 9000
BSI Assurance UK Limited, registered in England under number 7805321 at 389 Chiswick High Road, London W4 4AL, UK.
A Member of the BSI Group of Companies.

G15-152 10/21

PROTOTYPE TEST REPORT



Models Covered: **KD800, KD900, KD1000**
Model Tested: **KD1000**
Cooling System Tested: **50C**

Alternator Tested: **KH04070TO4D**
Engine Tested: **KD27V12**
Voltage Tested: **480V**

GENSET

Maximum power test to assure that the prime mover and alternator have sufficient capacity to operate within specifications.

Meets Rated Load

Steady-state load test to ensure voltage stability meets or exceeds ISO8528-5 requirements and to verify compliance with steady state speed control specifications.

± 0.25 % Frequency Band

± 0.25 % Voltage Deviation

Transient load tests per NEMA MG1-32.18, and ISO 8528 to verify specifications of transient voltage regulation, voltage dip, voltage overshoot, recovery voltage, and recovery time. Values shown for model tested above. Please contact factory for additional details.

Full Load Acceptance

37.7 % Voltage Dip

4.34 Seconds of Recovery Time

15.4 % Frequency Dip

3.41 Seconds of Recovery Time

Full Load Rejection

14.3 % Voltage Overshoot

1.80 Seconds of Recovery Time

9.30 % Frequency Overshoot

2.29 Seconds of Recovery Time

G3 ISO8528-5 Class (G1, G2, G3)

NFPA 110 one step testing to determine the amount of time required for the generator set to reach 90% voltage and frequency to allow the ATS to transfer.

Complies with NFPA 110 Type 10

Vibrational analysis to verify that generator vibrations are within acceptable limits per ISO 8528-9.

Complies

Torsional analysis data to verify torsional effects are not detrimental and that the generator set will provide dependable service as specified.

Complies

Generator set cooling and air flow tests to verify maximum operating ambient temperature. (Cooling system test results are available on TIB-118)

Acoustical noise intensity and sound attenuation effects tests (Acoustical noise results are available on TIB-114 &115)

Exhaust Back Pressure test completed to demonstrate within engine limitation (Exhaust back pressure test results are available on TIB-119)

PROTOTYPE TEST REPORT



Models Covered: **KD800, KD900, KD1000**
Model Tested: **KD1000**
Cooling System Tested: **50C**

Alternator Tested: **KH04070TO4D**
Engine Tested: **KD27V12**
Voltage Tested: **480V**

ALTERNATOR

Alternator temperature rise test per NEMA MG1-32.6. Standby and prime ratings of the alternator are established during this test.

Alternator overload test per NEMA MG1-32.8. Motor starting tests per NEMA MG1-32.18.5 to evaluate capabilities of generator, exciter, and regulator system.

Three-phase symmetrical short-circuit test per NEMA MG1-32.13 to demonstrate short circuit performance, mechanical integrity, ability to sustain short-circuit current.

Harmonic analysis, voltage waveform deviation per NEMA MG1-32.10 to confirm that the generator set is producing clean voltage within acceptable limits.

(Alternator detailed test results are available on TIB-102)

Kohler Standby/Prime Generator Set Test Program

Testing is an integral part of quality assurance. In keeping with our uncompromising commitment to quality, safety, and reliability, every Kohler Standby/Prime power generator set undergoes an extensive series of prototype and production testing.

Prototype Testing

Prototype testing includes the potentially destructive tests necessary to verify design, proper function of protective devices and safety features, and reliability expectations. Kohler's prototype testing includes the following:

- Alternator temperature rise test per NEMA MG1-32.6. Standby and prime ratings of the alternator are established during this test.
- Maximum power test to assure that the prime mover and alternator have sufficient capacity to operate within specifications.
- Alternator overload test per NEMA MG1-32.8.
- Steady-state load test to ensure voltage regulation meets or exceeds ANSI C84.1, NEMA MG1-32.17 requirements and to verify compliance with steady-state speed control specifications.
- Transient test to verify speed controls meets or exceeds specifications.
- Transient load tests per NEMA MG1-32.18, and ISO 8528 to verify specifications of transient voltage regulation, voltage dip, voltage overshoot, recovery voltage, and recovery time.
- Motor starting tests per NEMA MG1-32.18.5 to evaluate capabilities of generator, exciter, and regulator system.
- Three-phase symmetrical short-circuit test per NEMA MG1-32.13 to demonstrate short circuit performance, mechanical integrity, ability to sustain short-circuit current.
- Harmonic analysis, voltage waveform deviation per NEMA MG1-32.10 to confirm that the generator set is producing clean voltage within acceptable limits.

Torsional analysis data, to verify torsional effects are not detrimental and that the generator set will provide dependable service as specified, is available upon request.

Kohler offers other testing at the customer's request at an additional charge. These optional tests include power factor testing, customized load testing for specific application, witness testing, and a broad range of MIL-STD-705c testing. A certified test report is also available at an additional charge.

- Generator set cooling and air flow tests to verify maximum operating ambient temperature.
- Reliability tests to demonstrate product durability, followed by root cause analysis of discovered failures and defects. Corrective action is taken to improve the design, workmanship, or components.
- Acoustical noise intensity and sound attenuation effects tests.

Production Testing

In production, Kohler Standby/Prime generator sets are built to the stringent standards established by the prototype program. Every Kohler generator set is fully tested prior to leaving the factory. Production testing includes the following:

- Stator and exciter winding high-potential test on all generators. Surge transient tests on stators for generators 180 kW or larger. Continuity and balance tests on all rotors.
- One-step, full-load pickup tests to verify that the performance of each generator set, regulator, and governor meets published specifications.
- Regulation and stability of voltage and frequency are tested and verified at no load, 1/4 load, 1/2 load, 3/4 load, and full-rated load.
- Voltage, amperage, frequency and power output ratings verified by full-load test.
- The proper operation of controller logic circuitry, prealarm warnings, and shutdown functions is tested and verified.
- Any defect or variation from specification discovered during testing is corrected and retested prior to approval for shipment to the customer.

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KOHLER CO. Kohler, Wisconsin 53044
Phone 920-565-3381, Fax 920-459-1646
For the nearest sales/service outlet in the
US and Canada, phone 1-800-544-2444
KohlerPowerSystems.com

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PreStartup Checklist

Generator Set/Transfer Switch Installation Checklist

This document has generic content and some items may not apply to some applications. Check only the items that apply to the specific application. Read and understand all of the safety precautions found in the Operation and Installation Manuals. Make the following installation checks before performing the Startup Checklist.

Note: Use this form as a general guide, along with any applicable codes or standards. Comply with all applicable codes and standards. Improper installation voids the warranty.

Equipment Room or Weather Housing		Does Not Apply	Yes		
<input type="checkbox"/>	<input type="checkbox"/>	25.	Is there an exhaust line condensate trap with a drain installed?		
<input type="checkbox"/>	<input type="checkbox"/>	26.	Is the specified silencer installed and are the hanger and mounting hardware tightened?		
<input type="checkbox"/>	<input type="checkbox"/>	27.	Is a heat-isolating thimble(s) installed at points where exhaust lines pass through combustible wall(s) or partition(s)?		
<input type="checkbox"/>	<input type="checkbox"/>	28.	Is the exhaust line free of excessive bends and restrictions? Is the backpressure within specifications?		
<input type="checkbox"/>	<input type="checkbox"/>	29.	Is the exhaust line installed with a downward pitch toward the outside of the building?		
<input type="checkbox"/>	<input type="checkbox"/>	30.	Is the exhaust line protected from entry by rain, snow, and animals?		
<input type="checkbox"/>	<input type="checkbox"/>	31.	Does the exhaust system outlet location prevent entry of exhaust gases into buildings or structures?		
<input type="checkbox"/>	<input type="checkbox"/>	32.	Are individuals protected from exposure to high temperature exhaust parts and are hot parts safety decals present?		
Engine and Mounting		AC Electrical System			
<input type="checkbox"/>	<input type="checkbox"/>	7.	Is the mounting surface(s) properly constructed and leveled?		
<input type="checkbox"/>	<input type="checkbox"/>	8.	Is the mounting surface made from non-combustible material?		
<input type="checkbox"/>	<input type="checkbox"/>	9.	Was the generator-to-engine alignment performed after attaching the skid to the mounting base? Generator sets with two-bearing generators require alignment.		
Lubrication		<input type="checkbox"/>	<input type="checkbox"/>	33.	Does the nameplate voltage/frequency of the generator set and transfer switch match normal/utility source ratings?
<input type="checkbox"/>	<input type="checkbox"/>	10.	Is the engine crankcase filled with the specified oil?		
Cooling and Ventilation		<input type="checkbox"/>	<input type="checkbox"/>	34.	Do the generator set load conductors have adequate ampacity and are they correctly connected to the circuit breakers and/or the emergency side of the transfer switch?
<input type="checkbox"/>	<input type="checkbox"/>	11.	Is the cooling system filled with the manufacturer's specified coolant/antifreeze and purged of air?		
<input type="checkbox"/>	<input type="checkbox"/>	12.	Is there adequate inlet and outlet air flow (electric louvers adjusted and ventilation fan motor(s) connected to the corresponding voltage)?		
<input type="checkbox"/>	<input type="checkbox"/>	13.	Is the radiator duct properly sized and connected to the air vent or louver?		
<input type="checkbox"/>	<input type="checkbox"/>	14.	Are flexible sections installed in the cooling water lines?		
Fuel		<input type="checkbox"/>	<input type="checkbox"/>	35.	Are the load conductors, engine starting cables, battery charger cables, and remote annunciator leads installed in separate conduits?
<input type="checkbox"/>	<input type="checkbox"/>	15.	Is there an adequate/dedicated fuel supply?		
<input type="checkbox"/>	<input type="checkbox"/>	16.	Are the fuel filters installed?		
<input type="checkbox"/>	<input type="checkbox"/>	17.	Are the fuel tanks and piping installed in accordance with applicable codes and standards?		
<input type="checkbox"/>	<input type="checkbox"/>	18.	Is there adequate fuel transfer tank pump lift capacity and is the pump motor connected to the corresponding voltage?		
<input type="checkbox"/>	<input type="checkbox"/>	19.	Is the fuel transfer tank pump connected to the emergency power source?		
<input type="checkbox"/>	<input type="checkbox"/>	20.	Are flexible fuel lines installed between the engine fuel inlet and fuel piping?		
<input type="checkbox"/>	<input type="checkbox"/>	21.	Is the specified gas pressure available at the fuel regulator inlet?		
<input type="checkbox"/>	<input type="checkbox"/>	22.	Does the gas solenoid valve function?		
<input type="checkbox"/>	<input type="checkbox"/>	23.	Are the manually operated fuel and cooling water valves installed allowing manual operation or bypass of the solenoid valves?		
Exhaust		<input type="checkbox"/>	<input type="checkbox"/>	36.	Is the battery charger AC circuit connected to the corresponding voltage?
<input type="checkbox"/>	<input type="checkbox"/>	24.	Is the exhaust line sized per guidelines and does it have flexible connector(s)? Is the flexible connector(s) straight?		
		Transfer Switch, Remote Control System, Accessories			
		<input type="checkbox"/>	<input type="checkbox"/>	37.	Is the transfer switch mechanism free of binding? Note: Disconnect all AC sources and operate the transfer switch manually.
		<input type="checkbox"/>	<input type="checkbox"/>	38.	Are the transfer switch AC conductors correctly connected? Verify lead designations using the appropriate wiring diagrams.
		<input type="checkbox"/>	<input type="checkbox"/>	39.	Is all other wiring connected, as required?
		Batteries and DC Electrical System			
		<input type="checkbox"/>	<input type="checkbox"/>	40.	Does the battery(ies) have the specified CCA rating and voltage?
		<input type="checkbox"/>	<input type="checkbox"/>	41.	Is the battery(ies) filled with electrolyte and connected to the battery charger?
		<input type="checkbox"/>	<input type="checkbox"/>	42.	Are the engine starting cables connected to the battery(ies)?
		<input type="checkbox"/>	<input type="checkbox"/>	43.	Do the engine starting cables have adequate length and gauge?
		<input type="checkbox"/>	<input type="checkbox"/>	44.	Is the battery(ies) installed with adequate air ventilation?
		<input type="checkbox"/>	<input type="checkbox"/>	45.	Are the ends of all spark plug wires properly seated onto the coil/distributor and the spark plug?
		Special Requirements			
		<input type="checkbox"/>	<input type="checkbox"/>	46.	Is the earthquake protection adequate for the equipment and support systems?
		<input type="checkbox"/>	<input type="checkbox"/>	47.	Is the equipment protected from lightning damage?

Generator Set/Transfer Switch Startup Checklist

This document has generic content and some items may not apply to some applications. Check only the items that apply to the specific application. Read and understand all of the safety precautions found in the Operation and Installation Manuals. Complete the Installation Checklist before performing the initial startup checks. Refer to Service Bulletin 616 for Warranty Startup Procedure Requirements regarding generator set models with ECM-controlled engines.

- | <div style="display: flex; justify-content: space-between; font-size: 0.8em; margin-bottom: 5px;"> Does Not
Yes Apply Does Not
Yes Apply </div> | |
|--|---|
| <input type="checkbox"/> <input type="checkbox"/> 1. Verify that the engine is filled with oil and the cooling system is filled with coolant/antifreeze. | <input type="checkbox"/> <input type="checkbox"/> 29. Close the normal source circuit breaker or replace fuses to the transfer switch. |
| <input type="checkbox"/> <input type="checkbox"/> 2. Prime the fuel system. | <input type="checkbox"/> <input type="checkbox"/> 30. Check the normal source voltage, frequency, and phase sequence on three-phase models. The normal source must match the load. |
| <input type="checkbox"/> <input type="checkbox"/> 3. Open all water and fuel valves. Temporarily remove the radiator cap to eliminate air in the cooling system. Replace radiator cap in step 21. | <input type="checkbox"/> <input type="checkbox"/> 31. Open the normal source circuit breaker or remove fuses to the transfer switch. |
| <input type="checkbox"/> <input type="checkbox"/> 4. Place the generator set master switch in the OFF/RESET position. Observe Not-in-Auto lamp and alarm, if equipped, on the controller. | <input type="checkbox"/> <input type="checkbox"/> 32. Manually transfer the load to the normal source. |
| <input type="checkbox"/> <input type="checkbox"/> 5. Press the lamp test, if equipped on controller. Do all the alarm lamps on the panel illuminate? | <input type="checkbox"/> <input type="checkbox"/> 33. Close the generator set main line circuit breakers, close the safeguard breaker, and/or replace the fuses connected to the transfer switch. |
| <input type="checkbox"/> <input type="checkbox"/> 6. Open the main line circuit breakers, open the safeguard breaker, and/or remove fuses connected to the generator set output leads. | <input type="checkbox"/> <input type="checkbox"/> 34. Place the generator set master switch in the RUN position. |
| <input type="checkbox"/> <input type="checkbox"/> 7. Turn down the speed control (electronic governor) or speed screw (mechanical governor).* | <input type="checkbox"/> <input type="checkbox"/> 35. Check the generator set voltage, frequency, and phase sequence on three-phase models. The generator set must match normal source and load. |
| <input type="checkbox"/> <input type="checkbox"/> 8. Verify the presence of lube oil in the turbocharger, if equipped. See the engine and/or generator set operation manual. | <input type="checkbox"/> <input type="checkbox"/> 36. Place the generator set master switch in the OFF/RESET position. |
| <input type="checkbox"/> <input type="checkbox"/> 9. Place the generator set master switch in the RUN position. Allow the engine to start and run for several seconds. | <input type="checkbox"/> <input type="checkbox"/> 37. Open the generator set main line circuit breakers, open the safeguard breaker, and/or remove the fuses connected to the transfer switch. |
| <input type="checkbox"/> <input type="checkbox"/> 10. Verify that the day tank, if equipped, is energized. | <input type="checkbox"/> <input type="checkbox"/> 38. Reconnect the power switching device and logic controller wire harness at the inline disconnect plug at the transfer switch. |
| <input type="checkbox"/> <input type="checkbox"/> 11. Place the generator set master switch in the OFF/RESET position. Check for oil, coolant, and exhaust leaks. | <input type="checkbox"/> <input type="checkbox"/> 39. Close the normal source circuit breaker or replace fuses to the transfer switch. Place the generator set master switch to the AUTO position. |
| <input type="checkbox"/> <input type="checkbox"/> 12. Turn on the water/oil heaters and fuel lift pumps. | <input type="checkbox"/> <input type="checkbox"/> 40. Close the generator set main line circuit breakers, close the safeguard breaker, and/or replace the fuses connected to the transfer switch. |
| <input type="checkbox"/> <input type="checkbox"/> 13. Check the battery charger ammeter for battery charging indication. | <input type="checkbox"/> <input type="checkbox"/> 41. Place the transfer switch in the TEST position (load test or open normal source circuit breaker). NOTE: Obtain permission from the building authority before proceeding. This procedure tests transfer switch operation and connects building load to generator set power. |
| <input type="checkbox"/> <input type="checkbox"/> 14. Place the generator set master switch in the RUN position. Verify whether there is sufficient oil pressure. Check for oil, coolant, and exhaust leaks. | <input type="checkbox"/> <input type="checkbox"/> 42. Readjust frequency to 50 or 60 Hz with total building loads.* |
| <input type="checkbox"/> <input type="checkbox"/> 15. Close the safeguard circuit breaker. Adjust the engine speed to 50/60 Hz if equipped with an electronic governor or to 52.8/63 Hz if equipped with a mechanical governor.* | <input type="checkbox"/> <input type="checkbox"/> 43. Verify that the current phase is balanced for three phase systems. |
| <input type="checkbox"/> <input type="checkbox"/> 16. If the speed is unstable, adjust according to the appropriate engine and/or governor manual.* | <input type="checkbox"/> <input type="checkbox"/> 44. Release the transfer switch test switch or close the normal circuit breaker. The transfer switch should retransfer to the normal source after appropriate time delay(s). |
| <input type="checkbox"/> <input type="checkbox"/> 17. Adjust the AC output voltage to match the load voltage using the voltage adjusting control. See the generator set/controller operation manual. | <input type="checkbox"/> <input type="checkbox"/> 45. Allow the generator set to run and shut down automatically after the appropriate cool down time delay(s). |
| <input type="checkbox"/> <input type="checkbox"/> 18. Allow the engine to reach normal operating coolant temperature. | <input type="checkbox"/> <input type="checkbox"/> 46. Set the plant exerciser to the customer's required exercise period, if equipped. |
| <input type="checkbox"/> <input type="checkbox"/> 19. Check the operating temperature on city water-cooled models and adjust the thermostatic valve as necessary. | <input type="checkbox"/> <input type="checkbox"/> 47. Verify that all options on the transfer switch are adjusted and functional for the customer's requirements. |
| <input type="checkbox"/> <input type="checkbox"/> 20. Manually overspeed the engine to cause an engine shutdown (68-70 Hz on 60 Hz models and 58-60 Hz on 50 Hz models). Place the generator set master switch in the OFF/RESET position.* | <input type="checkbox"/> <input type="checkbox"/> 48. If possible, run the building loads on the generator set for several hours or perform the load bank test if required. |
| <input type="checkbox"/> <input type="checkbox"/> 21. Check the coolant level, add coolant as necessary, and replace the radiator cap. Verify that all hose clamps are tight and secure. | <input type="checkbox"/> <input type="checkbox"/> 49. Verify that all the wire connections from the generator set to the transfer switch and optional accessories are tight and secure. |
| <input type="checkbox"/> <input type="checkbox"/> 22. Place the generator set master switch in the RUN position. | <input type="checkbox"/> <input type="checkbox"/> 50. Verify that the customer has the appropriate engine/generator set and transfer switch literature. Instruct the customer in the operation and maintenance of the power system. |
| <input type="checkbox"/> <input type="checkbox"/> 23. Verify the engine low oil pressure and high coolant temperature shutdowns.* | <input type="checkbox"/> <input type="checkbox"/> 51. Fill out the startup notification at this time and send the white copy to the Generator Warranty Dept. Include the warranty form if applicable. |
| <input type="checkbox"/> <input type="checkbox"/> 24. Check the overcrank shutdown.* | |
| <input type="checkbox"/> <input type="checkbox"/> 25. Place the generator set master switch in the OFF/RESET position. | |
| <input type="checkbox"/> <input type="checkbox"/> 26. Open the normal source circuit breaker or remove fuses to the transfer switch. | |
| <input type="checkbox"/> <input type="checkbox"/> 27. Disconnect the power switching device and logic controller wire harness at the inline disconnect plug at the transfer switch. | |
| <input type="checkbox"/> <input type="checkbox"/> 28. Manually transfer the load to the emergency source. | |

* Some models with an Engine Electronic Control Module (ECM) may limit or prohibit adjusting the engine speed or testing shutdowns. Refer to appropriate documentation available from the manufacturer.



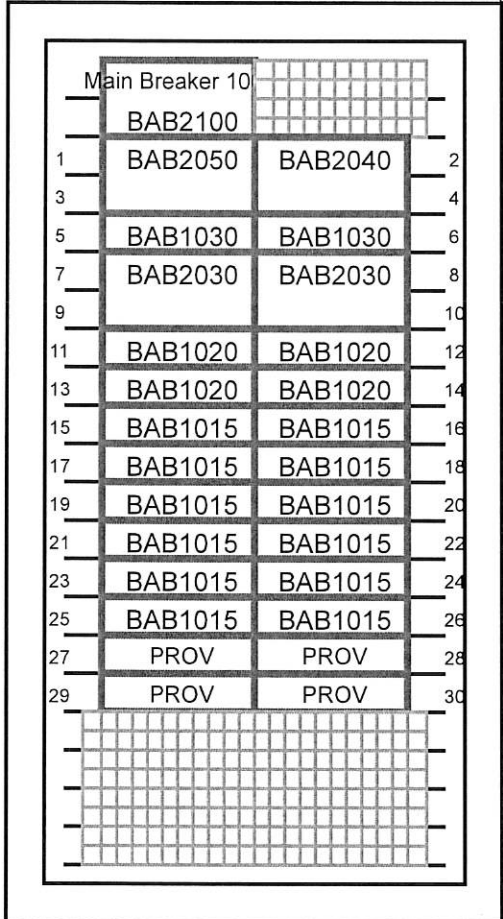
Detail Bill of Material

Project Name: EFI# 93136
General Order No:

Item No.	Qty	Product	Description
	1	Panelboards	30 Circuits, 100A, Fully Rated, 120/240V 1Ph 3W, Copper Bus, 10kAIC, 100A, 2P BAB Main Breaker[Top Fed], Surface Mounted

Catalog No P1C100BT26CH01
Designation 93136 LP-2

Qty	List of Materials
1	100A, 2P BAB Main Breaker
22	Padlockable Lockoff Device
4	1P BAB Branch Provision Only
1	50A, 2P BAB Branch Breaker
1	40A, 2P BAB Branch Breaker
2	30A, 2P BAB Branch Breaker
2	30A, 1P BAB Branch Breaker
12	15A, 1P BAB Branch Breaker
4	20A, 1P BAB Branch Breaker
1	Copper Main Bus, 100 Amps
1	Std. Bolted Cu Ground Bar (Cu Cable Only)
1	Panel Nameplate - White with Black Letters
1	Type 1 Enclosure: EZB2036R
1	EZ Trim, Door in Door, Concealed Hardware: EZT2036S



General Information (Section 1 of 1)

Service Voltage: 120/240V 1Ph 3W **Enclosure:** Type 1
Bus Rating & Type: 100A Copper **Neutral Rating:** 100A
Ground Bar: Std. Bolted Copper, Cu cable only
S.C. Rating: 10k A.I.C. Fully Rated

Main Device Type: Main Breaker - Top Cable Entry
Main Terminals: Mechanical - (1) #8-1/0 (Cu/Al)
Neutral Terminals: Mechanical - (1) #14-1/0 (Cu/Al)
Box Catalog No.: EZB2036R
Trim: EZ Trim, Door in Door, Concealed Hardware (EZT2036S)
 Surface Mounted

Box Dimensions: 36.00" [914.4mm]H x 20.00" [508.0mm]W x 5.75" [146.1mm]D
Min. Gutter Size: Top = 5.5" [139.7mm] Bottom = 5.5" [139.7mm]
 Left = 6.0" [152.4mm] Right = 6.0" [152.4mm]

Panel ID Nameplate: (1) 93136 LP-2
Type: Plastic, adhesive-backed (2) 120/240V 1Ph 3W
Color: White with Black Letters (3)

UL *****Non-Interchangeable Main Device*****

Trim Lock: Standard Lock & Key (Keyed WEM2)
 Circuit Directory: Plastic Sleeve with Card
 Main Circuit Breaker Trip Type: Thermal-Magnetic.
 Seismic Label (IBC/CBC Seismic Qualified).
 Heat Loss - Watts (Est.) = 50
 Weight - lbs (Est.) = 97
 Wire shall be based on the ampacity of 75°C rated conductors unless otherwise indicated.

Device Modifications:

Ref #	Description
1256C41G05	Padlockable Lockoff
Ckt #: 1, 2, 5, 6, 7, 8, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26	

Branch Devices

Qty	Poles	Trip	Frame	Amps	kAIC
4	1	20	BAB	100	10
12	1	15	BAB	100	10
2	1	30	BAB	100	10
2	2	30	BAB	100	10
1	2	40	BAB	100	10
1	2	50	BAB	100	10
4	1		PROV		

Main Devices

Qty	Poles	Trip	Frame	Amps	kAIC
1	2	100	BAB	100	10

Notes:

The information on this document is created by Eaton Corporation. It is disclosed in confidence and it is only to be used for the purpose in which it is supplied.	PREPARED BY SHAUN HOPPE	DATE 2/23/2023	Eaton		
	APPROVED BY	DATE	JOB NAME EFI# 93136		
	VERSION 1.0.0.56		DESIGNATION 93136 LP-2	DRAWING TYPE Customer Approval	
NEG-ALT Number D4TD0216X3K2-0000	REVISION 0	DWG SIZE A	G.O.	ITEM	SHEET 1 of 1

LS35P51B02

General Information

Extended Product Type:	LS35P51B02
Product ID:	1SBV012151R1202
EAN:	3471522610980
Catalog Description:	LS35P51B02 Limit Switch
Long Description:	LS35P51B02 Limit Switch

Categories

Products » Low Voltage Products and Systems » Control Products » Sensors » Limit Switches

Ordering

EAN:	3471522610980
Minimum Order Quantity:	5 piece
Customs Tariff Number:	85364900

Dimensions

Product Net Width:	30 mm
Product Net Weight:	0.107 kg

Container Information

Package Level 1 Units:	1 piece
Package Level 1 Width:	118 mm
Package Level 1 Height:	54 mm
Package Level 1 Length:	32 mm
Package Level 1 Gross Weight:	0.105 kg
Package Level 1 EAN:	3471522610980

Environmental

Ambient Air Temperature:	Operation -25 ... +70 °C Storage -30 ... +80 °C
---------------------------------	--

Resistance to Shock acc. to IEC 60068-2-27: Half-sine Pulse for 11 ms, No Change in Contact Position 50 m/s²

Resistance to Vibrations acc. to IEC 60068-2-6: 25g (10 to 500 Hz) no change in position of contacts greater than 100 µs

Technical UL/CSA

Pilot Duty of Contact Elements acc. UL508:	A600 Q600
Flammability According to UL94:	V0

Additional Information

Action Type of the Contact Element (acc. to IEC 60947-5-1):	snap action contacts
Actuation Speed:	acc. to IEC 60947-5-1 Max. 1.50 m/s acc. to IEC 60947-5-1 Min. 0.00 m/s
Actuation Torque:	acc. to IEC 60947-5-1 Min. 0.10 N·m

Actuator Type:	adjustable Ø 18 mm polyamide roller lever
Angular Head Adjustment:	adjustable head every 90°
Angular Lever Adjustment:	10° in 10°
Climatic Withstand:	according to IEC 68-2-3 and salty mist according to IEC 68-2-11
Connecting Capacity:	AWG 20 ... AWG 14 0.5 ... 2.5 mm ²
Connecting terminals (delivered in open position):	M3.5 (+,-) pozidriv 2 screw with cable clamp
Consistency (Measured over 1 Million Operations):	0.1 mm
Contact Element Form (acc. to IEC 60947-5-1):	Zb
Conventional Free-air Thermal Current (I_{th}):	acc. to IEC 60947-5-1, q = 40 °C 10.0 A
Degree of Protection:	acc. to IEC 60529 IP65
Electrical Shock Protection acc. to IEC 536:	Double insulation - Class II
IIT Publishing Status:	Level 0 - Information enabled
Maximum Electrical Switching Frequency:	3600 cycles per hour
Mechanical Durability:	10 million
Mounting by Screws (not supplied):	2 x M4 screws
Mounting Position:	all positions are authorised
Movement to be Detected:	30° Cam Translation Movement
Number and Type of Bottom Cable Glands:	1/2 NPT plastic adaptor
Number of Auxiliary Contacts NC:	2
Order Multiple:	1 piece
Positive Opening Operation of NC Contact(s):	No
Product Main Type:	LS30
Product Name:	Limit Switch
Rated Frequency (f):	Supply Circuit 50 Hz Supply Circuit 60 Hz
Rated Impulse Withstand Voltage (U_{imp}):	6 kV
Rated Insulation Voltage (U_i):	acc. to IEC 60947-5-1 and VDE 0110 (Gr. C) 690 V acc. to UL/CSA 600 V
Rated Operational Current AC-15 (I_e):	(130 V) 5.5 A (230 V) 3.1 A (240 V) 3 A (24 V) 10 A (400 V) 1.8 A
Rated Operational Current DC-13 (I_e):	(110 V) 0.6 / 66 A (24 V) 2.8 / 67.2 A (250 V) 0.27 / 67.5 A

Resistance Between Contacts: 25 mΩ

Standards: IEC 60947-1, IEC 60947-5-1, EN 60947-1, EN 60947-5-1, UL 508 and CSA C22-2 N°14

Terminal Marking: according to EN 50013

Certificates and Declarations (Document Number)

Declaration of Conformity - CE: 1SBD250881C2000

Data Sheet, Technical Information: AC1300

Classifications

ETIM 4: EC001829 - Position switch modular

ETIM 5: EC001829 - Position switch modular

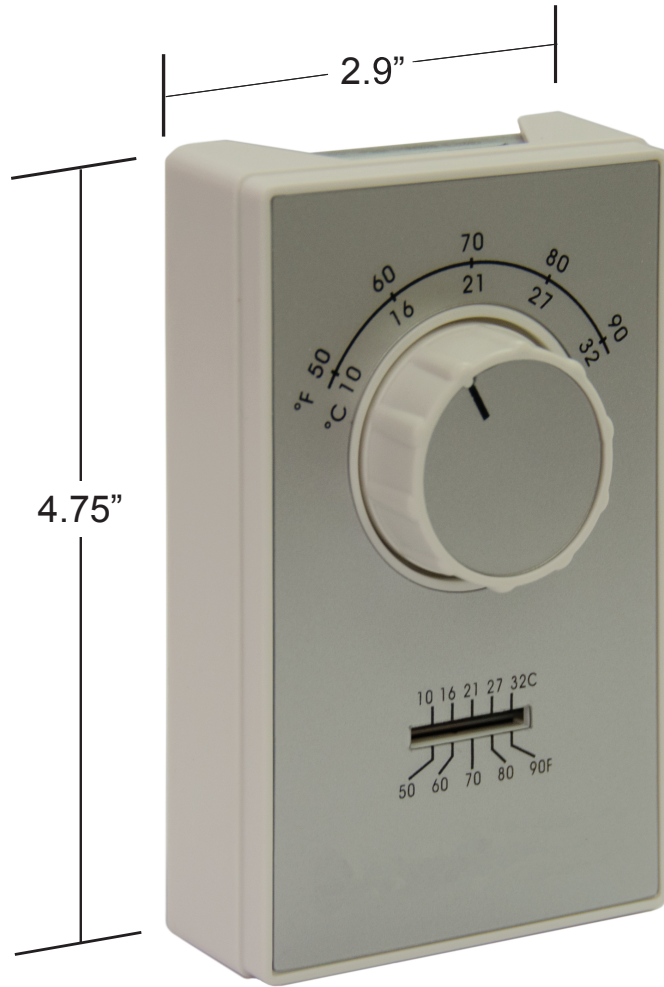
ETIM 6: EC001829 - Position switch modular



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ET9 Series

Line Voltage Thermostats



Operational Specifications

Setpoint Temperature Range

50-90°F / 10-32°C

35-75°F / 2-24°C

Rated Differential

2-4°F

Voltage

120-277VAC

Amp Rating

Heating: 22 Amps, Resistive Max.

Cooling: 3/4 HP 125 VAC,

1-1/2 HP 250/277 VAC

Thermometer: Standard

Glass, Alcohol filled

Anticipation: Optional

Fixed Heat

Imported to TPI Specifications

Packaging Specifications

Product Size

4.75"H x 2.9"W x 1.5"D*

Depth is from wall to top of knob.

Individual Carton Size

4.75"L x 3W x 2.75"D

Individual Carton Weight

< 1lb (varies slightly by model)

Master Carton Qty

25 Pcs

Master Carton Size

16"L x 14.5"W x 6"H

Master Carton Weight

19 LBS (varies slightly by model)

Model	PCN #	DESCRIPTION	Range	Connections	Pos. Off	Anticipator	
AET9DWTS	05238302	DPST Heat Only	50-90°F	Wire Leads	Yes	Yes	
AET9SWTS	05238402	SPST Heat Only	50-90°F	Wire Leads	No	Yes	
ET9DTS	05238502	DPST Heat Only	50-90°F	Terminals	Yes	No	
ET9D4TS	05238602	DPST Heat Only	35-75°F	Terminals	Yes	No	
ET9DWTS	05238702	DPST Heat Only	50-90°F	Wire Leads	Yes	No	
ET9MTS	05238802	2 Stage Heat Only	50-90°F	Terminals	No	No	
ET9STS	05238902	SPST Heat Only	50-90°F	Terminals	No	No	
ET9S4TS	05239002	SPST Heat Only	35-75°F	Terminals	No	No	
ET9SRTS	05239102	SPST Cool Only	50-90°F	Terminals	No	No	
ET9SWTS	05239202	SPST Heat Only	50-90°F	Wire Leads	No	No	
ETD9MTS*	05239302	2 Stage Heat, 1 Stg Cool	50-90°F	Terminals	No	No	
ETD9STS	05239402	SPDT Heat or Cool	50-90°F	Terminals	No	No	

* The 2 stage heat / 1 stage cool models may also be used as a 1 stage heat / 1 stage cool deadband thermostat.

Columbus Electric/div. of TPI
Johnson City, Tennessee

T800-251-7828
F423-477-0545

Photoelectric Smoke Alarm

S 1 2 0 9

S E R I E S

Applications

The S1209 (120VAC/9VDC) Series photoelectric smoke alarms are for use as an evacuation device in all dwelling units, including but not limited to homes, apartments, hospitals, hotels and motels. The S1209 Series is listed in compliance with ANSI/UL 217 for installation per NFPA 72 and the International Codes (IBC/IFC/IRC).

Available in two models, the S1209 Series is engineered to virtually eliminate nuisance alarms and deliver outstanding performance wherever reliable smoke detection is required.

The S1209 Series is provided with a 9VDC alkaline battery for emergency power back-up in the event building power is lost. The battery impedance is verified and the alarm provides a low or missing battery warning. The battery drawer provides easy replacement without removing the unit from the wall or ceiling.

The Gentex S1209 Series is provided with a push button self test and functionality test feature. The push button self test verifies power operation and tests battery levels. The push and hold button functionality test analyzes the photoelectric sensing chamber for proper operation of smoke alarm. The self and functionality tests are in compliance with NFPA 72 and ANSI/UL Standards.

Features of the smoke alarm series include DUALINK® tandem capabilities with all Gentex tandem interconnect capable alarms products. Options include Form A/Form C dry contacts for remote annunciation and connection to a protected premises alarm system to provide a supervisory/trouble signal. The S1209 Series provides Temporal 3 evacuation tone for the smoke alarm units



Product Listings

SIGNALING



LISTED



- ANSI/UL 217 Listed
- CSFM # 7257-0569:0145

Product Compliance

- NFPA 72
- IBC/IFC/IRC
- Quality Management System is certified to: ISO 9001:2008



Standard Product Features

- 120VAC with 9VDC battery back-up
- Photoelectric smoke sensing technology
- Horn frequency 3100 Hz (nominal)
- Temporal 3 evacuation audible signal
- Optional Auxiliary Form A/Form C relay contacts (F model)
- Relay contacts operate when on battery back-up
- Nominal 2.5% sensitivity
- Push button self test feature, verifies power sources/operation
- Push and hold button functional test feature, analyzes sensing chamber
- Quick-disconnect wiring harness
- DUALINK® - tandem with all Gentex tandem capable alarms
- Red LED pulses every 30 seconds, green LED for AC power on
- Solid State Red LED to indicate smoke presence
- Mounting hardware adapts to standard junction boxes
- Dust cover to prevent particle contamination during installation
- Low or missing battery indicator
- 12 month warranty from date of manufacture or 18 months from date of purchase

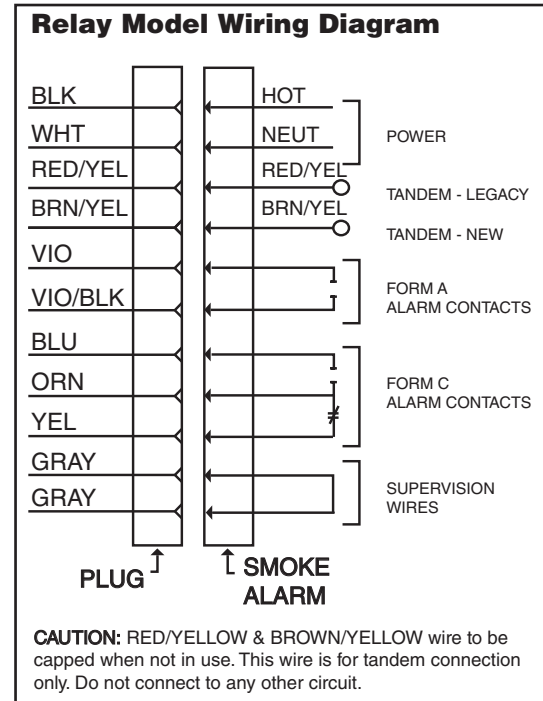
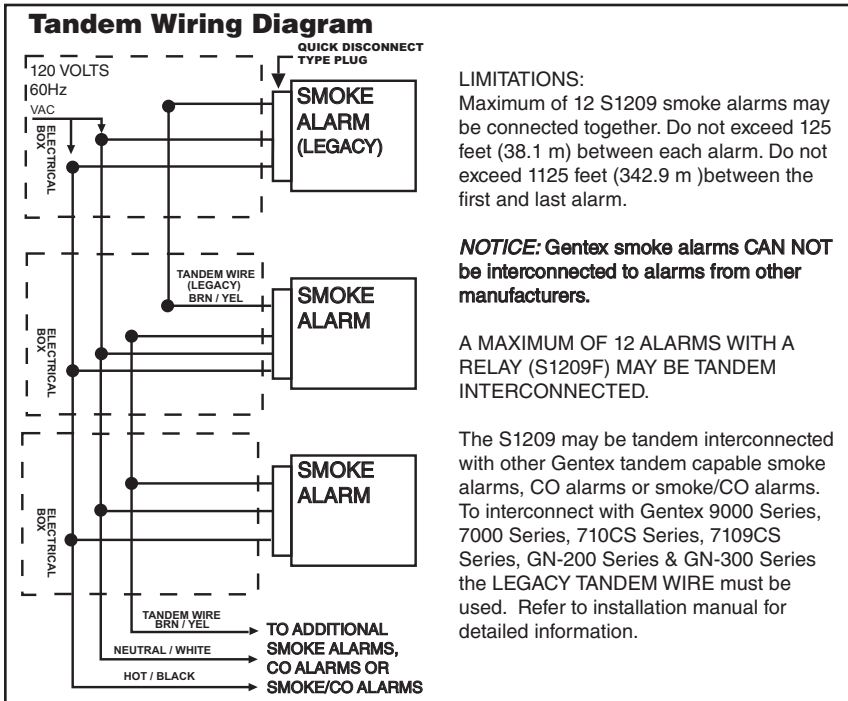
Model Number	Part Number	Form A/ Form C Relay
S1209	917-0059-002	
S1209F	917-0057-002	●

Electrical Specifications

Operating Voltage.....	120VAC, 60Hz
Operating Current	0.045 amps
Operating Current (Relay Options)	0.070 amps
Operating Ambient Temp Range	40°F-100°F (4.4°C-38°C)
Alarm Horn Rating	meets or exceeds 85dBA
.....	at 10ft (3.048 m)
Auxiliary Relay	1 Form A & 1 Form C (0.5 amp)
Size	Diameter at base: 5.75 in. (14.605 cm)
.....	Overall diameter: 6.25 in. (16.51 cm)
.....	Depth: 1.8 in (4.572 cm)
Secondary Power Source	Alkaline 9 VDC battery
.....	Duracell® MN 1604

S1209 SERIES

Wiring Diagrams



NOTES:

- Utilizing DUALINK®, if S1209 alarm annunciates, all smoke alarms, CO alarms or combination smoke/CO alarms tandem interconnected will sound smoke alarm warning.
- Utilizing DUALINK®, if S1209 is tandem interconnected with CO alarms or combination smoke/CO alarms and CO devices go into alarm, CO alarms and smoke alarm will sound CO warning.
- When both smoke and CO conditions are present, smoke condition will have priority and alarm will sound smoke annunciation.

Architect & Engineering Specifications

The photoelectric smoke alarm shall be a Gentex Model S1209/S1209F or approved equal which shall provide at least the following features and functions:

- Nominal smoke sensitivity shall be 2.5%.
- The smoke alarm portion of device shall utilize an infrared LED sensing circuit which pulses in 4 to 5 second intervals when subjected to smoke. After 2 consecutive pulses in smoke, the alarm will activate.
- The S1209 Series alarm shall have a Duracell® MN 1604 9VDC alkaline battery as a back-up in the event building power is lost.
- The 9VDC battery impedance shall be verified by the circuit of the smoke alarm.
- The alarm shall provide an indicator when the battery is low in power, high impedance or is missing.
- A solid state piezo alarm meets or exceeds the rating of 85dBA at 10ft.
- A visual LED monitor (condition indicator) will slow pulse in normal operation and rapid pulse in alarm (red color)
- An easily accessible test button shall be provided. Push down on button for 5 seconds causing smoke alarm to activate. If device does not go into alarm, the device is not working properly.
- The device shall have tandem interconnect capability of up to 12 smoke alarms.
- The alarm shall have the capability to tandem interconnect with all Gentex tandem capable smoke alarms, CO alarms or combination smoke/CO alarms, including 7000/7003 Series, 9000/9003 Series, 710CS/713CS Series, 7109CS/7139CS Series, GN-200/GN-300 Series, CO1209 Series and GN-503 Series
- The manufacturer shall provide models with the optional feature of auxiliary Form A/Form C relay contacts for initiating remote functions and annunciation
- Unit must be ANSI/UL 217 listed for both wall and ceiling mounting.
- Unit shall be listed by Underwriters Laboratories and California State Fire Marshal (CSFM).

All equipment shall be completely factory assembled, wired and tested, and the contractor shall be prepared to submit a certified letter testifying to this condition. Alarms which do not meet all of the requirements of this specification will not be considered.

For complete product specifications, refer to product installation manual.

24 units per carton
24 pounds per carton

GENTEX CORPORATION

Fire Protection Products Group • www.gentex.com
10985 Chicago Drive • Zeeland, Michigan 49464
616.392.7195 • 1.800.436.8391 • 616.392.4219 Fax

Gentex Corporation reserves the right to make changes to the product data sheet at their discretion.

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551-0001-02

Catalog Number
Notes
Type

FEATURES & SPECIFICATIONS

INTENDED USE — A general purpose and energy-efficient surface-mounted or suspended LED fixture, suitable for wet, damp and/or cold locations. For vapor-tight demanding environments where moisture or dust is a concern and where relatively low fixture mounting heights and wide fixture spacing are common. Typical applications include industrial facilities, parking garages, retail malls, multi-purpose rooms, garden centers, and food processing **Certain airborne contaminants can diminish the integrity of acrylic and/or polycarbonate.** [Click here for Acrylic-Polycarbonate Compatibility table for suitable use.](#)

CONSTRUCTION — One-piece 5VA fiberglass housing with integral perimeter channel utilizing continuous poured-in-place NEMA 4X gasket. Approved as a wireway and for through wiring. Captive polymeric latches are standard. Stainless steel latches (#316) available as an option for food processing or more demanding applications.

Power connection is easily accomplished through pre-drilled holes at each end populated with wet location fittings for maximum flexibility. Fixture easily mounts to ceilings and other solid structures, or can be suspended with chain, cable or rod using stainless steel mounting brackets (included).

OPTICS — Injection molded, acrylic lens (.080" thick) provides high impact-resistance comparable to 100% DR. For L48 Medium Distribution, a UV stabilized polycarbonate diffuser (.080" thick) in clear or frosted for additional impact strength where vandal protection is desired.

Expected service life of 60,000 hours at 80% lumen maintenance (L80); predicted life of more than 100,000 hours.

ELECTRICAL — Utilizes high-efficiency LEDs mounted to core circuit boards. High-efficiency drivers operate 120 thru 277V, 347V and 480V offered with 0-10 volt dimming, allowing granular control when coupled with wireless networking controls. Integral 6kV/3kA surge protection, tested in accordance to IEEE/ANSI standards.

INSTALLATION — Fixture can be ceiling or suspended mounted. Pre-punched stainless steel mounting brackets are included (two per luminaire) for easy field-attachment of bolts, screws and other mounting hardware. A covered ceiling is not required to maintain wet location listing or IP rating.

LISTINGS — CSA certified to UL and C-UL standards. Listed for wet locations in ambient temps ranging from -35°C (-31°F) to 25°C (77°F) when fixture is surface mounted or up to 45°C (113°F) when fixture is suspended at least 6" from ceiling. IP65, IP66 and IP67 rated. NSF splash-zone 2 certified and meets FDA/USDA guidelines. Nema 4X rated lens and housing. 1500 PSI hose-down. DesignLights Consortium® (DLC) Premium qualified product and DLC qualified product. Not all versions of this product may be DLC Premium qualified or DLC qualified. Please check the DLC Qualified Products List at www.designlights.org/QPL to confirm which versions are qualified.

WARRANTY — 5-year limited warranty. Complete warranty terms located at: www.acuitybrands.com/CustomerResources/Terms_and_conditions.aspx

NOTE: Actual performance may differ as a result of end-user environment and application. All values are design or typical values, measured under laboratory conditions at 25 °C. Specifications subject to change without notice.

Low-Profile Enclosed and Gasketed Industrial

FEM LED

CEILING/ SUSPENDED MOUNT



Deep Lens



Low profile with sensor



Low profile



Stock configurations are offered for shorter lead times:

Standard Part Number	Stock Part Number
FEM L48 4000LM LPAFL MD MVOLT GZ10 40K 80CRI	FEM L48 4L MVOLT
FEM L48 4000LM LPAFL MD MVOLT GZ10 50K 80CRI	FEM L48 4L MVOLT 5K

A+ Capable Luminaire

This item is an A+ capable luminaire, which has been designed and tested to provide consistent color appearance and out-of-the-box control compatibility with simple commissioning.

- All configurations of this luminaire meet the Acuity Brands' specification for chromatic consistency
- This luminaire is part of an A+ Certified solution for nLight® or XPoint™ Wireless control networks marked by a shaded background*

To learn more about A+, visit www.acuitybrands.com/aplus.

*See ordering tree for details

FEM LED Low-Profile Enclosed and Gasketed



A+ Capable options indicated by this color background.

ORDERING INFORMATION

Lead times will vary depending on options selected. Consult with your sales representative.

Example: FEM L48 4000LM IMAFL WD MVOLT GZ10 40K 80CRI

Series	Length	Nominal Lumens	Diffuser	Distribution	Voltage	Driver	Color temperature	CRI
FEM	L48 48" ¹	3000LM 3,000 lumens	IMAFL Acrylic, lineal ribbed frosted lens	MD Medium	MVOLT MVOLT	GZ10 0-10V dimming	30K 3000K	80CRI 80 CRI
		4000LM 4,000 lumens	IMACD Acrylic, clear deep lens	WD Wide ⁴	120 120V		35K 3500K	90CRI 90 CRI
		6000LM 6,000 lumens	IMAFD Acrylic, deep frosted lens		277 277V		40K 4000K	
		8000LM 8,000 lumens	LPAFL Acrylic, low profile frosted lens ³		347 347V ⁵		50K 5000K	
		10000LM 10,000 lumens	LPACL Acrylic, low profile clear lens ³		480 480V ⁵			
	L96 96" ²	9000LM 9,000 lumens	LPPCL Polycarbonate, low profile clear lens ³					
		12000LM 12,000 lumens	LPPFL Polycarbonate, low profile frosted lens ³					
		15000LM 15,000 lumens						
		18000LM 18,000 lumens						
		20000LM 20,000 lumens						

Options

SF	Single fuse (available with 120, 277, 347) ⁶	CS88	6' Brad Harrison 16/3 cord and straight blade plug set ⁶	MSI10NWL	Low mount 360° integral motion sensor, wet location, On/Off operation ⁶
DF	Double Fusing (available with 347, 480V) ⁶	CS88L12	12' Brad Harrison 16/3 cord and straight blade plug set ⁶	MSI102L3VWL	Low mount 360° integral motion sensor, wet location, High/Low operation (bi-level) ⁶
BSL722	Bodine® emergency LED battery pack for 0°C and up ^{6,7}	CS88R	Brad Harrison receptacle	MSI10NWL DSCNWL	Low mount 360° integral motion sensor, wet location, On/Off operation for motion sensing, override Off due to daylight ⁶
BSL722C	Bodine® emergency LED battery pack for -20°C and up ^{6,7}	CS89	6' white cord, 16/3, no plug, wet location	MSI10XAWL DSCXAWL	Xpoint wireless integral motion sensor, On/Off operation for motion sensing, override Off due to daylight ⁶
BSL722C	Bodine® emergency LED battery pack for -20°C and up ^{6,7}	CS89L12	12' white cord, 16/3, no plug, wet location	XAD	XPoint™ wireless controller, 0-10V dimming ⁶
BGTD	Generator transfer device ^{6,8}	TRS	Tamper Resistant Torx® T10 screws		
SPD	Surge protection device, additional 10kV/5kA ⁶	DPMB	Dual pendant mounting bracket		
WLF	Wet location fitting (two outboard, top)	DL	Damp location		
WLFEND	Wet location fitting (one end)	STSL	Stainless steel latches		
WLFEND2	Wet location fitting (both ends)				

Accessories: Order as separate catalog number.

MHCH 36	Jack chain 36" (pair)
MHHK120	10' single leg air craft cable (ships as pair)
MHHK120SS	10' single leg air craft cable, stainless steel (ships as pair)
RK1 T10DRV	Torx® T10 screwdriver for TRS option
FEMDPMB	Dual pendant mounting bracket (ships as a pair)

Notes

- 1 Available with 3000LM, 4000LM, 6000LM, 8000LM, and 10000LM lumen packages. Not available with WD when using low profile diffuser.
- 2 Available with 9000LM, 12000LM, 15000LM, 18000LM, and 20000LM. Not available with low profile diffuser options.
- 3 Not available with L96. Not available with L48 when ordering WD option.
- 4 Not available with L48 when ordering low-profile lens options.
- 5 Utilizes step-down transformer. Not available with BGTD.
- 6 Must specify voltage.
- 7 Not available with 347 or 480V. For use in ambient temperature up to 30°C.
- 8 Available with 120V or 277V only. For use in ambient environments up to 25°C. Not available with L48 when ordering 10000LM lumen package. Not available with L96 when ordering 18000LM or 20000LM lumen packages.

FEM LED Low-Profile Enclosed and Gasketed

OPERATIONAL DATA

	Lumen packages	Wattage				Diffusers			
		120v	277v	347v	480v	Acrylic Linear Frosted (IMAFI)	Frosted (IMAFD, LPAFL, LPPFL)	Clear (IMACD, LPAFL, LPPFL)	
L48 Medium Distribution <small>*test results reflect less than 1% difference between acrylic (clear/deep/low profile) and polycarbonate (low profile) lens</small>	Delivered Lumens at 30K 80CRI	3000LM	23	23	24	25	2972	3032	3071
		4000LM	31	30	31	32	4019	4100	4153
		6000LM	45	44	46	47	5925	6044	6122
		8000LM	69	67	70	71	7593	7746	7845
		10000LM	80	78	81	82	9781	9979	10107
	Delivered Lumens at 35K 80CRI	3000LM	23	23	24	25	3039	3100	3140
		4000LM	31	30	31	32	4109	4192	4246
		6000LM	45	44	46	47	6057	6179	6258
		8000LM	69	67	70	71	7762	7918	8020
		10000LM	80	78	81	82	9999	10201	10332
	Delivered Lumens at 40K 80CRI	3000LM	23	23	24	25	3086	3148	3189
		4000LM	31	30	31	32	4173	4257	4312
		6000LM	45	44	46	47	6151	6275	6356
		8000LM	69	67	70	71	7883	8042	8145
		10000LM	80	78	81	82	10155	10360	10493
	Delivered Lumens at 50K 80CRI	3000LM	23	23	24	25	3200	3264	3306
		4000LM	31	30	31	32	4326	4414	4470
		6000LM	45	44	46	47	6378	6506	6590
		8000LM	69	67	70	71	8173	8338	8445
		10000LM	80	78	81	82	10529	10741	10879

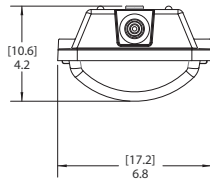
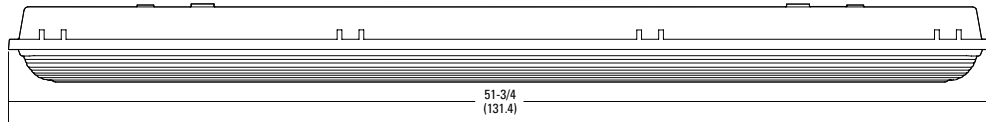
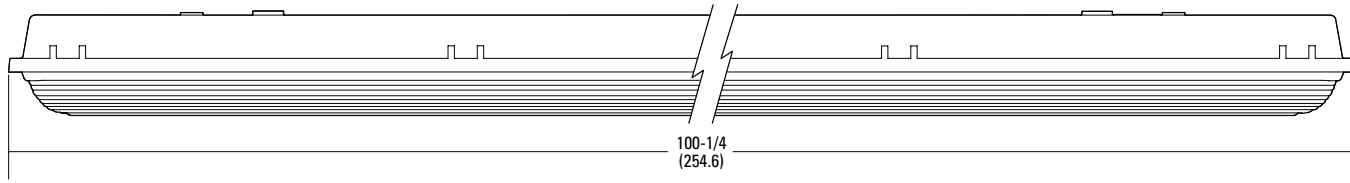
	Lumen packages	Wattage				Diffusers			
		120v	277v	347v	480v	Acrylic Linear Frosted (IMAFI)	Acrylic Frosted (IMAFD)	Acrylic Clear (IMACD)	
L96 Medium Distribution	Delivered Lumens at 30K 80CRI	9000LM	65	64	66	67	8718	8959	9072
		12000LM	88	86	89	90	11370	11685	11831
		15000LM	120	118	122	124	14263	14657	14841
		18000LM	145	141	146	148	16863	17330	17547
		20000LM	160	156	162	164	19313	19847	20096
	Delivered Lumens at 35K 80CRI	9000LM	65	64	66	67	8913	9159	9274
		12000LM	88	86	89	90	11624	11945	12095
		15000LM	120	118	122	124	14581	14984	15172
		18000LM	145	141	146	148	17239	17716	17938
		20000LM	160	156	162	164	19743	20289	20544
	Delivered Lumens at 40K 80CRI	9000LM	65	64	66	67	9051	9302	9419
		12000LM	88	86	89	90	11805	12131	12284
		15000LM	120	118	122	124	14808	15218	15409
		18000LM	145	141	146	148	17507	17992	18218
		20000LM	160	156	162	164	20051	20605	20864
	Delivered Lumens at 50K 80CRI	9000LM	65	64	66	67	9385	9644	9765
		12000LM	88	86	89	90	12239	12578	12736
		15000LM	120	118	122	124	15353	15778	15976
		18000LM	145	141	146	148	18152	18654	18888
		20000LM	160	156	162	164	20789	21364	21632

FEM LED Low-Profile Enclosed and Gasketed

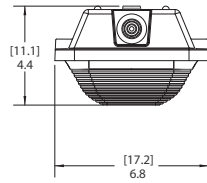
DIMENSIONS

Specifications subject to change without notice.
All dimensions are in inches (centimeters) unless otherwise indicated.

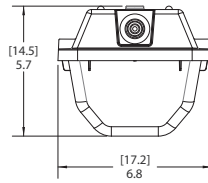
Weight (may vary with options or accessories)
FEM L48: 11.9 lbs (5.397kg)
FEM L96: 24.3 lbs (11.022kg)



Diffuser Type:
LPAFL
LPAFL
LPPFL
LPPCL



Diffuser Type:
IMAFL



Diffuser Type:
IMAFD
IMACD

PHOTOMETRICS

See www.lithonia.com for photometry reports.

DATE: _____ LOCATION: _____
 TYPE: _____ PROJECT: _____
 CATALOG #: _____

Perimashield PRS

WALLPACK

tradeSELECT®

FEATURES

- Non-cutoff refractor illuminates surrounding area to enhance safety and security
- Durable polycarbonate lens and die-cast housing are impact resistant
- Photocontrol for automatic off during daylight hours
- Easy to install by one person
- Environmentally friendly with minimal uplight



RELATED PRODUCTS

- ∅ [NRG®300L](#) ∅ [Sling Wall](#) ∅ [Sling Canopy](#)



SPECIFICATIONS

HOUSING

- Rugged die-cast aluminum housing
- Lens is made of UV stabilized Polycarbonate with self-retaining screws

OPTICS

- Prismatic frosted lens is field replaceable
- Type IV Distribution

INSTALLATION

- Capable of mounting on a minimum of 3-3.5" junction box
- Conduit entrances on bottom and sides

ELECTRICAL

- 0-10 Volt dimmable driver
- For use in 120-277V applications

OPTIONS/CONTROLS

- Photocell can be disconnected during installation if not needed

CERTIFICATIONS

- Fixture is IP65 rated
- Listed to UL1598 for use in wet locations

WARRANTY

- 5 year limited warranty
- See [HLI Standard Warranty](#) for additional information

KEY DATA	
Lumen Range	2841–2898
Wattage Range	22.8
Efficacy Range (LPW)	125–127
Fixture Projected Life (Hours)	>60K
Weights lbs. (kg)	2.75 (1.2)

ORDERING GUIDE

STOCK ORDERING INFORMATION

Catalog Number	Distribution	Wattage	Voltage	Delivered Lumens	LPW	CCT/CRI	Weight lbs. (kg)	Color
PRS-20-5K-PC	Wall	Type IV	22.8	120-277	2898	127	5000K/70	2.75 (1.2)
PRS-20-4K-PC	Wall	Type IV	22.8	120-277	2841	125	4000K/70	2.75 (1.2)

Perimashield PRS

WALLPACK

ELECTRICAL DATA

Nominal Wattage	Input Voltage	Oper. Current (Amps)	System Power (Watts)
20	120	0.19	22.8
	208	0.11	
	240	0.10	
	277	0.08	

PROJECTED LUMEN MAINTENANCE

Ambient Temperature	OPERATING HOURS					
	0	25,000	TM-21-11 36,000	50,000	100,000	L70 (Hours)
25°C / 77°F	1.00	0.95	0.93	0.90	0.81	170,000
40°C / 104°F	0.99	0.94	0.92	0.89	0.80	165,000

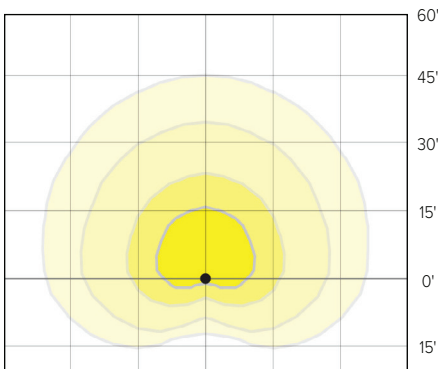
LUMINAIRE AMBIENT TEMPERATURE FACTOR (LATF)

Ambient Temperature		Lumen Multiplier
0°C	32°F	1.03
10°C	50°F	1.01
20°C	68°F	1.00
25°C	77°F	1.00
30°C	86°F	0.99
40°C	104°F	0.98
50°C	122°F	0.97

Use these factors to determine relative lumen output for average ambient temperatures from 0-40°C (32-104°F).

PHOTOMETRY

PRS-20

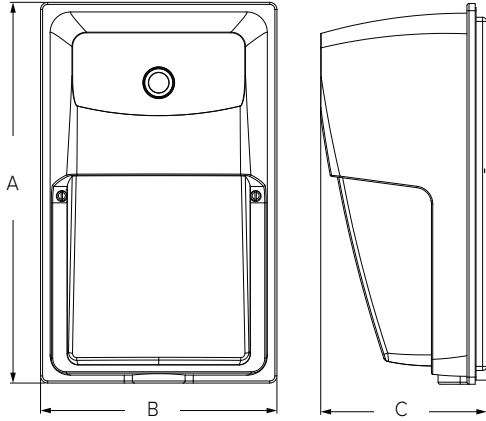


Mounting Height: 10'

Perimashield PRS

WALLPACK

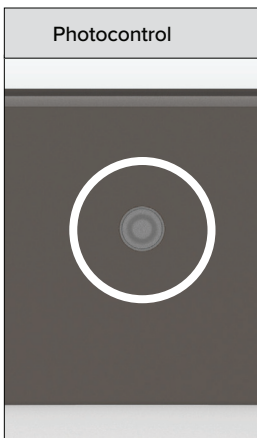
DIMENSIONS



A	B	C	Weight
10.9" (277mm)	6.8" (172mm)	4.8" (121mm)	2.75lbs (1.25kg)

ADDITIONAL INFORMATION

Accessories and Services



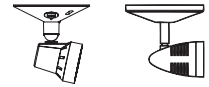
Photocontrol comes standard for energy-saving dusk-to-dawn operation

USE OF TRADEMARKS AND TRADE NAMES

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PG & P12G Series

Steel housing 6V up to 54W & 12V-54W capacities Lead-Calcium battery



Available Head Style Choices:

ELF3

DR130

Head Style Suffix:

/ELF3

/DR130

Housing

- Steel housing
- Standard mist white finish, optional black finish
- Choice of MR16 LED lamp voltages and wattages
- Heads available in thermoplastic or decorative die-cast aluminum

Mounting

- Wall mount
- Universal J-box mounting

Electronics

- Pulse plus charger
- Low voltage disconnect
- Automatic brownout protection
- Battery lock-out
- Fused output circuit
- Optional: Improved Diagnostics
- Optional: Nexus® monitoring system
- 120/277 60Hz

Photometric performance

Lamp	Spacing center-to-center (feet)	
	7 feet mounting height	15 feet mounting height
LD1	43'	36'
LD7	55'	43'
LD9	71'	56'
LD10	100'	85'

Choice of Battery

- 6V or 12V Lead-Calcium battery

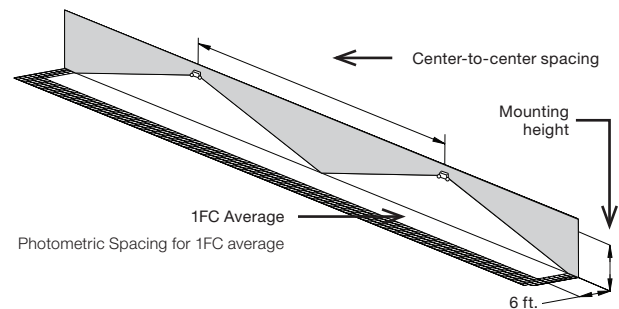
Approvals

- UL 924 Standard
- New York City Approved

Warranty (subject to proper installation and maintenance)

Unit: three-year limited warranty

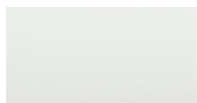
Detailed warranty terms located on **page 182** or online at: www.lightalarms.com



Housing color

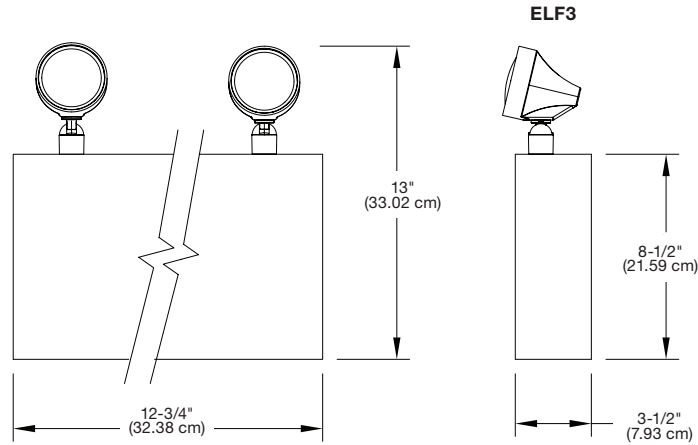


Black



Mist White

Dimensions (Dimensions are approximate and subject to change)



Power consumption chart

Series	Battery	Voltage	DC Specs				AC Specs	
			Battery capacity (in watts)				Units dual voltage ¹	Current Maximum
			90 Mins	2 Hrs	3 Hrs	4 Hrs		
PG1	Lead-Calcium	6V	18	15	0	120VAC 277VAC	0.25A 0.15A	
PG2		6V	54	36	27			18
P12G1		12V	54	36	27			18

¹ All units 120/277 dual voltage, information based on wiring to specific voltage type

Accessories (Order as a separate item)

Description	Product code
Wire guard	WG2-L
Mounting platform	MP-PQA

Ordering format

Number of heads	Series/Capacity	Head style	Lamp type	Housing color	Options
0= No heads	PG1 = 6V-18W	/ELF3= ELF3	LD1 = 6V-4W MR16 LED	-M= Mist White	Blank = No Options
1= One head	PG2 = 6V-54W	(MR16, Plastic)	LD7 = 12V-4W MR16 LED	-B= Black	-ID = Improved Diagnostics (audible) ^{1,3}
2= Two heads	P12G1 = 12V-54W	/DR130 = DR130	LD9 = 12V-5W MR16 LED		-IDNA = Improved Diagnostics (non audible) ^{1,3}
3= Three heads		(MR16, Metal)	LD10 = 12V-6W MR16 LED		-NEX = Nexus® Wired (contact your sales representative) ³
					-NEXRF = Nexus® Wireless (contact your sales representative) ³
					-T3 = Time delay (15 minute)
					-DS = Lamp disconnect switch
					-VS = Vandal-Resistant Screws
					-3CP = 120V Cord & plug, 3 wire, 3ft long ²

Example: 2PG1/DR130LD1

¹ -ID & -IDNA include a time delay feature that can be enabled/disabled in the field or set by the factory by including -ID-TD* or -IDNA-TD*

² -3CP custom length available. Consult your sales representative

³ Minimum lamp load required: 20% of unit capacity

Switches, Three Way
 15A, 120-277V AC
 HBL® Extra Heavy Duty Industrial Switch

HUBBELL

Features

- Large brass binding head screws with deep slots
- Abuse resistant nylon toggle
- Strip gauge for accurate wiring

Ordering Information

Description	Toggle Color	UPC	Catalog Number
Nylon toggle, back and side wired, Illuminated Toggle	Ivory	783585430287	HBL1203IL

Listings

UL Listed
 CSA Certified
 Fed. Spec. W-S-896

Specifications

Top Material	Thermoset
Base Material	Thermoset, Blue
Toggle Material	Nylon
Contacts	Silver Alloy
Terminal Screws	Brass
Ground Screw	Brass (Green)

Performance

Electrical

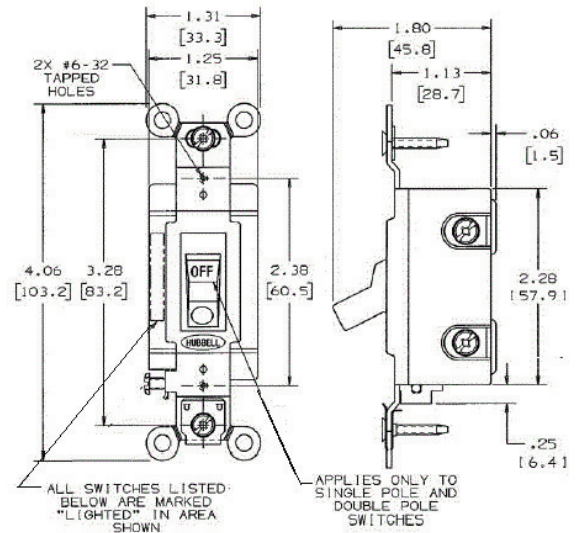
Dielectric Voltage	Withstands 1500V AC minimum for 1 minute
Max. Continuous Current	15A
Max. Working Voltage	277V AC
Overload	Minimum 4.8 times rated current for 100 cycles
Temperature Rise	30°C maximum at rated current

Mechanical

Terminal Accommodations #14 AWG min. - #10 AWG max. Solid and stranded copper wire only

Environmental

Flammability	UL 94V-2
Operating Temperature	Max. continuous: 75°C; Min. continuous: -40°C without impact



Complementary Products

Nylon Wall Plate NP11

Online Resources

Customer Use Drawing
 eCatalog
 Installation Instructions

Dimensions in Inches (mm)

Hubbell Wiring Device-Kellems • Hubbell Incorporated (Delaware) • 40 Waterview Drive • Shelton, CT 06484

Phone (800) 288-6000 • Fax (800) 255-1031 • Specifications subject to change without notice.



Straight Blade Devices 15A, 125V, 2 Pole, 3 Wire Grounding Commercial Specification Grade Duplex Receptacles

HUBBELL

Features

- Weather-resistance complies with national electrical code requirements
- Smooth face
- Wrap-around galvanized steel strap
- Triple wipe contacts

Ordering Information

Description	Device Color	UPC	Catalog Number
Weather Resistant, smooth face, back and side wired	Brown	783585144467	BR15WR

Listings

UL Listed to UL498 File No. E2186
Certified to CSA C22.2, No. 42
Fed. Spec. W-C-596
NEMA® WD-6 Compliant

Specifications

Face	Nylon
Base	Nylon
Power Contacts	.030 in. (.8) Brass
Ground Contacts	Brass
Wire Clamp	.062 in. (1.6) Nickel plated steel
Terminal Screws	Stainless steel
Mounting Screws	Stainless steel
Automatic Self-grounding Staple	Stainless steel
Mounting Screws	Stainless steel

Performance

Electrical

Current Interrupting	Certified for current interrupting at full rated current
Dielectric Voltage	Withstands 2,000V minimum

Mechanical

Product Identification	Ratings are a permanent part of the device
Terminal Accommodation	#14-#10 AWG copper stranded or solid conductor only
Terminal Identification	Terminals identified in accordance with UL 498 and CSA

Environmental

Flammability	UL 94 V-2
Operating Temperatures	Maximum continuous 75°C; minimum -40°C (w/o impact)



Accessories

Wallplate or Weatherproof Cover Duplex Opening

Resources

[eCatalog](#)

Dimensions in Inches (mm)

Hubbell Wiring Device-Kellems • Hubbell Incorporated (Delaware) • 40 Waterview Drive • Shelton, CT 06484

Phone (800) 288-6000 • Fax (800) 255-1031 • Specifications subject to change without notice.





Features

- Patented AUTOGUARD® self test technology
- Internal back wiring clamp and guide for quick and secure termination
- Triple wipe construction

Ordering Information

Description	Color	UPC	Catalog Number
15A, 125V, Style Line®, AUTOGUARD® self test GFCI receptacle, flush face, back and side wired, multiple drive screws	Ivory	883778122033	GFRST15I

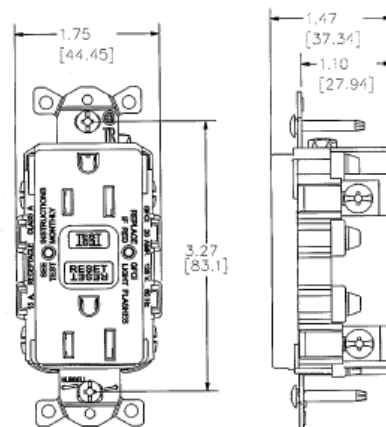


Listings

UL Listed - Canadian and U.S.
Meets ADA Standards
Meets all NEC® requirements
CSA Certified
NEMA® WD-6 Compliant

Specifications

Face	Nylon
Base	Nylon
Power Contacts	Brass
Ground Contacts	Brass
Mounting Strap	Zinc plated steel
Mounting Screws	Zinc plated steel



Online Resources

[Customer Use Drawing](#)
[eCatalog](#)
[Installation Instructions](#)

ATM blade fuses



Catalog symbol

- ATM_

Description

A range of UL® Listed fast-acting miniature blade fuses for automotive and low-voltage circuits.

Ratings

- Volts: 32 Vac/dc
- Amps: 2 to 30 A
- Interrupting rating: 1 kA

Agency information

- UL Listed, Guide FHXT, File AU169
- ISO 8820-3 / JASO D612 / SAE J2077 and J1171 ignition protection

Materials

- Silver-plated zinc terminals and element
- Polyamide housing with UL 94 HB flammability rating

Environmental

- Operating temperature range -40°C to +80°C, 95% RH non-condensing
- Storage temperature range -5°C to +35°C or lower, 85% RH non-condensing

Basic catalog numbers

Cat. no. (amp)	Color code	Cat. no. (amp)	Color code
ATM-1*	Black	ATM-10	Red
ATM-2	Gray	ATM-15	Blue
ATM-3	Violet	ATM-20	Yellow
ATM-4	Pink	ATM-25	Clear
ATM-5	Tan	ATM-30	Green
ATM-7-1/2	Brown		

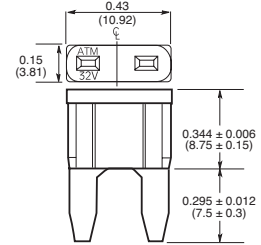
* Available only in traditional and bulk pack.

Packaging codes

Package type	Cat. no. configuration	Contents
Traditional	ATM-(amp)	5 fuses in a tin
Reload	ATM-(amp)RLD*	10 fuses in a polybag
Retail pack	BP/ATM-(amp)-RP	5 fuses in a blister card
Value pack	VP/ATM-(amp)-RP	25 fuses in a clamshell pack
Bulk pack	BK/ATM-(amp)	500 fuses in a carton

* Not available for the 4 amp ATM fuses.

Dimensions – in



Operating @ 23°C*

% of fuse amp rating	Min	Max
110%	100 hrs	—
135%	0.75 sec	600 sec
160%	0.25 sec	50.0 sec
200%	0.15 sec	5.0 sec
350%	0.04 sec	0.5 sec
600%	0.02 sec	0.1 sec

* Fuse characteristics may vary according to the conditions under which they are used. Fuse derating with change in ambient temperature: -0.15% / 1°C.

Features

- Halogen free and RoHS compliant
- Test points on fuse housing speeds troubleshooting
- Industry standard color coded by amp rating

Typical applications

- Automotive
- Low voltage control circuits

Recommended fuse holders, add-a-circuit and fuseclips

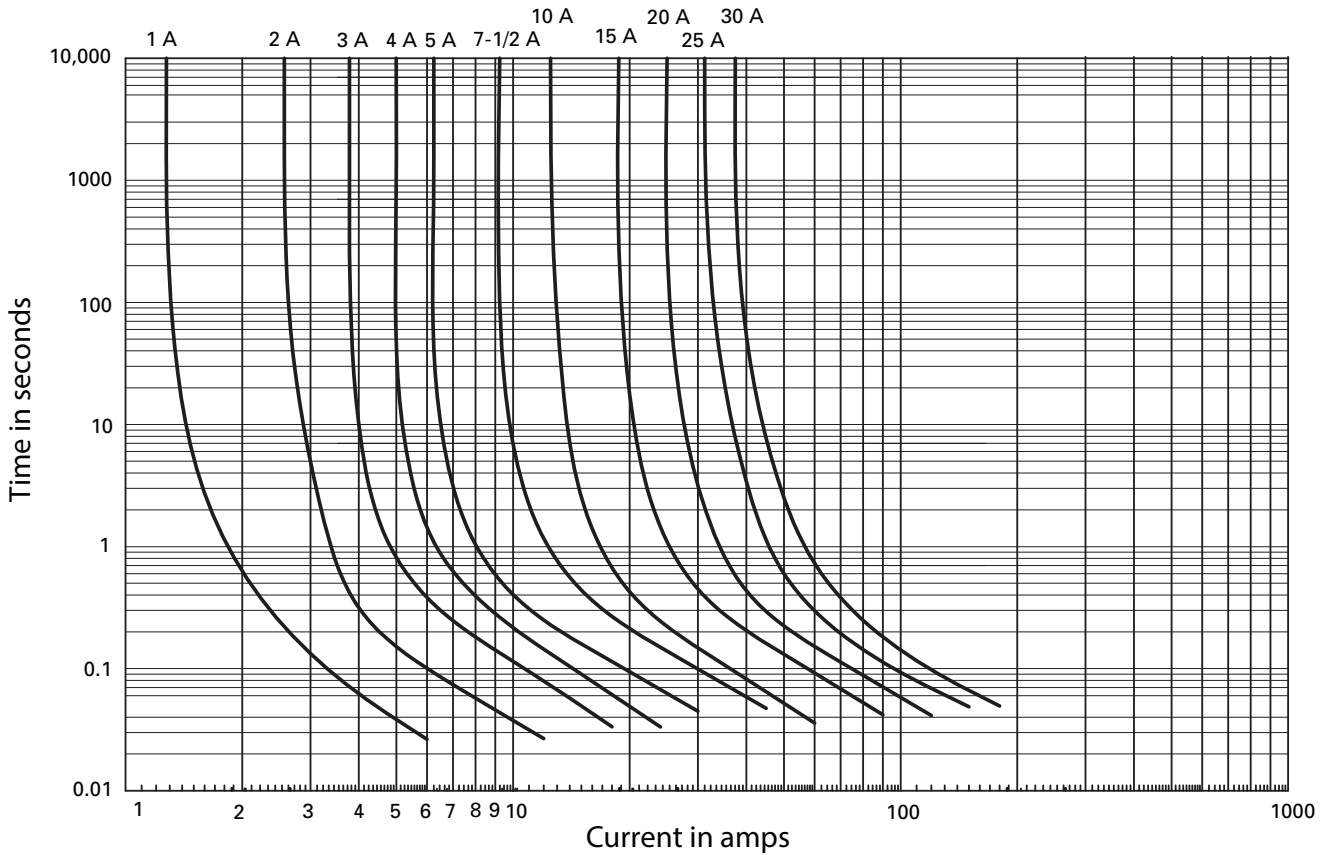
Part number	Description	Max volts/ amps	Leadwire
HHH	Add-a-circuit for additional fused circuit on a block	32V/10A	5"/#16
HHL	Inline fuse holder with cover	32V/20A	2x4"/#16
HHM	Inline fuse holder with cover	32V/30A	2x4"/#12
HHU	Water resistant inline fuse holder with cover	32V/30A	2x4"/#12
ATM-FHID	Indicating inline fuse holder with cover	32V/20A	2x4"/#16
1A5778**	PCB fuse clip	32V/15A	—
1A5779**	PCB fuse clip with nylon base	32V/15A	—

** See data sheet no. 2131 for details.



Powering Business Worldwide

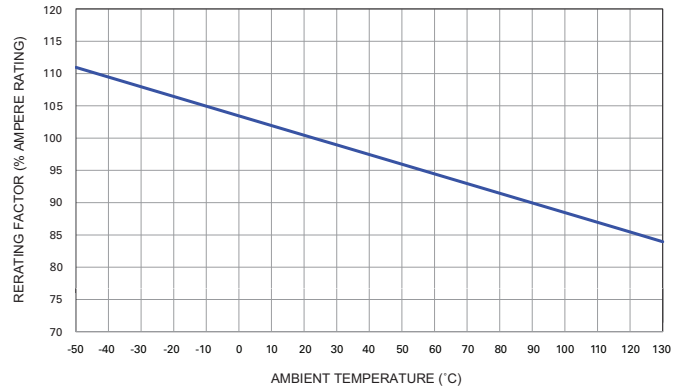
Time-current characteristic curves — average melt



Electrical characteristics

Fuse amps	Resistance	Voltage drop
1	121 mΩ	175 mV
2	49.7 mΩ	140 mV
3	29.6 mΩ	140 mV
4	23.8 mΩ	136 mV
5 A	16.7 mΩ	112 mV
7-1/2	11.1 mΩ	112 mV
10	7.82 mΩ	106 mV
15	4.93 mΩ	99 mV
20	3.48 mΩ	95 mV
25	2.58 mΩ	92 mV
30	2.12 mΩ	86 mV

Temperature derating curve



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Eaton
1000 Eaton Boulevard
Cleveland, OH 44122
Eaton.com

Bussmann Division
114 Old State Road
Ellisville, MO 63021
United States
Eaton.com/bussmannseries

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CONCEPT, TYPE 4 AND 12



INDUSTRY STANDARDS

Wall-mounting brackets required to maintain UL/CSA external mounting requirement.

Concept solid single-door, door with window and flush-mount models

UL 508A Listed; Type 4, 12; File No. E61997
 cUL Listed per CSA C22.2 No. 94; Type 4, 12; File No. E61997

NEMA/EEMAC Type 4, 12, 13
 CSA, File No. 42186: Type 4, 12
 VDE IP66
 IEC 60529, IP66

Concept two-door models

UL 508A Listed; Type 12; File No. E61997
 cUL Listed per CSA C22.2 No. 94; Type 12; File No. E61997

NEMA/EEMAC Type 12
 CSA, File No. 42186, Type 12
 VDE IP 55
 IEC 60529, IP55

APPLICATION

Concept Enclosures are ideal for machine control applications. With streamlined styling, flush quarter-turn latches and an attractive, durable finish. Available in solid or window single-door and two-door landscape, flush-mount and sloped-top versions for application and mounting flexibility. Two-door landscape models provide full-width access and easy panel installation.

SPECIFICATIONS

- 16 or 14 gauge steel
- Seams continuously welded and ground smooth
- Corner-formed doors
- Simple easy-to-remove and install hinge pins with captivation clip
- High-torque threadless studs and fasteners on door
- Minimum-width body flange provides maximum door opening
- Door opens 210 degrees
- External formed body flange
- Panel mounting studs fit optional CONCEPT panels and other accessories
- Mounting holes in back of body for direct mounting or optional external mounting brackets
- Removable door with hidden hinges for clean, aesthetic appearance
- Seamless foam-in-place gasket
- Quarter-turn slotted latch(es)
- Door alignment device on doors wider than 30 in.
- Four hinges on 60-in.-high enclosures
- Grounding stud on body; bonding provision on door (except window-door models)
- Provisions on door for optional high-impact thermoplastic data pocket
- Hardware kit with panel mounting nuts, panel grounding hardware and sealing washers
- Installation instructions provided

Single-Door and Window-Door Models:

- 3-point latch system on enclosures with height equal to or greater than 42-in. with quarter-turn, slotted latch

Flush-Mount Models:

- Mounting frame extends completely around enclosure

Two-Door Models:

- Overlapping door design provides full-width access
- Three-point latch system on right-hand hinged door with quarter-turn, slotted latch

FINISH

Two standard finishes are available: ANSI 61 gray or RAL 7035 textured light-gray polyester powder paint inside and out.

ACCESSORIES

- Concept Panels
- Door Stop Kit
- Handles
- Lock Inserts
- Mounting-Bracket Kits
- Padlock Insert
- Padlock Handle
- HF Side-Mount Filter Fans

MODIFICATION AND CUSTOMIZATION

Hoffman excels at modifying and customizing products to your specifications. Contact your local Hoffman sales office or distributor for complete information.

BULLETIN: CW1

QLINE D PUSHBUTTON, TYPE 4X



APPLICATION

Used for insulating and housing 30.5-mm or 22.5-mm pushbuttons in hostile environments, QLine D Enclosures have contoured bodies with flush cover screws for an attractive, contemporary appearance.

SPECIFICATIONS

- High-impact polycarbonate material is used for both body and cover
- Polycarbonate material is easily punched, drilled, filed or sawed
- Straight side walls permit ganging of multiple enclosures
- Cross-point captivated cover screws are stainless steel
- Mounting holes molded directly adjacent to cover screws
- Cover screws protected by removable caps that are both aesthetic and provide tamper resistance
- Molded internal pads for mounting optional panels, rails or other components
- Seamless foam-in-place gasket assures watertight and dust-tight seal
- Screws provided for mounting optional panel
- Mounting hardware furnished
- Material is halogen free

FINISH

Polycarbonate enclosure material is RAL 7035 light-gray inside and out. Optional panels are unpainted plated steel.

ACCESSORIES

See also *Accessories*.
 Hardware Kit
 Hinge Kit
 Mounting Bracket Kit

BULLETIN: Q41

INDUSTRY STANDARDS

UL 508A Listed; Type 4, 4X, 12, 13; No. E61997
 cUL Listed per CSA C22.2 No 94; Type 4, 4X, 12, 13; No. E61997
 Enclosure flammability evaluated per UL 508A

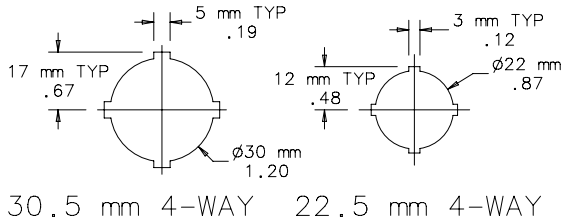
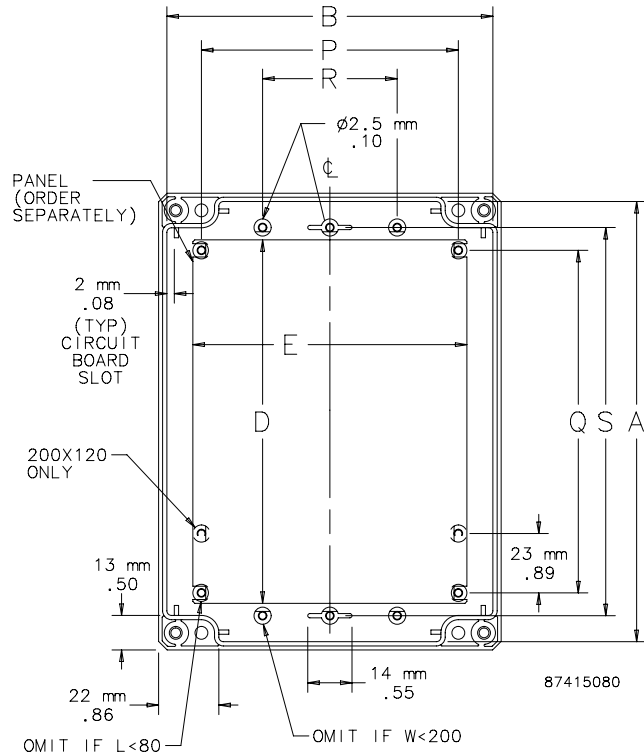
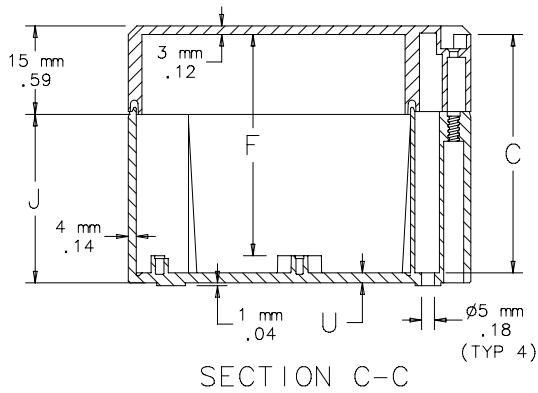
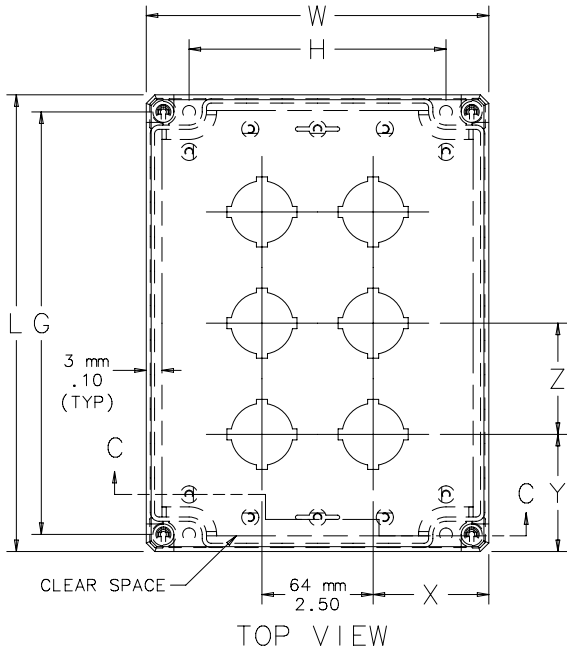
NEMA/EEMAC Type 4, 4X, 12
 CSA File Number 42186: Type 4, 4X, 12
 IEC 60529, IP67

Standard Product

Catalog Number	AxBxC mm/in.	Hole Size mm	External Dimensions L x W mm/in.	Panel	Panel Size D x E mm/in.	Mounting G x H mm/in.	F mm/in.	J mm/in.	P mm/in.	Q mm/in.	R mm/in.	S mm/in.	U mm/in.	X mm/in.	Y mm/in.	Z mm/in.
Q1PBPCD	75 x 73 x 79 2.95 x 2.87 x 3.11	30.5	82 x 80 3.23 x 3.15	Q88PD	68 x 55 2.68 x 2.17	70 x 50 2.76 x 1.97	72 2.83	70 2.76	70 2.75	50 1.97	— —	58 2.28	3 0.12	40 1.57	41 1.61	—
Q1PBPCDM	75 x 73 x 79 2.95 x 2.87 x 3.11	22.5	82 x 80 3.23 x 3.15	Q88PD	68 x 55 2.68 x 2.17	70 x 50 2.76 x 1.97	72 2.83	70 2.76	70 2.75	50 1.97	— —	58 2.28	3 0.12	40 1.57	41 1.61	—
Q2PBPCD	153 x 73 x 79 6.02 x 2.87 x 3.11	30.5	160 x 80 6.29 x 3.15	Q168PD	131 x 65 5.15 x 2.56	148 x 50 5.83 x 1.97	72 2.83	70 2.76	50 1.97	148 5.83	— —	136 3.78	3 0.12	40 1.57	48 1.89	64 2.52
Q2PBPCDM	113 x 73 x 79 4.45 x 2.87 x 3.11	22.5	120 x 80 4.72 x 3.15	Q128PD	131 x 65 5.15 x 2.56	108 x 50 4.25 x 1.97	72 2.83	70 2.76	50 1.97	108 4.25	— —	136 3.78	3 0.12	40 1.57	36 1.42	48 1.89
Q3PBPCD	193 x 113 x 79 7.60 x 4.45 x 3.11	30.5	200 x 120 7.87 x 4.72	Q2012PD	170 x 100 6.69 x 3.94	188 x 90 7.40 x 3.54	72 2.83	70 2.76	90 3.54	188 7.40	— —	136 5.35	3 0.12	60 2.36	36 1.42	64 2.52
Q3PBPCDM	153 x 73 x 79 6.02 x 2.87 x 3.11	22.5	160 x 80 6.29 x 3.15	Q168PD	170 x 100 6.69 x 3.94	148 x 50 5.83 x 1.97	72 2.83	70 2.76	50 1.97	148 5.83	— —	136 5.35	3 0.12	40 1.57	30 1.26	48 1.89
Q4PBPCD	193 x 113 x 79 7.60 x 4.45 x 3.11	30.5	200 x 120 7.87 x 4.72	Q2012PD	170 x 100 6.69 x 3.94	188 x 90 7.40 x 3.54	72 2.83	70 2.76	90 3.54	188 7.40	40 1.57	176 6.93	3 0.12	28 1.10	68 2.68	64 2.52
Q4PBPCDM	193 x 113 x 79 7.60 x 4.45 x 3.11	22.5	200 x 120 7.87 x 4.72	Q2012PD	170 x 100 6.69 x 3.94	188 x 90 7.40 x 3.54	72 2.83	70 2.76	90 3.54	188 7.40	40 1.57	176 6.93	3 0.12	28 1.10	60 2.36	48 1.89
Q6PBPCD	233 x 153 x 84 9.17 x 6.02 x 3.29	30.5	240 x 160 9.45 x 6.30	Q2416PD	211 x 148 8.31 x 5.83	228 x 130 8.98 x 5.12	78 3.07	75 2.95	138 5.43	202 7.95	75 2.95	215 8.46	4 0.16	48 1.89	56 2.20	64 2.52

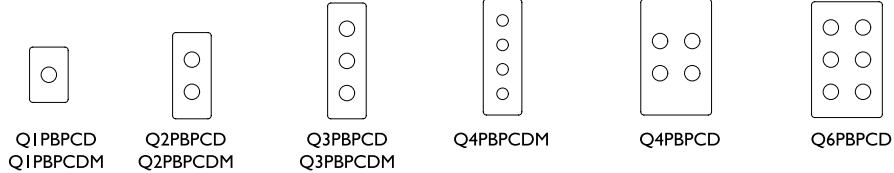
A x B x C are internal dimensions.

Purchase panels separately.



QLINE D Polycarbonate Type 4X Pushbutton Hole Arrangement Drawing

Hole Arrangement



87415079

Product data sheet

Specifications



IEC contactor, TeSys D,
nonreversing, 9A, 5HP at 480VAC,
up to 100kA SCCR, 3 phase, 3 NO,
120VAC 50/60Hz coil, open style

LC1D09G7

Main

Range	TeSys TeSys Deca
Product name	TeSys D TeSys Deca
Product or Component Type	Contactors
Device short name	LC1D
Contactors application	Resistive load Motor control
Utilisation category	AC-3 AC-1 AC-4 AC-3e
Poles description	3P
Power pole contact composition	3 NO
[Ue] rated operational voltage	Power circuit <= 690 V AC 25...400 Hz Power circuit <= 300 V DC
[Ie] rated operational current	9 A 140 °F (60 °C)) <= 440 V AC AC-3 power circuit 25 A 140 °F (60 °C)) <= 440 V AC AC-1 power circuit 9 A 140 °F (60 °C)) <= 440 V AC AC-3e power circuit
Motor power kW	2.2 kW 220...230 V AC 50/60 Hz AC-3) 4 kW 380...400 V AC 50/60 Hz AC-3) 4 kW 415...440 V AC 50/60 Hz AC-3) 5.5 kW 500 V AC 50/60 Hz AC-3) 5.5 kW 660...690 V AC 50/60 Hz AC-3) 2.2 kW 400 V AC 50/60 Hz AC-4) 2.2 kW 220...230 V AC 50/60 Hz AC-3e) 4 kW 380...400 V AC 50/60 Hz AC-3e) 4 kW 415...440 V AC 50/60 Hz AC-3e) 5.5 kW 500 V AC 50/60 Hz AC-3e) 5.5 kW 660...690 V AC 50/60 Hz AC-3e)
Motor power HP (UL / CSA)	1 hp 230/240 V at AC 50/60 Hz for 1 phase 2 hp 200/208 V at AC 50/60 Hz for 3 phase 2 hp 230/240 V at AC 50/60 Hz for 3 phase 5 hp 460/480 V at AC 50/60 Hz for 3 phase 7.5 hp 575/600 V at AC 50/60 Hz for 3 phase 0.33 hp 115 V at AC 50/60 Hz for 1 phase
Control circuit type	AC 50/60 Hz
[Uc] control circuit voltage	120 V AC 50/60 Hz
Auxiliary contact composition	1 NO + 1 NC

Disclaimer: This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications

[Uimp] rated impulse withstand voltage	6 kV IEC 60947
Overvoltage category	III
[Ith] conventional free air thermal current	25 A 140 °F (60 °C) power circuit 10 A 140 °F (60 °C) signalling circuit
Irms rated making capacity	250 A 440 V power circuit IEC 60947 140 A AC signalling circuit IEC 60947-5-1 250 A DC signalling circuit IEC 60947-5-1
Rated breaking capacity	250 A 440 V power circuit IEC 60947
[Icw] rated short-time withstand current	105 A 104 °F (40 °C) - 10 s power circuit 210 A 104 °F (40 °C) - 1 s power circuit 30 A 104 °F (40 °C) - 10 min power circuit 61 A 104 °F (40 °C) - 1 min power circuit 100 A - 1 s signalling circuit 120 A - 500 ms signalling circuit 140 A - 100 ms signalling circuit
Associated fuse rating	10 A gG signalling circuit IEC 60947-5-1 25 A gG ≤ 690 V type 1 power circuit 20 A gG ≤ 690 V type 2 power circuit
Average impedance	2.5 mOhm - Ith 25 A 50 Hz power circuit
[Ui] rated insulation voltage	Power circuit 690 V IEC 60947-4-1 Power circuit 600 V CSA Power circuit 600 V UL Signalling circuit 690 V IEC 60947-1 Signalling circuit 600 V CSA Signalling circuit 600 V UL
Electrical durability	0.6 Mcycles 25 A AC-1 ≤ 440 V 2 Mcycles 9 A AC-3 ≤ 440 V 2 Mcycles 9 A AC-3e ≤ 440 V
Power dissipation per pole	1.56 W AC-1 0.2 W AC-3 0.2 W AC-3e
Front cover	With
Mounting Support	Rail Plate
Standards	CSA C22.2 No 14 EN 60947-4-1 EN 60947-5-1 IEC 60947-4-1 IEC 60947-5-1 UL 508 IEC 60335-1
Product Certifications	RINA DNV GOST LRQS (Lloyds register of shipping) UL GL BV CCC CSA UKCA
Connections - terminals	Power circuit screw clamp terminals 1 0.00...0.01 in ² (1...4 mm ²)flexible without cable end Power circuit screw clamp terminals 2 0.00...0.01 in ² (1...4 mm ²)flexible without cable end Power circuit screw clamp terminals 1 0.00...0.01 in ² (1...4 mm ²)flexible with cable end Power circuit screw clamp terminals 2 0.00...0.00 in ² (1...2.5 mm ²)flexible with cable end Power circuit screw clamp terminals 1 0.00...0.01 in ² (1...4 mm ²)solid without cable end Power circuit screw clamp terminals 2 0.00...0.01 in ² (1...4 mm ²)solid without cable end Control circuit screw clamp terminals 1 0.00...0.01 in ² (1...4 mm ²)flexible without cable end Control circuit screw clamp terminals 2 0.00...0.01 in ² (1...4 mm ²)flexible without cable end Control circuit screw clamp terminals 1 0.00...0.01 in ² (1...4 mm ²)flexible with cable end Control circuit screw clamp terminals 2 0.00...0.00 in ² (1...2.5 mm ²)flexible with cable end Control circuit screw clamp terminals 1 0.00...0.01 in ² (1...4 mm ²)solid without cable end Control circuit screw clamp terminals 2 0.00...0.01 in ² (1...4 mm ²)solid without cable end
Tightening torque	Power circuit 15.05 lbf.in (1.7 N.m) screw clamp terminals flat Ø 6 mm Power circuit 15.05 lbf.in (1.7 N.m) screw clamp terminals Philips No 2 Control circuit 15.05 lbf.in (1.7 N.m) screw clamp terminals flat Ø 6 mm Control circuit 15.05 lbf.in (1.7 N.m) screw clamp terminals Philips No 2 Control circuit 15.05 lbf.in (1.7 N.m) screw clamp terminals pozidriv No 2 Power circuit 22.13 lbf.in (2.5 N.m) screw clamp terminals pozidriv No 2
Operating time	12...22 ms closing 4...19 ms opening

Safety reliability level	B10d = 1369863 cycles contactor with nominal load EN/ISO 13849-1 B10d = 20000000 cycles contactor with mechanical load EN/ISO 13849-1
Mechanical durability	15 Mcycles
Maximum operating rate	3600 cyc/h 140 °F (60 °C)

Complementary

Coil technology	Without built-in suppressor module
Control circuit voltage limits	0.3...0.6 Uc -40...158 °F (-40...70 °C) drop-out AC 50/60 Hz 0.8...1.1 Uc -40...140 °F (-40...60 °C) operational AC 50 Hz 0.85...1.1 Uc -40...140 °F (-40...60 °C) operational AC 60 Hz 1...1.1 Uc 140...158 °F (60...70 °C) operational AC 50/60 Hz
Inrush power in VA	70 VA 60 Hz 0.75 68 °F (20 °C)) 70 VA 50 Hz 0.75 68 °F (20 °C))
Hold-in power consumption in VA	7.5 VA 60 Hz 0.3 68 °F (20 °C)) 7 VA 50 Hz 0.3 68 °F (20 °C))
Heat dissipation	2...3 W 50/60 Hz
Auxiliary contacts type	Mechanically linked 1 NO + 1 NC IEC 60947-5-1 Mirror contact 1 NC IEC 60947-4-1
Signalling circuit frequency	25...400 Hz
Minimum switching current	5 mA signalling circuit
Minimum switching voltage	17 V signalling circuit
Non-overlap time	1.5 ms on de-energisation between NC and NO contact 1.5 ms on energisation between NC and NO contact
Insulation resistance	> 10 MOhm signalling circuit

Environment

IP degree of protection	IP20 front face IEC 60529
Protective treatment	TH IEC 60068-2-30
Pollution degree	3
Ambient air temperature for operation	-40...140 °F (-40...60 °C) 140...158 °F (60...70 °C) with derating
Ambient Air Temperature for Storage	-76...176 °F (-60...80 °C)
Operating altitude	0...9842.52 ft (0...3000 m)
Fire resistance	1562 °F (850 °C) IEC 60695-2-1
Flame retardance	V1 conforming to UL 94
Mechanical robustness	Vibrations contactor open 2 Gn, 5...300 Hz Vibrations contactor closed 4 Gn, 5...300 Hz Shocks contactor open 10 Gn for 11 ms Shocks contactor closed 15 Gn for 11 ms
Height	3.03 in (77 mm)
Width	1.77 in (45 mm)
Depth	3.39 in (86 mm)
Net Weight	0.71 lb(US) (0.32 kg)

Ordering and shipping details

Category	22354 - CTR, TESYS D, OPEN, 9-38A AC
Discount Schedule	I12
GTIN	3389110348835
Nbr. of units in pkg.	1
Package weight(Lbs)	12.80 oz (363 g)

Returnability	Yes
Country of origin	ID

Packing Units

Unit Type of Package 1	PCE
Package 1 Height	2.17 in (5.5 cm)
Package 1 width	3.19 in (8.1 cm)
Package 1 Length	3.74 in (9.5 cm)
Unit Type of Package 2	S02
Number of Units in Package 2	16
Package 2 Weight	13.96 lb(US) (6.331 kg)
Package 2 Height	5.91 in (15 cm)
Package 2 width	11.81 in (30 cm)
Package 2 Length	15.75 in (40 cm)

Offer Sustainability

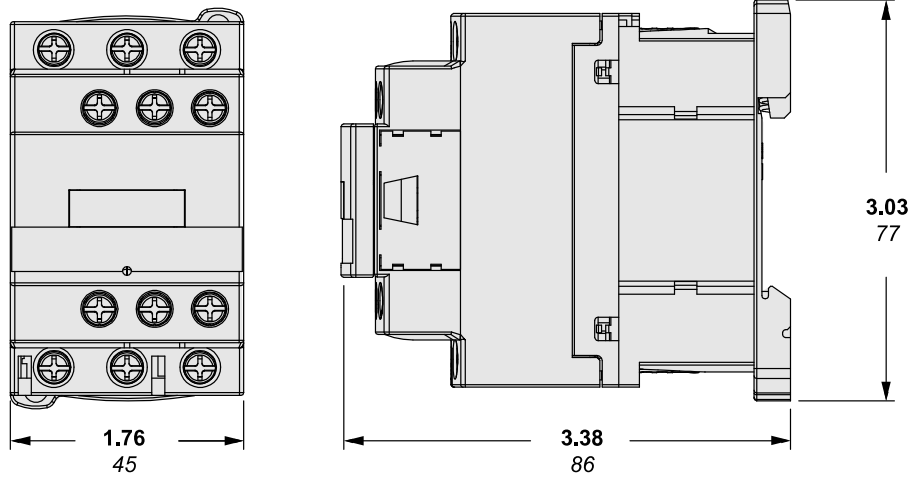
Sustainable offer status	Green Premium product
California proposition 65	WARNING: This product can expose you to chemicals including: Antimony oxide & Antimony trioxide, which is known to the State of California to cause cancer. For more information go to www.P65Warnings.ca.gov
REACH Regulation	REACH Declaration
REACH free of SVHC	Yes
EU RoHS Directive	Compliant EU RoHS Declaration
Toxic heavy metal free	Yes
Mercury free	Yes
RoHS exemption information	Yes
China RoHS Regulation	China RoHS declaration Pro-active China RoHS declaration (out of China RoHS legal scope)
Environmental Disclosure	Product Environmental Profile
Circularity Profile	End of Life Information
WEEE	The product must be disposed on European Union markets following specific waste collection and never end up in rubbish bins.
PVC free	Yes

Contractual warranty

Warranty	18 months
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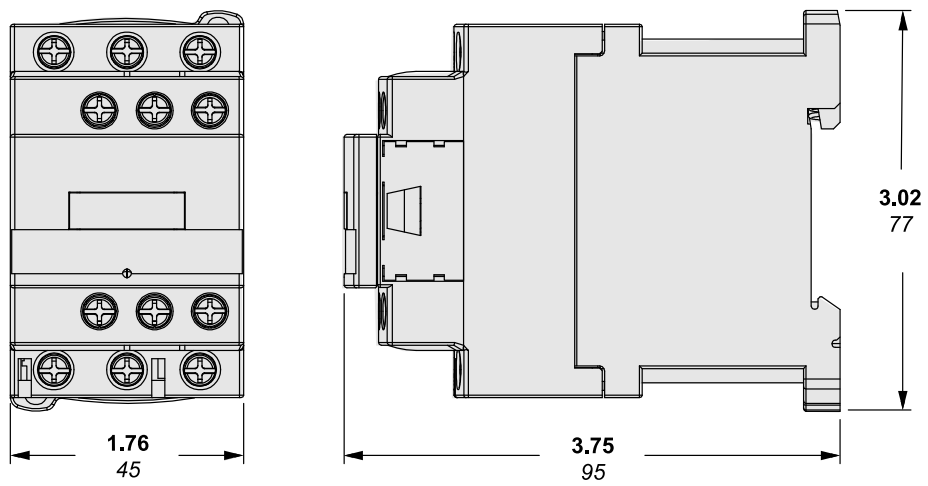
Dimensions

CONTACTOR WITH AC COIL



in.
mm

CONTACTOR WITH DC COIL



All dimensions are approximate. Also refer to technical drawings and documentation.

Product data sheet

Specifications

SQUARE D

Panelboard accessory, NQ, ground bar kit, 12 circuits, 225A max



PK9GTA

Main

Product line QO

Product type Bar

Complementary

Number of connectors 9

Wire size
AWG 14...AWG 10 copper
AWG 12...AWG 10 aluminium
AWG 8 aluminium/copper
AWG 6...AWG 4 aluminium/copper
AWG 14...AWG 12

Provided equipment 2 screw

Bar length 3.78 in (96 mm)

Maximum length of segment 3.15 in (80 mm)

Device mounting Direct mounting back of enclosure

Height 0.437 in (11.10 mm)

Depth 0.312 in (7.92 mm)

Tightening torque
20 lb.in, AWG 14...AWG 10, copper
20 lb.in, AWG 12...AWG 10, aluminium
35 lb.in, AWG 6...AWG 4

Ordering and shipping details

Category 00102 - QO LC ACCESSORIES

Discount Schedule DE3A

GTIN 785901026396

Nbr. of units in pkg. 1

Package weight(Lbs) 0.80 oz (22.68 g)

Returnability Yes

Country of origin US

Packing Units

Unit Type of Package 1 PCE

Package 1 Height 0.30 in (0.762 cm)

Package 1 width	0.70 in (1.778 cm)
Package 1 Length	3.80 in (9.652 cm)
Unit Type of Package 2	PAL
Number of Units in Package 2	2160
Package 2 Weight	314.00 lb(US) (142.428 kg)
Package 2 Height	26.80 in (68.072 cm)
Package 2 width	40.00 in (101.6 cm)
Package 2 Length	48.00 in (121.92 cm)

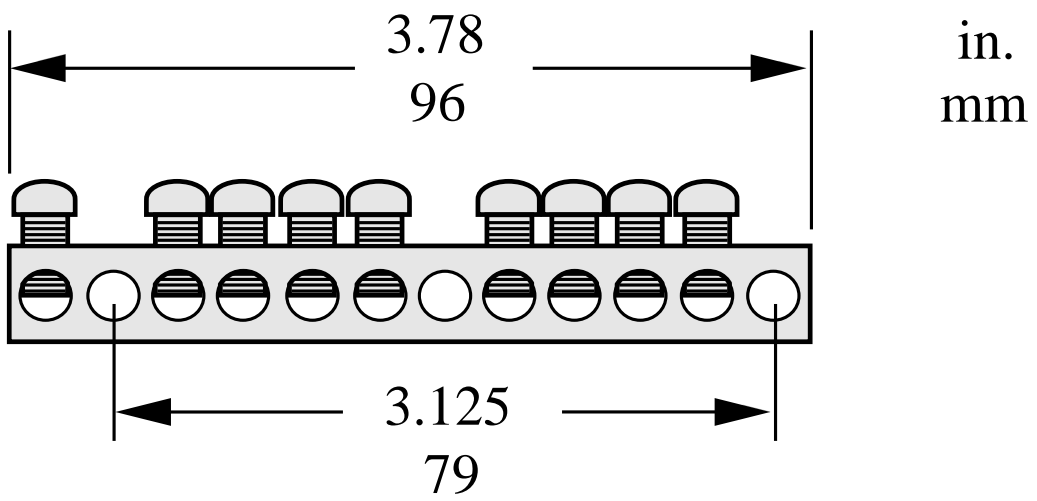
Offer Sustainability

California proposition 65	WARNING: Cancer and Reproductive Harm - www.P65Warnings.ca.gov
REACH Regulation	REACH Declaration
REACH free of SVHC	Yes
EU RoHS Directive	Pro-active compliance (Product out of EU RoHS legal scope) EU RoHS Declaration
Toxic heavy metal free	Yes
Mercury free	Yes
RoHS exemption information	Yes
China RoHS Regulation	China RoHS declaration Pro-active China RoHS declaration (out of China RoHS legal scope)

Contractual warranty

Warranty	18 months
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Dimensions



RU Series Universal Relays

Key features:

- Full featured universal miniature relays
- Designed with environment taken into consideration
- Two terminal styles: plug-in and PCB mount
- Non-polarized LED indicator
- No internal wires, lead-free construction
- Cadmium-free contacts
- Mechanical flag indicator
- Manual latching lever with color coding for AC or DC coil
- Snap-on yellow marking plate; optional marking plates are available in four other colors
- Maximum contact ratings: 10A (RU2), 6A (RU4), 3A (RU42)
- UL Recognized, CSA Certified, EN Compliant



With Latching or Momentary Lever

Mechanical Indicator*

The contact position can be confirmed through the five small windows.

Marking Plate

Standard yellow marking plate is easily replaced with optional marking plates in four colors for easy identification of relays.

LED Indicator*

Non-polarized green LED indicator is standard provision for plug-in terminal, latching lever types



Latching and Momentary Lever

Using the lever, operation can be checked without energizing the coil. The lever is color coded for AC and DC coils.

	Latching	Momentary
AC coil:	Orange	Red
DC coil:	Green	Blue

In Normal Operation



Note: Turn off the power to the relay coil when using the latching lever. After checking the operation, return the latching lever in the normal position.

Standard (without lever)

AC/DC Color Marking

For identification of AC or DC coils.

AC coil: Yellow

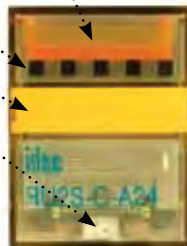
DC coil: Blue

Mechanical Indicator*

Marking Plate

LED Indicator*

Non-polarized green LED indicator is standard provision for plug-in terminal types.



AC Coil

DC Coil






Coil Voltage	Tape Color
24V AC	White
100 to 110V AC	Clear
110 to 120V AC	Blue
200 to 220V AC	Black
220 to 240V AC	Red
24V DC	Green
6V DC	Voltage marking on yellow tape
12V DC	
48V DC	
110V DC	



*Not available on PCB type.

Part Number Selection

Contact	Model	Part Number			Coil Voltage Code (Standard Stock in bold)
		Standard	With Latching Lever	With Momentary Lever	
DPDT (10A) 	Standard	RU2S-C-□	RU2S-□	RU2S-M-□	A24, A110, A220 D6, D12, D24 , D48, D110
	With RC (AC coil only)	RU2S-CR-□	RU2S-R-□	RU2S-MR-□	A110, A220
	With diode (DC coil only)	RU2S-CD-□	RU2S-D-□	RU2S-MD-□	D6, D12, D24 , D48, D110
	PCB	RU2V-NF-□	—	—	A24, A110, A220 D6, D12, D24 , D48, D110
4PDT (6A) 	Standard	RU4S-C-□	RU4S-□	RU4S-M-□	A24, A110, A220 D6, D12, D24 , D48, D110
	With RC (AC coil only)	RU4S-CR-□	RU4S-R-□	RU4S-MR-□	A110, A220
	With diode (DC coil only)	RU4S-CD-□	RU4S-D-□	RU4S-MD-□	D6, D12 , D24, D48, D110
	PCB	RU4V-NF-□	—	—	A24, A110 , A220 D6, D12, D24 , D48, D110
4PDT Bifurcated (3A) 	Standard	RU42S-C-□	RU42S-□	RU42S-M-□	A24, A110, A220 D6, D12, D24 , D48, D110
	With RC (AC coil only)	RU42S-CR-□	RU42S-R-□	RU42S-MR-□	A110, A220
	With diode (DC coil only)	RU42S-CD-□	RU42S-D-□	RU42S-MD-□	D6, D12, D24, D48, D110
	PCB	RU42V-NF-□	—	—	A24, A110, A220 D6, D12, D24 , D48, D110






- 1. Plug-in terminal models have an LED indicator and a mechanical indicator as standard.
- 2. PCB models do not have an LED indicator or a mechanical indicator.

Ordering Information
 When ordering, specify the Part No. and coil voltage code:
 (example) **RU2S-C** **A110**
Part No. Coil Voltage Code

Coil Voltage Table

Coil Voltage Code	A24	A110	A220	D6	D12	D24	D48	D110
Coil Rating	24V AC	110-120V AC	220-240V AC	6V DC	12V DC	24V DC	48V DC	110V DC

Sockets

Relays	Spring Clamp DIN Rail Mount	Standard DIN Rail Mount	Finger-safe DIN Rail Mount	Panel Mount	PCB Mount
RU2S (DPDT)	SU2S-11L	SM2S-05	SM2S-05C	SY4S-51	SM2S-61 SM2S-62
RU4S (4PDT) RU42S (4PDT)	SU4S-11L	SY4S-05	SY4S-05C		SY4S-61 SY4S-62
					

Switches & Pilot Lights

Signaling Lights

Relays & Sockets

Timers




Contactors

Terminal Blocks

Circuit Breakers

Switches & Pilot Lights

Hold Down Springs & Clips

Appearance	Item	Relay	For DIN Mount Socket	For Through Panel & PCB Mount Socket
	Pullover Wire Spring	RU2S/RU4S/ RU42S	SY4S-02F1	SY4S-51F1
	Leaf Spring (side latch)	RU2S/RU4S/ RU42S	SFA-202*	SFA-302*
	Leaf Spring (top latch)	RU2S/RU4S/ RU42S	SFA-101*	SFA-301*



Note: Order 2 pieces for each relay

Signaling Lights

Relays & Sockets

Accessories

Name	Part Number	Color Code *
Marking Plate	RU9Z-P*	A (orange), G (green), S (blue), W (white), Y (yellow)



Specify a color code when ordering. The marking plate can be removed from the relay by inserting a flat screwdriver under the marking plate.

Timers

Specifications

Model (Contact)	RU2 (DPDT)	RU4 (4PDT)	RU42 (4PDT-bifurcated)
Contact Material	Silver alloy	Silver (gold clad)	Silver-nickel (gold clad)
Contact Resistance ¹		50 mΩ maximum	
Minimum Applicable Load ²	24V DC, 5 mA (reference value)	1V DC, 1 mA	1V DC, 0.1 mA
Operating Time ³		20 ms maximum	
Release Time ³		20 ms maximum	
Power Consumption	AC: 1.1 to 1.4VA (50 Hz), 0.9 to 1.2VA (60 Hz) DC: 0.9 to 1.0W		
Insulation Resistance	100MΩ minimum (500V DC megger)		
Dielectric Strength	Between contact and coil: 2500V AC, 1 minute		
	Between contacts of different poles:		
	2500V AC, 1 minute	2000V AC, 1 minute	
	Between contacts of the same pole: 1000V AC, 1 minute		
Operating Frequency	Electrical: 1800 operations/h maximum Mechanical: 18,000 operations/h maximum		
Vibration Resistance	Damage limits: 10 to 55 Hz, amplitude 0.5 mm Operating extremes: 10 to 55 Hz, amplitude 0.5 mm		
Shock Resistance	Damage limits: 1000 m/s ² (100G) Operating extremes: 150 m/s ² (15G)		
Mechanical Life	AC: 50,000,000 operations DC: 100,000,000 operations	50,000,000 operations	
Electrical Life ⁴	See table on page 794		
Operating Temperature ⁵	PCB model: -55 to +70°C (no freezing) Blade model: -55 to +60°C (no freezing)		
Operating Humidity	5 to 85% RH (no condensation)		
Weight	Approx. 35g		

Contactors




Terminal Blocks

Circuit Breakers



1. Measured using 5V DC, 1A voltage drop method
2. Measured at operating frequency of 120 operations/min (failure rate level P, reference value)
3. Measured at the rated voltage (at 20°C), excluding contact bouncing;
Release time of AC relays with RC: 25 ms maximum
Release time of DC relays with diode: 40 ms maximum
4. Contact Load and Electrical Life (at ambient temperature 20°C)
5. Measured at the rated voltage.

Accessories

Item	Appearance	Use with	Part No.	Remarks
Aluminum DIN Rail (1 meter length)		All DIN rail sockets	BNDN1000	The BNDN1000 is designed to accommodate DIN mount sockets. Made of durable extruded aluminum, the BNDN1000 measures 0.413 (10.5mm) in height and 1.37 (35mm) in width (DIN standard). Standard length is 39" (1,000mm).
DIN Rail End Stop		DIN rail	BNL5	9.1 mm wide.
Replacement Hold-Down Spring Anchor		Horseshoe clip for DIN rail sockets	Y778-011	For use on DIN rail mount socket when using pullover wire hold down spring. 2 pieces included with each socket.

Coil Ratings

Rated Voltage (V)	Coil Voltage Code	Rated Current (mA) ±15% (at 20°C)		Coil Resistance (Ω) ±10% (at 20°C)	Operating Characteristics (values at 20°C)			
		50 Hz	60 Hz		Maximum Continuous Applied Voltage	Pickup Voltage	Dropout Voltage	
AC (50/60 Hz)	24	A24	49.3	42.5	164	110%	80% maximum	30% minimum
	110-120	A110	8.4-10.0	7.1-8.2	4,550			
	220-240	A220	4.2-5.0	3.6-4.2	18,230			
DC	6	D6	155		40	110%	80% maximum	10% minimum
	12	D12	80		160			
	24	D24	44.7		605			
	48	D48	18		2,560			
	110	D110	8.9		12,100			

1. The rated current includes the current of the LED indicator.

Surge Suppressor Ratings

Model		Ratings
AC Coil	With RC	RC series circuit R: 20 kΩ, C: 0.033 μF
DC Coil	With Diode	Diode reverse voltage: 1000V Diode forward current: 1A

UL and c-UL Ratings

Voltage	Resistive			General Use			Horse Power Rating		
	RU2	RU4	RU42	RU2	RU4	RU42	RU2	RU4	RU42
250V AC	10A	—	3A	—	6A	—	—	1/10HP	—
30V DC	10A	6A	3A	—	—	—	—	—	—

Contact Ratings

Maximum Contact Capacity						
Contact	Continuous Current	Allowable Contact Power		Voltage (V)	Rated Load	
		Resistive Load	Inductive Load		Res. Load	Ind. Load
DPDT	10A	2500VA AC	1250VA AC	250 AC	10A	5A
		300W DC	150W DC	30 DC	10A	5A
4PDT	6A	1500VA AC	600VA AC	250 AC	6A	0.8A
		180W DC	90W DC	30 DC	6A	1.5A
4PDT bifurcated	3A	750VA AC	200VA AC	250 AC	3A	0.8A
		90W DC	45W DC	30 DC	3A	1.5A

1. On 4PDT relays, the maximum allowable total current of neighboring two poles is 6A. At the rated load, make sure that the total current of neighboring two poles does not exceed 6A (3A + 3A = 6A).
2. Inductive load for the rated load — cos φ = 0.3, L/R = 7 ms

CSA Ratings

Voltage	Resistive
	RU42
250V AC	3A
30V DC	3A

TÜV Ratings

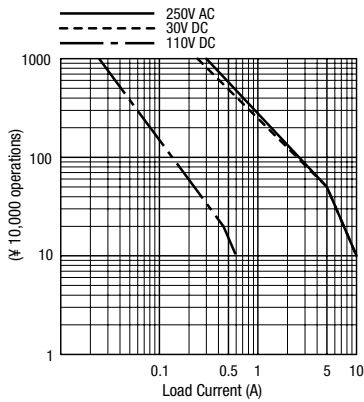
Voltage	Resistive			Inductive		
	RU2	RU4	RU42	RU2	RU4	RU42
250V AC	10A	6A	3A	5A	0.8A	0.8A
30V DC	10A	6A	3A	5A	1.5A	1.5A

Socket Specifications

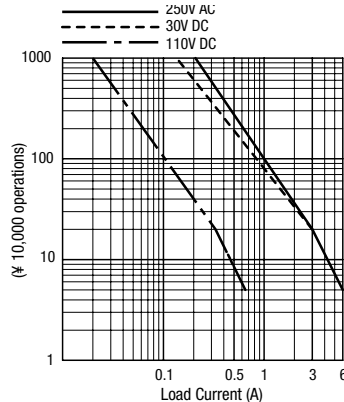
	Sockets	Terminal	Electrical Rating	Wire Size	Torque
DIN Rail Mount Sockets	SU2S-11L	Spring clamp terminals	250V/10A	24-16 AWG	—
	SU4S-11L	Spring clamp terminals	250V/6A (using RU4), 10A (using RU2)	24-16 AWG	—
	SM2S-05	M3 screw with captive wire clamp	300V, 10A	Maximum up to 2-#14AWG	5.5 - 9in•lbs
	SM2S-05C	M3 screw with captive wire clamp, fingersafe	300V, 10A	Maximum up to 2-#14AWG	5.5 - 9in•lbs
	SY4S-05	M3 screw with captive wire clamp	300V, 7A (using RU4), 10A (using RU2)	Maximum up to 2-#14AWG	5.5 - 9in•lbs
Through Panel Mount Socket	SY4S-05C	M3 screw with captive wire clamp, fingersafe	300V, 7A (using RU4), 10A (using RU2)	Maximum up to 2-#14AWG	5.5 - 9in•lbs
Through Panel Mount Socket	SY4S-51	Solder	300V, 7A	—	—
PCB Mount Socket	SY4S-61	PCB mount	300V, 7A	—	—
	SY4S-62	PCB mount	250V, 7A	—	—

Electrical Life Curves

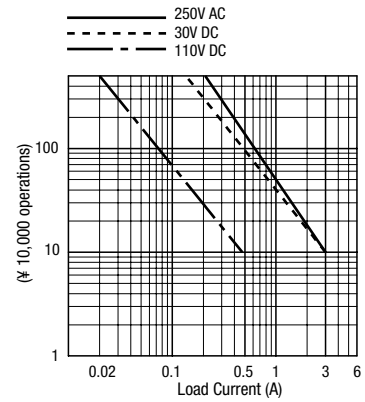
RU2 (Resistive Load)



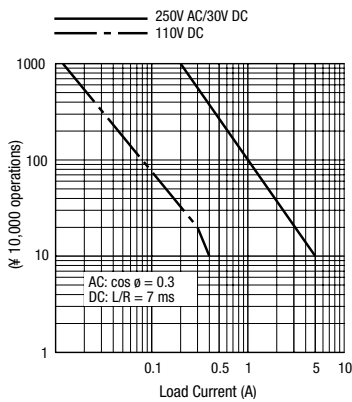
RU4 (Resistive Load)



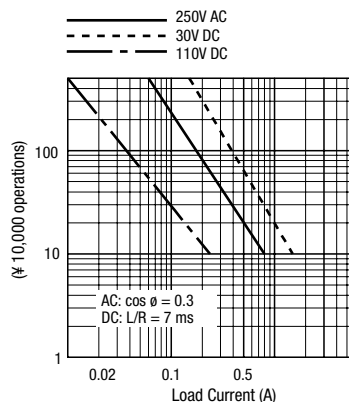
RU42 (Resistive Load)



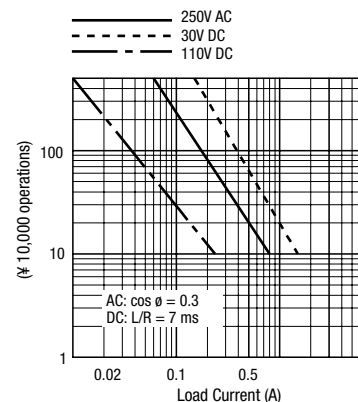
RU2 (Inductive Load)



RU4 (Inductive Load)

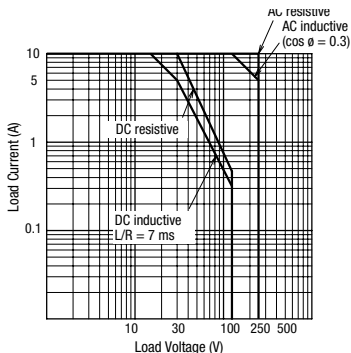


RU42 (Inductive Load)

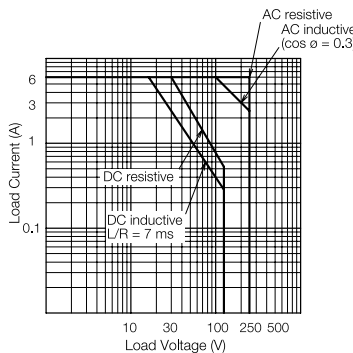


Maximum Switching Current

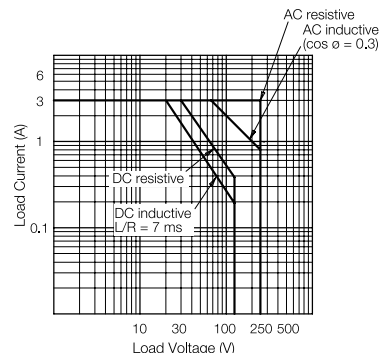
RU2



RU4

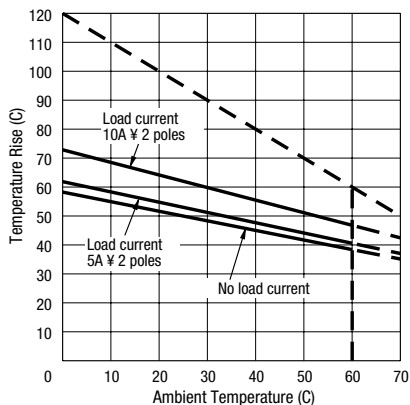


RU42 (Bifurcated)

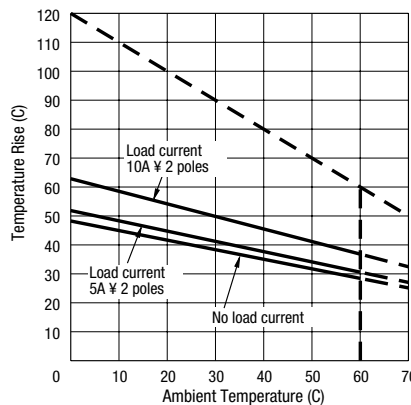


Ambient Temperature vs. Temperature Rise Curves

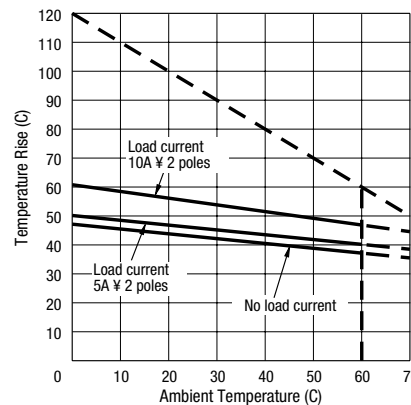
RU2 (AC Coil, 50 Hz)



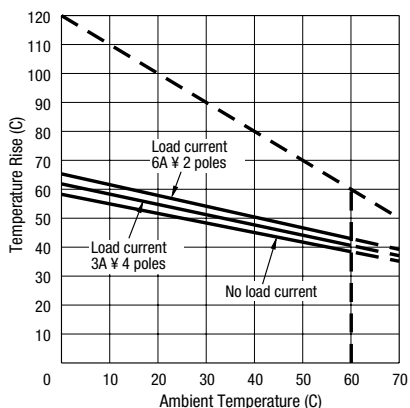
RU2 (AC Coil, 60 Hz)



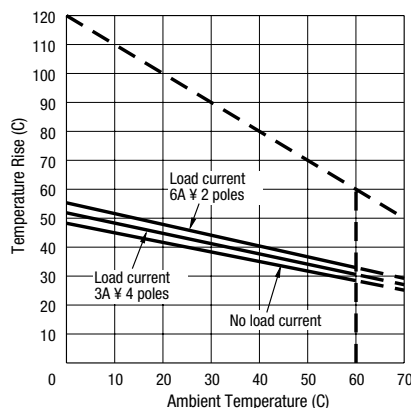
RU2 (DC Coil)



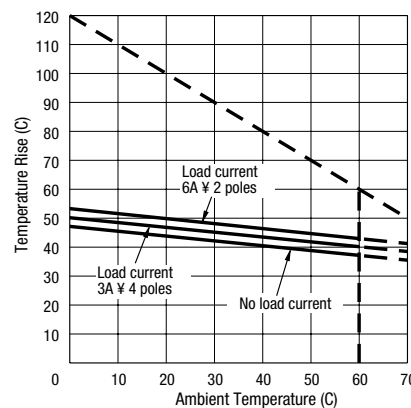
RU4/RU42 (AC Coil, 50 Hz)



RU4/RU42 (AC Coil, 60 Hz)



RU4/RU42 (DC Coil)



The above temperature rise curves show the characteristics when 100% the rated coil voltage is applied. The heat resistance of the coil is 120°C. The slant dashed line indicates the allowable temperature rise for the coil at different ambient temperatures. Load current 6A x 2 poles is for the RU4 models only.

Switches & Pilot Lights

Signaling Lights

Relays & Sockets

Timers

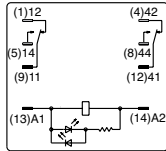
Contactors

Terminal Blocks

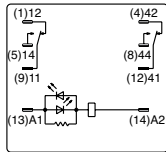
Circuit Breakers

Internal Connection (View from Bottom)

RU2S-* Standard

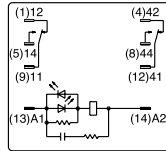


24V AC/DC coil or less

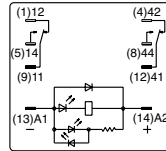


Over 24V AC/DC coil

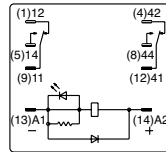
RU2S-*R with RC



RU2S-*D With Diode

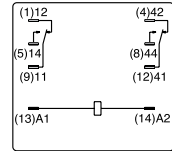


24V DC coil or less

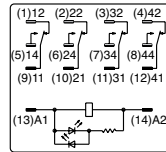


Over 24V DC coil

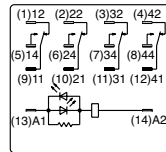
RU2V-NF-*



RU4S-*/RU42S-* Standard

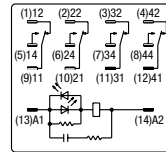


24V AC/DC coil or less

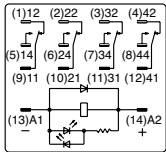


Over 24V AC/DC coil

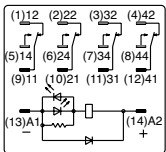
RU4S-*R/RU42S-*R With RC



RU4S-*D/RU42S-*D With Diode

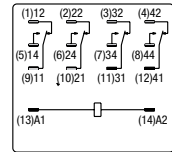


24V DC coil or less



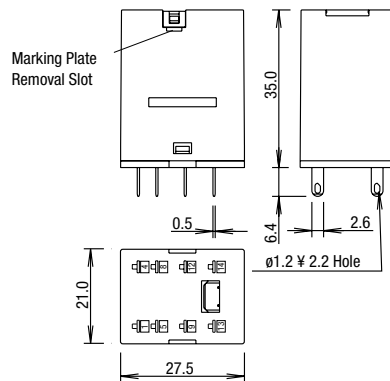
Over 24V DC coil

RU4V-NF-*/RU42V-NF-*

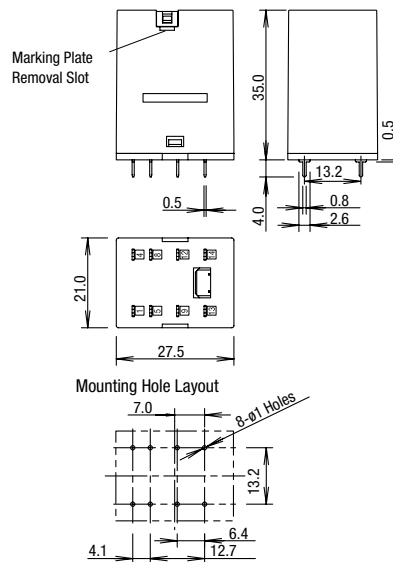


Dimensions (mm)

RU2S



RU2V



Marking plate removal slot is provided only on one side. Insert a flat screwdriver into the slot to remove the marking plate.

All dimensions in mm.

Switches & Pilot Lights

Signaling Lights

Relays & Sockets

Timers

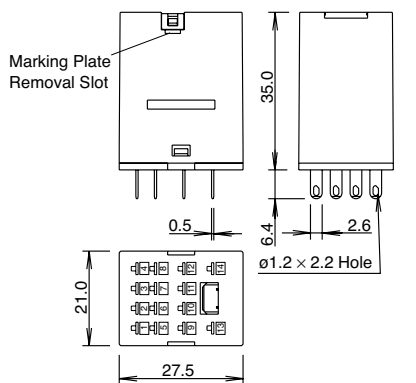
Contactors

Terminal Blocks

Circuit Breakers

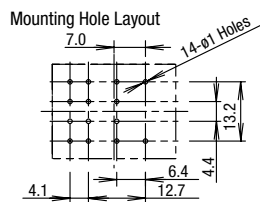
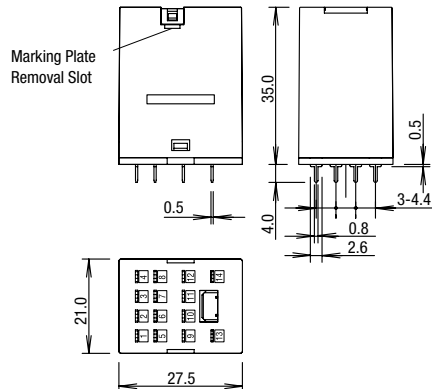
Dimensions con't (mm)

RU4S/RU42S



Marking plate removal slot is provided only on one side. Insert a flat screwdriver into the slot to remove the marking plate.

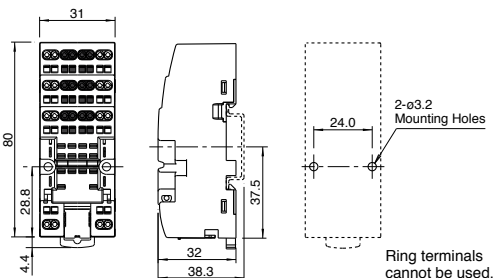
RU4V/RU42V



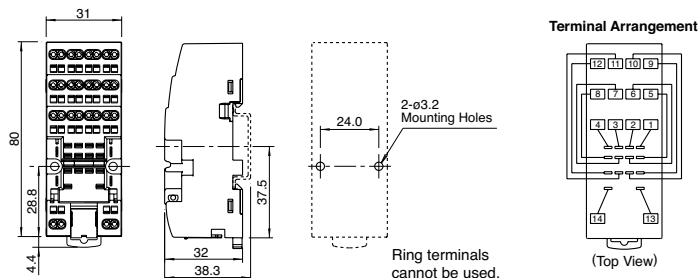
All dimensions in mm.

Spring Clamp DIN Rail Mount Sockets

SU2S-11L

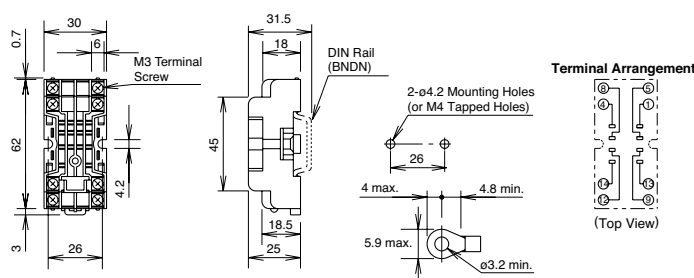


SU4S-11L

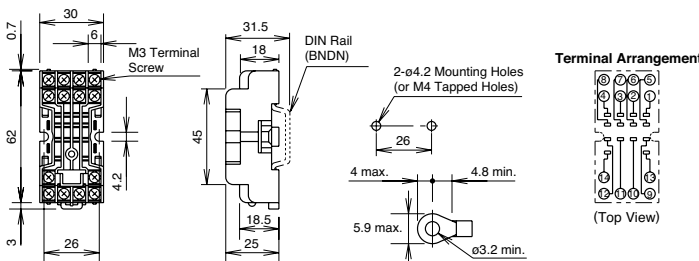


Standard DIN Rail Mount Sockets

SM2S-05



SY4S-05



Switches & Pilot Lights

Signaling Lights

Relays & Sockets

Timers

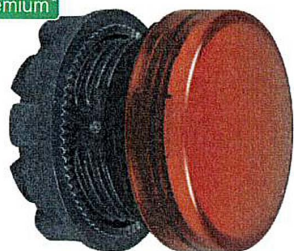
Contactors

Terminal Blocks

Circuit Breakers

Product data sheet

Specifications



Head for pilot light, Harmony XB5,
plastic, red, 22mm, universal LED,
plain lens

ZB5AV043

Main

Range of Product	Hamony XB5
Product or Component Type	Head for pilot light
Product Compatibility	Universal LED
Device short name	ZB5
Bezel material	Dark grey plastic
Mounting diameter	0.87 in (22 mm)
Head type	Standard
Sale per indivisible quantity	1
Shape of signaling unit head	Round
Cap/Operator or lens colour	Red
Operator additional information	With plain lens

Complementary

CAD overall width	1.14 in (29 mm)
CAD overall height	1.14 in (29 mm)
CAD overall depth	1.22 in (31 mm)
Net Weight	0.04 lb(US) (0.017 kg)
Station name	XALD 1...5 cut-outs XALK 2...5 cut-outs
Electrical composition code	P1 front mounting integral LED P2 front mounting integral LED and transformer PF1 front mounting integral LED PR1 rear mounting integral LED
Device presentation	Basic element

Environment

Protective treatment	TH
Ambient Air Temperature for Storage	-40...158 °F (-40...70 °C)
Ambient Air Temperature for Operation	-40...158 °F (-40...70 °C)
Overvoltage category	Class II IEC 60536

Disclaimer: This documentation is not intended as a substitute for and is not to be used for determining suitability or reliability of these products for specific user applications

IP degree of protection	IP66 IEC 60529 IP67 IEC 60529 IP69 IEC 60529 IP69K ISO 20653
NEMA degree of protection	NEMA 13 NEMA 4X
Resistance to high pressure washer	1015.26 psi (7000000 Pa) 131 °F (55 °C) 0.1 m
IK degree of protection	IK05 IEC 50102
Standards	CSA C22.2 No 14 UL 508 EN/IEC 60947-5-5 JIS C8201-5-1 EN/IEC 60947-5-1 EN/IEC 60947-1 EN/IEC 60947-5-4 JIS C8201-1
Vibration resistance	5 gn 2...500 Hz)IEC 60068-2-6
Shock resistance	30 gn 18 ms) half sine wave acceleration IEC 60068-2-27 50 gn 11 ms) half sine wave acceleration IEC 60068-2-27

Ordering and shipping details

Category	22467-PUSHBUTTONS,22MM(PLASTIC) NEW
Discount Schedule	CS2
GTIN	3389110908107
Returnability	Yes
Country of origin	FR

Packing Units

Unit Type of Package 1	PCE
Number of Units in Package 1	1
Package 1 Height	1.77 in (4.500 cm)
Package 1 Width	1.34 in (3.400 cm)
Package 1 Length	2.13 in (5.400 cm)
Package 1 Weight	0.53 oz (15.0 g)
Unit Type of Package 2	S03
Number of Units in Package 2	300
Package 2 Height	11.81 in (30.000 cm)
Package 2 Width	11.81 in (30.000 cm)
Package 2 Length	15.75 in (40.000 cm)
Package 2 Weight	11.60 lb(US) (5.263 kg)
Unit Type of Package 3	P06
Number of Units in Package 3	2400
Package 3 Height	30.31 in (77.000 cm)
Package 3 Width	31.50 in (80.000 cm)
Package 3 Length	23.62 in (60.000 cm)
Package 3 Weight	111.56 lb(US) (50.604 kg)

Offer Sustainability

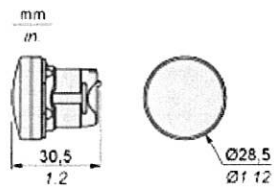
Sustainable offer status	Green Premium product
REACH Regulation	REACH Declaration

REACH free of SVHC	Yes
EU RoHS Directive	Pro-active compliance (Product out of EU RoHS legal scope) EU RoHS Declaration
Toxic heavy metal free	Yes
Mercury free	Yes
China RoHS Regulation	China RoHS declaration
RoHS exemption information	Yes
Environmental Disclosure	Product Environmental Profile
Circularity Profile	End of Life Information

Contractual warranty

Warranty	18 months
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Dimensions



Product data sheet

Specifications



Complete body/light block assembly, Harmony XB5, XB4, with body/fixing collar, universal LED, 12V AC

ZB5AVJ1

Main

Range of product	Harmony XB5
Product or component type	Complete body/light block assembly
Device short name	ZB5
Fixing collar material	Plastic
Sale per indivisible quantity	1
Connections - terminals	Screw clamp terminals, $\leq 2 \times 1.5 \text{ mm}^2$ with cable end conforming to EN 60947-1 Screw clamp terminals, $\geq 1 \times 0.22 \text{ mm}^2$ without cable end conforming to EN 60947-1
Light source	Universal LED
Bulb base	Integral LED
Light source colour	White

Complementary

CAD overall width	30 mm
CAD overall height	42 mm
CAD overall depth	32 mm
Terminals description ISO n°1	(X1-X2)PL
Net weight	0.022 kg
Tightening torque	0.8...1.2 N.m conforming to EN 60947-1
Shape of screw head	Cross compatible with Philips no 1 screwdriver Cross compatible with pozidriv No 1 screwdriver Slotted compatible with flat $\varnothing 4 \text{ mm}$ screwdriver Slotted compatible with flat $\varnothing 5.5 \text{ mm}$ screwdriver
[Ui] rated insulation voltage	600 V (pollution degree 3) conforming to EN 60947-1
[Uimp] rated impulse withstand voltage	6 kV conforming to EN 60947-1
Signalling type	Steady
[Us] rated supply voltage	12 V AC/DC at 50/60 Hz
Supply voltage limits	10...15 V DC 10.2...13.8 V AC
Current consumption	18 mA
Service life	100000 h at rated voltage and 25 °C
Surge withstand	1 kV conforming to IEC 61000-4-5

Device presentation	Basic sub-assemblies
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Environment

Protective treatment	TH
Ambient air temperature for storage	-40...70 °C
Ambient air temperature for operation	-40...70 °C
Electrical shock protection class	Class II conforming to IEC 60536
Standards	EN/IEC 60947-1 JIS C8201-5-1 EN/IEC 60947-5-4 UL 508 EN/IEC 60947-5-1 CSA C22.2 No 14 JIS C8201-1
Product certifications	GL BV CSA UL listed LROS (Lloyds register of shipping) DNV
Vibration resistance	5 gn (f= 2...500 Hz) conforming to IEC 60068-2-6
Shock resistance	30 gn (duration = 18 ms) for half sine wave acceleration conforming to IEC 60068-2-27 50 gn (duration = 11 ms) for half sine wave acceleration conforming to IEC 60068-2-27
Resistance to fast transients	2 kV conforming to IEC 61000-4-4
Resistance to electromagnetic fields	10 V/m conforming to IEC 61000-4-3
Resistance to electrostatic discharge	6 kV on contact (on metal parts) conforming to IEC 61000-2-6 8 kV in free air (in insulating parts) conforming to IEC 61000-2-6
Electromagnetic emission	Class B conforming to IEC 55011

Packing Units

Unit Type of Package 1	Db
Number of Units in Package 1	1
Package 1 Height	5.7 cm
Package 1 Width	3.4 cm
Package 1 Length	5.3 cm
Package 1 Weight	21.0 g
Unit Type of Package 2	S02
Number of Units in Package 2	100
Package 2 Height	15.0 cm
Package 2 Width	30.0 cm
Package 2 Length	40.0 cm
Package 2 Weight	2.555 kg

Offer Sustainability

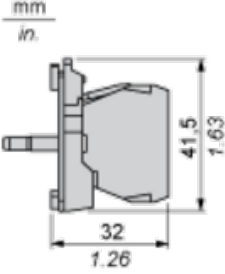
Sustainable offer status	Green Premium product
REACH Regulation	REACH Declaration
REACH free of SVHC	Yes
EU RoHS Directive	Pro-active compliance (Product out of EU RoHS legal scope) EU RoHS Declaration

Mercury free	Yes
China RoHS Regulation	China RoHS declaration
RoHS exemption information	Yes
Environmental Disclosure	Product Environmental Profile
Circularity Profile	End of Life Information
WEEE	The product must be disposed on European Union markets following specific waste collection and never end up in rubbish bins
California proposition 65	WARNING: This product can expose you to chemicals including: Lead and lead compounds, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

Contractual warranty

Warranty	18 months
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Dimensions



Product data sheet

Specifications



Harmony, 22mm Push Button, selector switch operating head, 3 position, maintained, black, unmarked

ZB4BD3

Main

Range of Product	Harmony XB4
Product or Component Type	Head for selector switch
Device short name	ZB4
Bezel material	Chromium plated metal
Mounting diameter	0.87 in (22 mm)
Head type	Standard
Sale per indivisible quantity	1
Shape of signaling unit head	Round
Type of operator	stay put
Operator profile	Black standard handle
Operator position information	3 positions +/- 45°

Complementary

CAD overall width	1.14 in (29 mm)
CAD overall height	1.14 in (29 mm)
CAD overall depth	1.73 in (44 mm)
Net weight	0.09 lb(US) (0.04 kg)
Resistance to high pressure washer	1015.26 psi (7000000 Pa) 131 °F (55 °C) 0.1 m
Mechanical durability	1000000 cycles
Electrical composition code	C3 6 single front mounting C4 6 single and double front mounting C5 5 single front mounting C6 5 single and double front mounting C7 4 single front mounting C8 4 single and double front mounting C11 3 single front mounting
Device presentation	Basic element

Environment

Protective treatment	TH
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* Price is "List Price" and may be subject to a trade discount – check with your local distributor or retailer for actual price.

Ambient Air Temperature for Storage	-40...158 °F (-40...70 °C)
Ambient Air Temperature for Operation	-40...158 °F (-40...70 °C)
Overvoltage category	Class I IEC 60536
IP degree of protection	IP67 IEC 60529 IP69 IP69K
NEMA degree of protection	NEMA 13 NEMA 4X
IK degree of protection	IK06 IEC 50102
Standards	EN/IEC 60947-5-5 EN/IEC 60947-1 UL 508 CSA C22.2 No 14 EN/IEC 60947-5-4 EN/IEC 60947-5-1 JIS C8201-5-1 JIS C8201-1
Product certifications	LROS (Lloyds register of shipping) DNV GL BV UL Listed CSA
Vibration resistance	5 gn 2...500 Hz)IEC 60068-2-6
Shock resistance	30 gn 18 ms) half sine wave acceleration IEC 60068-2-27 50 gn 11 ms) half sine wave acceleration IEC 60068-2-27

Ordering and shipping details

Category	22468 - PUSHBUTTONS,22MM(METAL) NEW
Discount Schedule	CS2
GTIN	3389110888966
Nbr. of units in pkg.	1
Package weight(Lbs)	1.59 oz (45 g)
Returnability	Yes
Country of origin	FR

Packing Units

Unit Type of Package 1	PCE
Package 1 Height	1.97 in (5 cm)
Package 1 width	1.34 in (3.4 cm)
Package 1 Length	2.13 in (5.4 cm)
Unit Type of Package 2	BB1
Number of Units in Package 2	5
Package 2 Weight	7.83 oz (222 g)
Package 2 Height	1.97 in (5 cm)
Package 2 width	10.43 in (26.5 cm)
Package 2 Length	1.34 in (3.4 cm)
Unit Type of Package 3	S03
Number of Units in Package 3	250
Package 3 Weight	25.76 lb(US) (11.686 kg)
Package 3 Height	11.81 in (30 cm)

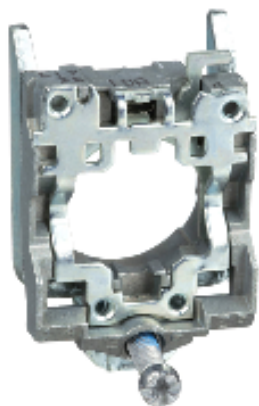
Package 3 width	11.81 in (30 cm)
Package 3 Length	15.75 in (40 cm)

Offer Sustainability

Sustainable offer status	Green Premium product
California proposition 65	WARNING: This product can expose you to chemicals including: Di-isodecyl phthalate (DIDP), which is known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov
REACH Regulation	REACH Declaration
REACH free of SVHC	Yes
EU RoHS Directive	Pro-active compliance (Product out of EU RoHS legal scope) EU RoHS Declaration
Toxic heavy metal free	Yes
Mercury free	Yes
RoHS exemption information	Yes
China RoHS Regulation	China RoHS declaration
Environmental Disclosure	Product Environmental Profile
Circularity Profile	End of Life Information

Contractual warranty

Warranty	18 months
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Main

Range of Product	Harmony XB4
Accessory / separate part designation	Fixing collar
Accessory / separate part type	Body fixing collar
Accessory / separate part category	Mounting and fixing accessories
Material	Metal
Head type	Standard
Accessory / separate part destination	Electrical block
Device presentation	Basic element

Complementary

Quantity per Set	Set of 10
Net weight	0.01 Lb(US) (0.006 kg)

Ordering and shipping details

Category	22469 - PUSHBUTTON,22MM ACCESSORIES-NEW
Discount Schedule	CS2
GTIN	3389110102024
Nbr. of units in pkg.	1
Package weight(Lbs)	1.31 Oz (37 g)
Returnability	Yes
Country of origin	FR

Packing Units

Unit Type of Package 1	PCE
Package 1 Height	0.79 In (2 cm)
Package 1 width	1.18 In (3 cm)
Package 1 Length	1.81 In (4.6 cm)
Unit Type of Package 2	BB1

Number of Units in Package 2	10
Package 2 Weight	14.00 Oz (397 g)
Package 2 Height	3.46 In (8.8 cm)
Package 2 width	2.76 In (7 cm)
Package 2 Length	2.76 In (7 cm)
Unit Type of Package 3	S02
Number of Units in Package 3	150
Package 3 Weight	13.83 Lb(US) (6.273 kg)
Package 3 Height	5.91 In (15 cm)
Package 3 width	11.81 In (30 cm)
Package 3 Length	15.75 In (40 cm)

Offer Sustainability

Sustainable offer status	Green Premium product
California proposition 65	WARNING: This product can expose you to chemicals including: Di-isodecyl phthalate (DIDP), which is known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov
REACH Regulation	REACH Declaration
REACH free of SVHC	Yes
EU RoHS Directive	Pro-active compliance (Product out of EU RoHS legal scope) EU RoHS Declaration
Toxic heavy metal free	Yes
Mercury free	Yes
RoHS exemption information	Yes
China RoHS Regulation	China RoHS Declaration
Environmental Disclosure	Product Environmental Profile
Circularity Profile	End Of Life Information

Contractual warranty

Warranty	18 months
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Product Life Status : **Commercialised**



Main

Range of Product	Harmony XB5 Harmony XB4
Product or Component Type	Contact block
Device short name	ZBE
Sale per indivisible quantity	5
IP degree of protection	IP20 IEC 60529
Contact operation	Slow-break
Contact block type	Single
Contacts usage	Standard contacts
Connections - terminals	Screw clamp terminals, $\leq 2 \times 1.5 \text{ mm}^2$ with cable end EN 60947-1 Screw clamp terminals, $\geq 1 \times 0.22 \text{ mm}^2$ without cable end EN 60947-1

Complementary

Net weight	0.02 Lb(US) (0.011 kg)
Contacts type and composition	1 NO
Positive opening	Without
Operating travel	0.10 In (2.6 mm) NO changing electrical state) 0.17 In (4.3 mm) total travel)
Operating force	2.3 N NO changing electrical state
Mechanical durability	10000000 Cycles
Tightening torque	7.08...10.62 Lbf.In (0.8...1.2 N.m) EN 60947-1
Shape of screw head	Cross pozidriv No 1 Slotted flat $\varnothing 4 \text{ mm}$ Slotted flat $\varnothing 5.5 \text{ mm}$
Contacts material	Silver alloy (Ag/Ni)
Short-circuit protection	10 A cartridge fuse gG EN/IEC 60947-5-1
[Ith] conventional free air thermal current	10 A EN/IEC 60947-5-1
[Ui] rated insulation voltage	600 V 3)EN 60947-1
[Uimp] rated impulse withstand voltage	6 KV EN 60947-1

[I _e] rated operational current	3 A 240 V, AC-15, A600 EN/IEC 60947-5-1 6 A 120 V, AC-15, A600 EN/IEC 60947-5-1 0.1 A 600 V, DC-13, Q600 EN/IEC 60947-5-1 0.27 A 250 V, DC-13, Q600 EN/IEC 60947-5-1 0.55 A 125 V, DC-13, Q600 EN/IEC 60947-5-1 1.2 A 600 V, AC-15, A600 EN/IEC 60947-5-1
Electrical durability	1000000 Cycles, AC-15, 2 A 230 V 3600 cyc/h 0.5 EN/IEC 60947-5-1 appendix C 1000000 Cycles, AC-15, 3 A 120 V 3600 cyc/h 0.5 EN/IEC 60947-5-1 appendix C 1000000 Cycles, AC-15, 4 A 24 V 3600 cyc/h 0.5 EN/IEC 60947-5-1 appendix C 1000000 Cycles, DC-13, 0.2 A 110 V 3600 cyc/h 0.5 EN/IEC 60947-5-1 appendix C 1000000 Cycles, DC-13, 0.5 A 24 V 3600 cyc/h 0.5 EN/IEC 60947-5-1 appendix C
Mounting of block	Front mounting
Electrical composition code	C1 9) C2 7) C3 6) C4 4) C5 5) C6 3) C7 4) C8 2) C9 3) C12 6) M1 6) M2 4) M3 4) M5 2) M6 2) M7 6) M8 4) M9 2) SF1 3) SF2 2) MF1 2) MF2 2) C10 2) M4 2) C13 1)
Device presentation	Basic element

Environment

Protective treatment	TH
Ambient Air Temperature for Storage	-40...158 °F (-40...70 °C)
Ambient Air Temperature for Operation	-40...158 °F (-40...70 °C)
Standards	CSA C22.2 No 14 EN/IEC 60947-5-1 UL 508 EN/IEC 60947-1 JIS C8201-5-1 EN/IEC 60947-5-4 JIS C8201-1
Product certifications	CCC UL DNV GL GOST LROS (Lloyds register of shipping) BV CSA
Vibration resistance	5 gn 2...500 Hz)IEC 60068-2-6
Shock resistance	30 gn 18 ms) half sine wave acceleration IEC 60068-2-7 50 gn 11 ms) half sine wave acceleration IEC 60068-2-7

Ordering and shipping details

Category	22469 - PUSHBUTTON,22MM ACCESSORIES-NEW
Discount Schedule	CS2
GTIN	3389110089479
Nbr. of units in pkg.	1
Package weight(Lbs)	0.32 Oz (9 g)
Returnability	Yes
Country of origin	FR

Packing Units

Unit Type of Package 1	PCE
Package 1 Height	0.39 In (1 cm)
Package 1 width	0.98 In (2.5 cm)
Package 1 Length	1.18 In (3 cm)
Unit Type of Package 2	BB1
Number of Units in Package 2	5
Package 2 Weight	1.84 Oz (52.25 g)
Package 2 Height	1.77 In (4.5 cm)
Package 2 width	2.17 In (5.5 cm)
Package 2 Length	2.17 In (5.5 cm)
Unit Type of Package 3	S03
Number of Units in Package 3	800
Package 3 Weight	19.36 Lb(US) (8.78 kg)
Package 3 Height	11.81 In (30 cm)
Package 3 width	11.81 In (30 cm)
Package 3 Length	15.75 In (40 cm)

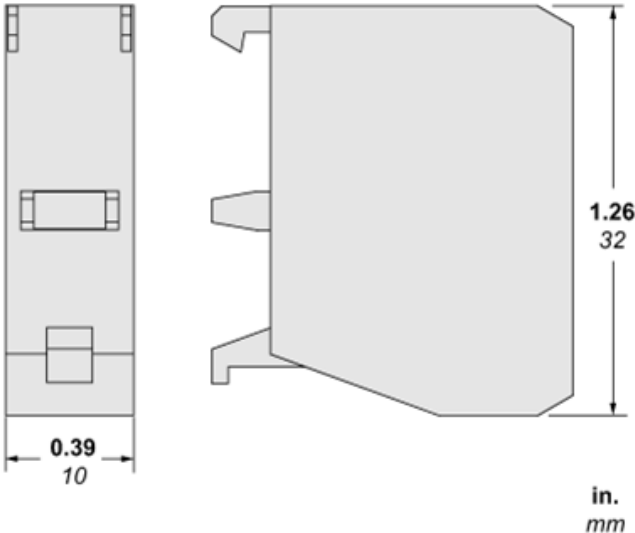
Offer Sustainability

Sustainable offer status	Green Premium product
California proposition 65	WARNING: This product can expose you to chemicals including: Di-isodecyl phthalate (DIDP), which is known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov
REACH Regulation	REACH Declaration
REACH free of SVHC	Yes
EU RoHS Directive	Pro-active compliance (Product out of EU RoHS legal scope) EU RoHS Declaration
Toxic heavy metal free	Yes
Mercury free	Yes
RoHS exemption information	Yes
China RoHS Regulation	China RoHS Declaration
Environmental Disclosure	Product Environmental Profile
Circularity Profile	End Of Life Information
WEEE	The product must be disposed on European Union markets following specific waste collection and never end up in rubbish bins.

Contractual warranty

Warranty	18 months
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Approximate Dimensions



Product Life Status : Commercialised

Product data sheet

Specifications



legend holder 30 x 40 mm with
legend 8 x 27 mm with marking
HAND-OFF-AUTO

ZBY2387

Main

Product or component type	Legend holder
Accessory / separate part category	Marking accessory

Complementary

Material	Plastic
Device composition	Marked legend Legend holder
Accessory / separate part destination	Ø 22 mm control or signalling unit For standard head
Range compatibility	Harmony XB4 Harmony XB5
Legend holder size	30 x 40 mm
Marking	White HAND-OFF-AUTO on 1 black side, 1 red side background
Language	English
Net weight	0.002 kg

Packing Units

Unit Type of Package 1	PCE
Number of Units in Package 1	1
Package 1 Weight	0.9 g
Package 1 Height	0.3 cm
Package 1 width	3 cm
Package 1 Length	4 cm
Unit Type of Package 2	BAG
Number of Units in Package 2	10
Package 2 Weight	100 g
Package 2 Height	10 cm
Package 2 width	1 cm
Package 2 Length	10 cm
Unit Type of Package 3	S01

Number of Units in Package 3	600
Package 3 Weight	3.2 kg
Package 3 Height	15 cm
Package 3 width	15 cm
Package 3 Length	40 cm

Offer Sustainability

Sustainable offer status	Green Premium product
REACH Regulation	REACH Declaration
REACH free of SVHC	Yes
EU RoHS Directive	Pro-active compliance (Product out of EU RoHS legal scope) EU RoHS Declaration
Toxic heavy metal free	Yes
Mercury free	Yes
RoHS exemption information	Yes
China RoHS Regulation	China RoHS declaration
Environmental Disclosure	Product Environmental Profile
Circularity Profile	End of Life Information
California proposition 65	WARNING: This product can expose you to chemicals including: Di-isodecyl phthalate (DIDP), which is known to the State of California to cause birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov

Contractual warranty

Warranty	18 months
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Screw Connection Terminal Blocks

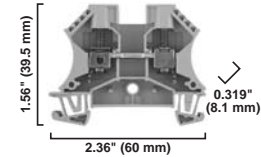
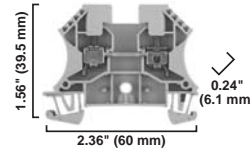
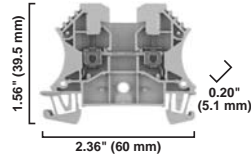
Standard Feed-Through Blocks

1492-J3

1492-J4

1492-J6

Dimensions are not intended to be used for manufacturing purposes.
Note: Height dimension is measured from top of rail to top of terminal block.



Specifications	Feed-Through Terminal Block				Feed-Through Terminal Block				Feed-Through Terminal Block			
Certifications		CSA	IEC	ATEX		CSA	IEC	ATEX		CSA	IEC	ATEX
Voltage Rating	600V AC/DC				600V AC/DC				600V AC/DC			
Maximum Current	65 A	50 A	24 A	21 A	35 A	25 A	32 A	28 A	50 A	41 A	36 A	36 A
Wire Range (Rated Cross Section)	#22... 12 AWG	#26... 12 AWG	2.5 mm ²	2.5 mm ² (#20... 14 AWG)	#22... 10 AWG	#26... 10 AWG	4 mm ²	4 mm ² (#20... 12 AWG)	#22...8 AWG	6 mm ²	6 mm ² (#20... 10 AWG)	6 mm ² (#20... 10 AWG)
Wire Strip Length	0.39 in. (10 mm)				0.39 in. (10 mm)				0.47 in (12 mm)			
Recommended Tightening Torque	4.5...7.1 lb•in. (0.5...0.8 N•m)				9.0 lb•in. (1.0 N•m)				14.2 lb•in (1.6 N•m)			
Density	59 pcs/ft (196 pcs/m)				49 pcs/ft (163 pcs/m)				37 pcs/ft (123 pcs/m)			
Housing Temperature Range	-58...+248 °F (-50...+120 °C)				-58...+248 °F (-50...+120 °C)				-58...+248 °F (-50...+120 °C)			
Short-Circuit Current Rating	See page 12-43											

Terminal Blocks		Cat. No.	Pkg Qty.	Cat. No.	Pkg Qty.	Cat. No.	Pkg Qty.
Color:	Grey	1492-J3	100	1492-J4	100	1492-J6	100
	Red	1492-J3-RE	100	1492-J4-RE	100	1492-J6-RE	100
	Blue	1492-J3-B	100	1492-J4-B	100	1492-J6-B	100
	Black	1492-J3-BL	100	1492-J4-BL	100	1492-J6-BL	100
	Green	1492-J3-G	100	1492-J4-G	100	1492-J6-G	100
	Yellow	1492-J3-Y	100	1492-J4-Y	100	1492-J6-Y	100
	Orange	1492-J3-OR	100	1492-J4-OR	100	1492-J6-OR	100
	Brown	1492-J3-BR	100	1492-J4-BR	100	1492-J6-BR	100
	White	1492-J3-W	100	1492-J4-W	100	1492-J6-W	100

Accessories		Cat. No.	Pkg Qty.	Cat. No.	Pkg Qty.	Cat. No.	Pkg Qty.
Mounting Rails:							
1 m Symmetrical DIN (Steel)		199-DR1	10	199-DR1	10	199-DR1	10
1 m Symmetrical DIN (Aluminum)		1492-DR5	10	1492-DR5	10	1492-DR5	10
1 m Hi-Rise Sym. DIN (Aluminum)		1492-DR6	2	1492-DR6	2	1492-DR6	2
1 m Angled Hi-Rise Sym. DIN (Steel)		1492-DR7	2	1492-DR7	2	1492-DR7	2
End Barriers	Grey	1492-EBJ3	50	1492-EBJ3	50	1492-EBJ3	50
	Blue	1492-EBJ3-B	50	1492-EBJ3-B	50	1492-EBJ3-B	50
	Yellow	1492-EBJ3-Y	50	1492-EBJ3-Y	50	1492-EBJ3-Y	50
End Anchors and Retainers:							
Screwless End Retainer		1492-ERL35	20	1492-ERL35	20	1492-ERL35	20
DIN Rail — Normal Duty		1492-EAJ35	100	1492-EAJ35	100	1492-EAJ35	100
DIN Rail — Heavy Duty		1492-EAHJ35	50	1492-EAHJ35	50	1492-EAHJ35	50
Jumpers:*							
Screw Center Jumper — 10-pole		1492-CJJ5-10	20	1492-CJJ6-10	20	1492-CJJ8-10	20
Screw Center Jumper — 4-pole		1492-CJJ5-4	50	1492-CJJ6-4	50	1492-CJJ8-4	50
Screw Center Jumper — 3-pole		1492-CJJ5-3	50	1492-CJJ6-3	50	1492-CJJ8-3	50
Screw Center Jumper — 2-pole		1492-CJJ5-2	50	1492-CJJ6-2	50	1492-CJJ8-2	50
Plug-in Center Jumper — 50-Pole		1492-CJLJ5-50	10	1492-CJLJ6-41 (41-pole)	10	—	—
Plug-in Center Jumper — 10-Pole		1492-CJLJ5-10	20	1492-CJLJ6-10	20	—	—
Plug-in Center Jumper — 9-Pole		1492-CJLJ5-9	20	—	—	—	—
Plug-in Center Jumper — 8-Pole		1492-CJLJ5-8	20	—	—	—	—
Plug-in Center Jumper — 7-Pole		1492-CJLJ5-7	20	—	—	—	—
Plug-in Center Jumper — 6-Pole		1492-CJLJ5-6	20	—	—	—	—
Plug-in Center Jumper — 5-Pole		1492-CJLJ5-5	20	—	—	—	—
Plug-in Center Jumper — 4-Pole		1492-CJLJ5-4	60	1492-CJLJ6-4	60	—	—
Plug-in Center Jumper — 3-Pole		1492-CJLJ5-3	60	1492-CJLJ6-3	60	—	—
Plug-in Center Jumper — 2-Pole		1492-CJLJ5-2	60	1492-CJLJ6-2	60	—	—
Insulated Side Jumper — 24-Pole		1492-SJ5B-24	50	—	—	—	—
Insulated Side Jumper — 10-Pole		1492-SJ5B-10	50	—	—	—	—
Screw Type Jumper Notching Tool		1492-T1	1	1492-T1	1	1492-T1	1
Other Accessories:							
Partition Plate		1492-EBJ16	20	1492-EBJ16	20	1492-EBJ16	20
Test Plug Socket		1492-TPS23	20	1492-TPS23L	50	1492-TPS23L	50
Test Plug		1492-TP23	20	1492-TP23	20	1492-TP23	20
Test Plug (Stackable)		1492-TPJ5	25	1492-TPJ6	25	—	—
Electrical Warning Plate		1492-EWPJ5	25	1492-EWPJ5	25	1492-EWPJ8	50
Group Marking Carrier		1492-GM35	25	1492-GM35	25	1492-GM35	25
Marking Systems:							
Snap-in Marker Cards		1492-M5X12 (144/card)	5	1492-M6X12 (120/card)	5	1492-MR8X12 (84/card)	5
		1492-M5X5 (200/card)	5	1492-M6X5 (200/card)	5	1492-M8X5 (160/card)	5

* Use of center jumpers may affect spacings, requiring derating of terminal blocks. See page 12-78 for details.

ELECTRICAL SCHEMATIC STANDARD SYMBOLS

	GROUND
	RELAY CONTACTS (no) NORMALLY OPEN
	RELAY CONTACTS (nc) NORMALLY CLOSED
	TIME DELAY CONTACTS (tc) TIMED CLOSED
	TIME DELAY CONTACTS (to) TIMED OPEN
	MOTOR STARTER CONTACTS (no) NORMALLY OPEN (ON MOTOR STARTER NO.1)
	MOTOR STARTER CONTACTS (nc) NORMALLY CLOSED (ON MOTOR STARTER NO.1)
	PRESSURE SWITCH (PS-)
	FLOAT SWITCH (MAKE ON RISE)
	FLOAT SWITCH (MAKE ON FALL)
	THERMOSTAT (HIGH TEMP)
	THERMOSTAT (LOW TEMP)
	HAND-OFF-AUTO
	PUSH TO TEST PILOT LIGHT
	FLOAT SWITCH (MAKE ON RISE)
	LIMIT SWITCH (LS-)
	FLOW SWITCH (FS-)
	CIRCUIT BREAKER
	BATTERY
	REMOTE TO PANEL

	MOTOR STARTER W/OVERLOAD RELAY
	TIME DELAY No.1(OON DELAY COIL)
	RELAY No.1(COIL)
	MOTOR STARTER No.1(COIL)
	LIGHT
	ALARM LIGHT W/HORN
	ELAPSED TIME METER
	ALTERNATOR
	TIME CLOCK
	EXHAUST FAN
	HEATER
	CONTACTOR NO.1
	DIGITAL READOUT
	CHART RECORDER
	POWER SUPPLY
	PRESSURE TRANSDUCER
	OVERLOAD (MOTOR STARTER)
	LIGHTNING ARRESTOR
	GROUND FAULT INTERRUPTER
	PHASE MONITOR
	PHASE CONVERTER CONTACTOR
	ENERGIZE TO CLOSE
	ENERGIZE TO OPEN
	TERMINAL BLOCK

REV 05/22/02



ENGINEERED FLUID, INC.

P.O. DRAWER 723 * CENTRALIA, ILLINOIS 62801

JOB REF. NO. ES-073192

DRAWING NO. ESYMB1a

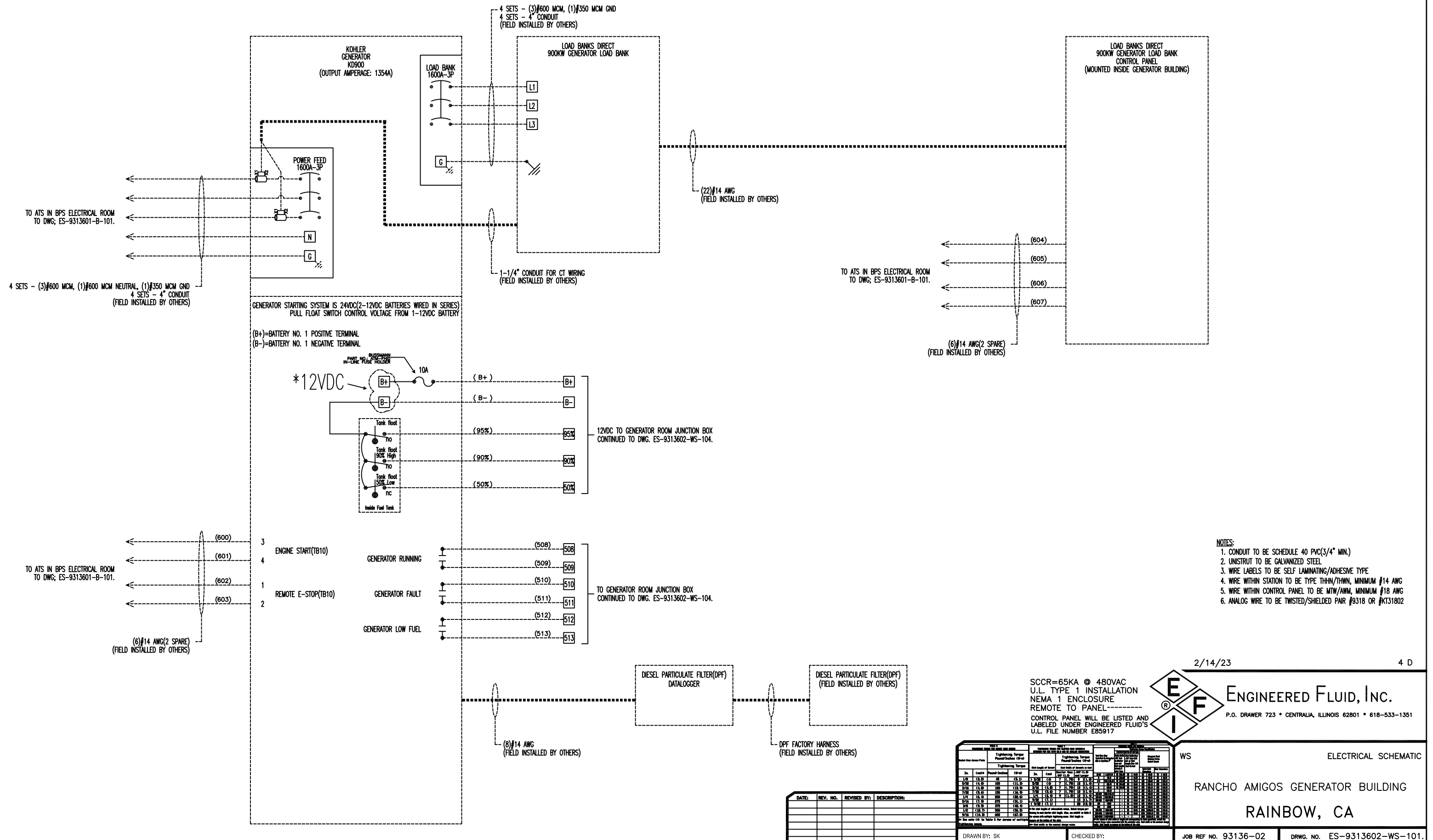
GENERATOR BUILDING PROVIDED BY EFI

ALL CONDUIT/WIRE TO/FROM BOOSTER STATION/LOAD BANK/DPF TO BE PROVIDED AND INSTALLED/TERMINATED BY OTHERS

WIRE SIZES ARE SHOWN AS REQUIRED BY THE NEC AND DO NOT TAKE INTO ACCOUNT ANY DERATING OR INCLUDE COMPENSATION FOR VOLTAGE DROP.

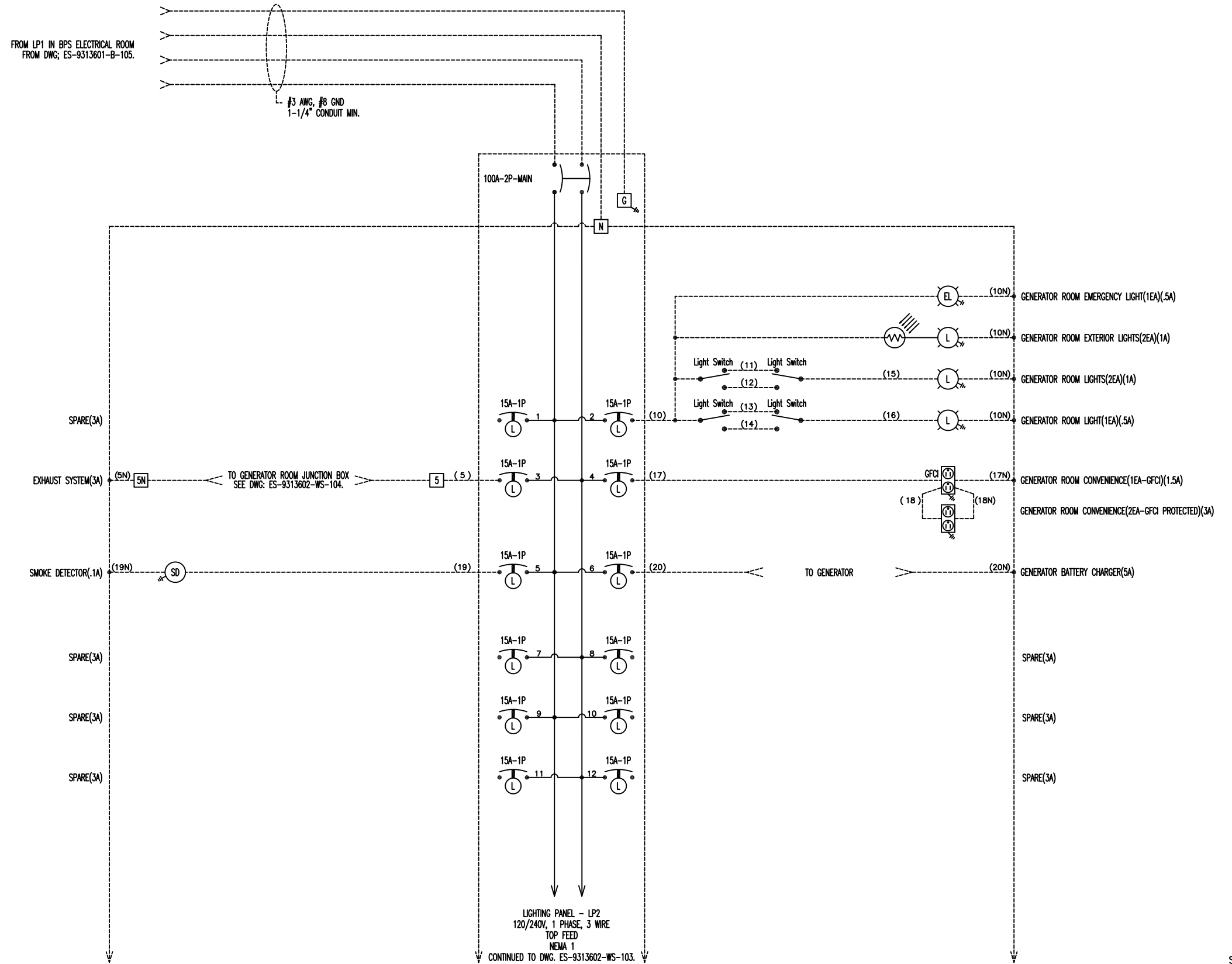
CONDUIT SIZES ARE SIZED PER THE NEC FOR THE CONDUCTOR SIZES SHOWN. CONDUITS SHALL BE RESIZED BY THE INSTALLER IF WIRE SIZES ARE INCREASED.

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- NOTES:
1. CONDUIT TO BE SCHEDULE 40 PVC(3/4" MIN.)
 2. UNISTRUT TO BE GALVANIZED STEEL
 3. WIRE LABELS TO BE SELF LAMINATING/ADHESIVE TYPE
 4. WIRE WITHIN STATION TO BE TYPE THHN/THWN, MINIMUM #14 AWG
 5. WIRE WITHIN CONTROL PANEL TO BE MTW/ANM, MINIMUM #18 AWG
 6. ANALOG WIRE TO BE TWISTED/SHIELDED PAIR #9318 OR #KT31802

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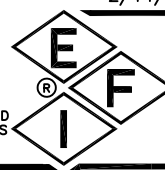


- NOTES:
1. CONDUIT TO BE SCHEDULE 40 PVC(3/4" MIN.)
 2. UNISTRUT TO BE GALVANIZED STEEL
 3. WIRE LABELS TO BE SELF LAMINATING/ADHESIVE TYPE
 4. WIRE WITHIN STATION TO BE TYPE THHN/THWN, MINIMUM #14 AWG
 5. WIRE WITHIN CONTROL PANEL TO BE MTW/ANW, MINIMUM #18 AWG
 6. ANALOG WIRE TO BE TWISTED/SHIELDED PAIR #9318 OR #KT31802

2/14/23

4 D

SCCR=10KA @ 240VAC
 U.L. TYPE 1 INSTALLATION
 NEMA 1 ENCLOSURE
 REMOTE TO PANEL
 CONTROL PANEL WILL BE LISTED AND
 LABELED UNDER ENGINEERED FLUID'S
 U.L. FILE NUMBER E85917



ENGINEERED FLUID, INC.
 P.O. DRAWER 723 • CENTRALIA, ILLINOIS 62801 • 618-533-1351

TERMINAL BLOCK				TERMINAL BLOCK			
Terminal	Wire	Terminal	Wire	Terminal	Wire	Terminal	Wire
1	15A-1P	1	15A-1P	1	15A-1P	1	15A-1P
2	15A-1P	2	15A-1P	2	15A-1P	2	15A-1P
3	15A-1P	3	15A-1P	3	15A-1P	3	15A-1P
4	15A-1P	4	15A-1P	4	15A-1P	4	15A-1P
5	15A-1P	5	15A-1P	5	15A-1P	5	15A-1P
6	15A-1P	6	15A-1P	6	15A-1P	6	15A-1P
7	15A-1P	7	15A-1P	7	15A-1P	7	15A-1P
8	15A-1P	8	15A-1P	8	15A-1P	8	15A-1P
9	15A-1P	9	15A-1P	9	15A-1P	9	15A-1P
10	15A-1P	10	15A-1P	10	15A-1P	10	15A-1P
11	15A-1P	11	15A-1P	11	15A-1P	11	15A-1P
12	15A-1P	12	15A-1P	12	15A-1P	12	15A-1P

DATE	REV. NO.	REVISED BY	DESCRIPTION

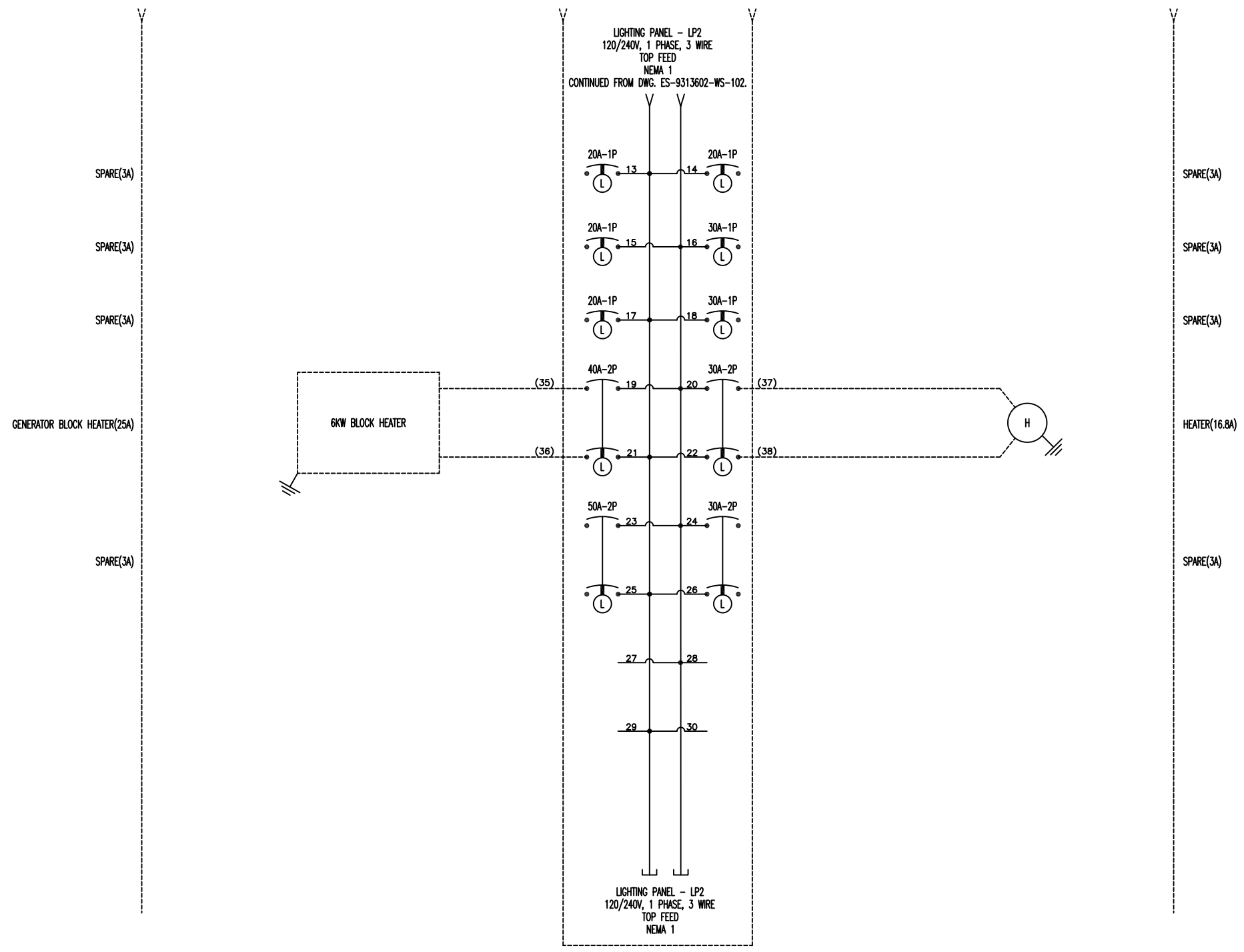
DRAWN BY: SK CHECKED BY:

WS ELECTRICAL SCHEMATIC

RANCHO AMIGOS GENERATOR BUILDING
 RAINBOW, CA

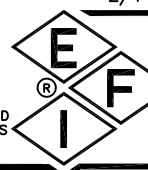
JOB REF NO. 93136-02 DRWG. NO. ES-9313602-WS-102.

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- NOTES:**
1. CONDUIT TO BE SCHEDULE 40 PVC(3/4" MIN.)
 2. UNISTRUT TO BE GALVANIZED STEEL
 3. WIRE LABELS TO BE SELF LAMINATING/ADHESIVE TYPE
 4. WIRE WITHIN STATION TO BE TYPE THHN/THWN, MINIMUM #14 AWG
 5. WIRE WITHIN CONTROL PANEL TO BE MTW/ANM, MINIMUM #18 AWG
 6. ANALOG WIRE TO BE TWISTED/SHIELDED PAIR #9318 OR #KT31802

SCCR=10KA @ 240VAC
 U.L. TYPE 1 INSTALLATION
 NEMA 1 ENCLOSURE
 REMOTE TO PANEL
 CONTROL PANEL WILL BE LISTED AND
 LABELED UNDER ENGINEERED FLUID'S
 U.L. FILE NUMBER E85917



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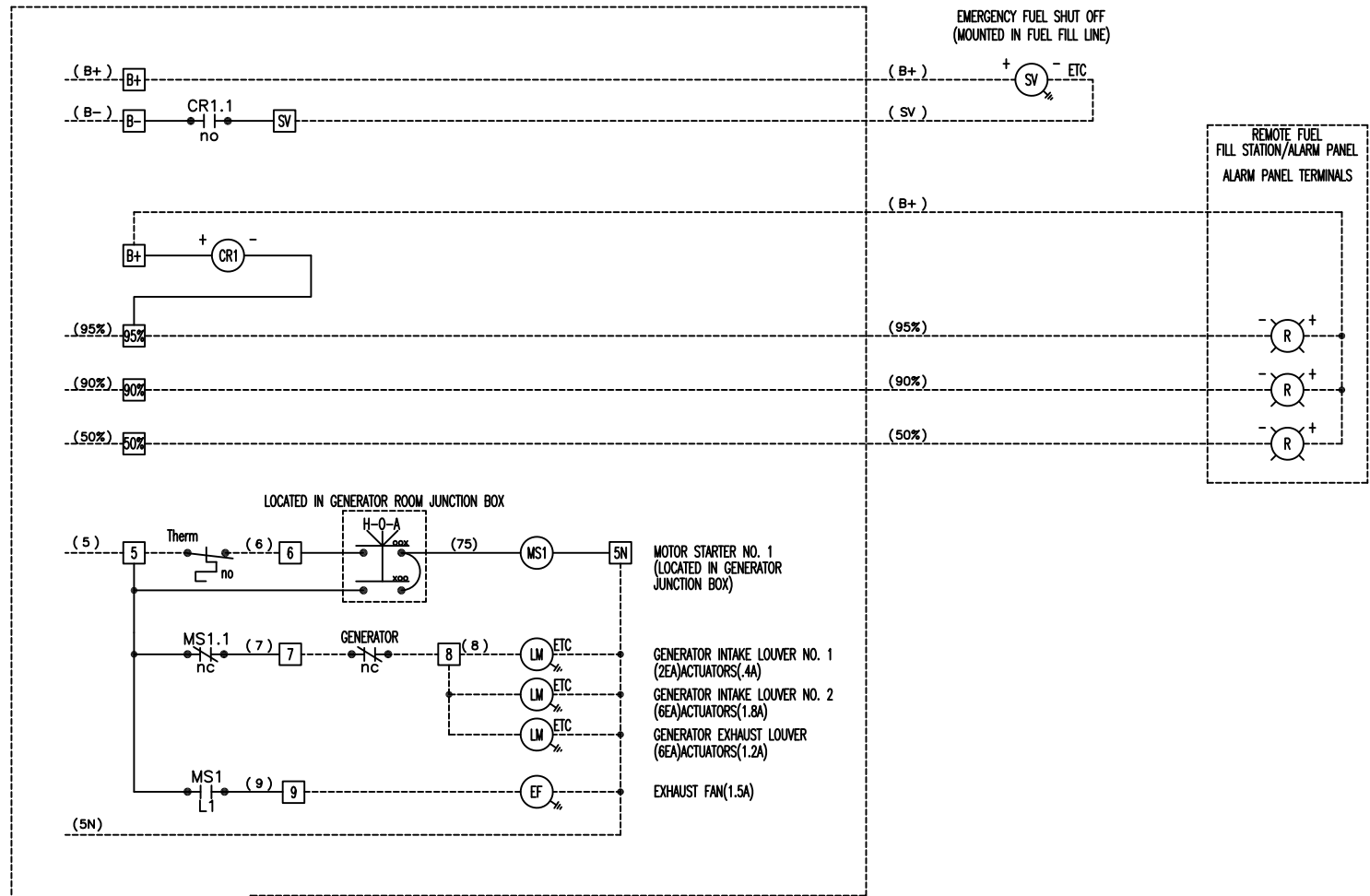
2/14/23 4 D

DATE:	REV. NO.	REVISED BY:	DESCRIPTION:

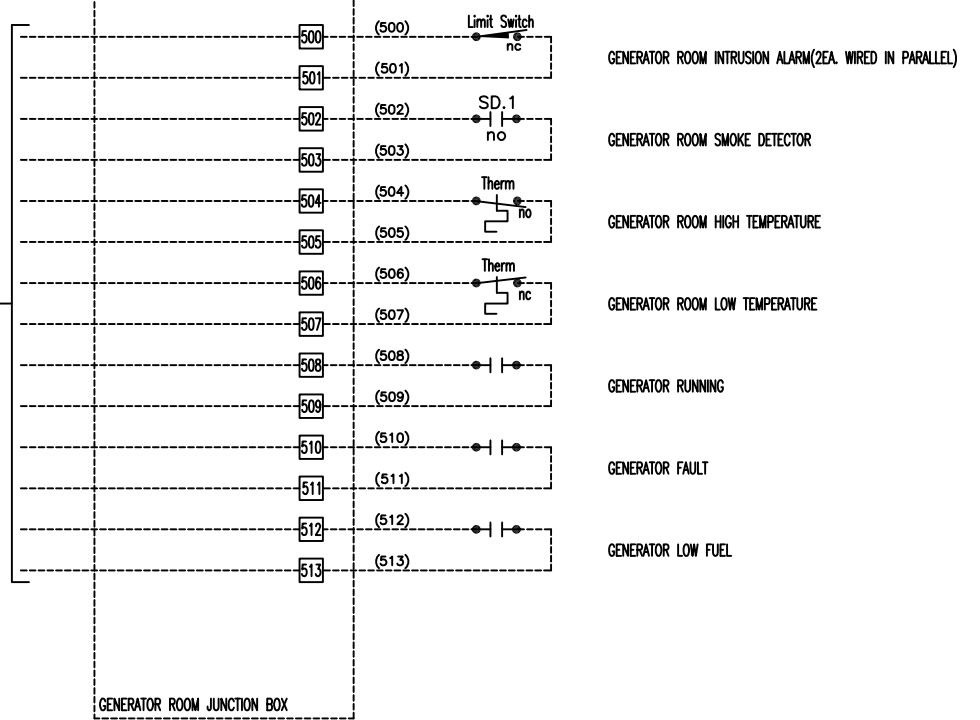
TERMINAL BLOCK		TERMINAL BLOCK		TERMINAL BLOCK	
In.	Code	In.	Code	In.	Code
1/8"	CS-D	1/8"	CS-D	1/8"	CS-D
3/16"	CS-D	3/16"	CS-D	3/16"	CS-D
1/4"	CS-D	1/4"	CS-D	1/4"	CS-D
5/16"	CS-D	5/16"	CS-D	5/16"	CS-D
3/8"	CS-D	3/8"	CS-D	3/8"	CS-D
1/2"	CS-D	1/2"	CS-D	1/2"	CS-D
5/8"	CS-D	5/8"	CS-D	5/8"	CS-D
3/4"	CS-D	3/4"	CS-D	3/4"	CS-D
1"	CS-D	1"	CS-D	1"	CS-D

WS ELECTRICAL SCHEMATIC
RANCHO AMIGOS GENERATOR BUILDING
RAINBOW, CA
 JOB REF NO. 93136-02 DRWG. NO. ES-9313602-WS-103.

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SIGNAL WIRING TO INTERFACE PANEL IN BPS ELECTRICAL ROOM FROM DWG; ES-9313601-B-107.

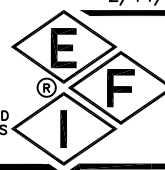


- NOTES:
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 4. WIRE WITHIN STATION TO BE TYPE THHN/THWN, MINIMUM #14 AWG
 5. WIRE WITHIN CONTROL PANEL TO BE MTW/ANM, MINIMUM #18 AWG
 6. ANALOG WIRE TO BE TWISTED/SHIELDED PAIR #9318 OR #KTS1802

2/14/23

4 D

SCCR=5KA @ 120VAC
 U.L. TYPE 1 INSTALLATION
 NEMA 1 ENCLOSURE
 REMOTE TO PANEL
 CONTROL PANEL WILL BE LISTED AND LABELED UNDER ENGINEERED FLUID'S U.L. FILE NUMBER E85917



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RANCHO AMIGOS GENERATOR BUILDING
 RAINBOW, CA