TPG Pritchard Power Systems

First in Quality, First in Service.

Submittal Data
R1

PREPARED FOR:

Burrows LS

Kohler Generator Model:

45REZG

Kohler Transfer Switch Model:

KCP-ANTB-0225S

SHOP DRAWING REVIEW

THIS DRAWING HAS BEEN REVIEWED FOR GENERAL CONFORMANCE WITH THE DESIGN CONCEPT ONLY. SUCH REVIEW SHALL NOT RELIEVE THE CONTRACTOR OF THEIR RESPONSIBILITY FOR ERRORS OR OMISSIONS OR OF MEETING THE REQUIREMENTS OF THE CONTRACT DOCUMENTS. NO RESPONSIBILITY IS ASSUMED FOR CORRECTNESS OF DIMENSIONS OR DETAILS

Proposal # 15572

	NO COMMENT
X	SEE COMMENTS
	AMEND & RESUBMIT
	REJECTED

Submission No.	1
Project No.	16-3523
By	B. Moore
Date	August 15, 2016

DILLON CONSULTING LIMITED

100 Otter Street, Winnipeg, Manitoba, Canada, R3T 0M8
Phone: (204) 474-5909 Fax: (204) 474-5970

TPG Pritchard Power Systems

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Burrows LS

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TPG Pritchard Power Systems

BILL OF MATERIALS

Burrows LS

MODEL:	ITEM DESCRIPTION:
45REZG	42kW/53kVA, 347/600 volt, 60Hz, Three Phase, Natural Gas Fuelled Generator, Amperage Output – 51

Installed Accessories:

- CSA Approval
- Unit Mounted Radiator, 50 Deg. C, Ambient
- Block Heater, 120V Single Phase, 1500W, Thermostatically Controlled
- Generator Control Panel, Unit Mounted, DEC3000
  - Run Relay
  - Emergency Stop Button
  - 2 Input, 5 Output Module
  - Pre-Alarm Senders
- Electronic Governor
- Additional Gas Solenoid Valve
- Line Circuit Breaker, 60 Amp, Thermal Mag Trip, 100%
  - Auxiliary Contact
  - Alarm Switch
- Permanent Magnetic Generator (PMG) Model: 4P8
- Flexible Fuel Line
- Battery Rack & Cables
- Lead/Acid Starting Battery(s)
- Vibration Isolators
- Standard Duty Air Intake
- Air Cleaner Restriction Indicator

Accessories Supplied Loose:

- Battery Charger, Float w/Alarms, 12v – 10A
- Flex Exhaust Connector
- Critical Grade Silencer
- Insulated Wall Thimble
- Transfer Switch Model: KCP-ANTB-0225S
  - Current Sensing
  - Line to Neutral Monitoring

Other Services:

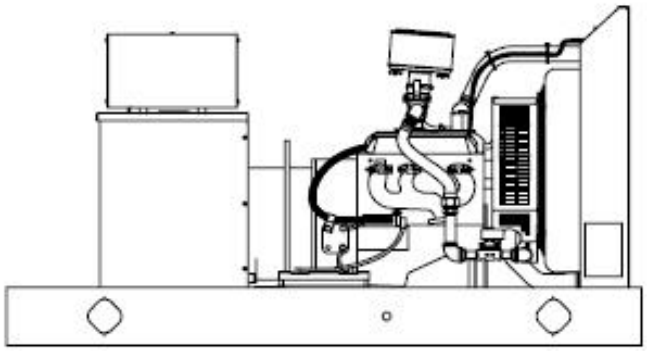
- First Fill of Lube Oil and Antifreeze/Coolant
- 5 Year Extended Warranty
- Standard Factory Test (CTR)
- Set of Manuals
- Delivery to Site, Offloading by Others
- Start-up & Commissioning

As per D9.4, the contractor is required to off-load the goods

Generator & Accessories

KOHLER. Power Systems

45REZG
Natural Gas



Standard Features

- Kohler Co. provides one-source responsibility for the generating system and accessories.
- 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 one-year limited warranty covers all systems and components. Two- and five-year extended warranties are also available.
- EPA certified for Stationary Emergency Applications

Alternator Features

- The unique Fast-Response™ II excitation system delivers excellent voltage response and short circuit capability using a permanent magnet (PM)-excited alternator.
- The brushless, rotating-field alternator has broad range reconnectability.

Generator Set Ratings

				Standby 130C Ratings	
Alternator	Voltage	Ph	Hz	kW/kVA	Amps
4P8	347/600	3	60	42 / 53	51

RATINGS: All three-phase units are rated at 0.8 power factor. All single-phase units are rated at 1.0 power factor.
Standby Ratings: Standby ratings apply to installations served by a reliable utility source. The standby rating is applicable to varying loads for the duration of a power outage.
There is no overload capability for this rating. Ratings are in accordance with ISO-3046/1, BS 5514, AS 2789, and DIN 6271.
Prime Power Ratings: Prime power ratings apply to installations where utility power is unavailable or unreliable. At varying load, the number of generator set operating hours is unlimited.
A 10% overload capacity is available for one hour in twelve. Ratings are in accordance with ISO-8528/1, overload power in accordance with ISO-3046/1, BS 5514, AS 2789, and DIN 6271. For limited running time and base load ratings, consult the factory.
Obtain the technical information bulletin (TIB-101) on ratings guidelines for the complete ratings definitions.
The generator set manufacturer reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever.
GENERAL GUIDELINES FOR DERATION: Altitude: Derate 1.3% per 100 m (328 ft.) elevation above 200 m (656 ft.). Temperature: Derate 3.0% per 10?C (18?F) temperature above 25?C (77?F).

Model: 45REZG, continued

Alternator Specifications

Specifications	Alternator
Alternator manufacturer	Kohler
Type	4-Pole, Rotating-Field
Exciter type	Brushless, Permanent-Magnet
Leads, quantity	4P7, 4P8: 12, Reconnectable 4Q10: 4, 110-120/220-240
Voltage regulator	Solid State, Volts/Hz
Insulation	NEMA MG1
Insulation: Material	Class H
Insulation: Temperature Rise	130°C, Standby
Bearing: quantity, type	1, Sealed
Coupling	Flexible Disc
Amortisseur windings	Full
Voltage regulation, no-load to full-load Permanent magnet (PM) alternator	Controller Dependent
One-Step Load Acceptance	100% of rating
Unbalanced load capability	100% of Rated Standby Current

• 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 down stream circuit breakers to trip without collapsing the alternator field.
• Self-ventilated and dripproof construction.
• Vacuum-impregnated windings with fungus-resistant epoxy varnish for dependability and long life.
• Superior voltage waveform from a two-thirds pitch stator and skewed rotor.
• Fast-Response™ II brushless alternator with brushless exciter for excellent load response.

Exhaust

Exhaust System

Exhaust Manifold Type	Dry
Exhaust flow at rated kW,m3/min. (cfm)	9.3 (327)
Maximum allowable back pressure, kPa (in. Hg)	10.2 (3.0)
Exhaust temperature at rated kW, dry exhaust, °C (°F)	649 (1200)
Exh. outlet size at eng. hookup, mm (in.)	76 (3.0) OD

Engine Electrical

Engine Electrical System

Ignition system	Electronic, Distributor
Battery charging alternator: Ground (negative/positive)	Negative
Battery charging alternator: Volts (DC)	12
Battery charging alternator: Ampere rating	70
Starter motor rated voltage (DC)	12
Battery, recommended cold cranking amps (CCA): Qty., rating for --18 C (0?F)	One, 630
Battery voltage (DC)	12

Fuel

Fuel System

Fuel type	Natural Gas
Fuel supply line inlet	1 NPTF
Natural gas/LPG fuel supply pressure, kPa (in. H20). Fuel supply pressure measured at the generator set fuel inlet downstream of any fuel system equipment accessories.	1.74-2.74 (7-11)

Model: 45REZG, continued

Fuel Composition

Fuel Composition

Natural Gas: Methane, % by volume	90 min.
Natural Gas: Ethane, % by volume	4.0 max.
Natural Gas: Propane, % by volume	1.0 max.
Natural Gas: Propene, % by volume	0.1 max.
Natural Gas: C4 and higher, % by volume	0.3 max.
Natural Gas: Sulfur, ppm mass	25 max.
Natural Gas: Lower heating value, kJ/m3 (Btu/ft3), min.	33.2 (890)

* Fuels with other compositions may be acceptable. If your fuel is outside the listed specifications, contact your local distributor for further analysis and advice.

Lubrication

Lubrication System

Type	Full Pressure
Oil pan capacity, L (qt.)	4.3 (4.5)
Oil pan capacity with filter, L (qt.)	5.7 (6.0)
Oil filter: quantity, type	1, Cartridge

Cooling

Radiator System

Ambient temperature, °C (°F)	50 (122)
Engine jacket water capacity, L (gal.)	6.8 (1.8)
Radiator system capacity, including engine, L (gal.)	19.7 (5.2)
Engine jacket water flow, Lpm (gpm)	106.0 (28)
Heat rejected to cooling water at rated kW, dry exhaust, kW (Btu/min.)	40.8 (2320)
Water pump type	Centrifugal
Fan diameter, including blades, mm (in.)	533 (21)
Fan, kWm (HP)	1.5 (2.0)
Max. restriction of cooling air, intake and discharge side of radiator, kPA (in. H20)	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) *	142 (5000)
Combustion air, m3/min. (cfm)	2.78 (98)
Heat rejected to ambient air: Engine, kW (Btu/min.)	19.2 (1090)
Heat rejected to ambient air: Alternator, kW (Btu/min.)	7.4 (420)
Radiator-cooled cooling air, m3/min. (scfm) *	142 (5000)
Combustion air, m3/min. (cfm)	2.78 (98)
Heat rejected to ambient air: Engine, kW (Btu/min.)	19.2 (1090)
Heat rejected to ambient air: Alternator, kW (Btu/min.)	7.4 (420)

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

Fuel Consumption

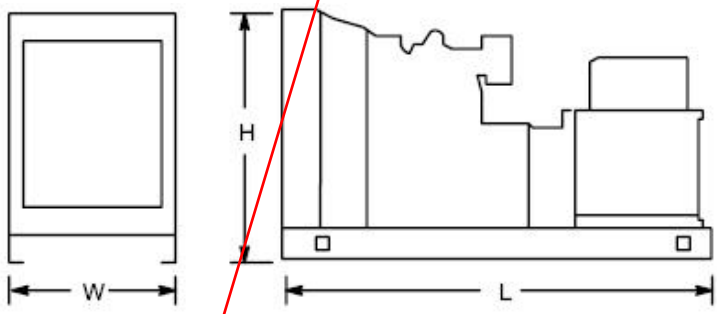
Natural Gas, m3/hr. (cfh) at % load	Rating
Standby Fuel Consumption at 100% load	16.5 m3/hr. (584 cfh)
Standby Fuel Consumption at 75% load	13.8 m3/hr. (486 cfh)
Standby Fuel Consumption at 50% load	10.2 m3/hr. (360 cfh)

Model: 45REZG, continued

Standby Fuel Consumption at 25% load	7.7 m3/hr. (272 cfh)
Prime Fuel Consumption at 100% load	15.7 m3/hr. (552 cfh)
Prime Fuel Consumption at 75% load	12.7 m3/hr. (448 cfh)
Prime Fuel Consumption at 50% load	9.5 m3/hr. (336 cfh)
Prime Fuel Consumption at 25% load	7.6 m3/hr. (267 cfh)

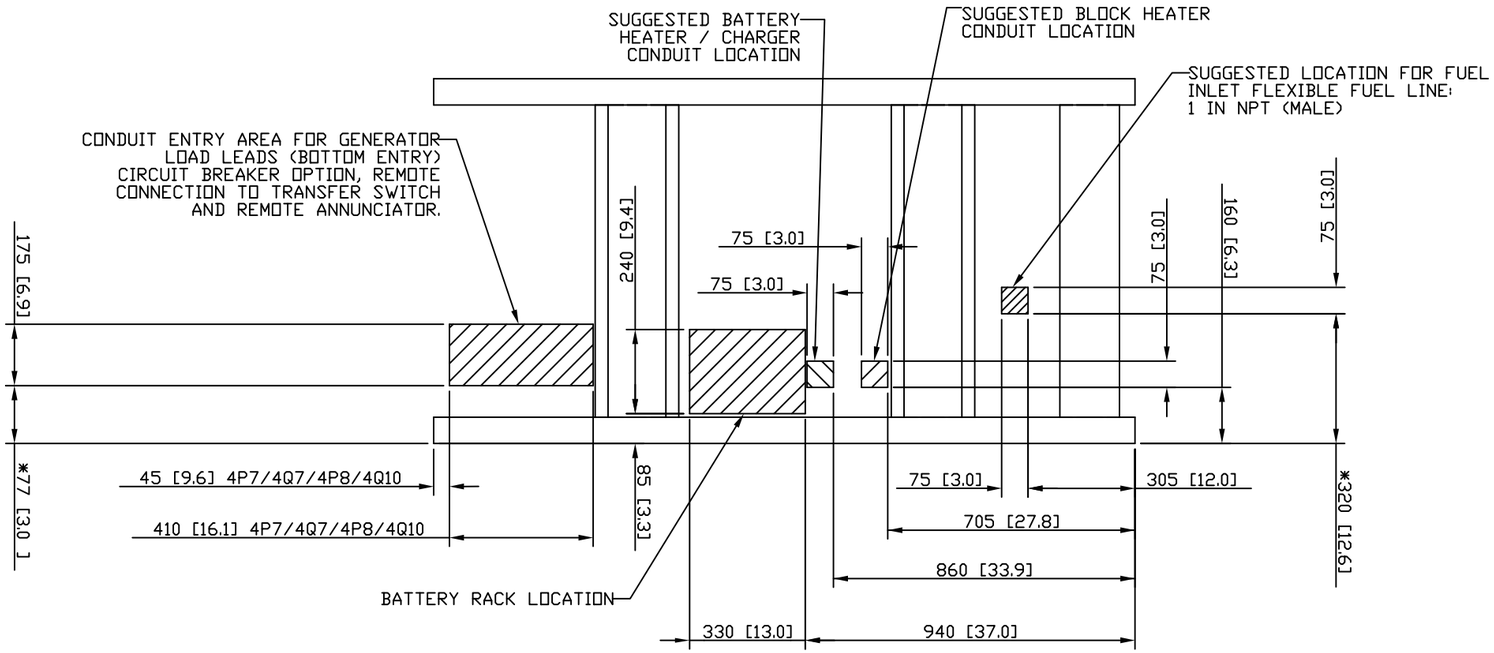
Dimensions and Weights

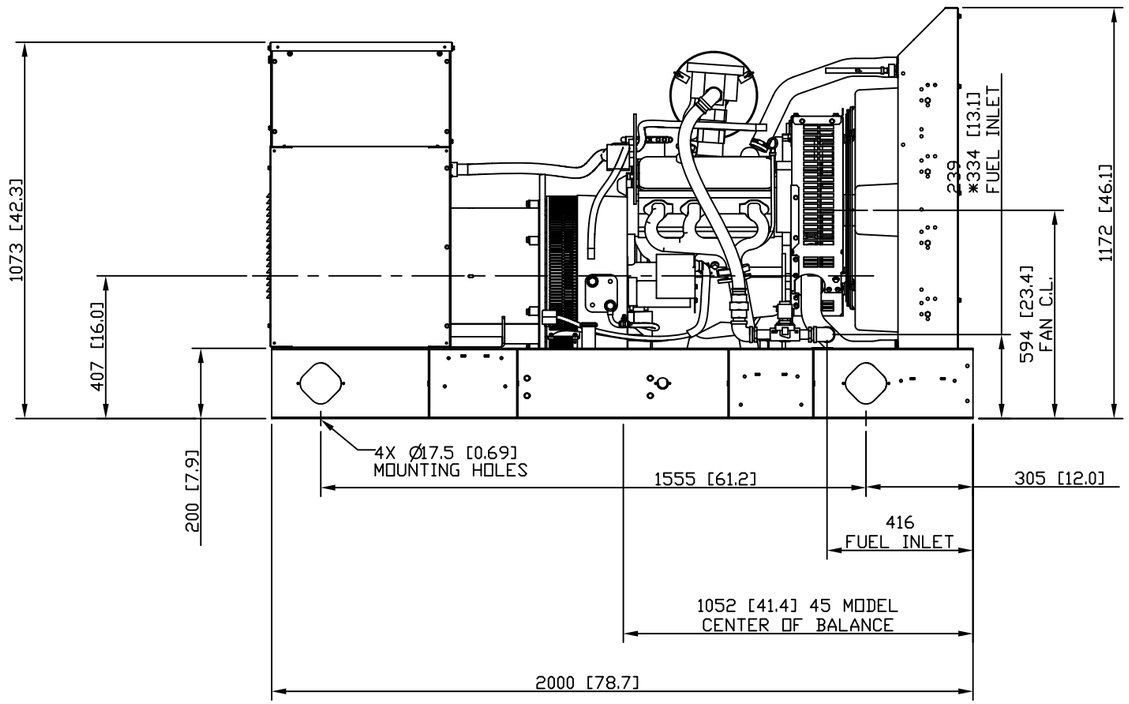
Dim Weight Spec	Dim Weight Value
Fuel	LP Gas or Natural Gas
Engine Manufacturer	General Motors
Overall Size, L x W x H, mm (in.): Wide Skid	2200 x 1040 x 1172 (86.6 x 40.9 x 46.1)
Overall Size, L x W x H, mm (in.): Narrow Skid	2200 x 864 x 1172 (86.6 x 34.0 x 46.1)
Weight (radiator model), wet, kg (lb.):	655 (1456)

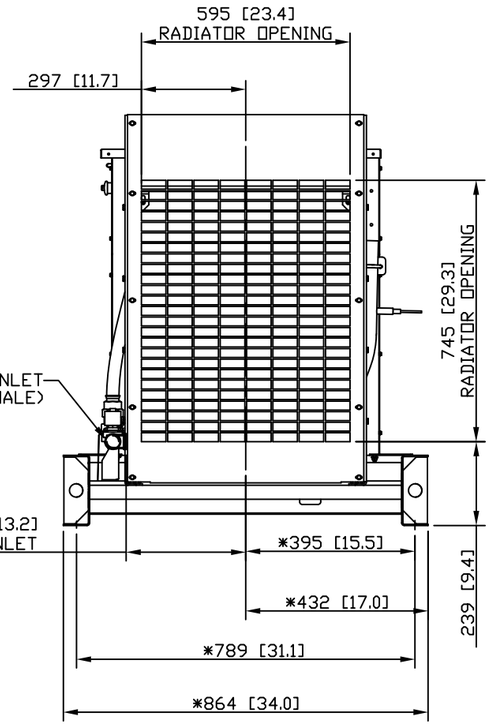


NOTE: This drawing is provided for reference only and should not be used for planning installation. Contact your local distributor for more detailed information.

maximum dimensions:
length 2000mm
width 864mm
exhaust outlet height 813mm







MODEL	ALTERNATOR	WEIGHT (WET)
45	4P8	753 KG [1660 LBS]

NOTES:
1. IF IBC CERTIFICATION IS APPLICABLE OR REQUIRED SEE SEISMC ADV FOR INSTALLATION INSTRUCTIONS.
2. DIMENSIONS IN [] ARE ENGLISH STANDARD EQUIVALENTS.
3. * - ASTERISK DENOTES 864 [34.0] SKID WIDTH.

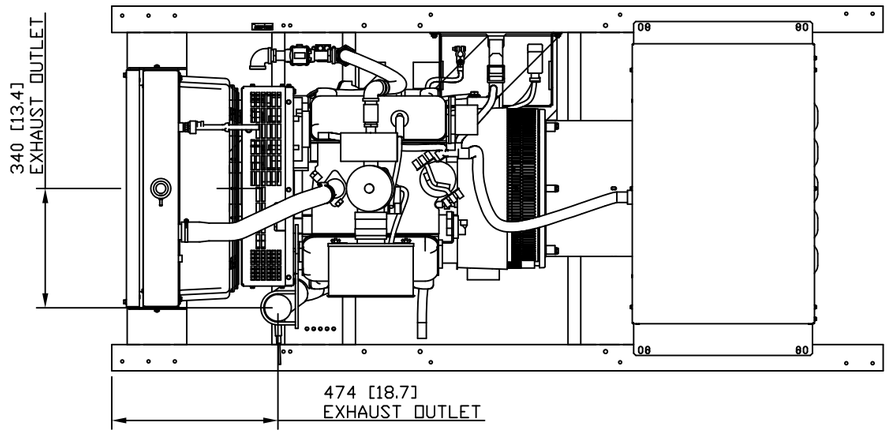
40 MODEL, 4P5/4Q5/4Q7
45 MODEL 4P7/4P8/4Q10
RECONNECTABLE,
IMPROVED MOTOR STARTING (IMS) RECONNECTABLE,
& 600V ALTERNATOR
4.3 LITER GM 2009 EMISSIONS

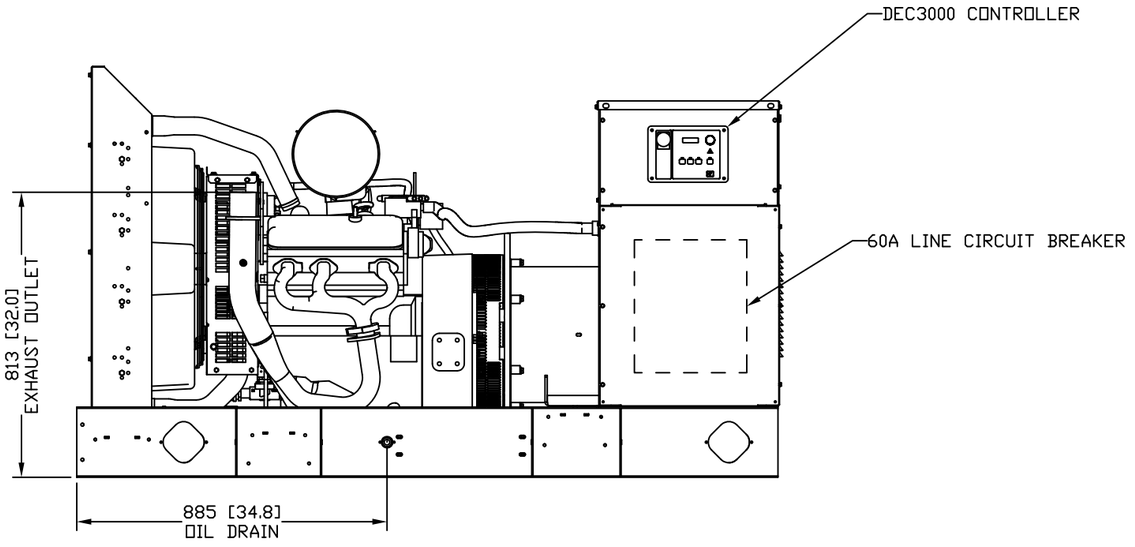
REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
D	5-27-10	(D-2) DEC3000 CONTROLLER VIEW ADDED [89809]	KRH
E	8-8-11	(B-8) DIM 1076 ADDED, DIM 803 & 275 REMOVED,	
		VIEWS UPDATED FOR UL GAP STYLE J-BOX, (C-3)	
		AUX. VIEW FOR DEC 3000 CONTROLLER REMOVED	
		[91290]	KMP
F	1-24-13	(C-8) '*' REMOVED FROM 365 & 290 DIMENSIONS [CT35983]	PKD
G	5-2-13	(C-8) 4Q7 ADDED TO 245 & 410 DIM [CT45388]	SAM
H	9-15-14	SEE SHEET 2 [CT93079]	SAM

UNLESS OTHERWISE SPECIFIED -
1) DIMENSIONS ARE IN MILLIMETERS
2) TOLERANCES ARE:
X.XX ± 0.25
XX' ± 1.0
X ± 1.5
ANGLES ± 0° 30'
SURFACE FINISH MAX.
THIRD ANGLE PROJECTION

APPROVALS		DATE
DRAWN	KRH	2-27-09
CHECKED	CWF	2-27-09
APPROVED	JAS	2-27-09

TITLE: DIMENSION PRINT 40/45 GM
SCALE 0.12 CAD NO. SHEET 1 of 2
SVG NO. ADV-7670 D





40 MODEL, 4P5/4Q5/4Q7
45 MODEL 4P7/4P8/4Q10
RECONNECTABLE,
IMPROVED MOTOR STARTING (IMS) RECONNECTABLE,
& 600V ALTERNATOR
4.3 LITER GM 2009 EMISSIONS

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	3-3-09	NEW DRAWING [86172-7]	KRH
A	8-12-09	(B-4:7) VIEWS UPDATED [88266]	DJV
B	1-29-10	SEE SHEET 1 [89102]	SAM
C	3-24-10	SEE SHEET 1 OF 2. [89097]	GFR
D	5-27-10	SEE SHEET 1 [89809]	KRH
E	8-8-11	VIEWS UPDATED, SEE SHEET 1 [91290]	KMP
F	1-24-13	SEE SHEET 1 [CT35983]	PKD
G	5-2-13	(C-8) 4Q7 ADDED TO 245 & 410 DIM [CT45388]	SAM
H	9-15-14	(A-3) PRIME ONLY VIEW ADDED [CT93079]	SAM

UNLESS OTHERWISE SPECIFIED -
1) DIMENSIONS ARE IN MILLIMETERS
2) TOLERANCES ARE:
X.XX ± 0.25
X.X ± 1.0
X ± 1.5
ANGLES ± 0° 30'
SURFACE FINISH MAX.
THIRD ANGLE PROJECTION

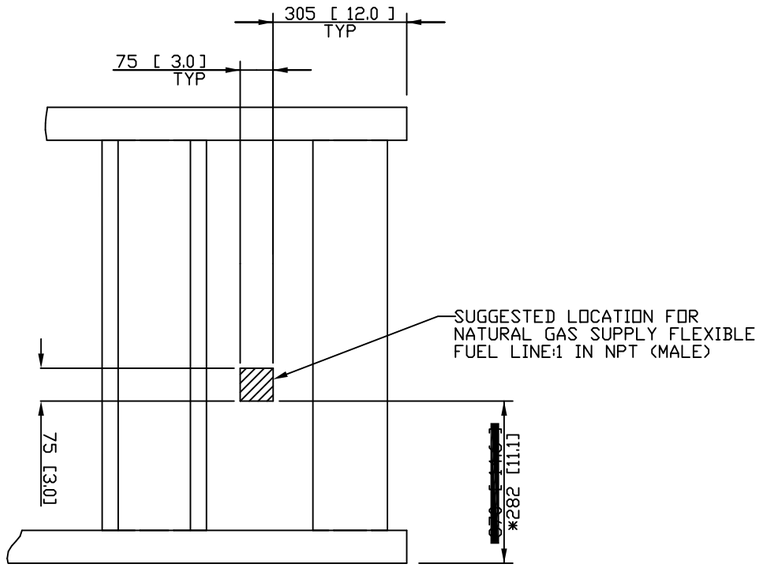
APPROVALS		DATE
DRAWN	KRH	3-3-09
CHECKED	CWF	3-3-09
APPROVED	JAS	3-3-09

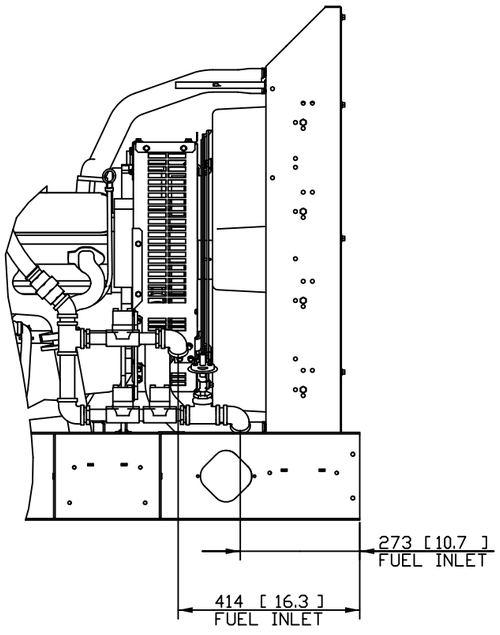
KOHLER CO. METRIC PRO-E
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

TITLE: DIMENSION PRINT
40/45 GM

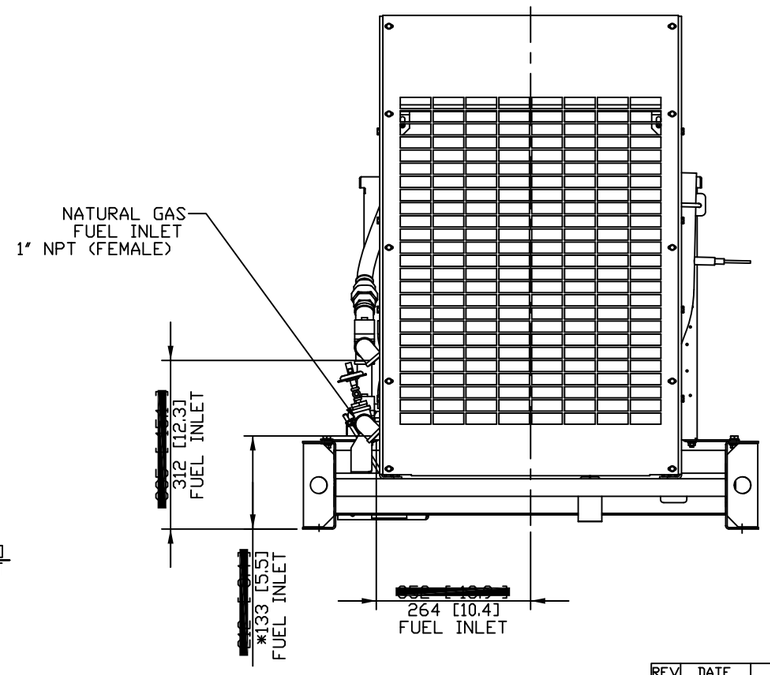
SCALE 0.12 | CAD NO. | SHEET 2 of 2

DWG NO. ADV-7670 | D





FUEL NAT GAS



NOTES:
1. DIMENSIONS IN [] ARE ENGLISH STANDARD EQUIVALENTS.

2. * - ASTERISK DENOTES 864 [34.0] SKID WIDTH.

SEE GENSET ADV FOR GENSET DIMENSIONS

45 MODEL 4P8
RECONNECTABLE,
IMPROVED MOTOR STARTING (IMS) RECONNECTABLE,
& 600V ALTERNATOR
4.3 LITER GM 2009 EMISSIONS

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	6-06-09	NEW DRAWING [88019]	KRH

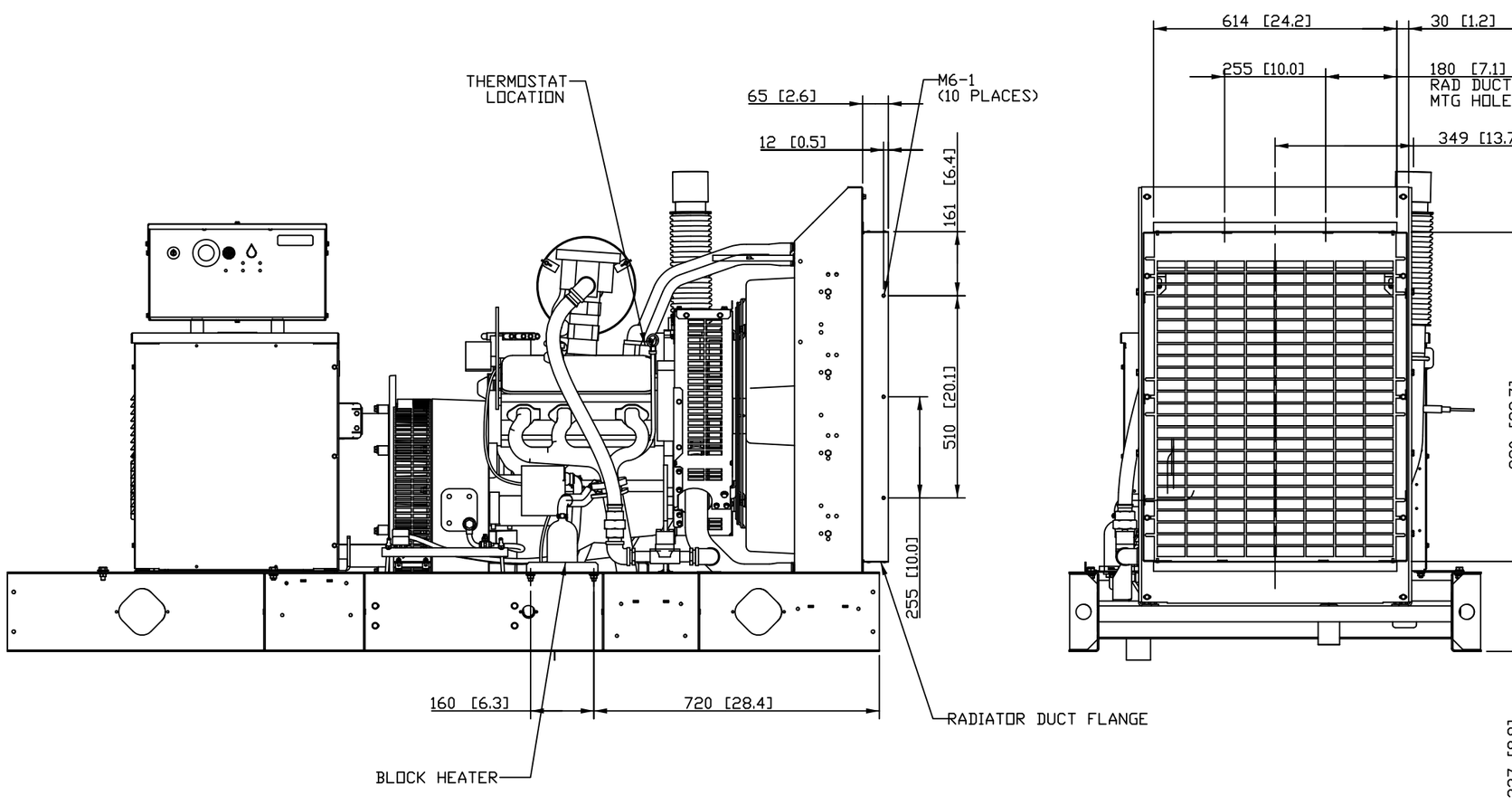
UNLESS OTHERWISE SPECIFIED -
1) DIMENSIONS ARE IN MILLIMETERS
2) TOLERANCES ARE:
XXX ±
XX ±
X ±
ANGLES ±
SURFACE FINISH MAX.
THIRD ANGLE PROJECTION

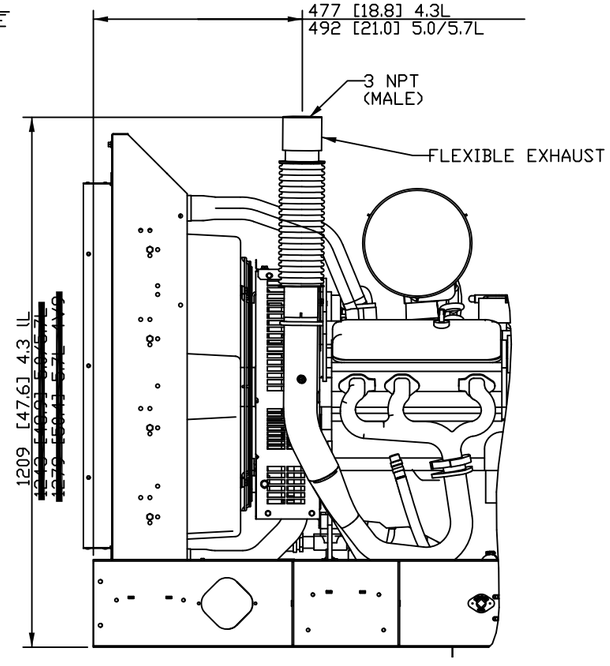
APPROVALS		DATE
DRAWN	KRH	6-06-09
CHECKED	CWF	6-06-09
APPROVED	SAH	6-06-09

KOHLER CO. METRIC PRO-E
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

TITLE
DIMENSION PRINT 40/45 GM

SCALE 0.15 | CAD NO. | SHEET 1 of 1
DWG NO. ADV-7742 | D





NOTE:
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DIMENSIONS IN [] ARE ENGLISH STANDARD EQUIVALENTS

45 MODEL 4P8
RECONNECTABLE,
IMPROVED MOTOR STARTING (IMS) RECONNECTABLE,
& 600V ALTERNATOR
4.3/5.0/5.7 LITER GM 2009 EMISSIONS

REV	DATE	DN COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	2-27-09	NEW DRAWING [86172-7]	KRH

UNLESS OTHERWISE SPECIFIED -
1) DIMENSIONS ARE IN MILLIMETERS
2) TOLERANCES ARE:
X.XX ± 0.25
X.X ± 1.0
X ± 1.5
ANGLES ± 0° 30'
SURFACE FINISH MAX.
THIRD ANGLE PROJECTION

APPROVALS	DATE
DRAWN KRH	2-27-09
CHECKED CWF	2-27-09
APPROVED JAS	2-27-09

TITLE: DIMENSION PRINT
40/45 GM ACCESSORIES

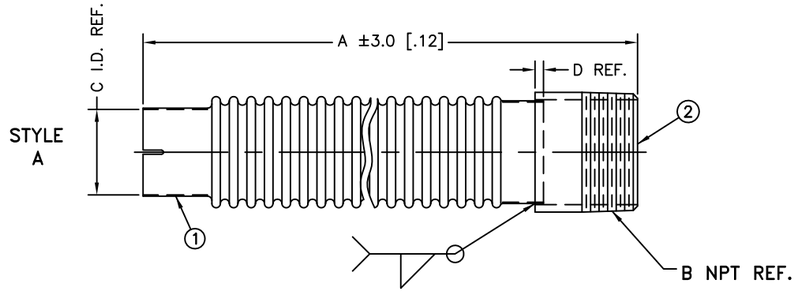
SCALE 0.15 | CAD NO. | SHEET 1 of 1

DWG NO. ADV-7689 | D

PART NO.	REV.	ITEM 1	ITEM 2	A±3.0[.12]	B REF.	C ID REF	D REF.	STYLE
273671	AF	X-797-25	X-533-1	406 [16.0]	3" NPT	62.0 [2.44]	25.4 [1.00]	A
~~273672~~	~~N~~	~~X-797-26~~	~~X-533-1~~	~~18.0~~	~~3" NPT~~	~~3.87~~	~~1.00~~	~~A~~
~~273673~~	~~AB~~	~~X-797-27~~	~~X-549-3~~	~~450.9 [17.75]~~	~~4" NPT.~~	~~98.8 [3.89]~~	~~6.4 [.25]~~	~~A~~
276242	AF	X-797-29	X-396-17	305 [12.0]	2" NPT.	44.7 [1.76]	25.4 [1.00]	A
~~276244~~	~~AF~~	~~X-797-30~~	~~X-533-1~~	~~432 [17.0]~~	~~3" NPT.~~	~~51.1 [2.01]~~	~~25.4 [1.00]~~	~~A~~
276249	AF	X-797-31	X-533-1	457 [18.0]	3" NPT.	76.5 [3.01]	25.4 [1.00]	A
~~276251~~	~~AF~~	~~X-797-32~~	~~X-549-3~~	~~349.3 [13.75]~~	~~4" NPT.~~	~~101.9 [4.01]~~	~~6.4 [.25]~~	~~A~~
276946	AF	X-797-33	X-533-1	406 [16.0]	3" NPT.	62.2 [2.45]	25.4 [1.00]	B
276947	AF	X-797-34	X-533-1	457 [18.0]	3" NPT.	101.1 [3.98]	25.4 [1.00]	B
276951	AF	X-797-35	X-549-3	450.9 [17.75]	4" NPT.	101.1 [3.98]	6.4 [.25]	B
324089	AF	X-797-37	X-396-17	432 [17.0]	2" NPT.	51.1 [2.01]	25.4 [1.00]	A
324197	AF	X-797-38	X-533-1	457 [18.0]	3" NPT.	63.8 [2.51]	25.4 [1.00]	A
324297	AF	X-797-39	X-549-3	501.7 [19.75]	4" NPT.	79.5 [3.13]	6.4 [.25]	A
324611	AF	324406	X-549-3	685.8 [27.00]	4" NPT.	85.9 [3.38]	38.1 [1.50]	C
324612	AF	324408	X-6062-1	762 [30.0]	6" NPT.	85.9 [3.38]	38.1/63.5 [1.50/2.50]	C
343145	AF	343016	X-707-1	1070.1 [42.13]	5" NPT.	122.7 [4.83]	6.4/31.8 [.25/1.25]	C
~~343146~~	~~AN~~	~~343018~~	~~X-6062-1~~	~~1098.6 [43.25]~~	~~6" NPT.~~	~~122.7 [4.83]~~	~~38.1/63.5 [1.50/2.50]~~	~~C~~
336801	AF	X-797-40	X-707-1	454.2 [17.88]	5" NPT.	101.1 [3.98]	6.4 [.25]	B
~~358335~~	~~S~~	~~X-797-42~~	~~X-396-17~~	~~17.0~~	~~2" NPT.~~	~~1.64~~	~~1.00~~	~~A~~
364421	AF	364223	X-533-1	511 [20.12]	3" NPT	45.0 [1.77]	25.4 [1.00]	D
364422	AF	364423	X-549-3	641 [25.24]	4" NPT	60.0 [2.36]	25.4 [1.00]	D
364424	AF	364265	X-707-1	787 [30.98]	5" NPT.	65.0 [2.56]	12.7 [.50]	D
GM14274	AF	X-797-43	X-549-3	451 [17.76]	4" NPT.	89.2 [3.51]	6.4 [.25]	A
GM21270	AF	X-797-45	X-549-3	350 [13.76]	4" NPT.	72.4 [2.85]	6.4 [.25]	A
GM22426	AF	X-797-47	X-549-3	552 [21.75]	4" NPT.	101.1 [3.98]	6.4 [.25]	B
GM22700	AL	X-797-38	X-533-12	651 [25.63]	3" NPT.	63.8 [2.51]	25.4 [1.00]	A
GM23824	AF	GM23823	X-6062-1	850 [33.46]	6" NPT.	91.9 [3.62]	38.1/63.5 [1.50/2.50]	E
GM24945	AF	GM24944	X-549-3	570 [22.4]	4" NPT.	76.5 [3.01]	6.4 [.25]	E
~~GM32981~~	~~AH~~	~~X-797-49~~	~~X-549-3~~	~~670 [26.4]~~	~~4" NPT.~~	~~89.2 [3.51]~~	~~25.4 [1.00]~~	~~A~~
GM69760	AM	GM69761	X-549-3	694 [27.3]	4" NPT.	85.9 [3.38]	6.4 [.25]	C
GM72527	AN	GM72526	X-6062-1	762 [30.0]	6" NPT.	85.9 [3.38]	38.1/63.5 [1.50/2.50]	C

REV	DATE	REVISION	BY
AH	10-15-08	(C-8) GM32981 VOIDED [85764-1]	SAM
AJ	2-20-09	(C-8) GM67412 ADDED [87038-2]	DJG
AK	4-1-09	(C-8)GM67412: X-549-3 WAS X-533-1, 4" NPT WAS 3" NPT[87436-1]	DJG
AL	5-7-09	(C-8) GM22700: 63.8 [2.51] WAS 51.1 [2.01], GM67412 MOVED TO SEPARATE DRAWING [87528]	DJG
AM	8-25-09	(C-8) GM69760 ADDED [86619-10]	DDH
AN	9-21-09	(C-8) 343146 VOIDED, GM72527 ADDED. [87805-9]	MRS

REVISION BLOCK INDICATES REVISION LEVEL OF DRAWING NOT PART REVISION. SEE PART REVISION LEVEL BEHIND PART NUMBER FOR CURRENT PART REVISION LEVEL.



NOTES :
MUST BE FREE OF RUST, BURRS & WELD SPATTER.
PAINT ONE COAT HEAT RESISTANT BLACK
WIRE BRUSH ANY FLAKED PAINT AROUND WELDS.

METRIC CAD FILE

DIMENSIONS IN [ ] ARE INCH EQUIVALENTS.

UNLESS OTHERWISE SPECIFIED –
1) DIMENSIONS ARE IN MILLIMETERS
2) TOLERANCES ARE:
X.XX ± 0.25
X.X ± 1.0
X ± 1.5
ANGLES ± 0°30'
SURFACE FINISH MAX.
THIRD ANGLE PROJECTION

APPROVALS	DATE
DRAWN PD	11-16-88
CHECKED CD	11-16-88
APPROVED RDH	11-18-88

KOHLER CO.
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

TITLE: ADAPTER, FLEX EXHAUST

SCALE 0.5X | CAD NO. 273671.DWG | SHEET 1-1
DWG. NO. 273671 | D
PLOTTED DATE

20-180 KW STANDBY

SMS SILENCERS INC.

SMS Silencers Inc.
7-15 Bramalea Rd.
Brampton, ON, Canada L6T 2W4

Toll Free 800 459 1512
Phone 905 459 1512
Fax 905 459 3138

Silencers
Model SM2

No Insulation
Cylindrical
Standard
Critical
25-30 dBA

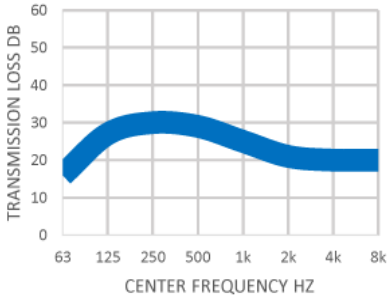
Applications and Performance

Model SM2 is a Cylindrical Multi Chamber Reactive Silencer used where moderate level of attenuation is required.Available options: stainless steel, mounting brackets, flex connections and other accessories.

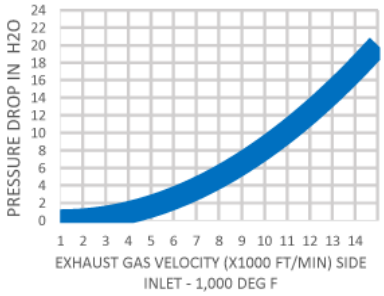
Selecting The Right Silencer

In selecting a proper size silencer for a given application, consideration must be given to the total system back pressure as well as exhaust velocity. In order to retain expected silencer insertion loss, exhaust flow velocity for Model SM2 must not exceed 11,500 ft/min. Log on to our online sizing software to guide you in making the right selection.

TRANSMISSION LOSS

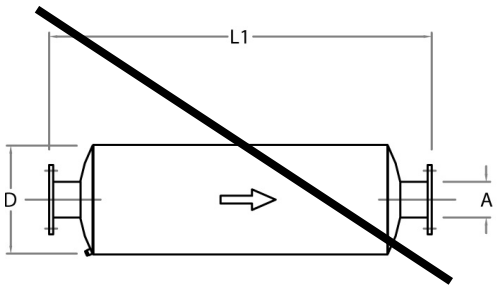


PRESSURE DROP

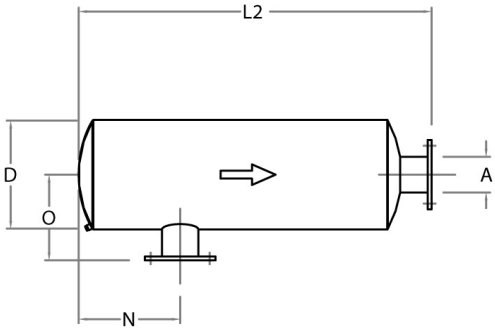


Model	A	D	L1	L2	L3	O	N	N	M	M	Weight
	Outlet	Dia	EIEO	SIEO	SISO	O	Min	Max	Min	Max	
SM2-1.5	1.5	8	26	23	20	7	3	10	3	5	
SM2-2	2	9	30	27	24	7.5	4	13	4	6	
SM2-2.5	2.5	10	34	31	28	8	5	15	5	7	
SM2-3	3	12	36	33	30	9	5	16	5	8	
SM2-3.5	3.5	12	42	39	36	9	5	20	5	10	
SM2-4	4	12	50	46	42	10	6	24	6	11	
SM2-5	5	14	54	50	46	11	6	26	6	12	
SM2-6	6	16	63	59	55	12	7	31	7	15	
SM2-8	8	22	68	64	60	15	9	33	9	16	
SM2-10	10	26	92	88	84	17	12	47	12	22	
SM2-12	12	30	98	94	90	19	14	50	14	23	
SM2-14	14	36	104	99	94	23	17	51	17	24	
SM2-16	16	40	118	113	108	25	17	59	17	28	
SM2-18	18	42	127	122	117	26	18	64	18	30	
SM2-20	20	48	144	139	134	29	21	74	21	35	
SM2-22	22	54	154	149	144	32	23	79	23	38	
SM2-24	24	60	163	158	153	35	26	83	26	41	
SM2-26	26	64	181	176	171	37	28	94	28	46	
SM2-28	28	68	198	193	188	39	29	104	29	51	
SM2-30	30	72	214	209	204	41	32	114	32	55	

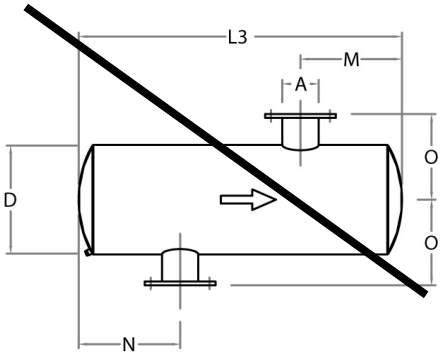
All sizes and measurements are in inches and pounds



END IN END OUT - EIEO



SIDE IN END OUT - SIEO



SIDE IN SIDE OUT - SISO

The silencer may be installed at any angle. When mounting horizontally allow for a 3/8"/ft incline to provide proper drainage.
Mounting brackets, side inlet connections, clean out doors and companion flanges are available at additional cost.
The silencer is of an all welded construction and the exterior surfaces are given a coat of high temperature paint.

SMS SILENCERS INC.

SMS Silencers Inc.
153A Rutherford Road South
Brampton, Ontario
Canada L6W 3N5

Toll Free 800 459 1512
Phone 905 459 1512
Fax 905 459 3138
www.SMSsilencers.com

Wall and Roof Thimbles

Insulated

Model SMWT-I

Applications and Performance

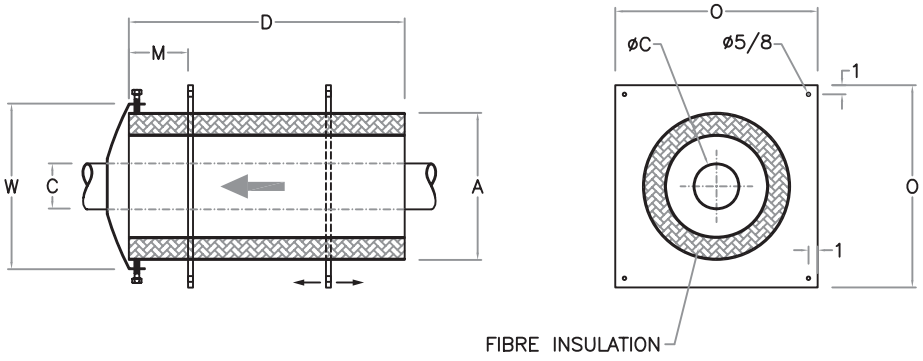
Insulated wall and roof thimbles are designed as per National Fire Protection Standards NFPA 37. The standard length of thimbles are 24" in total length with a fixed welded on wall mounting plate at 6". All thimble units come complete with two wall plates and rainguard.

Selecting The Right Thimble

When selecting a proper size thimble for a given application, select the thimble based on the material Sch 40 pipe (P) or OD tubing (T).

Part Number	C		A		W		O		M		D		Weight	
	in	(mm)	in	(mm)	in	(mm)	in	(mm)	in	(mm)	in	(mm)	Lb	(Kg)
SMWT-2-P-I	2 5/8	(67)	14	(356)	16	(406)	20	(508)	6	(152)	24	(610)	103	(47)
SMWT-2.5-P-I	3 1/8	(79)	14	(356)	16	(406)	20	(508)	6	(152)	24	(610)	103	(47)
SMWT-3-P-I	3 5/8	(92)	16	(406)	18	(457)	22	(559)	6	(152)	24	(610)	111	(50)
SMWT-3.5-P-I	4 1/8	(105)	16	(406)	18	(457)	22	(559)	6	(152)	24	(610)	111	(50)
SMWT-4-P-I	4 5/8	(117)	16	(406)	18	(457)	22	(559)	6	(152)	24	(610)	125	(57)
SMWT-5-P-I	5 3/4	(146)	18	(457)	20	(508)	24	(610)	6	(152)	24	(610)	146	(66)
SMWT-6-P-I	6 3/4	(171)	18	(457)	20	(508)	24	(610)	6	(152)	24	(610)	146	(66)
SMWT-8-P-I	8 7/8	(225)	20	(508)	22	(559)	26	(660)	6	(152)	24	(610)	181	(82)
SMWT-10-P-I	11	(279)	22	(559)	24	(610)	28	(711)	6	(152)	24	(610)	203	(92)
SMWT-12-P-I	13	(330)	24	(610)	26	(660)	32	(813)	6	(152)	24	(610)	225	(102)
SMWT-14-P-I	14 1/4	(362)	26	(660)	28	(711)	34	(864)	6	(152)	24	(610)	251	(114)
SMWT-16-P-I	16 1/4	(413)	28	(711)	30	(762)	36	(914)	6	(152)	24	(610)	272	(124)
SMWT-18-P-I	18 1/4	(464)	30	(762)	32	(813)	38	(965)	6	(152)	24	(610)	302	(137)
SMWT-20-P-I	20 1/4	(514)	32	(813)	34	(864)	40	(1016)	6	(152)	24	(610)	315	(143)
SMWT-22-P-I	22 1/4	(565)	34	(864)	36	(914)	42	(1067)	6	(152)	24	(610)	337	(153)
SMWT-24-P-I	24 1/4	(616)	36	(914)	38	(965)	44	(1118)	6	(152)	24	(610)	344	(156)
SMWT-26-P-I	26 1/4	(667)	38	(965)	40	(1016)	46	(1168)	6	(152)	24	(610)	375	(170)
SMWT-28-P-I	28 1/4	(718)	40	(1016)	42	(1067)	48	(1219)	6	(152)	24	(610)	392	(178)
SMWT-30-P-I	30 1/4	(768)	42	(1067)	44	(1118)	50	(1270)	6	(152)	24	(610)	435	(198)

Part Number	C		A		W		O		M		D		Weight	
	in	(mm)	in	(mm)	in	(mm)	in	(mm)	in	(mm)	in	(mm)	Lb	(Kg)
SMWT-2-T-I	2 1/8	(54)	14	(356)	16	(406)	20	(508)	6	(152)	24	(610)	103	(47)
SMWT-2.5-T-I	2 5/8	(67)	14	(356)	16	(406)	20	(508)	6	(152)	24	(610)	103	(47)
SMWT-3-T-I	3 7/8	(98)	16	(406)	18	(457)	22	(559)	6	(152)	24	(610)	111	(50)
SMWT-3.5-T-I	3 5/8	(92)	16	(406)	18	(457)	22	(559)	6	(152)	24	(610)	111	(50)
SMWT-4-T-I	4 1/8	(105)	16	(406)	18	(457)	22	(559)	6	(152)	24	(610)	125	(57)
SMWT-5-T-I	5 1/8	(130)	18	(457)	20	(508)	24	(610)	6	(152)	24	(610)	146	(66)
SMWT-6-T-I	6 1/8	(156)	18	(457)	20	(508)	24	(610)	6	(152)	24	(610)	146	(66)



REV. 01-07

KOHLER. Power Systems

Generator Set Controller

ISO 9001 KOHLER POWER SYSTEMS NATIONALLY REGISTERED

Decision-Maker® 3000

Kohler® Decision-Maker® 3000 Controller

General Description and Function

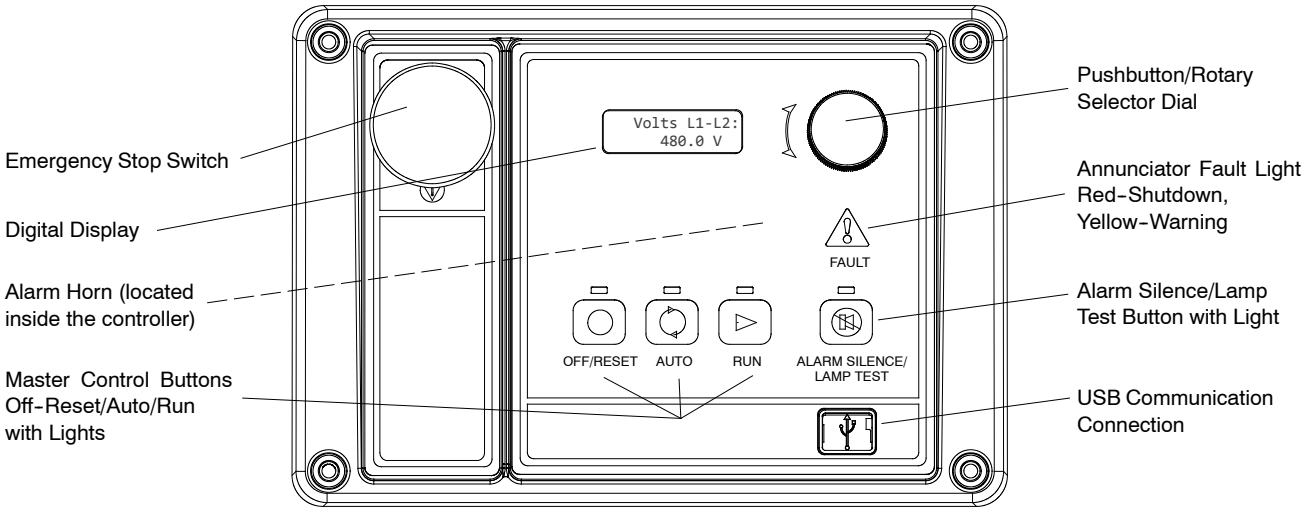
The Decision-Maker® 3000 generator set controller provides advanced control, system monitoring, and system diagnostics for optimum performance.

The Decision-Maker® 3000 controller meets NFPA 110, Level 1 when equipped with the necessary accessories and installed per NFPA standards.

The Decision-Maker® 3000 controller uses a patented hybrid voltage regulator and unique software logic to manage alternator thermal overload protection features normally requiring additional hardware. Additional features include:

- A digital display and pushbutton/rotary selector dial provide easy local access to data.
- Measurements selectable in metric or English units.
- The controller can communicate directly with a personal computer via a network or serial configuration using SiteTech™ or Monitor III software.
- The controller supports Modbus® protocol. Use with serial bus or Ethernet networks. (Ethernet requires an external Modbus®/Ethernet converter module.)
- Scrolling display shows critical data at a glance.
- Digital display of power metering (kW and kVA).
- Integrated hybrid voltage regulator providing ±0.5% regulation.
- Built-in alternator thermal overload protection.

Modbus® is a registered trademark of Schneider Electric.



User Interface Controls and Components

- Emergency stop switch
- Backlit LCD digital display with two lines of 12 characters *(see User Interface Displays for menus)*
- Alarm horn indicates generator set shutdown and warning faults
- Environmentally sealed membrane keypad with three master control buttons with lights
  - Off/Reset (red)
  - Auto (green)
  - Run (yellow)
- Pushbutton/rotary selector dial for menu navigation
  - Rotate dial to access main menus
  - Push dial and rotate to access sub menus
  - Press dial for 3 seconds to return to top of main menu
- Annunciator fault light
  - System shutdown (red)
  - System warning (yellow)
- Alarm silence/lamp test button
  - Alarm silence
  - Lamp test
- USB and RS-485 connections
  - Allows software upgrades
  - Provides access for diagnostics
  - PC communication using SiteTech™ or Monitor III software
- Dedicated user inputs
  - Remote emergency stop switch
  - Remote 2-wire start for transfer switch
  - Auxiliary shutdown
- Integrated hybrid voltage regulator
- Auto-resettable circuit protection mounted on circuit board.
- One relay output standard. Optional five relay output available.
- One analog and three digital inputs standard. Optional two inputs available.

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 Controller Displays as Provided by the Engine ECM.

User Interface Displays

The listing below has ● denoting main menus and ○ denoting sub-menus.

- Overview
  - Software version
  - Active shutdowns and warnings (if any are present)
  - Engine run time, total hours
  - Average voltage line-to-line
  - Frequency
  - Average current
  - Coolant temperature
  - Fuel level or pressure *
  - Oil pressure
  - Battery voltage
- Engine Metering
  - Engine speed
  - Oil pressure
  - Coolant temperature
  - Battery voltage
- Generator Metering
  - Total power, VA
  - Total power, W
  - Rated power, %
  - Voltage, L-L and L-N for all phases
  - Current, L1, L2, L3
  - Frequency
- GenSet Information
  - Generator set model number
  - Generator set serial number
  - Controller serial number
- GenSet Run Time
  - Engine run time, total hours
  - Engine loaded, hours
  - Number of engine starts
  - Total energy, kWh
- GenSet System
  - System voltage
  - System frequency, 50 or 60 Hz
  - System phase, single or three (wye or delta)
  - Power rating, kW
  - Amp rating
  - Power type, standby or prime
  - Measurement units, metric or English (user selectable)
  - Alarm silence, always or auto only (NFPA 110)
  - Manual speed adjust *
- GenSet Calibration
  - Voltage, L-L and L-N for all phases
  - Current, L1, L2, L3
  - Reset calibration
- Voltage Regulation
  - Adjust voltage, ±10%
- Digital Inputs
  - Input settings and status
- Digital Outputs
  - Output settings and status
- Analog Inputs
  - Input settings and status
- Event Log
  - Event history (stores up to 1000 system events)
- Selector Switch (requires initial activation by SiteTech™)

Controller Features

- **AC Output Voltage Regulator Adjustment**. The voltage adjustment provides a maximum of ±10% of the system voltage.
- **Alarm Silence.** The controller can be set up to silence the alarm horn only when in the AUTO mode for NFPA-110 application or Always for user convenience.
- **Alternator Protection**. The controller provides generator set overload and short circuit protection matched to each alternator for the particular voltage/phase configuration.
- **Automatic Restart**. The controller automatic restart feature initiates the start routine and recrank after a failed start attempt.
- **Common Failure Relay.** This relay is integrated on the controller circuit board. Contacts are rated 2 amps at 32 VDC or 0.5 amp at 120 VAC.
- **Communication.** Controller communication is available.
- **Cyclic Cranking.** The controller has programmable cyclic cranking.
- **ECM Diagnostics.** The controller displays engine ECM fault code descriptions to help in engine troubleshooting.
- **Engine Start Aid**. The starting aid feature provides control for an optional engine starting aid.
- **Event Logging**. The controller keeps a record (up to 1000 entries) for warning and shutdown faults. This fault information becomes a stored record of system events and can be reset.
- **Historical Data Logging**. Total number of generator set successful starts is recorded and displayed.
- **Integrated Hybrid Voltage Regulator**. The voltage regulator provides ±0.5% no-load to full-load regulation with three-phase sensing.
- **Lamp Test**. Press the alarm silence/lamp test button to verify functionality of the indicator lights.
- **LCD Display.** Adjustable contrast for improving visibility.
- **Measurement Units.** The controller provides selection of English or metric displays.
- **Power Metering**. Controller digital display provides kW and kVA.
- **Programming Access (USB)**. Provides software upgrades and diagnostics.
- **Remote Reset**. The remote reset function resets faults and allows restarting of the generator set without going to the master control switch off/reset position.
- **Remote Monitoring Panel.** The controller is compatible with the Kohler® Remote Serial Annunciator.
- **Run Time Hourmeter**. The generator set run time is displayed.
- **Time Delay Engine Cooldown (TDEC)**. The TDEC provides a time delay before the generator set shuts down.
- **Time Delay Engine Start (TDES)**. The TDES provides a time delay before the generator set starts.
- **Voltage Selection Menu.** This menu provides the capability of quickly switching controller voltage calibrations. Requires initial activation using SiteTech™ software. **NOTE:** Generator set output leads require voltage reconnection.

Controller Functions

The following chart shows which functions cause a warning or shutdown. All functions are available as relay outputs.

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

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

	Warning Function	Shutdown Function
Engine Functions		
Critically high fuel level *	○	
ECM communication loss		●
ECM diagnostics	●	●
Engine over speed		●†
Engine start aid active		
Engine under speed		●
Fuel tank leak *	○	○
High battery voltage	●	
High coolant temperature	●	●†
High fuel level *	○	
Low battery voltage	●	
Low coolant level		●
Low coolant temperature	●	
Low cranking voltage	●	
Low engine oil level *	○	○
Low fuel level (diesel models) *	○	○
Low fuel pressure (gas models) *	○	
Low oil pressure	●	●†
No coolant temperature signal		●
No oil pressure signal		●
Overcrank		●†
Speed sensor fault	●	
General Functions		
Alarm horn silenced		
Analog inputs	○	○
Battery charger fault *	●	
Chicago code active *		
Common fault **(includes †)**		●
Common warning	●	
Digital inputs	○	○
Emergency stop		●†
Engine cooldown (delay) active		
Engine start delay active		
Engine started		
Engine stopped		
EPS supplying load		
Generator running		
Input/output communication loss	●	
Internal failure		●
Master switch not in auto	●	
NFPA 110 alarm active		
Remote start		
System ready		
Generator Functions		
AC sensing loss	●	●
Alternator protection		●
Ground fault input *	●	
kW overload		●
Locked rotor		●
Overfrequency		●
Overvoltage (each phase)		●
Underfrequency		●
Undervoltage (each phase)		●

● Standard function
○ Available user function
* Function requires optional input sensors or kits and is engine dependent; see Controller Displays as Provided by the Engine ECM.
† Items included with common fault shutdown

KOHLER CO., Kohler, Wisconsin 53044 USA
Phone 920-457-4441, Fax 920-459-1646
For the nearest sales and service outlet in the
US and Canada, phone 1-800-544-2444
KOHLERPower.com

Kohler Power Systems
Asia Pacific Headquarters
7 Jurong Pier Road
Singapore 619159
Phone (65) 6264-6422, Fax (65) 6264-6455

Controller Displays as Provided by the Engine ECM (availability subject to change by the engine manufacturer)						
Display	**GM/PSI**	**Doosan**	**John Deere (JDEC)**	**Volvo (EMS II)**	**Volvo (EDC III)**	**DD/MTU (ADEC)**
Ambient temperature		X				
Charge air pressure	X	X		X	X	X
Charge air temperature	X	X	X	X	X	
Coolant level				X	X	X
Coolant pressure				X	X	
Coolant temperature	X	X	X	X	X	X
Crankcase pressure				X	X	
ECM battery voltage	X	X				X
ECM fault codes	X	X	X	X	X	X
ECM serial number						X
Engine model number			X			X
Engine serial number			X			X
Engine speed	X	X	X	X	X	X
Fuel pressure				X	X	
Fuel rate	X	X	X	X	X	X
Fuel temperature			X	X	X	X
Oil level					X	
Oil pressure	X	X	X	X	X	X
Oil temperature				X	X	X
Trip fuel				X	X	X

NOTE: 15–60REOZK (Kohler KDI engines) do not include an ECM as standard equipment. REOZMD/ROZMC (Mitsubishi engines) have an ECM but do not send signals to the generator set controller.

Controller Specifications

Decision-Maker® 3000—Software Version 3.11 or higher

- Power source with circuit protection: 12- or 24-volt DC
- Power drain: 200 milliamps at 12 VDC or 100 milliamps at 24 VDC
- Humidity range: 5% to 95% noncondensing
- Operating temperature range: -40°C to +70°C (-40°F to +158°F)
- Storage temperature range: -40°C to +85°C (-40°F to +185°F)
- Standards:
  - CE Directive
  - NFPA 99
  - NFPA 110, Level 1
  - CSA 282-09
  - UL 508
  - ASTM B117 (salt spray test)
- Panel dimensions—W x H, 229 x 160 mm (9.0 x 6.3 in.)

Communication and PC Software Available Options

Refer to G6-76 Monitor III Software and the communication literature for additional communication and PC software information including Modbus® communication.

❑ **Monitor III Software for Monitoring and Control (Windows®-based user interface)**

❑ **Converter, Modbus®/Ethernet.** Supports a power system using controllers accessed via the Ethernet. Converter is supplied with an IP address by the site administrator. Refer to G6-79 for converter details.

❑ **Converter, RS-232/RS-485.** Supports a power system using controllers accessed via a serial (RS-232) connection.

Availability is subject to change without notice. Kohler Co. reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever. Contact your local Kohler® generator set distributor for availability.

Decision-Maker® 3000 Available Options

✓ **Float/Equalize Battery Charger** available with ~~6-or~~ 10 amp DC volt output. The 10 amp models are available with and without NFPA alarm to signal a battery charger fault.

❑ **Manual Speed Adjust** available for applications using closed transition ATS. Adjustment range for 60 Hz: 1751–1849 rpm (58.2–61.8 Hz) and for 50 Hz: 1451–1549 rpm (48.2–51.8 Hz).

❑ **Prime Power Switch** prevents battery drain during generator set non-operation periods and when the generator set battery cannot be maintained by an AC battery charger.

❑ **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.

✓ **Run Relay** provides a relay indicating that the generator set is running.

❑ **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 120VAC.

✓ **Two Input/Five Output Module** provides a generator set mounted panel with two inputs and five relay outputs.

Modbus® is a registered trademark of Schneider Electric.

Windows® is a registered trademark of Microsoft Corporation.

DISTRIBUTED BY:

KOHLER. POWER SYSTEMS

Wiring Schematics

REV	DATE	REVISION	BY	M F
–	11-5-10	NEW DRAWING [89970-4]	CRS	
A	1-3-12	(C-6) THERMOSTAT HOUSING ADDED [92717]	CRS	
B	9-18-12	(B-6) CT LEAD CONNECTIONS INTO P1 WERE P2 [CT24158]	CRS	
C	1-22-14	(D-3,-4) LEADS "N30" & "N31" PRIME POWER CONNECTION ADDED [CT68312]	DFS	

ECM INTERFACE

FOR MIL LIGHT
QCON4 → MIL
QCON5 → P1

P5-G (MIL)
P5-K (PRIM PWR GND) ← N30 ← QCON35
FOR PRIME POWER UNITS PLUG LEADS N30 & N31 TOGETHER
QCON36 ← N31

P5-A (VSW-SW PWR) ← 70B1
P5-F (START CMD) ← 71
P5-P (CAN L (-)) ← GRN ← WHT
P5-N (CAN H (+)) ← YEL

P5-B (PRIM FUEL) → 73A → H
P5-C (SEC FUEL) → 73B → J
P5-H (FUEL SEL) → 65 → T

TO FUEL SYSTEMS SHEET 2

P1
RED
12VDC BATTERY
P4-9
14P1 — TB12 P
THERMOSTAT HOUSING (4.3L ONLY) — N6
QCON3 (NOT USED) — N4
63 → N
70E2 → R
N5 → S
P4-4
14N1
P4-31
14N1

DEC 3000 CONTROLLER

GND P1-5 ← 14N
FUEL P1-7 ← 70B ← P4-16
FUEL P1-3 ← 70
TB12: 70 / 7N
QCON1: 14P2 → 14P → P1-12 +VBAT
CRANK P1-1 ← 71 ← P4-17
LOW FUEL P1-23 ← 63 ← P4-13
P4-33
P4-34
P4-32
QCON32 ← WHT
(CAN LOW) P1-17 ← GRN
(CAN HIGH) P1-13 ← YEL

P9 (CLS): N1 — P9-B — P9-A — 31A — P4-15 — 31A → P1-10 COOLANT LEVEL

CTS (NFPA-110 ONLY): 35A2 — 35A — P4-14 — 35A → P1-24 COOLANT TEMP
QCON4 (NOT USED) ← 35A1

CURRENT SENSING
P1-18 ← I3R ← P26-6
P1-19 ← I3 ← P26-5
P1-14 ← I2R ← P26-4
P1-15 ← I2 ← P26-3
P1-6 ← I1R ← P26-2
P1-2 ← I1 ← P26-1

VOLTAGE SENSING
V9 — V9A
V8 — V8A
V7 — V7A
V0 — V0

TB2: N/C / COM

ESS: 1 — TB3 1 ESTOP-1; 1A — TB3 1A ESTOP-1A

PWM1 P1-20 ← 5B → A → TO SLB (P6) [FRII]
PWM1+ P1-16 ← 3B

QCON14: V0 V7A V8A V9A → V7 V8 V9 → TB5
250V 1.5A | 250V 1.5A | 250V 1.5A
V0 V7 V8 V9 → B → TO STAT [FRII]

I1 I1R | I2 I2R | I3 I3R
*CT1 *CT2 *CT3
L1 L2 L3 L0 → TO LOAD

NOTE:
CURRENT TRANSFORMER DOT OR "H1" TOWARD GENERATOR.

LEGEND

BCA – BATTERY CHARGING ALTERNATOR
CLS – COOLANT LEVEL SENDER
CT(#) – CURRENT TRANSFORMER
CTS – COOLANT TEMPERATURE SENSOR
D(#) – DIODE
ECM – ELECTRONIC CONTROL MODULE (E-CONTROLS)
ESS – EMERGENCY STOP SWITCH
FV(#) – FUEL VALVE
INSUL(#) – INSULINK
K20 – CRANK RELAY
LFP(#) – LOW FUEL PRESSURE SWITCH
LFPS – LOW FUEL PRESSURE AUTO SHUTDOWN SWITCH
LP – LIQUID PROPANE
OPS – OIL PRESSURE SENDER
P(#) – PLUG
PL(#) – PANEL LAMP
PMG – PERMANENT MAGNET GENERATOR
QCON(#) – QUICK CONNECT TERMINAL
STAT –STATOR
SLB – STATIONARY LED BOARD
SM – STARTER MOTOR
SS – STARTER SOLENOID
TB1 – INTERCONNECTION BOARD TERMINAL BLOCK
TB2 – A/D TERMINAL BLOCK
TB3 – OUTPUT TERMINAL BLOCK
TB4 – DIGITAL INPUT TERMINAL BLOCK
TB5 – CONTROLLER A.C. FUSE BLOCK
TB12 – ACCESSORY TERMINAL BLOCK

⏚ – ENGINE BLOCK GROUND

DEC 3000 W/ ECM
3.0L ENGINES, 25 & 30KW
4.3L ENGINES, 40 & 45KW
SPLIT ACTIVATOR 1ø, 3ø & 600V

UNLESS OTHERWISE SPECIFIED – 1) DIMENSIONS ARE IN INCHES 2) TOLERANCES ARE: .XXX± .010 ANGLES± 1/2° .XX ± .030 SURFACE FINISH .X ± .060 MAX. FRACTIONS ±

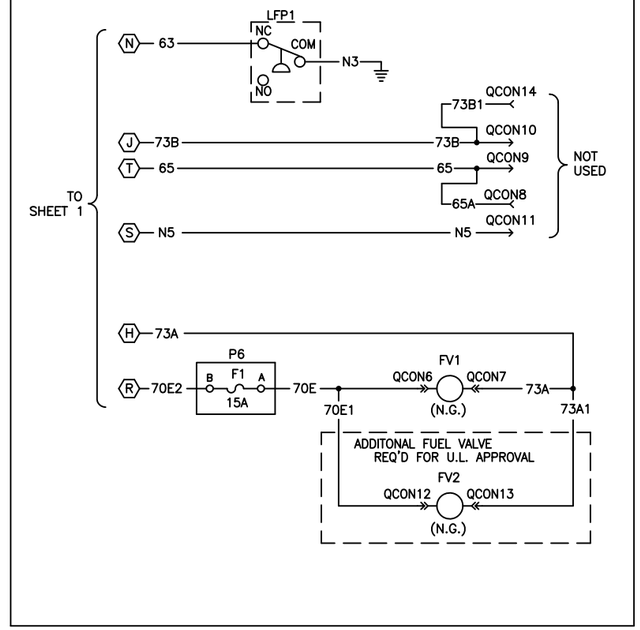
APPROVALS	DATE
DRAWN CRS	11-5-10
CHECKED DFS	11-5-10
APPROVED CRS	11-5-10

TITLE: DIAGRAM, SCHEMATIC GM 25 – 45KW
SCALE: NONE | CAD NO. | SHEET 1-4
PLOTTED | DWG. NO. ADV-7964 | D

REV	DATE	REVISION	BY	APP'D
–	11–5–10	NEW DRAWING [89970–4]	CRS	
A	1–3–12	SEE SHEET 1 [92717]	CRS	
B	9–18–12	SEE SHEET 1 [CT24158]	CRS	
C	1–22–14	SEE SHEET 1 [CT68312]	DFS	

FUEL SYSTEMS

NATURAL GAS



DEC 3000 W/ ECM
3.0L ENGINES, 25 & 30KW
4.3L ENGINES, 40 & 45KW
SPLIT ACTIVATOR 1ø, 3ø & 600V

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.XXX ± .010 ANGLES ± 1/2°
.XX ± .030 SURFACE FINISH
.X ± .080 √ MAX.
FRACTIONS ±

APPROVALS		DATE
DRAWN	CRS	11–5–10
CHECKED	DFS	11–5–10
APPROVED	CRS	11–5–10

TITLE: DIAGRAM, SCHEMATIC
GM 25 – 45KW

SCALE: NONE | CAD NO. | SHEET 2–4
PLOTTED | DWG. NO. ADV–7964 | D

REV	DATE	REVISION	BY	APP
–	11–5–10	NEW DRAWING [89970–4]	CRS	
A	1–3–12	SEE SHEET 1 [92717]	CRS	
B	9–18–12	SEE SHEET 1 [CT24158]	CRS	
C	1–22–14	SEE SHEET 1 [CT68312]	DFS	

BATTERY A (12 VDC) – +
RED
R2 (PWR)
PNK/DK GRN
F4 (IGN) 15 AMP
PNK/DK GRN
RED
BCA
B
A
B–
B+
PNK/DK GRN
RED
M3 70 AMP
RED
BLK
DIAGNOSTIC CONNECTION
(VBAT) 5
6 (GROUND)
(CAN 1+) 7
(CAN 1–) 8
RED/TAN
BLU/PNK
BLU/WHT
BLK
F3 (STARTER) 20 AMP
RED
RED/TAN
R1 (START)
WHT
SS
F2 (ECM) 10 AMP
RED
RED/TAN
R2 (PWR)
WHT/LT BLU
RED/TAN
PNK/DK GRN
IGN COIL
A
B
PNK/DK GRN
YEL
IGN MODULE
A
D
C
B
BLK
YEL/BLK
ECM
8 VRELAY
GROUND 42 BLK
GROUND 28 BLK
32 SPARK_COIL 1A
WHT/LT BLU
6 RELAY
RED/TAN
14 VBAT
ECM INTERFACE
(AUX PWM 5) R
(CAN –) P
(CAN +) N
(START COMMAND) F
(VSW) A
(AUX ANA PUD1) M
(GOV 1) L
(AUX ANA PUD3) K
(AUX ANA PUD 2) J
(FUEL SELECT) H
(MIL) G
(AUX PWM 4) E
(RELAY POWER) D
(LOCKOFF SECONDARY) C
(LOCKOFF PRIMARY) B
S (GROUND)
BLK
TO ECM INTERFACE (P5) SHEET 1
BRN/WHT
BLU/WHT
BLU/PNK
LT BLUE/PNK
R1 (START)
PNK/BLK
F1 (VSW) 5 AMP
PNK/TAN
PNK/TAN
PNK/TAN
DK BLU/YEL
GRAY/DK BLU
DK BLU/ORG
DK BLU/RED
TAN/BRN
GRN/YEL
BRN/PNK
PNK/DK GRN
LT BLU/WHT
WHT/BLK
BRN/WHT
BLU/WHT
BLU/PNK
PNK/BLK
PNK/TAN
DK BLU/YEL
GRAY/DK BLU
DK BLU/ORG
DK BLU/RED
TAN/BRN
GRN/YEL
BRN/PNK
LT BLU/WHT
WHT/BLK
51 AUX_PWM 5
47 CAN 1–
48 CAN 1+
13 STARTER
19 VSWITCH
37 AUX_ANA_PUD 1
39 AUX_DIG 1
35 AUX_ANA_PUD 3
36 AUX_ANA_PUD 2
38 AUX_DIG 2
5 MIL
52 AUX_PWM 4
11 LOCKOFF 2
12 LOCKOFF 1
CONNECTOR 2 (NO MATING CONNECTOR)
LT GRN/RED
A (5V EXT 1)
FPP 1 22
DK BLU/ORG
B (FPP1)
TACH 7
GRAY
D (TACH)
BLK/LT GRN
C (5V RTN 1)
AUX_PWM 3 54
BRN/ORG
E (AUX PWM 3)
AUX_PWM 3 RECIRC 53
BRN
F (AUX PWM 3 RECIRC)
INJ 1 LS 56
YEL/DK BLU
G (AUX PWM 6 (INJ 1))
INJ 2 LS 55
LT GRN/WHT
H (AUX PWM 7 (INJ 2))
LT GRN/RED
BLK/LT GRN
LT GRN/RED
WHT/PURP
PURP/WHT
CRANK SENSOR
1 2 3
LT GRN/RED
WHT/PURP
PURP/WHT
4 5V_EXT 1
2 CRK_NEG
1 CRK_POS
BLK/LT GRN
3 5V_RTN 1
CAM SENSOR
BLK/LT GRN
LT GRN/RED
A
B
C
GRAY/BRN
33 CAM 1
OIL PRESS
BLK/LT GRN
LT GRN/RED
A
B
C
LT BLUE
25 OIL PRESSURE
TMAP
LT GRN/RED
BLK/LT GRN
3
4
2
1
LT GREEN
YEL/GRAY
23 MAP
24 IAT
ELEC THROTTLE
LT GRN/RED
BLK/LT GRN
3
6
4
2
5
1
PURP/LT BLU
PNK/WHT
LT BLU/DK BLU
TAN/ORG
20 TPS 1
10 DBW +
21 TPS 2
9 DBW –
ECT
BLK/LT GRN
A
B
TAN/WHT
26 ECT
HEGO1
BLK/LT GRN
PNK/DK GRN
A
C
B
D
DK GRN/ORG
BLK/WHT
41 EGO 1
49 EGOH 1

40–45 KW (4.3L ENGINES)

DEC 3000 W/ ECM
3.0L ENGINES, 25 & 30KW
4.3L ENGINES, 40 & 45KW
SPLIT ACTIVATOR 1ø, 3ø & 600V

UNLESS OTHERWISE SPECIFIED – 1) DIMENSIONS ARE IN INCHES 2) TOLERANCES ARE: .XXX ± .010 ANGLES ± 1/2° .XX ± .030 SURFACE FINISH .X ± .060 FRACTIONS ± MAX.

APPROVALS		DATE
DRAWN	CRS	11–5–10
CHECKED	DFS	11–5–10
APPROVED	CRS	11–5–10

TITLE: DIAGRAM, SCHEMATIC GM 25 – 45KW
SCALE: NONE
SHEET: 4–4
PLOTTED
DWG. NO.: ADV–7964
D

REV	DATE	REVISION	BY	M/T
–	8–19–10	NEW DRAWING [89970–4]	CRS	

JUNCTION BOX

CONTROLLER BOX

A/C COVER

TB5

V9 (QCON30) — V9 — V9A

V8 (QCON29) — V8 — V8A

V7 (QCON28) — V7 — V7A

DEC–3000 CONTROLLER

P21: (–) (+) GND (–) (+) GND

P23 REMOTE I/O

V7 — V7A

V8 — V8A

V9 — V9A

V0 — V0 (QCON31)

TB2: COM NC COM NO

TB3: 1 AUX 1A | AUX 3 4

1A (ESS–2) — ESS 2

1 (ESS–1) — ESS 1

QCON28: V7 (STAT) — V7 (TB5–V7)

QCON29: V8 (STAT) — V8 (TB5–V8)

QCON30: V9 (STAT) — V9 (TB5–V9)

QCON31: V0 (STAT) — V0 (CONT–V0)

TO STAT [FRII] (AB)

TO SLB (P6) [FRII] (AA)

P26: I1R I1 | I2R I2 | I3R I3

I1R (P1–6) I1 (P1–2)

I2R (P1–14) I2 (P1–15)

I3R (P1–18) I3 (P1–19)

CT1 CT2 CT3

P26 CONNECTIONS

PIN #		
1	I1	(P1–2)
2	I1R	(P1–6)
3	I2	(P1–15)
4	I2R	(P1–14)
5	I3	(P1–19)
6	I3R	(P1–18)

P1

35A	5B	3B	P2	.	.
63	I3	I2	.	70B	70
.	I3R	I2R	31A	I1R	I1
.	GRN	YEL	.	14N	71

(24 … 4 / 21 … 1)

TB1: GND AI1 AI2 | DI3 DI2 DI1

P2: 5 . . . / . . . 1 / 6 2

P1 CONNECTIONS

PIN #					
1	71	(P4A–17)	13	YEL	YELLOW (P4A–34)
2	I1	(P26–1)	14	I2R	(P26–4)
3	70	(TB12–70)	15	I2	(P26–3)
4	N/C	.	16	3B	(P6–2)
5	14N	(W1)	17	GRN	GREEN (P4A–33)
6	i1R	(P26–2)	18	I3R	(P26–6)
7	70B	(P4A–16)	19	I3	(P26–5)
8	N/C	.	20	5B	(P6–1)
9	N/C	.	21	N/C	.
10	31A	(P4A–15)	22	N/C	.
11	N/C	.	23	63	(P4A–13)
12	P2	(QCON1)	24	35A	(P4A–14)

QCON32 — WHT (P4A–32)

QCON1: P2 (P1–12) — 14P2 (P4A–4)

7N (TB12–7N) — W1 — 14N1 (P4A–31)

14N (P1–5)

TB12: P 70 7N 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17

14P1 (P4A–9)

70 (P1–3)

7N (W1)

P4A

1 3 . . . / 4 14P2 . . . . 14P1 9 / . . . 63 35A 31A 70B 71 / . . . . . / 26 . . . . . 14N1 31 / WHT GRN YEL / 32 34

P4A CONNECTIONS

PIN #					
1	N/C	.	18	N/C	.
2	N/C	.	19	N/C	.
3	N/C	.	20	N/C	.
4	14P2	(QCON1)	21	N/C	.
5	N/C	.	22	N/C	.
6	N/C	.	23	N/C	.
7	N/C	.	24	N/C	.
8	N/C	.	25	N/C	.
9	14P1	(TB12–P)	26	N/C	.
10	N/C	.	27	N/C	.
11	N/C	.	28	N/C	.
12	N/C	.	29	N/C	.
13	63	(P1–23)	30	N/C	.
14	35A	(P1–24)	31	14N1	(W1)
15	31A	(P1–10)	32	WHT	WHITE (QCON32)
16	70B	(P1–7)	33	GRN	GREEN (P1–17)
17	71	(P1–1)	34	YEL	YELLOW (P1–13)

NOTE:
CURRENT TRANSFORMER DOT OR 'H1' TOWARD GENERATOR

LEGEND

CLS – COOLANT LEVEL SENDER
CT(#) – CURRENT TRANSFORMER
CTS – COOLANT TEMPERATURE SENSOR
EBG – ENGINE BLOCK GROUND
ECM – ELECTRONIC CONTROL MODULE
ESS – EMERGENCY STOP SWITCH
FV(#) – FUEL VALVE
GND – CONTROLLER BOX GROUND
J(#) – CONNECTOR
LFP(#) – LOW FUEL PRESSURE SWITCH
LFPS – LOW FUEL PRESSURE AUTO SHUTDOWN SWITCH
P(#) – CONNECTOR
PGND – CONTROLLER PANEL GROUND
PL(#) – PANEL LAMP
QCON(#) – QUICK CONNECT
SLB – STATIONARY LED BOARD
SM – STARTER MOTOR
SS – STARTER SOLENOID
STAT – STATOR
TB1 – INTERCONNECTION BOARD TERMINAL BLOCK
TB2 – A/D TERMINAL BLOCK
TB3 – OUTPUT TERMINAL BLOCK
TB4 – DIGITAL INPUT TERMINAL BLOCK
TB5 – CONTROLLER A.C. FUSE BLOCK
TB10 – ACCESSORY TERMINAL BLOCK
TB12 – JUNCTION BOX TERMINAL BLOCK

FOR SCHEMATIC SEE ADV–7963

GM 3.0L & 4.3L ENGINES, 25 – 45KW
DEC 3000 W/ECM
SPLIT ACTIVATOR 1ø, 3ø AND 600V

UNLESS OTHERWISE SPECIFIED – 1) DIMENSIONS ARE IN INCHES 2) TOLERANCES ARE: XXX ± .010 ANGLES ± 1/2° XX ± .030 SURFACE FINISH X ± .080 125 MAX. FRACTIONS ±

APPROVALS		DATE
DRAWN	CRS	8–19–10
CHECKED	DFS	8–19–10
APPROVED	CRS	8–19–10

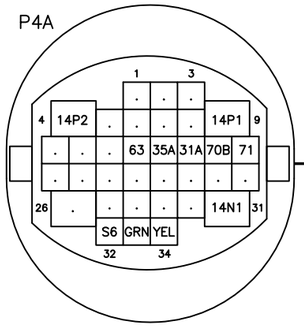
TITLE: DIAGRAM, WIRING
GM 25 – 45 KW

SCALE: NONE | CAD NO. | SHEET 1–3

PLOTTED | DWG. NO. GM77411 | D

REV	DATE	REVISION	BY	M/F
–	8-19-10	NEW DRAWING [89970-4]	CRS	

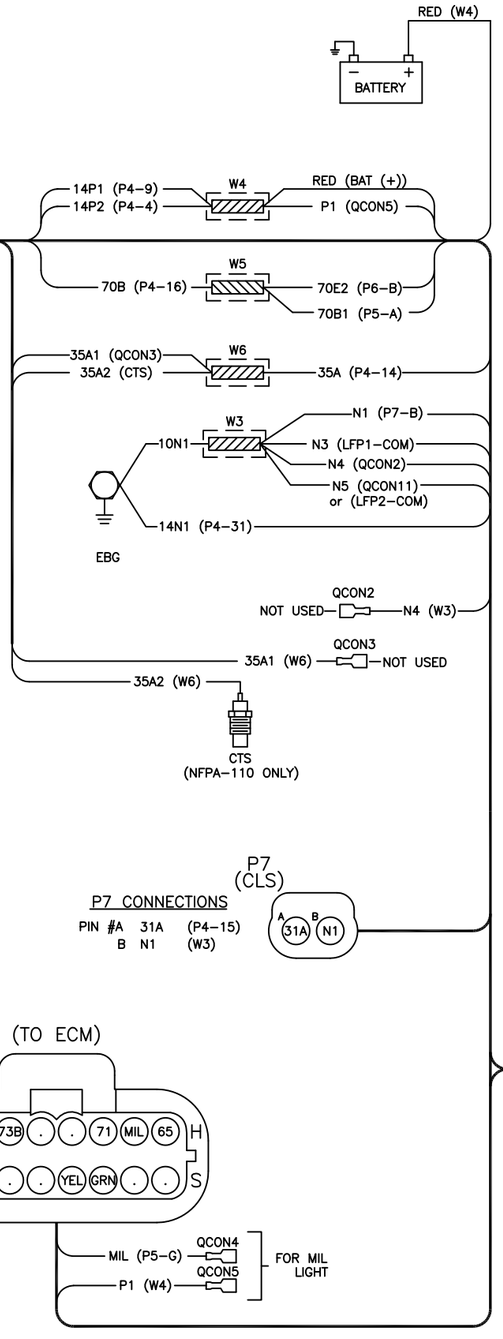
ENGINE



TO SHEET 1

P4 CONNECTIONS

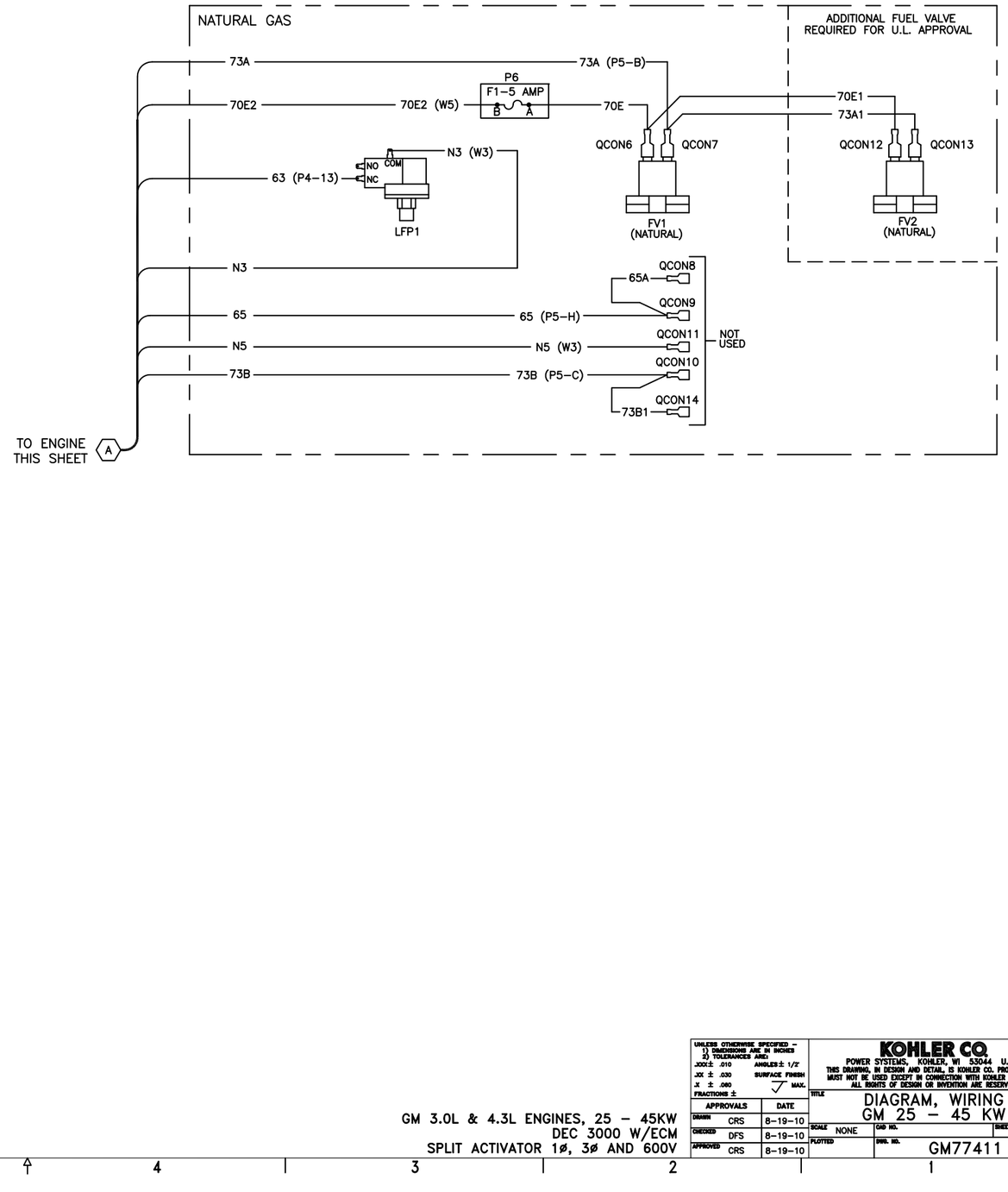
PIN	#1	N/C	.
	2	N/C	.
	3	N/C	.
	4	14P2	(W4)
	5	N/C	.
	6	N/C	.
	7	N/C	.
	8	N/C	.
	9	14P1	(W4)
	10	N/C	.
	11	N/C	.
	12	N/C	.
	13	63	(LFP1-NC)
	14	35A	(W6)
	15	31A	(P7-A)
	16	70B	(W5)
	17	71	(P5-F)
	18	N/C	.
	19	N/C	.
	20	N/C	.
	21	N/C	.
	22	N/C	.
	23	N/C	.
	24	N/C	.
	25	N/C	.
	26	N/C	.
	27	N/C	.
	28	N/C	.
	29	N/C	.
	30	N/C	.
	31	14N1	(EBG)
	32	S6	(P5)
	33	GRN	(P5-P)
	34	YEL	(P5-N)



P5 CONNECTIONS

PIN	#A	70B1	(W5)
	B	73A	(QCON7)
	C	73B	(QCON10)
	D	N/C	.
	E	N/C	.
	F	71	(P4-17)
	G	MIL	(QCON4)
	H	65	(QCON9)
	J	N/C	.
	K	N/C	.
	L	N/C	.
	M	N/C	.
	N	YEL	(P4-34)
	P	GRN	(P4-33)
	R	N/C	.
	S	N/C	.

FUEL SYSTEMS



GM 3.0L & 4.3L ENGINES, 25 – 45KW
DEC 3000 W/ECM
SPLIT ACTIVATOR 1ø, 3ø AND 600V

UNLESS OTHERWISE SPECIFIED –
1) DIMENSIONS ARE IN INCHES
2) TOLERANCES ARE:
.XXX ± .010 ANGLES ± 1/2°
.XX ± .030 SURFACE FINISH
.X ± .080 √ MAX.
FRACTIONS ±

APPROVALS		DATE
DRAWN	CRS	8-19-10
CHECKED	DFS	8-19-10
APPROVED	CRS	8-19-10

TITLE: DIAGRAM, WIRING
GM 25 – 45 KW

SCALE: NONE | CAD NO. | SHEET 2-3

PLOTTED | DWG. NO. GM77411 | D

REV	DATE	REVISION	BY	M F
–	9–16–10	NEW DRAWING [89518–4]	CRS	
A	12–11–14	(A,B–1 THRU –3) 15 RELAY DRY CONTACT WIRING ADDED [CT101273]	DFS	
B	9–18–15	SEE SHEET 2 [CT125095]	DFS	

LEGEND

P(#) – PLUG
QCON(#) – QUICK CONNECT
TB(#) – TERMINAL BLOCK
W(#) – SONIC WELD

P29 2 AMP RELAY OUPUT (2.1) CONNECTIONS
P29–NC 2.1 RELAY NORMALLY CLOSED
P29–COM 2.1 RELAY COMMON
P29–NO 2.1 RELAY NORMALLY OPEN

P30 2 AMP RELAY OUPUT (2.2) CONNECTIONS
P30–NC 2.2 RELAY NORMALLY CLOSED
P30–COM 2.2 RELAY COMMON
P30–NO 2.2 RELAY NORMALLY OPEN

P31 2 AMP RELAY OUPUT (2.3) CONNECTIONS
P31–NC 2.3 RELAY NORMALLY CLOSED
P31–COM 2.3 RELAY COMMON
P31–NO 2.3 RELAY NORMALLY OPEN

P32 10 AMP RELAY OUPUT (2.4 & 2.5) CONNECTIONS
P32–NO 2.4 RELAY NORMALLY OPEN
P32–COM 2.4 RELAY COMMON
P32–NC 2.4 RELAY NORMALLY CLOSED

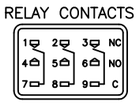
P32–NO 2.5 RELAY NORMALLY OPEN
P32–COM 2.5 RELAY COMMON
P32–NC 2.5 RELAY NORMALLY CLOSED

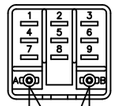
P27 CAN TERMINATOR CONNECTIONS
PLACE THE P27 JUMPER ON THE "IN" PINS

P28 SINGLE–ENDED (0–5V) ANALOG INPUT CONNECTIONS
P28–GND AGND ANALOG RETURN
P28–VN2 NO CONNECTION
P28–VP2 ACH2 SIGNAL
P28–+5V SUPPLY (0.05 AMP MAX)
P28–GND AGND ANALOG RETURN
P28–VN1 NO CONNECTION
P28–VP1 ACH1 SIGNAL
P28–+5V SUPPLY (0.05 AMP MAX)

P28 DIFFERENTIAL (+/–3V) ANALOG INPUT CONNECTIONS
P28–GND AGND ANALOG REFERENCE
P28–VN2 ACH2 NEGATIVE DIFFERENTIAL SIGNAL
P28–VP2 ACH2 POSITIVE DIFFERENTIAL SIGNAL
P28–+5V SUPPLY (0.05 AMP MAX)
P28–GND AGND ANALOG RETURN
P28–VN1 ACH1 NEGATIVE DIFFERENTIAL SIGNAL
P28–VP1 ACH1 POSITIVE DIFFERENTIAL SIGNAL
P28–+5V SUPPLY (0.05 AMP MAX)

NOTE: CONTACT AUTHORIZED DISTRIBUTOR TO DEFINE P28 A/D INPUTS.





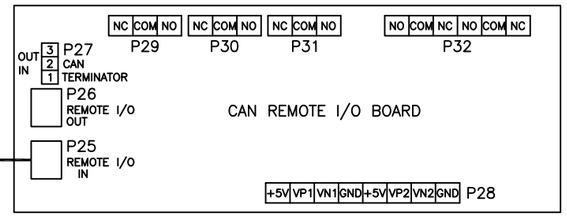
TB10–8 (70): BATTERY VOLTAGE PRESENT ONLY WHEN GENERATOR IS OPERATING

RED BLK

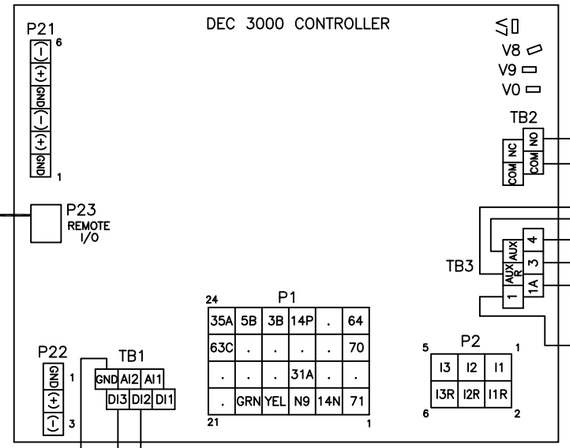
P 70 7N TB10/12

P 7N

NOTE:
IF SHUNT TRIP OR FAILURE RELAY IS NOT USED, DISCONNECT & TAPE LEADS 2 & 32A.

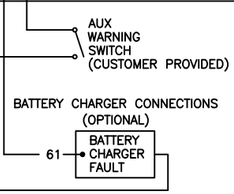


RJ–45 PACTH CABLE



NOTE: TRANSFER SWITCH TERMINAL DESIGNATIONS MAY VARY FROM THOSE SHOWN HERE. VERIFY THE CORRECT DESIGNATIONS USING THE APPROPRIATE TRANSFER SWITCH WIRING DIAGRAM.

(TERMINALS 3 AND 4: REMOTE START SWITCH OR ENGINE START CONTACTS ON TRANSFER SWITCH)



P21 RS485 NON–ISOLATED CONNECTIONS
P21–1 GND
P21–2 +
P21–3 –
P21–4 GND
P21–5 +
P21–6 –

TB1 ANALOG/DIGITAL INPUT FACTORY SETTINGS
TB1–DI1 DCH1 EXCITATION OVER VOLTAGE (4M, 5M, 7M)
TB1–DI2 DCH2 AUX WARNING
TB1–DI3 DCH3 BATTERY CHARGER FAULT WARNING
TB1–AI1 ACH1 NO FUNCTION
TB1–AI2 ACH2 NO FUNCTION
TB1–GND A/DGND ANALOG/DIGITAL RETURN

NOTE: TB1 A/D INPUTS MAY BE REDEFINED – FACTORY DEFAULTS LISTED. CONTACT AUTHORIZED DISTRIBUTOR FOR DETAILS.

TB2 RELAY OUTPUT
TB2–COM (RELAY COMMON) COMMON FAULT
TB2–COM (RELAY COMMON) COMMON FAULT
TB2–NO (RELAY NORMALLY OPEN) COMMON FAULT
TB2–NC (RELAY NORMALLY CLOSED) COMMON FAULT

NOTE: TB2 RELAY OUTPUT MAY BE REDEFINED – FACTORY DEFAULT LISTED. CONTACT AUTHORIZED DISTRIBUTOR FOR DETAILS. CUSTOMER TO CONNECT TO TB2 UNLESS SHUNT TRIP IS USED. IF SHUNT TRIP IS USED, CUSTOMER TO CONNECT TO DCB2 FOR COMMON FAULT.

INSTALLATION NOTE:
FOR FIELD INSTALLATION A MAXIMUM OF TWO WIRE TERMINALS PER TERMINAL STRIP SCREW IS RECOMMENDED UNLESS OTHERWISE NOTED ON THE WIRING DIAGRAM. DO NOT EXTEND ABOVE THE TERMINAL STRIP BARRIER.

DEC 3000 ACCESSORIES

UNLESS OTHERWISE SPECIFIED – 1) DIMENSIONS ARE IN INCHES 2) TOLERANCES ARE: .XXX ± .010 ANGLES ± 1/2° .XX ± .030 SURFACE FINISH .X ± .080 MAX. FRACTIONS ±

APPROVALS	DATE
DRAWN CRS	9–16–10
CHECKED DFS	9–16–10
APPROVED CRS	9–16–10

TITLE: DIAGRAM, DEC 3000 ACCY INTERCONNECTION

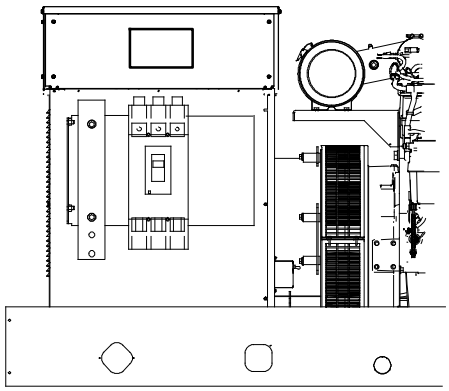
SCALE /// GAD NO. SHEET 1–2

PLOTTED DWG. NO. GM78246 D

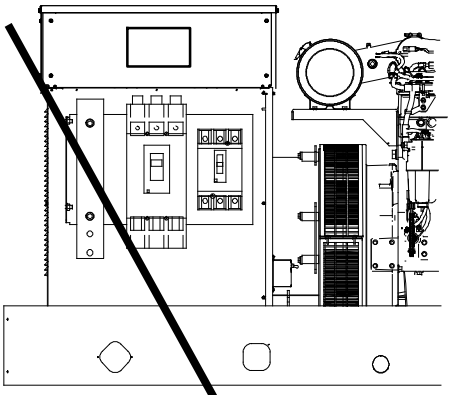
KOHLER. Power Systems

Line Circuit Breakers 15-2250 kW

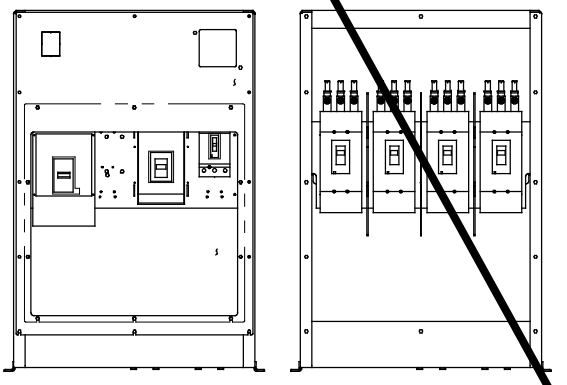
ISO 9001 KOHLER POWER SYSTEMS NATIONALLY REGISTERED



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



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



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

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 (350-2250 kW).
- 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 (UL 1077 circuit breakers).

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 dependant 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. LSIG breakers have all of the LSI breaker features plus ground-fault pickup and delay.

Electronic with Ground Fault Trip

The ground fault trip feature is referred to as LSIG in this document. Models with LSIG 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 (350–2250 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.
350–2250 kW. A bus bar kit is provided on the right side of the unit 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.

❑ 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.

❑ Neutral Lugs

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

❑ 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.

❑ 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.

15-300 kW Line Circuit Breaker Specifications

100% Rating Circuit Breaker

Gen. Set kW	Alt. Model	Ampere Range	Trip Type	C. B. Frame Size
15-80	4D/4E/ 4P/4PX/ 4Q/4QX	15-150	Thermal magnetic	HD
		60-150	Electronic LI	
			Electronic LSIG	
		175-250	Thermal magnetic	JD
		250	Electronic LI	
			Electronic LSIG	
		400	Electronic LI	LG
			Electronic LSIG	
60-200	4RX/4S/ 4SX/ 4TX/4V	15-150	Thermal magnetic	HD
		60-150	Electronic LI	
			Electronic LSIG	
		175-250	Thermal magnetic	JD
		250	Electronic LI	
			Electronic LSIG	
		400	Electronic LI	LG
			Electronic LSIG	
		600-1200	Electronic LSI	PG
			Electronic LSIG	
200-300	4UA/ 4M6226	15-150	Thermal magnetic	HD
		60-150	Electronic LI	
			Electronic LSIG	
		175-250	Thermal magnetic	JD
		250	Electronic LI	
			Electronic LSIG	
		400	Electronic LI	LG
			Electronic LSIG	
		600-1200	Electronic LSI	PG
			Electronic LSIG	

Circuit Breaker Lugs Per Phase (Al/Cu)

Frame Size	Ampere Range	Wire Range
E (480 V max.)	30-100	Up to two wire terminals fitting 10-32 or 1/4-20 stud
HD (80%)	15-150	One #14 to 3/0
HD (100%)	15-150	One #14 to 2/0 Cu only
JD (80%)	175	One 1/0 to 4/0
	200-250	One 3/0 to 350 kcmil
JD (100%)	175-250	One 3/0 to 300 kcmil Cu only
LA	300-400	One #1 to 600 kcmil or Two #1 to 250 kcmil
LG	400-600	Two 2/0 to 500 kcmil
MG	700-800	Three 3/0 to 500 kcmil
PG	600-800	Three 3/0 to 500 kcmil
	1000-1200	Four 3/0 to 500 kcmil

Interrupting Ratings

Circuit Breaker Frame Size	240 Volt, kA	480 Volt, kA	600 Volt, kA
HD	~~25~~	~~18~~	14
JD			
LA	42	30	22
LG	65	35	18
MG			
PG			

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For the nearest sales and service outlet in the
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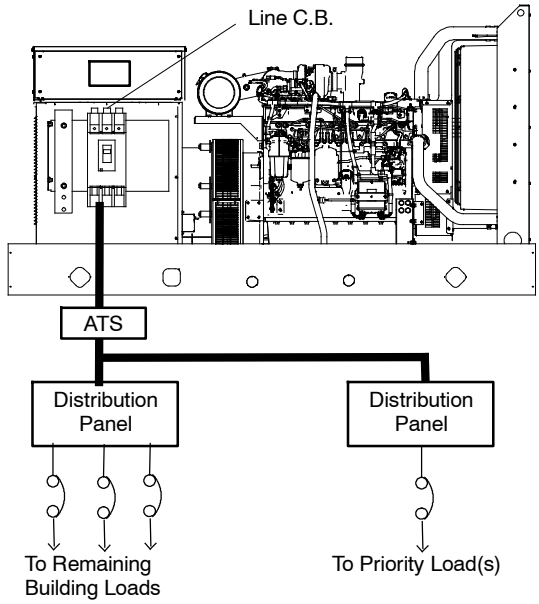
Kohler Power Systems
Asia Pacific Headquarters
7 Jurong Pier Road
Singapore 619159
Phone (65) 6264-6422, Fax (65) 6264-6455

15-300 kW Line Circuit Breaker Applications

Single Circuit Breaker Installations

A generator set with a single circuit breaker installed typically feeds a single transfer switch and then a distribution panel. This allows protection of the entire system.



Single line circuit breaker configuration where circuit breaker can trip causing all power to building loads including priority load to be disrupted.

DISTRIBUTED BY:

Availability is subject to change without notice. Kohler Co. reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever. Contact your local Kohler® generator set distributor for availability.

Powerpact® H- and J-Frame 15A to 250A Molded Case Circuit Breakers

HD and HG 2-Pole

H-Frame 150A

J-Frame 250A

Delivering unmatched application flexibility

Well-suited to a wide range of applications, the Powerpact H- and J-Frame Molded Case Circuit Breakers feature a full complement of field installable accessories, field installable trip units and improved interrupting ratings. These Molded Case Circuit Breakers deliver unmatched design flexibility for 15A to 250A applications and share identical mounting holes, handle locations, trim dimensions and accessories, allowing customers to standardize equipment designs for 15A to 250A applications.

Full-Featured Performance

- H-Frame – 150A available in both standard and 100% ratings with standard amperage ratings from 15 to 150A. Interrupting ratings (AIR) include D-18kA, G-35kA, J-65kA and L-100kA at 480VAC
- J-Frame – 250A available in both standard and 100% ratings with standard amperage ratings from 150A to 250A. Interrupting ratings (AIR) include D-18kA, G-35kA, J-65kA, and L-100kA at 480VAC
- Field installable accessories are common for H- and J-Frame Circuit Breakers to make stocking and installation easy
- Unique snap-in terminals make converting bus bar and lug configurations simple and easy
- Field-installable trip units lower inventory costs and reduce stocking space by configuring products at point of use
- Allows design standardization for 15A to 250A applications with common mounting holes, handle locations, and trim dimensions for both H- and J-Frame Circuit Breakers
- Many configuration options provide application flexibility, with I-Line®, plug-in, drawout, rear connected, distribution lug, crimp lug and din-rail configurations
- Motor operators, rotary handles and cable operators provide options for integrating into a variety of applications
- Certified to global standards, including UL, IEC, CSA and NOM

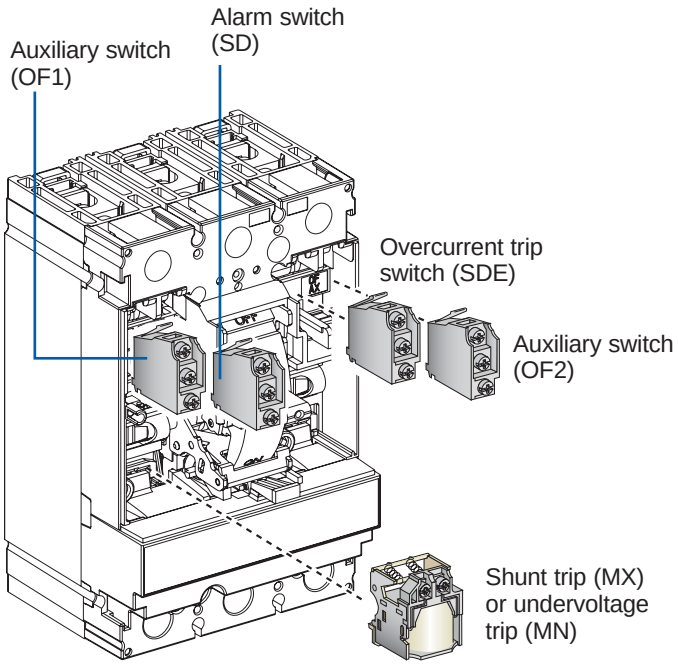
H-Frame **J-Frame** **H-Frame** **J-Frame**

Standardize Designs

Designed to help simplify the design process, the Powerpact H- and J-Frame Molded Case Circuit Breakers feature common mounting holes, handle locations and trim dimensions.

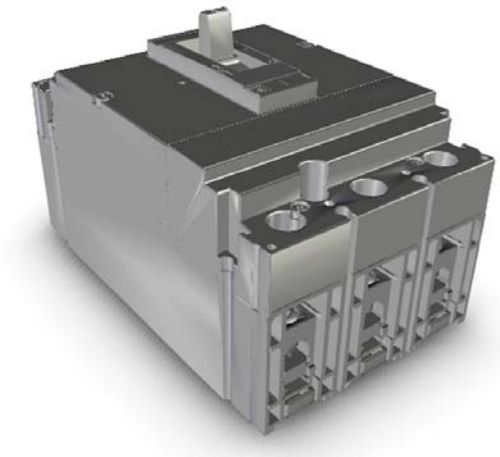
Consolidate Inventory

Reduce inventory costs with the Powerpact H- and J-Frame Molded Case Circuit Breakers. These circuit breakers are designed to work with common components like operating handles, auxiliary switches, shunt trips and many other accessories. They also offer savings in the form of rationalized mounting pans, door trims and enclosures.



Simplify Installation

Field-installable accessories provide flexibility for late specification changes or installation at point of use. Auxiliary switches, shunt trip and undervoltage release are easy to install, reliable and common to many Powerpact Circuit Breakers.



Streamline Design Integration

Comprehensive technical literature, CAD drawings and 3D models are available online to support the Powerpact H- and J-Frame Circuit Breaker line. In addition, 3D models can be downloaded in most CAD formats.

Easy to Convert

Unique snap-in lugs make converting between bus bar and lug options simple and easy. Whether the application calls for lugs on the line side, load side or both, conversions are simple, making the Powerpact H- and J-Frame Molded Case Circuit Breakers ideal for applications that require configuring products at the point of use. The terminal nut or mechanical lug is set on a plastic retainer that slides and snaps into place, without the use of tools.

Bus Bar Option

Lug Option

Powerpact® H- and J-Frame 15A to 250A Molded Case Circuit Breakers

Multiple Configurations

Cradle

Plug-in Base

I-Line

Rear Connected

Ordering Flexibility for Various Applications

- **Purchase Standard Circuit Breaker**
  Features fixed trip unit capable of reverse connection.
- **Circuit Breaker and Separate Trip Units***
  Save valuable inventory costs by configuring products at point of use. Only three frame sizes are needed to cover the entire range from 15A to 250A (shown below with H-Frame Circuit Breaker).
- **Purchase the Complete Circuit Breaker with Field-Interchangeable Trip Unit***
  Respond to last minute specification changes with the flexibility of a field interchangeable trip unit.

**Marked line and load and not suitable for reverse connection*

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

Schneider Electric - North American Operating Division

1415 S. Roselle Road
Palatine, IL 60067
Tel: 847-397-2600
Fax: 847-925-7500

Order Number 0611HO0401

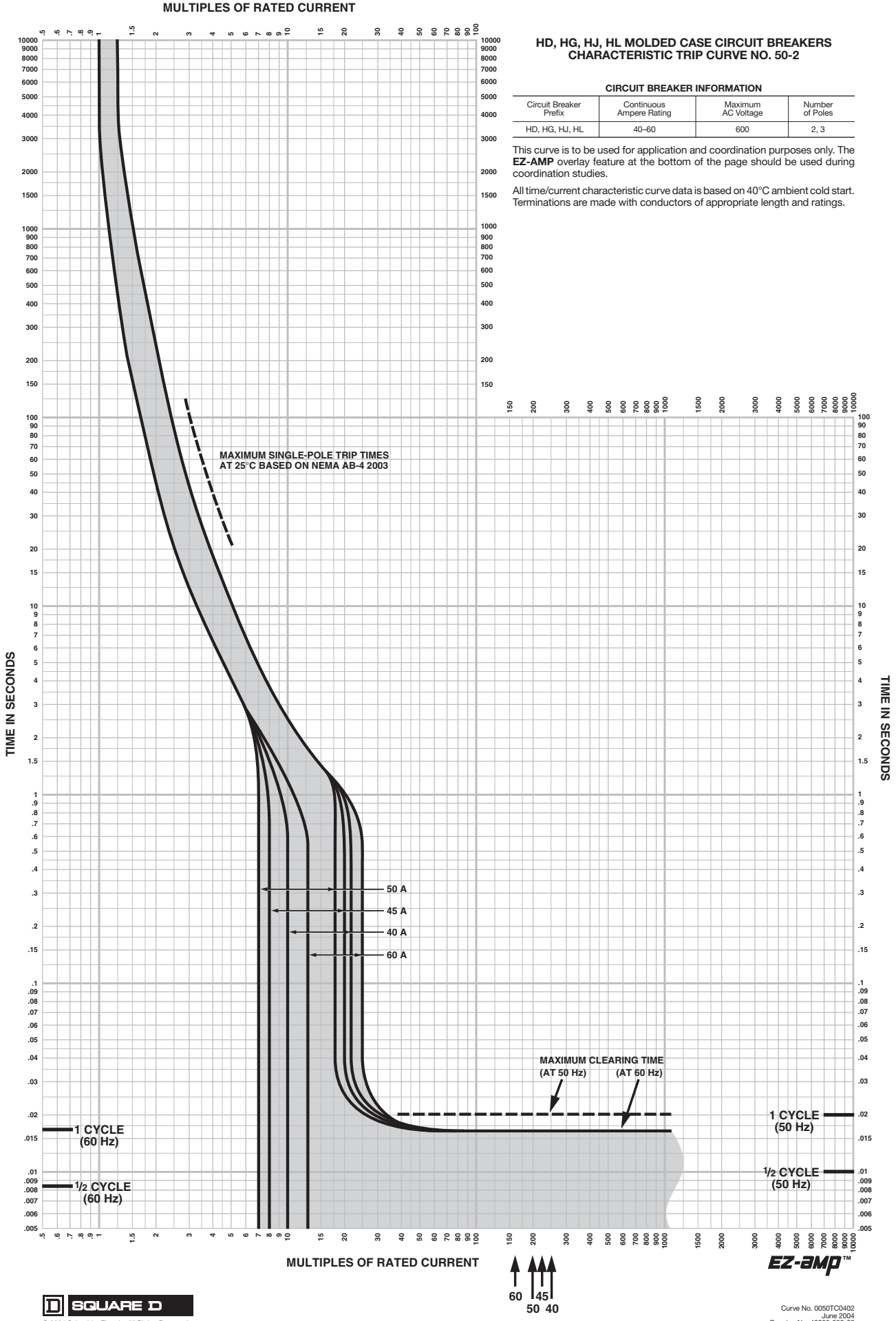
HD, HG, HJ, HL MOLDED CASE CIRCUIT BREAKERS
CHARACTERISTIC TRIP CURVE NO. 50-2

CIRCUIT BREAKER INFORMATION

Circuit Breaker Prefix	Continuous Ampere Rating	Maximum AC Voltage	Number of Poles
HD, HG, HJ, HL	40–60	600	2, 3

This curve is to be used for application and coordination purposes only. The **EZ-AMP** overlay feature at the bottom of the page should be used during coordination studies.

All time/current characteristic curve data is based on 40°C ambient cold start. Terminations are made with conductors of appropriate length and ratings.



Curve No. 0050TC0402
June 2004
Drawing No. 48095-050-02

PART NO.	PART REV		DESCRIPTION	AMPS	INTERRUPT kA @480 VAC	CONNECTION TYPE		POLES	RATING	TRIP TYPE	MAGNETIC TRIP ONLY		SQUARE D PART NO.
						LINE	LOAD				FULL LOAD AMPS	ADJUSTABLE TRIP RANGE	
GM47475-15	C		BREAKER, CIRCUIT 15A HDL	15	18	ALI50HD LUGS	ALI50HD LUGS	3	80%	THERMAL MAGNETIC	-	-	HDL36015
GM47475-17	D		BREAKER, CIRCUIT 15A HDP		18	TERMINAL NUTS	ALI50HD LUGS	3	80%	THERMAL MAGNETIC	-	-	HDP36015TX
GM47475-18	D		BREAKER, CIRCUIT 15A HDP		18	TERMINAL NUTS	CUI50HD LUGS	3	100%	THERMAL MAGNETIC	-	-	HDP36015CTX
GM47475-9	C		BREAKER, CIRCUIT 20A HDL	20	18	ALI50HD LUGS	ALI50HD LUGS	3	80%	THERMAL MAGNETIC	-	-	HDL36020
GM47475-19	D		BREAKER, CIRCUIT 20A HDP		18	TERMINAL NUTS	ALI50HD LUGS	3	80%	THERMAL MAGNETIC	-	-	HDP36020TX
GM47475-20	D		BREAKER, CIRCUIT 20A HDP		18	TERMINAL NUTS	CUI50HD LUGS	3	100%	THERMAL MAGNETIC	-	-	HDP36020CTX
GM47475-10	C		BREAKER, CIRCUIT 25A HDL	25	18	ALI50HD LUGS	ALI50HD LUGS	3	80%	THERMAL MAGNETIC	-	-	HDL36025
GM47475-21	D		BREAKER, CIRCUIT 25A HDP		18	TERMINAL NUTS	ALI50HD LUGS	3	80%	THERMAL MAGNETIC	-	-	HDP36025TX
GM47475-22	D		BREAKER, CIRCUIT 25A HDP		18	TERMINAL NUTS	CUI50HD LUGS	3	100%	THERMAL MAGNETIC	-	-	HDP36025CTX
GM47475-11	C		BREAKER, CIRCUIT 30A HDL	30	18	ALI50HD LUGS	ALI50HD LUGS	3	80%	THERMAL MAGNETIC	-	-	HDL36030
GM47475-23	D		BREAKER, CIRCUIT 30A HDP		18	TERMINAL NUTS	ALI50HD LUGS	3	80%	THERMAL MAGNETIC	-	-	HDP36030TX
GM47475-24	D		BREAKER, CIRCUIT 30A HDP		18	TERMINAL NUTS	CUI50HD LUGS	3	100%	THERMAL MAGNETIC	-	-	HDP36030CTX
GM47475-25	D		BREAKER, CIRCUIT 30A HJP		65	TERMINAL NUTS	ALI50HD LUGS	3	-	MAGNETIC ONLY	1.5-25	9-325	HJP36030M71TX
GM47475-12	C		BREAKER, CIRCUIT 35A HDL	35	18	ALI50HD LUGS	ALI50HD LUGS	3	80%	THERMAL MAGNETIC	-	-	HDL36035
GM47475-26	D		BREAKER, CIRCUIT 35A HDP		18	TERMINAL NUTS	ALI50HD LUGS	3	80%	THERMAL MAGNETIC	-	-	HDP36035TX
GM47475-27	D		BREAKER, CIRCUIT 35A HDP		18	TERMINAL NUTS	CUI50HD LUGS	3	100%	THERMAL MAGNETIC	-	-	HDP36035CTX
GM47475-1	C		BREAKER, CIRCUIT 40A HDL	40	18	ALI50HD LUGS	ALI50HD LUGS	3	80%	THERMAL MAGNETIC	-	-	HDL36040
GM47475-28	D		BREAKER, CIRCUIT 40A HDP		18	TERMINAL NUTS	ALI50HD LUGS	3	80%	THERMAL MAGNETIC	-	-	HDP36040TX
GM47475-29	D		BREAKER, CIRCUIT 40A HDP		18	TERMINAL NUTS	CUI50HD LUGS	3	100%	THERMAL MAGNETIC	-	-	HDP36040CTX
GM47475-13	C		BREAKER, CIRCUIT 45A HDL	45	18	ALI50HD LUGS	ALI50HD LUGS	3	80%	THERMAL MAGNETIC	-	-	HDL36045
GM47475-30	D		BREAKER, CIRCUIT 45A HDP		18	TERMINAL NUTS	ALI50HD LUGS	3	80%	THERMAL MAGNETIC	-	-	HDP36045TX
GM47475-31	D		BREAKER, CIRCUIT 45A HDP		18	TERMINAL NUTS	CUI50HD LUGS	3	100%	THERMAL MAGNETIC	-	-	HDP36045CTX
GM47475-14	C		BREAKER, CIRCUIT 50A HDL	~~50~~	18	ALI50HD LUGS	ALI50HD LUGS	3	80%	THERMAL MAGNETIC	-	-	HDL36050
GM47475-32	D		BREAKER, CIRCUIT 50A HDP		18	TERMINAL NUTS	ALI50HD LUGS	3	80%	THERMAL MAGNETIC	-	-	HDP36050TX
GM47475-33	D		BREAKER, CIRCUIT 50A HDP		18	TERMINAL NUTS	CUI50HD LUGS	3	100%	THERMAL MAGNETIC	-	-	HDP36050CTX
GM47475-34	D		BREAKER, CIRCUIT 50A HJP		65	TERMINAL NUTS	ALI50HD LUGS	3	-	MAGNETIC ONLY	14-42	84-546	HJP36050M72TX
GM47475-2	C		BREAKER, CIRCUIT 60A HDL	60	18	ALI50HD LUGS	ALI50HD LUGS	3	80%	THERMAL MAGNETIC	-	-	HDL36060
~~**GM47475-35**~~	~~D~~		~~BREAKER, CIRCUIT 60A HDP~~		~~18~~	~~TERMINAL NUTS~~	~~ALI50HD LUGS~~	~~3~~	~~80%~~	~~THERMAL MAGNETIC~~			~~HDP36060TX~~
GM47475-36	D		BREAKER, CIRCUIT 60A HDP		18	TERMINAL NUTS	ALI50HD LUGS	3	100%	THERMAL MAGNETIC	-	-	HDP36060CTX
~~**GM47475-53**~~	~~-~~	~~☐~~	~~BREAKER, CIRCUIT 60A HDP~~		~~18~~	~~TERMINAL NUTS~~	~~ALI50HD LUGS~~	~~3~~	~~80%~~	~~MICROLOGIC 3.2S LSI~~			~~HDP36060U33XTX~~
GM47475-54	-	☐	BREAKER, CIRCUIT 60A HDP		18	TERMINAL NUTS	ALI50HD LUGS	3	80%	MICROLOGIC 3.2S LSI	-	-	HDP36060U33XTX
GM47475-55	-	☐	BREAKER, CIRCUIT 60A HDP		18	TERMINAL NUTS	ALI50HD LUGS	3	80%	MICROLOGIC 6.2A LSIG	-	-	HDP36060U44XTX
GM47475-56	-	☐	BREAKER, CIRCUIT 60A HDP		18	TERMINAL NUTS	CUI50HD LUGS	3	100%	MICROLOGIC 3.2 LI	-	-	HDP36060CU31XTX
GM47475-57	-	☐	BREAKER, CIRCUIT 60A HDP		18	TERMINAL NUTS	CUI50HD LUGS	3	100%	MICROLOGIC 3.2S LSI	-	-	HDP36060CU33XTX
GM47475-58	-	☐	BREAKER, CIRCUIT 60A HDP		18	TERMINAL NUTS	CUI50HD LUGS	3	100%	MICROLOGIC 6.2A LSIG	-	-	HDP36060CU44XTX
GM47475-59	-	☐	BREAKER, CIRCUIT 60A HGP		35	TERMINAL NUTS	ALI50HD LUGS	3	80%	MICROLOGIC 3.2 LI	-	-	HGP36060U31XTX
GM47475-60	-	☐	BREAKER, CIRCUIT 60A HGP		35	TERMINAL NUTS	ALI50HD LUGS	3	80%	MICROLOGIC 3.2S LSI	-	-	HGP36060U33XTX
GM47475-61	-	☐	BREAKER, CIRCUIT 60A HGP		35	TERMINAL NUTS	ALI50HD LUGS	3	80%	MICROLOGIC 6.2A LSIG	-	-	HGP36060U44XTX
GM47475-62	-	☐	BREAKER, CIRCUIT 60A HGP		35	TERMINAL NUTS	CUI50HD LUGS	3	100%	MICROLOGIC 3.2 LI	-	-	HGP36060CU31XTX
GM47475-63	-	☐	BREAKER, CIRCUIT 60A HGP		35	TERMINAL NUTS	CUI50HD LUGS	3	100%	MICROLOGIC 3.2S LSI	-	-	HGP36060CU33XTX
GM47475-64	-	☐	BREAKER, CIRCUIT 60A HGP		35	TERMINAL NUTS	CUI50HD LUGS	3	100%	MICROLOGIC 6.2A LSIG	-	-	HGP36060CU44XTX
GM47475-3	C		BREAKER, CIRCUIT 70A HDL	~~70~~	18	ALI50HD LUGS	ALI50HD LUGS	3	80%	THERMAL MAGNETIC	-	-	HDL36070
GM47475-37	D		BREAKER, CIRCUIT 70A HDP		18	TERMINAL NUTS	ALI50HD LUGS	3	80%	THERMAL MAGNETIC	-	-	HDP36070TX
GM47475-38	D		BREAKER, CIRCUIT 70A HDP		18	TERMINAL NUTS	CUI50HD LUGS	3	100%	THERMAL MAGNETIC	-	-	HDP36070CTX

KOHLER PART NUMBER TO BE CLEARLY VISIBLE ON CIRCUIT BREAKER AND ON INDIVIDUAL PACKAGING.

CONNECTION CHART		
CONNECTION TYPE	**CONNECTION (PER PHASE)**	**TORQUE**
ALI50HD LUGS	(1) #14-#10 AWG	5 Nm [50 IN-LB]
ALI50HD LUGS	(1) #8-3/0 AWG	14 Nm [120 IN-LB]
CUI50HD LUGS	(1) #14-2/0 AWG (CU 90°C WIRE ONLY)	14 Nm [120 IN-LB]
TERMINAL NUTS	(1) M6	9-10.2 Nm [80-90 IN-LB]

△ DENOTES A CRITICAL CHARACTERISTIC THAT MUST BE ADDRESSED IN THE PRODUCTION CONTROL PLAN. TOTAL QUANTITY OF CRITICAL 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

SQUARE D H-FRAME 600V

☐ INDICATES PART NUMBERS AFFECTED BY LATEST DRAWING REVISION

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
A	2-6-08	(D-4) -9 THRU -14 ADDED [84577]	WSD
B	3-18-08	(D-4) GM47475-15 ADDED [S.O.#1005432720]	RDH
C	11-16-10	REDRAWN IN PRO-E & CHART UPDATED, GM47475-16 ADDED; [90604-1]	BTW
D	1-6-11	(B-5) GM47475-16 2 POLES WAS 3; GM47475-17 THRU -52 ADDED; SHEET 2 ADDED [90647-15]	WSD
E	4-13-12	(A-1) SHEET 3 ADDED; (B-8) GM47475-53 THRU -64 ADDED; (A-1) GM47475-CMP WAS GM47475 [CT14516]	WSD

UNLESS OTHERWISE SPECIFIED - 1) DIMENSIONS ARE IN MILLIMETERS 2) TOLERANCES ARE: X.XX ± 0.25, X.X ± 1.0, X ± 1.5, ANGLES ± 0° 30' — SURFACE FINISH MAX. — THIRD ANGLE PROJECTION

APPROVALS		DATE
DRAWN	WSD	10-21-05
CHECKED	WSD	6-13-06
APPROVED	AJH	6-15-06

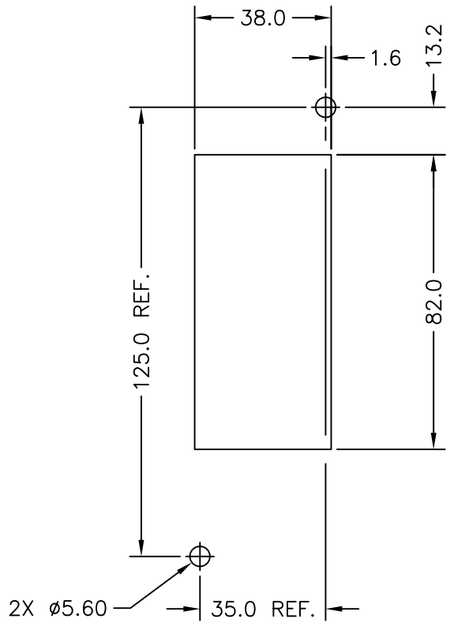
TITLE: **DWG, CIRCUIT BREAKER**

SCALE | CAD NO. | SHEET 1 of 3

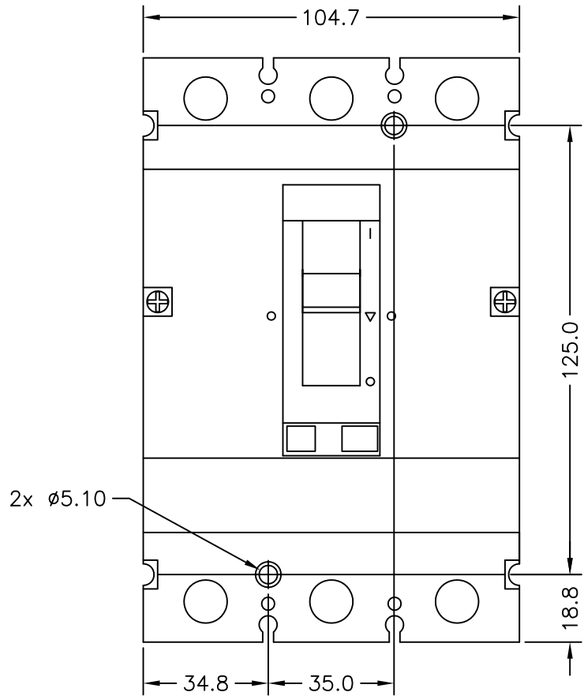
DWG NO. **GM47475-CMP** **D**

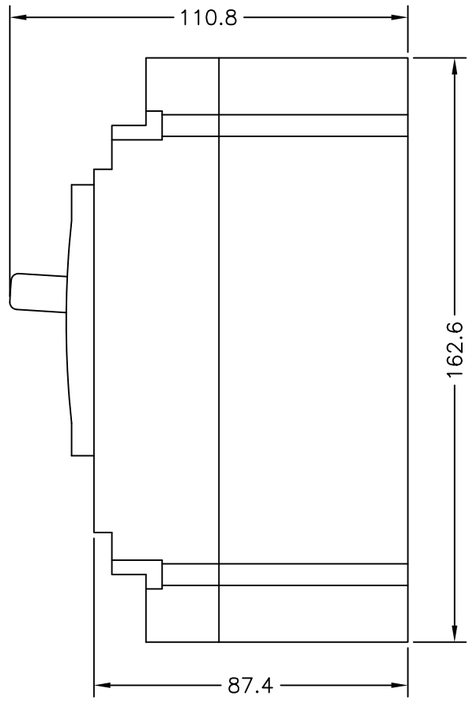
REV	DATE	REVISION	BY
–	10-21-05	NEW DRAWING [76459]	RAC
A	2-6-08	(D-4) -9 THRU -14 ADDED [84577]	WSD
B	3-18-08	(D-4) GM47475-15 ADDED [S.O.#1005432720]	RDH

REVISION BLOCK INDICATES REVISION LEVEL OF DRAWING NOT PART REVISION. SEE PART REVISION LEVEL BEHIND PART NUMBER FOR CURRENT PART REVISION LEVEL.



SUGGESTED PANEL
CUTOUT & MOUNTING





NOTES:

AL150HD LUGS EACH END (REF)
(1) #14–#10 AWG, TORQUE 5 Nm [50 IN-LBS]
OR (1) #8–3/0 AWG, TORQUE 14 Nm [120 IN-LB]

HARDWARE INCLUDED: (2) #8–32 SCREWS

METRIC CAD FILE

MODELLED IN PRO/E

SQUARE D HD-FRAME CIRCUIT BREAKER
THERMAL MAGNETIC 3 POLE TOGGLE LUG-LUG

UNLESS OTHERWISE SPECIFIED –
1) DIMENSIONS ARE IN MILLIMETERS
2) TOLERANCES ARE:
X.XX ± 0.25
X.X ± 1.0
X ± 1.5
ANGLES ± 0°30'
SURFACE FINISH MAX.
THIRD ANGLE PROJECTION

APPROVALS		DATE
DRAWN	RAC	10-21-05
CHECKED	JMS	6-13-06
APPROVED	SLJ	6-15-06

TITLE: DWG, CIRCUIT BREAKER

SCALE: NONE | CAD NO.: GM47475.DWG | SHEET: 1-1

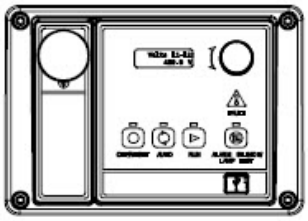
DWG. NO.: GM47475 | C

PLOTTED DATE

KOHLER. Power Systems

ISO 9001 KOHLER POWER SYSTEMS NATIONALLY REGISTERED

Integral Voltage Regulator with Kohler® Decision-Maker® 3000 and Menu-Driven Selections (15-1000 kW Generator Set Models)



Decision-Maker® 3000 Controller with integral Voltage Regulator

The voltage regulator is integral to the controller and uses patented hybrid voltae regulator design providing ±0.5% no-load to full-load regulation using root-mean-square (RMS) voltage sensing. The voltage regulator features three-phase sensing and is available for 12- or 24-volt engine electrical systems.

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 Decision-Maker® 3000 Controllers

Calibration	Digital Display	Range Settings	Default Selection
Voltage Adjustment	Volt Adj	±10% of System Voltage	System Voltage
Underfrequency Unload or Frequency Setpoint	Frequency Setpoint	42 to 62 Hz	2.5 Hz Below Nominal Frequency
Underfrequency Unload Scope	Slope	0-10% of System Voltage (Volts per Cycle)	5% of System Voltage

KOHLER. Power Systems

Specification/Feature	Integral with Decision-Maker® 3000
Generator Set Availability	15-1000 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	100-240 Volts (L-L), 50-60 Hz
Sensing Mode	RMS, Single- or 3-Phase
Input Requirements	8-36 VDC
Continuous Output	5 VDC @ 100mA max. 5.0 ADC with GM88453 Activator Board
Maximum Output	5 VDC @ 100mA max. 7.8 ADC with GM88453 Activator Board
Transition Frequency	42.0-62.0Hz
Exciter Field Resistance	4-30 Ohms with GM88453 Activator Board
No-Load to Full-Load Voltage Regulation	±0.5%
Thermal Drift	<0.5% (-40°C to 70°C) [-40°F to 158°F] Range
Response Time	Less than 5µS
System Voltage Adjust.	±10%
Voltage Adjustment	Controller Menu Knob
Remote Voltage Adjustment	not available
Paralleling Capability	not available
VAR/PF Control Input	not available

Integral Voltage Regulator with Decision-Maker® 3000 Controller

- The Decision-Maker® 3000 digital display and pushbutton/rotary dial provide access to data. A two-line LCD display provides complete and concise information. A two-line vacuum fluorescent display provides complete and concise information.
- The Decision-Maker® 3000 graphical display and pushbutton/rotary dial provide access to data. A five-line, 35-characters per line LCD display provides complete and concise information include gain, ramp rate, reactive droop, VAR control (P, I, D gains) and PF control (P, I, D gains).
- The controllers provide ISO 8528-5, Class G3, compliance for transient response on some 20-300 kW generator set models. Both controllers support Modbus®.
- These controllers can control Fast Response™ II, Fast Response™ X, and wound field alternators using the GM88453 activator board.

Voltage Regulator Menu

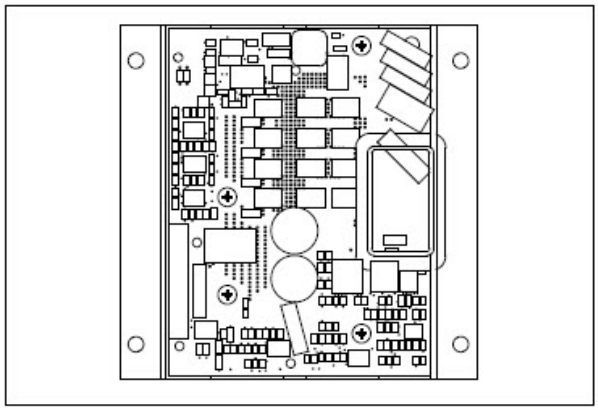
- Voltage adjustment, ±10% of system voltage
- V/Hz cut-in, 42-62 Hz
- Underfrequency unload slope, 0-10% of system voltage

Generator Set Calibration Menu

- L1-L2 volts
- L2-L3 volts (3-phase)
- L3-L1 volts (3-phase)
- L1-N volts
- L2-N volts
- L3-N volts (3-phase)

KOHLER. Power Systems

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™ alternator.
- 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.

KOHLER. POWER SYSTEMS

Alternator Data

TECHNICAL INFORMATION

rvm

Alternator Data Sheet

Alternator Model: 4P8, 4P8W 600 volt
Frequency: 60
Speed: 1800 RPM
Leads: 6

Voltage L-N/L-L	Phase	Power Factor	Conn	kW* (kVA) 80 C	90 C Lloyds	95 C ABS	105C Prime	125 C	130C Standby
347/600	3	0.8	Wye	48.2 (60.3)	52 (65.0)	53.7 (67.1)	56.7 (70.9)	61.3 (76.6)	62.2 (77.8)

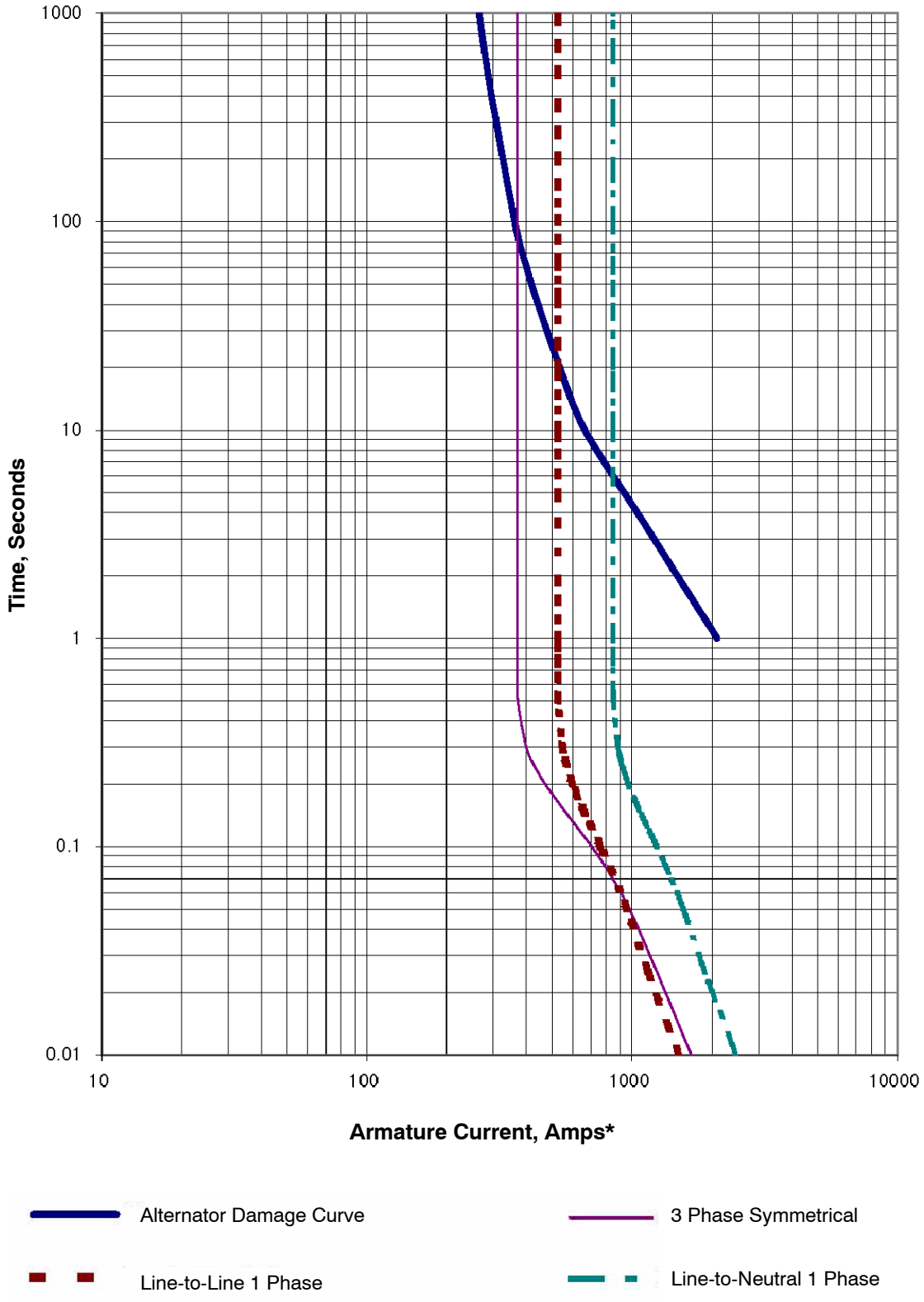
* All data tested in accordance with IEEE Standard 115. Kohler Co. reserves the right to change the design or specifications without notice and without any obligation or liability whatsoever.

Submittal Data: 600 Volt, 0.8 PF, 1800 RPM, 60 Hz, 3-Phase, 130 deg C

	Symbol	Per Unit	Ohms
Typical Resistances			
Phase Resistance		0.386	0.067
Rotor Resistance		19.0	3.3
Typical Reactances			
Synchronous			
Direct	Xd	3.67	17
Quadrature	Xq	1.78	8.2
Transient			
Unsaturated		0.395	1.8
Saturated	X'd	0.347	1.6
Subtransient			
Direct	X"d	0.160	0.74
Quadrature	X"q	0.147	0.68
Negative Sequenc	X2	0.153	0.71
Zero Sequence	X0	0.012	0.05

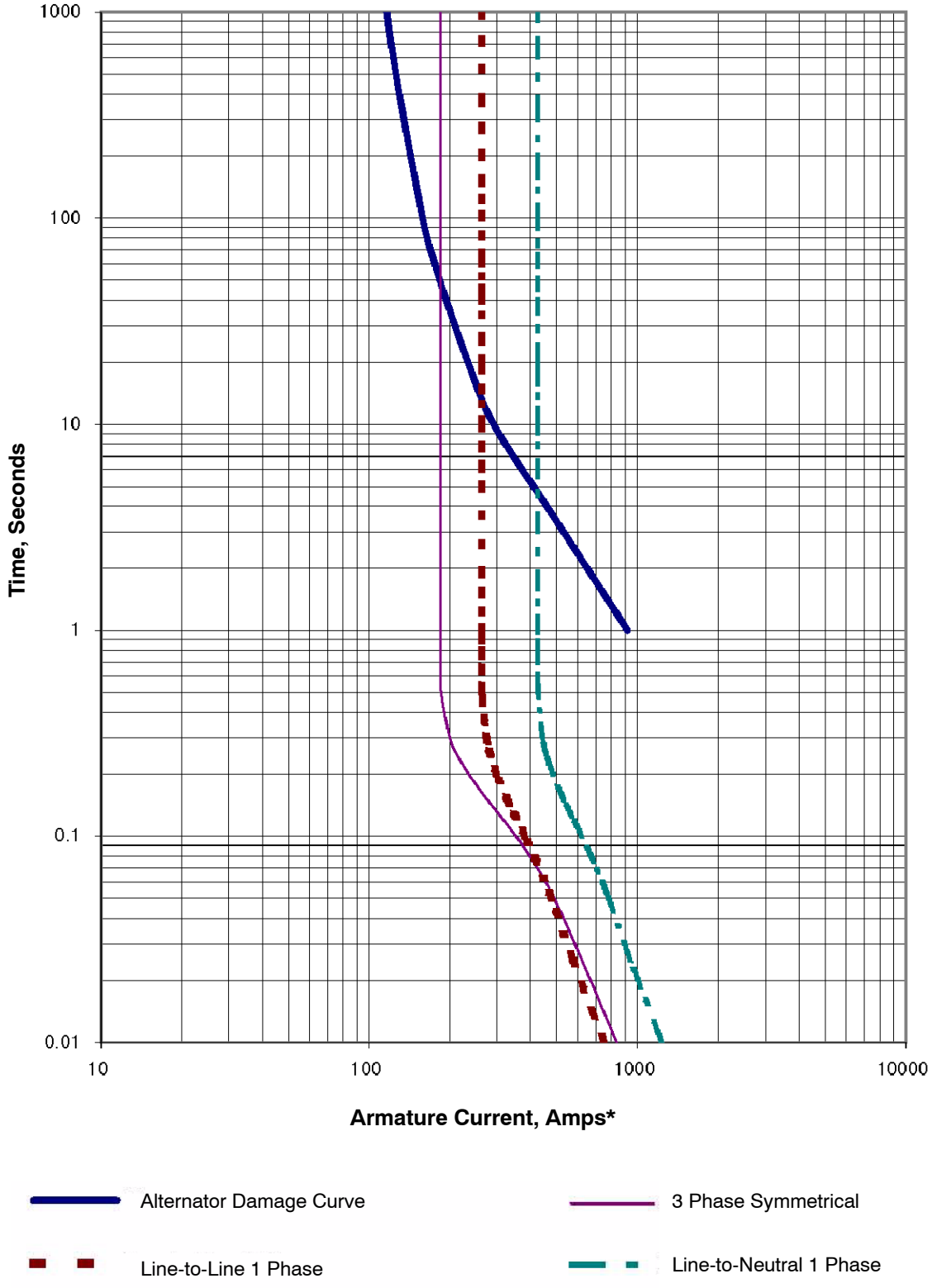
	Symbol	Value	
Typical Time Constants			
Armature Short Circuit	Ta	0.0096	sec
Transient Short Circuit	T'd	0.084	sec
Transient Open Circuit	T'do	0.89	sec
Typical Field Current			
Full Load	If fl	14.0	amps
No Load	If nl	4.2	amps
Typical Short Circuit Ratio			
Harmonic Distortion			
RMS Total Harmonic Distortion		2.7%	
Max. Single Harmonic		5th	
Deviation Factor (No Load, L-L)		4.9%	
Telephone Influence Factor		<50	
Insulation Class			
per NEMA MG1-1.66		H	
Phase Rotation		ABC	

4P8, 60 Hz, Low Wye or Delta Connection
SHORT CIRCUIT DECREMENT CURVE



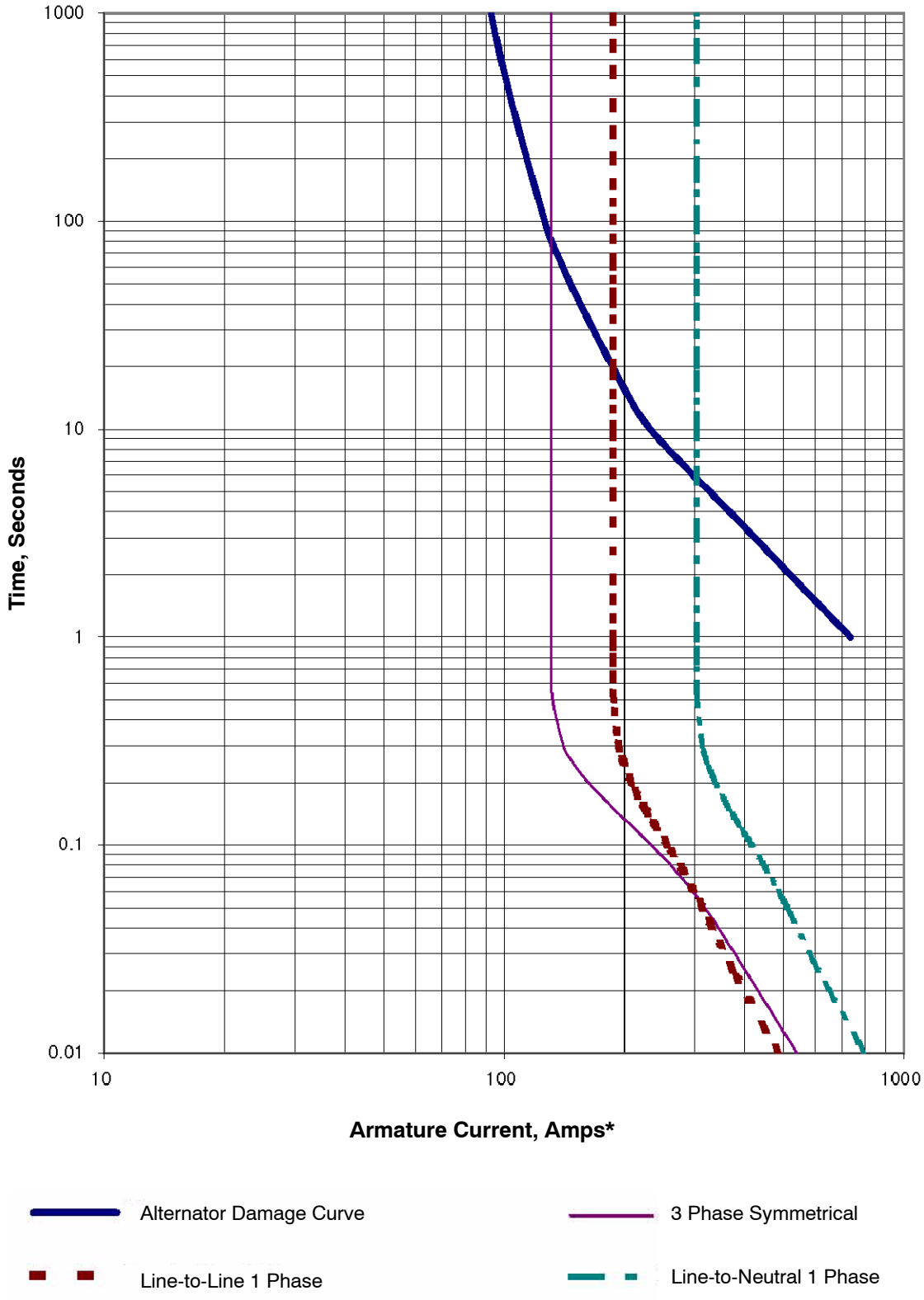
* Instantaneous current (t=0) is asymmetric. Divide by 1.732 for symmetric.

4P8, 60 Hz, High Wye Connection
SHORT CIRCUIT DECREMENT CURVE



* Instantaneous current (t=0) is asymmetric. Divide by 1.732 for symmetric.

4P8, 60 Hz, 600 V Connection
SHORT CIRCUIT DECREMENT CURVE



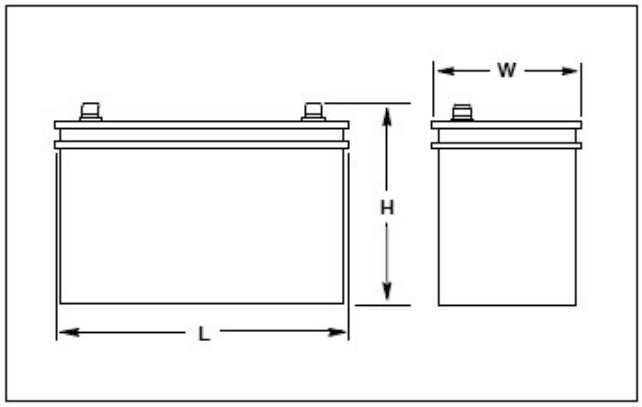
* Instantaneous current (t=0) is asymmetric. Divide by 1.732 for symmetric.

KOHLER. Power Systems

ISO 9001 KOHLER POWER SYSTEMS NATIONALLY REGISTERED

Typical Overall Dimensions

Typical Overall Dimensions



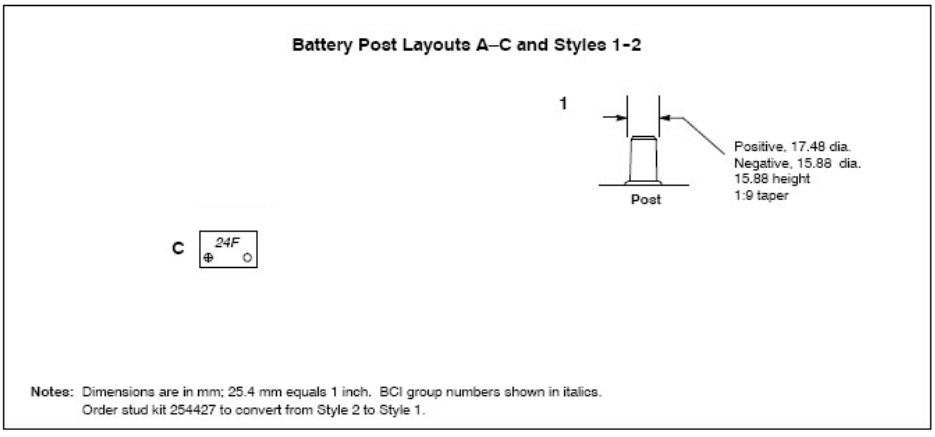
Standard Features

- 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.

				Battery SAE Dimension, mm (in.)					
Charge Type*	Battery Part Number	Battery Qty. per Size	BCI Group Size	L	W	H	Cold Cranking Amps at 18ºC (0ºF) Min.	Reserve Capacity Minutes at 27º (80ºF) Min.	Battery Post Layout and Style
Wet	256984	1	24	273.0 (10.8)	173.0 (6.8)	228.6 (9.0)	650	130	C/1

Battery Specifications

Battery Specifications

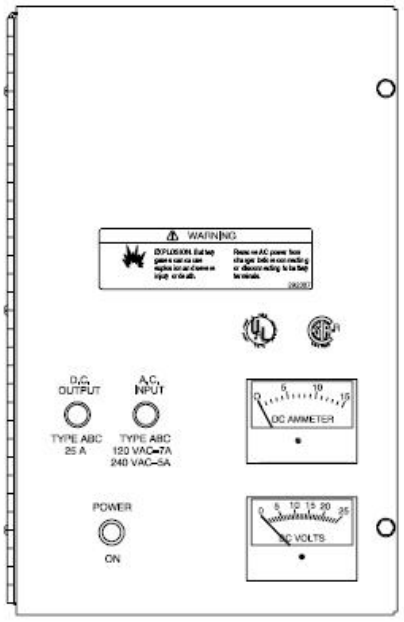


KOHLER POWER SYSTEMS

Float/Equalize

Battery Charger

ISO 9001 KOHLER POWER SYSTEMS NATIONALLY REGISTERED



Standard Features

- Kohler automatic battery chargers feature two charging modes to keep lead-acid and nickel-cadmium batteries fully charged without overcharging.
- The battery charger automatic float-to-equalize operation maintains battery voltage with no manual intervention.
- Temperature compensation feature prevents overcharging or undercharging battery at high/low ambient temperatures.
- Current-limiting circuitry prevents battery charger from overload at low battery voltage and during a short circuit.
- The ten amp DC current limit allows the battery charger to remain connected to the battery during engine cranking.
- Battery charger complies with NFPA 110 code requirements when equipped with optional alarm circuit board.
- Alarm board features low battery voltage, high battery voltage, and battery charger malfunction alarm contacts.

NFPA 110 Alarm Outputs	Output		Number of Cells	
	Voltage	Amps	Lead Acid	Ni Cd
Yes	12	10	6	9
AC Input Voltage, Frequency	120/240 VAC			
DC Voltage Regulation	±1%			
Weight (battery charger without mounting brackets)	11.8 kg (26 lb.)			
Dimensions, L x D x H (battery charger without mounting brackets)	271 x 143 x 422 mm (10.67 x 5.63 x 16.63 in.)			

Automatic Float to Equalize

When the battery loses its charge, the battery charger operates in the High Rate Constant Current Mode until the battery voltage rises to the preset equalize level.

At the preset equalize level, the battery charger switches to the constant voltage Equalize Mode until the current required to maintain this voltage drops to 50% of the battery charger's high rate current.

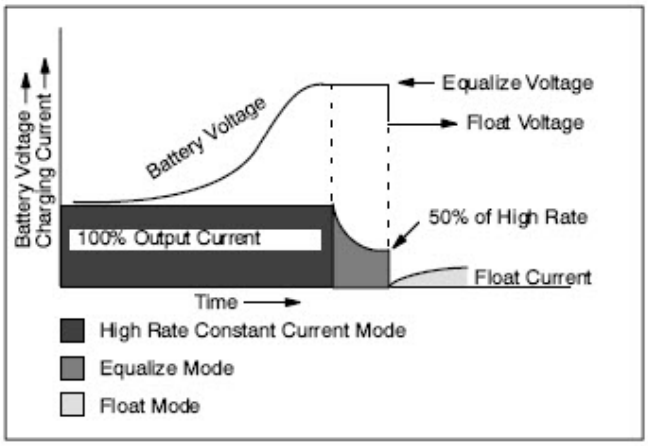


Figure 1

The battery charger then switches to the lower constant voltage Float Mode when the battery nears full charge. The battery charger continues to operate in this mode until AC input power disconnects or the current required to maintain the battery at the float voltage setting exceeds 6 amps.

Temperature Compensation

The battery charger compensates for battery temperature using a negative temperature coefficient. The battery charger provides temperature compensation of -2mv/°C per cell over the ambient temperature range of -40°C up to 60°C. The temperature compensation automatically adjusts the float and equalize voltage settings to prevent the battery from overcharging at high ambient temperatures and undercharging at low ambient temperatures.

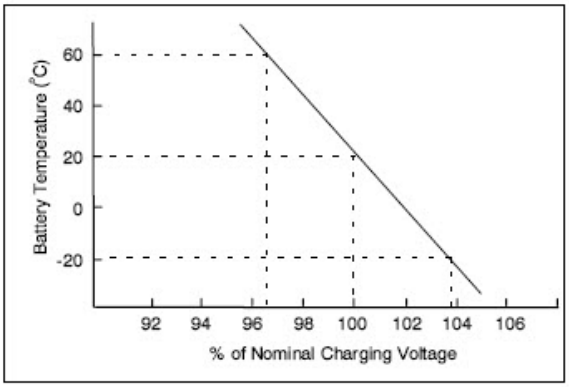
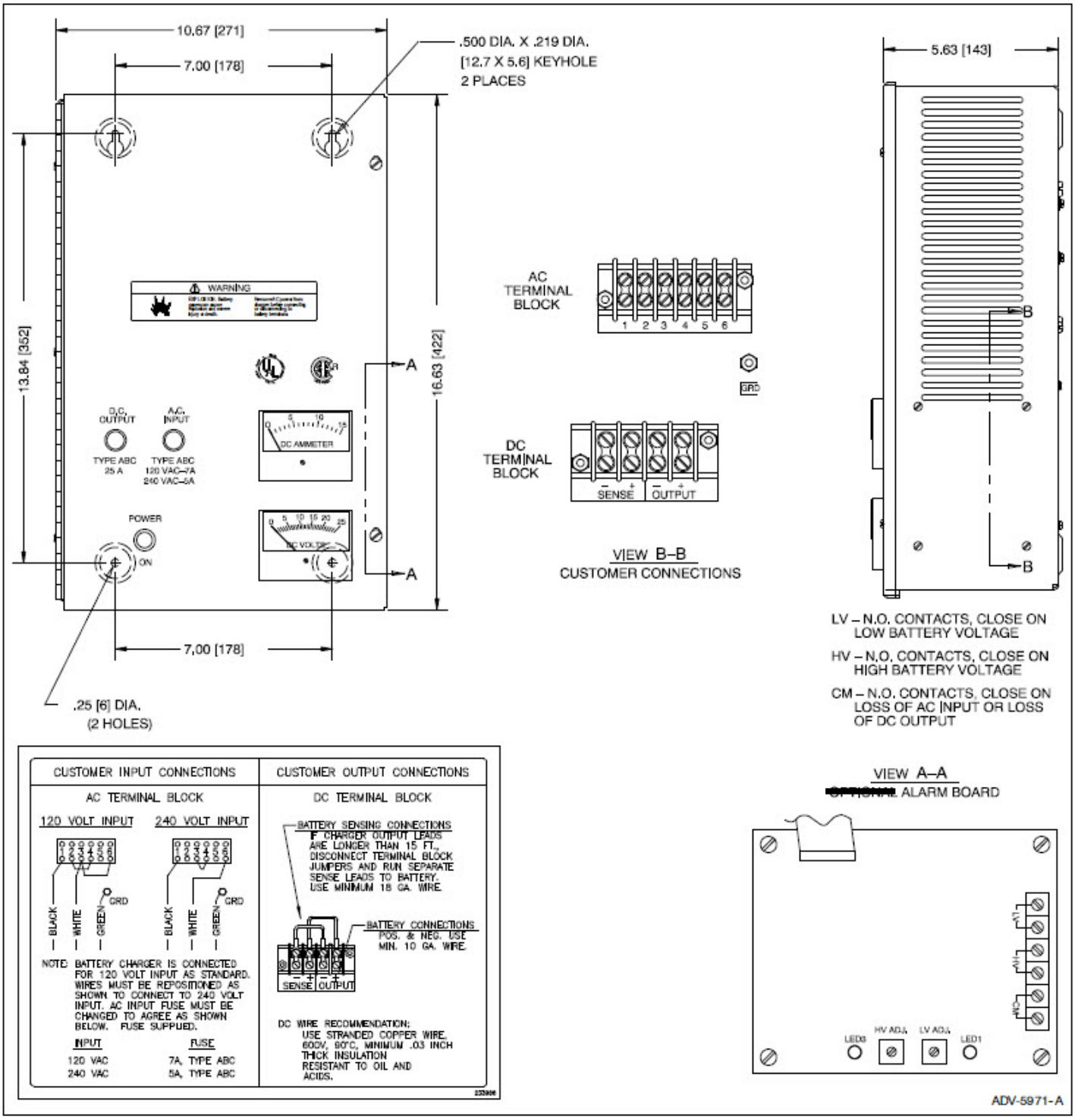


Figure 2

Standard Features

- Ammeter and voltmeter indicate battery charging rate with 5% full-scale accuracy. POWER ON lamp indicates battery charger is operating.
- AC input and DC output fuses prevent battery charger damage from abnormal overlaod and short-circuit conditions.
- Operational temperature range is from 40°C (-40°F) to 60°C (140°F). Battery charger float equalize voltage automatically adjust throughout the temperature range.
- Reverse polarity protection circuitry prevents battery charger from energizing if improperly connected.
- Internal terminal blocks for AC input and DC output/ sensing lead connections.
- DC voltage regulation of ±1% from no load to full load and AC input line voltage variations of ±10%.
- UL-1012 listed/CSA certified.
- Wall-mount, slotted enclosure with knockouts for customer conduit installation.
- Reconnection blocks allow operation at 120 or 240 volts AC, single phase, 50 or 60 hertz.
- Battery charger circuitry protected from AC line and DC load voltage spikes and transients.
- Terminal block for remote battery sensing leads.
- Automatic float-to-equalize operation with individual potentiometer adjustments. Charge up to 12 lead-acid or 18 nickel-cadmium battery cells.
- No adjustments are necessary for lead-acid or nickel-cadmium batteries.
- Oversized transformer and SCR heatsink allow constant current charging at 10 amps up to the equalize voltage setting for fastest battery charging.

Note: The battery charger will discharge the engine starting battery(ies) when the battery charger is connected to the battery(ies) and is not connected to an AC power supply. To prevent engine starting battery(ies) discharge, install battery charger relay kit GM39659.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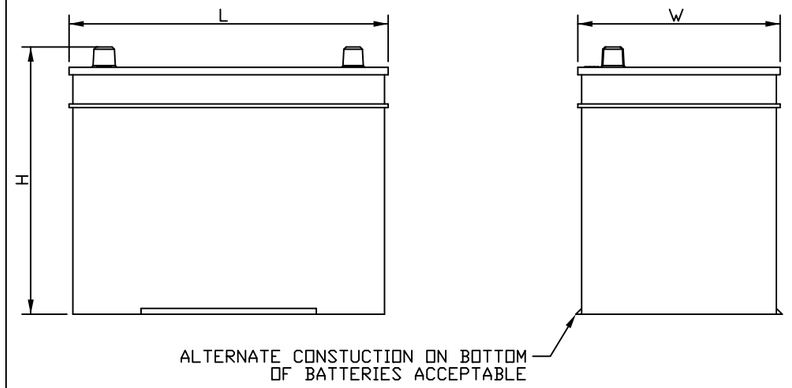
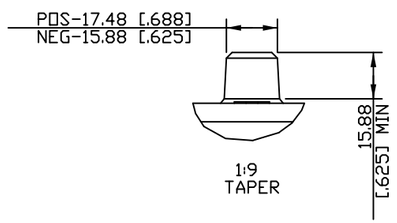
[12.7 X 5.6] KEYHOLE
2 PLACES
13.84 [352]
16.63 [422]
WARNING
D.C. OUTPUT
A.C. INPUT
TYPE ABC
25 A
TYPE ABC
120 VAC–7A
240 VAC–5A
DC AMMETER
POWER
ON
A
7.00 [178]
.25 [6] DIA.
(2 HOLES)
AC TERMINAL BLOCK
1 2 3 4 5 6
GRD
DC TERMINAL BLOCK
SENSE
OUTPUT
VIEW B–B
CUSTOMER CONNECTIONS
5.63 [143]
B
LV – N.O. CONTACTS, CLOSE ON LOW BATTERY VOLTAGE
HV – N.O. CONTACTS, CLOSE ON HIGH BATTERY VOLTAGE
CM – N.O. CONTACTS, CLOSE ON LOSS OF AC INPUT OR LOSS OF DC OUTPUT
CUSTOMER INPUT CONNECTIONS
AC TERMINAL BLOCK
120 VOLT INPUT
240 VOLT INPUT
BLACK
WHITE
GREEN
GRD
NOTE: BATTERY CHARGER IS CONNECTED FOR 120 VOLT INPUT AS STANDARD. WIRES MUST BE REPOSITIONED AS SHOWN TO CONNECT TO 240 VOLT INPUT. AC INPUT FUSE MUST BE CHANGED TO AGREE AS SHOWN BELOW. FUSE SUPPLIED.
INPUT
FUSE
120 VAC
7A, TYPE ABC
240 VAC
5A, TYPE ABC
CUSTOMER OUTPUT CONNECTIONS
DC TERMINAL BLOCK
BATTERY SENSING CONNECTIONS
IF CHARGER OUTPUT LEADS ARE LONGER THAN 15 FT., DISCONNECT TERMINAL BLOCK JUMPERS AND RUN SEPARATE SENSE LEADS TO BATTERY. USE MINIMUM 18 GA. WIRE.
BATTERY CONNECTIONS
POS. & NEG. USE MIN. 10 GA. WIRE.
SENSE
OUTPUT
DC WIRE RECOMMENDATION:
USE STRANDED COPPER WIRE, 600V, 90°C, MINIMUM .03 INCH THICK INSULATION RESISTANT TO OIL AND ACIDS.
VIEW A–A
OPTIONAL ALARM BOARD
LV
HV
CM
LED3
HV ADJ.
LV ADJ.
LED1
ADV-5971-A

PART NO.	REV	SAE DIMENSION L	SAE DIMENSION W	SAE DIMENSION H	VOLTAGE	COLD CRANKING AMPS AT 0°F MINIMUM	RESERVE CAP MINUTES AT 80°F MINIMUM	POST LAYOUT /STYLE	CHARGE TYPE	BATTERY CONSTRUCTION	BCI GROUP
256984	BR	273.0 [10.75]	173.0 [6.81]	228.6 [9.00]	12	650	120	D/1	WET	SEE NOTE 1	24



NOTE: DIMENSIONS IN [ ] ARE ENGLISH EQUIVALENTS.

STYLE 1



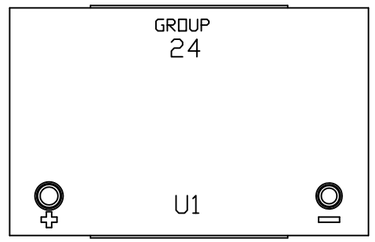
NOTES:
1) STYLE 3 CAN BE CONVERTED TO STYLE 1 BY INSTALLATION OF 254427 STUD CONVERTION KIT.
2) BATTERIES USING "STYLE 3" STUDS MUST HAVE EITHER THE "POS" OR "NEG" STUD CLEARLY IDENTIFIED.
3) STYLE 3 TERMINAL TORQUE 10 Nm [15 FT LBS].

NOTES: (APPLIES TO ALL BATTERIES)
SAE J537 DIMENSIONS ARE MAX ALLOWABLE DIMENSIONS.
COLD CRANKING AMPS ARE MINIMUM ACCEPTABLE VALUES.
HOLD DOWN DESIGN IN COMPLIANCE WITH SAE STANDARDS.
BATTERY WARNING LABEL TO BE LOCATED ON TAP OF BATTERY. (BETWEEN TERMINALS ON LAYOUT D)
MANUFACTURER MUST PROVIDE A CERTIFICATE CONTAINING MFGRS. NAME, MFGRS. PART NUMBER, AND KOHLER PART NUMBER CERTIFYING THAT THE BATTERY WAS BUIT TO INDUSTRY STANDARDS.
SEE N.F.P.A.-110 FOR SPECIFIC DETAILS. CERTIFICATE REQUIRED ONLY ONCE PER BATTERY PART NUMBER.
MAY NOT BE CALCIUM-CALCIUTYPE.

NOTES: (CHARGE TYPE)
ALL DRY CHARGED BATTERIES MUST BE SUPPLIED WITH ACTIVATION INSTRUCTIONS ADHERED TO BATTERY AND LOOSE. BATTERY MUST ALSO BE IDENTIFED ON TOP AS: "DRY CHARGED, MUST ADD BATTERY GRADE ELECTROLYTE, SEE ACTIVATION INSTRUCTIONS".
BATTERIES SHOULD BE RECEIVED APPROPRIATELY MARKED AS DRYCHARGED OR WET STORAGE.
ONE OF THE BATTERY POSTS MUST BE SHIELDED WHEN BATTERIES ARE WET CHARGED.
BATTERIES WHEN SHIPPED DRY - DO NOT REQUIRE POST PROTECTORS.

NOTES: (BATTERY CONSTRUCTION)
1) MUST BE LEAD-CALCIUM HYBRID OR LEAD-ANTIMONY TYPE.
2) LEAD-CALCIUM GRID.

LAYOUT D



REV	DATE	REVISION (SEE INDIVIDUAL PART NO. FOR REVISION LEVEL)	BY
BR	10-22-07	(D-4) BCI COLUMN ADDED (B-7) 15.88 DIM LOCATIONS CORRECTED (D C-8) 324586; 330.0 WAS 328.4, 173.0 WAS 171.2, 239.8 WAS 217.8, 324587; 330.2 WAS 333.2, 256984 & 225289; 273.0 WAS 270.0, 173.0 WAS 171.5, 228.6 WAS 225.6, 345197, 273.0 WAS 260.4, 228.6 WAS 225.6, 354147 & 354148; 330.2 WAS 333.2 [83327]	SAM
BS	4-7-10	(C-8) 345197 VOIDED PER 87080, GM75512 ADDED [89560]	BAL

UNLESS OTHERWISE SPECIFIED - D DIMENSIONS ARE IN MILLIMETERS D TOLERANCES ARE/ X.XX ± 0.25, X.X ± 1.0, X ± 1.5, ANGLES ± 0° 30', SURFACE FINISH MAX., THIRD ANGLE PROJECTION

APPROVALS	DATE
DRAWN SLR	2-4-80
CHECKED EB	9-13-83
APPROVED RAD	9-20-83

KOHLER CO. METRIC PRO-E

TITLE: BATTERY

SCALE scale | CAD NO. | SHEET 1 of 1

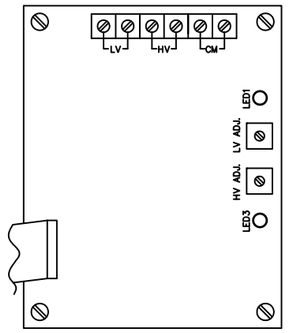
DWG NO. 244578 | D G

REV	DATE	REVISION	BY	M F
A	12-8-97	(A-4) DC WIRE RECOMMENDATION NOTE REVISED [53068]	KAR	

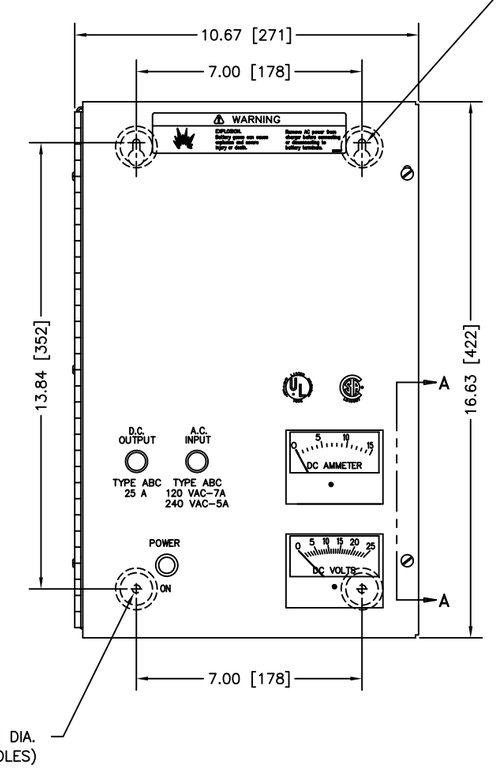
LV – N.O. CONTACTS, CLOSE ON LOW BATTERY VOLTAGE

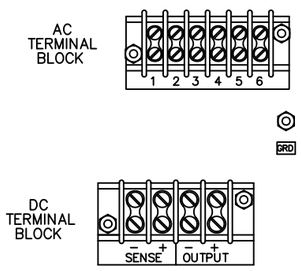
HV – N.O. CONTACTS, CLOSE ON HIGH BATTERY VOLTAGE

CM – N.O. CONTACTS, CLOSE ON LOSS OF AC INPUT OR LOSS OF DC OUTPUT

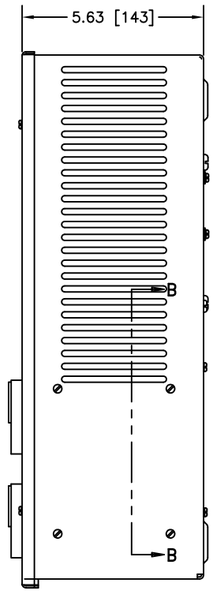


VIEW A–A
ALARM BOARD





VIEW B–B
CUSTOMER CONNECTIONS



CUSTOMER INPUT CONNECTIONS	CUSTOMER OUTPUT CONNECTIONS
AC TERMINAL BLOCK 120 VOLT INPUT 240 VOLT INPUT BLACK WHITE GREEN GRD NOTE: BATTERY CHARGER IS CONNECTED FOR 120 VOLT INPUT AS STANDARD. WIRES MUST BE REPOSITIONED AS SHOWN TO CONNECT TO 240 VOLT INPUT. AC INPUT FUSE MUST BE CHANGED TO AGREE AS SHOWN BELOW. FUSE SUPPLIED. INPUT FUSE 120 VAC 7A, TYPE ABC 240 VAC 5A, TYPE ABC	DC TERMINAL BLOCK BATTERY SENSING CONNECTIONS IF CHARGER OUTPUT LEADS ARE LONGER THAN 15 FT., DISCONNECT TERMINAL BLOCK JUMPERS AND RUN SEPARATE SENSE LEADS TO BATTERY. USE MINIMUM 18 GA. WIRE. BATTERY CONNECTIONS POS. & NEG. USE MIN. 10 GA. WIRE. SENSE OUTPUT DC WIRE RECOMMENDATION: USE STRANDED COPPER WIRE, 600V, 90°C, MINIMUM .03 INCH THICK INSULATION RESISTANT TO OIL AND ACIDS.
233000	

NOTE:

DINENSIONS IN [ ] ARE MILLIMETERS.

AUTO–FLOAT
12 & 24 VOLT
BATTERY CHARGER

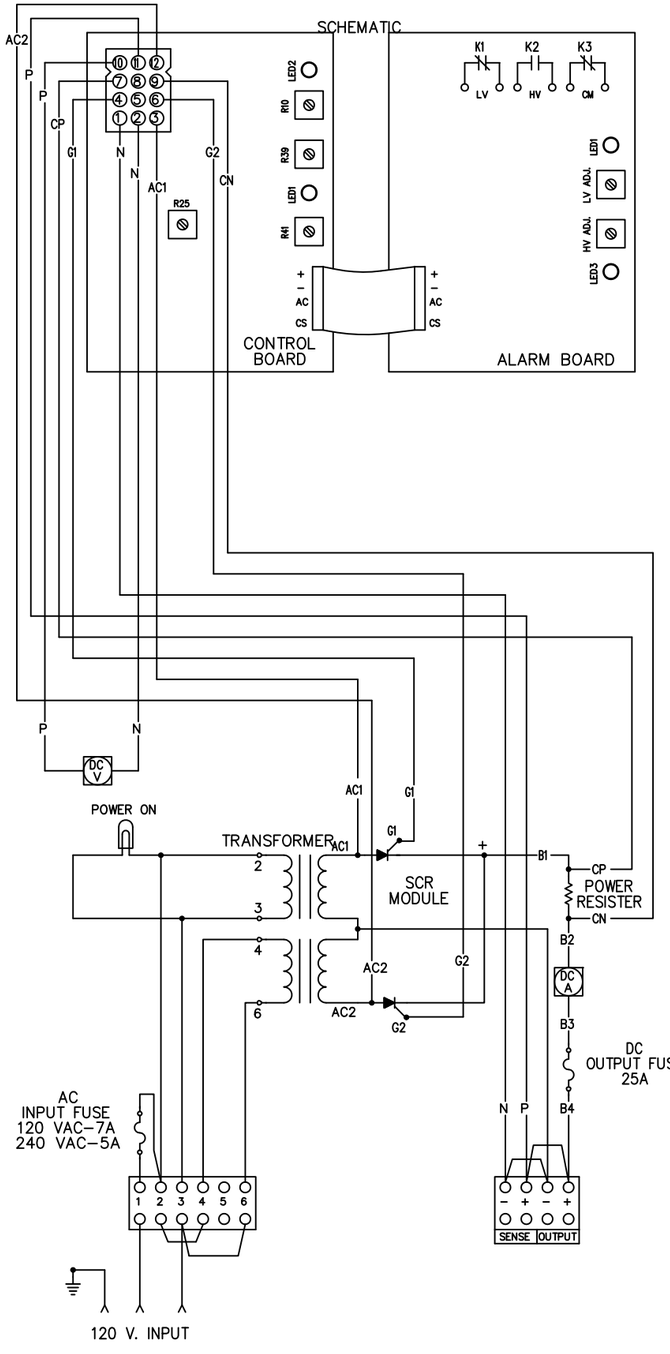
UNLESS OTHERWISE SPECIFIED –
1) DIMENSIONS ARE IN INCHES
2) TOLERANCES ARE:
.XXX± .010 ANGLES± 1/2°
.XX ± .030 SURFACE FINISH
.X ± .060 √ MAX.
FRACTIONS ±

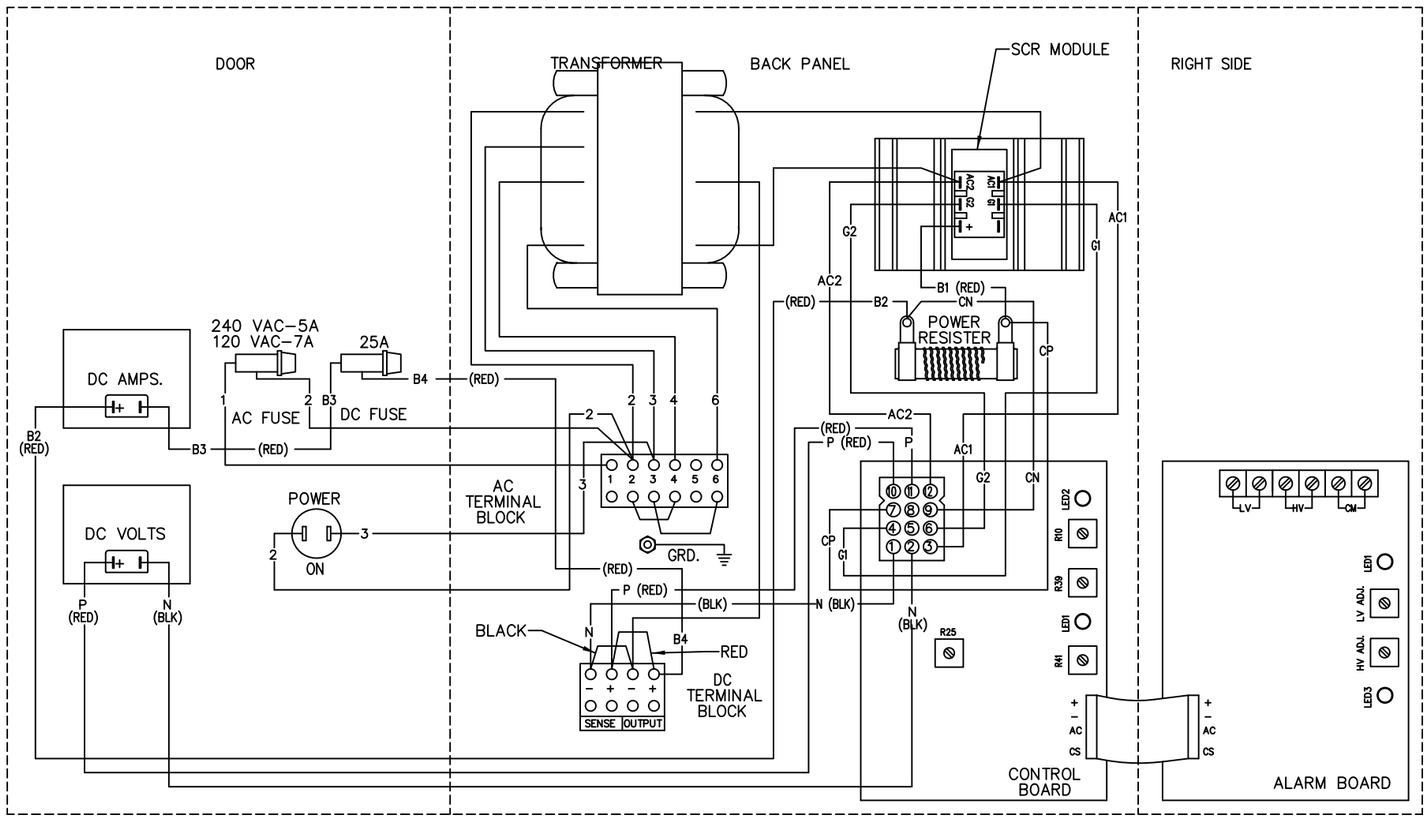
APPROVALS	DATE
DRAWN LRH	6–28–94
CHECKED JS	6–29–94
APPROVED TJM	6–29–94

TITLE: DIMENSION PRINT

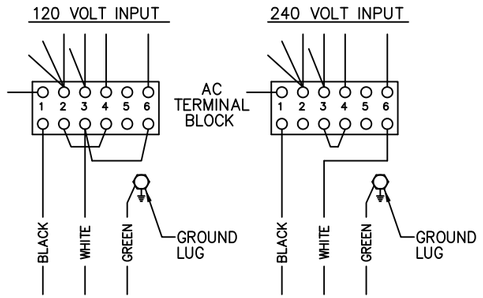
SCALE 1/2 | CAD NO. ADV5971.DWG | SHEET 1–1
PLOTTED | DWG. NO. ADV–5971 | D G

REV	DATE	REVISION	BY	M F
A	2-1-93	(C-5) AC & DC FUSE SYMBOLS REVISED	RSH	





CUSTOMER INPUT CONNECTIONS



NOTE:
WHEN CHANGING AC INPUT VOLTAGE, THE AC INPUT FUSE MUST BE CHANGED TO AGREE AS SHOWN.

INPUT	FUSE
120 VAC	7A, TYPE ABC
240 VAC	5A, TYPE ABC

AUTO–FLOAT
12 VOLT
BATTERY CHARGER

UNLESS OTHERWISE SPECIFIED – 1) DIMENSIONS ARE IN INCHES 2) TOLERANCES ARE: .XXX± .010 ANGLES± 1/2° .XX ± .030 SURFACE FINISH .X ± .060 √ MAX. FRACTIONS ±

APPROVALS	DATE
DRAWN VM	2-11-92
CHECKED JS	3-3-92
APPROVED DAH	3-11-92

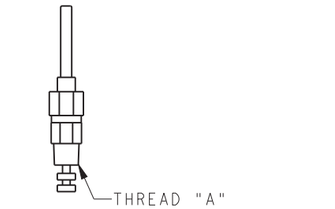
TITLE: DIAGRAM, WIRING

SCALE: /// CAD NO. 233967.DWG SHEET 1–1

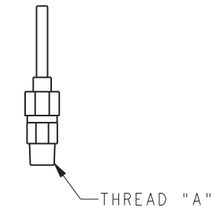
PLOTTED DWG. NO. 233967 D G

PART NO.	REV		VOLTS	WATTS	AMPS	THERMOSTAT TYPE/STYLE	REMOTE SENSOR TEMP. RANGE	TANK SENSOR TEMP RANGE	THREAD SIZE "A"	PLUG CONFIG.	LENGTH "B"	CORD TYPE	REMARKS
324930	W		120	1800	15.0	IN BLOCK/B	38°/49°C[100°/120°F]	49°/60°C[120°/140°F]	1/2 NPT	FIG-2	1575 [62.0]	1	-
324931	W		240	2000	8.3	IN BLOCK/B	38°/49°C[100°/120°F]	49°/60°C[120°/140°F]	1/2 NPT	FIG-3	1575 [62.0]	1	-
326220	W		120	1000	8.3	IN BLOCK/A	38°/49°C[100°/120°F]	49°/60°C[120°/140°F]	5/8-18 UNF 2A	FIG-1	1372 [54.0]	1	-
326221	W		240	1000	4.2	IN BLOCK/A	38°/49°C[100°/120°F]	49°/60°C[120°/140°F]	5/8-18 UNF 2A	FIG-3	1372 [54.0]	1	-
326222	W		120	1000	8.3	IN HOSE/C	27°/38°C[80°/100°F]	38°/49°C[100°/120°F]	-	FIG-1	1372 [54.0]	1	-
326224	Z		240	1000	4.2	IN HOSE/C	27°/38°C[80°/100°F]	38°/49°C[100°/120°F]	-	FIG-3	1372 [54.0]	1	-
326228	W		120	1500	12.5	IN BLOCK/A	38°/49°C[100°/120°F]	49°/60°C[120°/140°F]	1/2 NPT	FIG-1	1372 [54.0]	1	-
326229	W		240	1500	6.3	IN BLOCK/A	38°/49°C[100°/120°F]	49°/60°C[120°/140°F]	1/2 NPT	FIG-3	1372 [54.0]	1	-
326234	W		120	1800	15.0	IN BLOCK/A	38°/49°C[100°/120°F]	49°/60°C[120°/140°F]	1/2 NPT	FIG-2	1575 [62.0]	1	-
326235	W		240	2000	8.3	IN BLOCK/A	38°/49°C[100°/120°F]	49°/60°C[120°/140°F]	1/2 NPT	FIG-3	1575 [62.0]	1	-
326247	W		120	1500	12.5	IN BLOCK/A	38°/49°C[100°/120°F]	49°/60°C[120°/140°F]	5/8-18 UNF 2A	FIG-1	1372 [54.0]	1	-
326248	W		240	1500	6.3	IN BLOCK/A	38°/49°C[100°/120°F]	49°/60°C[120°/140°F]	5/8-18 UNF 2A	FIG-3	1372 [54.0]	1	-
336703	W		120	1500	12.5	IN HOSE/C	16°/27°C[60°/80°F]	38°/49°C[100°/120°F]	-	FIG-1	1372 [54.0]	1	-
352945	Y		120	1500	12.5	-	-	27°/38°C[80°/100°F]	-	FIG-1	1524 [60.0]	2	IN-BASE SENSING UNIT ONLY
352946	W		240	1500	6.3	-	-	27°/38°C[80°/100°F]	-	FIG-3	1219 [48.0]	2	IN-BASE SENSING UNIT ONLY
358311	Y		120	1000	8.3	-	-	27°/38°C[80°/100°F]	-	FIG-1	-	2	IN-BASE SENSING UNIT ONLY
358327	W		240	1000	4.2	-	-	27°/38°C[80°/100°F]	-	FIG-3	-	2	IN-BASE SENSING UNIT ONLY
GM23005	W		120	1800	15.0	IN BLOCK/D	27°/38°C[80°/100°F]	49°/60°C[120°/140°F]	28-1.25 6g METRIC	FIG-2	762 [30.0]	1	-
GM23006	W		240	2000	8.3	IN BLOCK/D	27°/38°C[80°/100°F]	49°/60°C[120°/140°F]	28-1.25 6g METRIC	FIG-3	762 [30.0]	1	-
GM24947	W		240	2000	8.3	IN BLOCK/A	38°/49°C[100°/120°F]	49°/60°C[120°/140°F]	M14-1.5 METRIC	FIG-3	1575 [62.0]	1	-
GM24948	W		120	1800	15.0	IN BLOCK/A	38°/49°C[100°/120°F]	49°/60°C[120°/140°F]	M14-1.5 METRIC	FIG-2	1575 [62.0]	1	-
GM28585	W		120	1000	8.3	-	-	27°/38°C[80°/100°F]	-	FIG-1	-	2	CORD THERMOSTAT [40°/60°F]
GM31942	Y		120	1000	8.3	IN BLOCK/A	27°/38°C[80°/100°F]	49°/60°C[120°/140°F]	1/2 NPT	FIG-1	1372 [54.0]	1	-
GM31943	Y		240	1000	4.2	IN BLOCK/A	27°/38°C[80°/100°F]	49°/60°C[120°/140°F]	1/2 NPT	FIG-3	1372 [54.0]	1	-
GM62682	Y		120	1000	8.3	-	-	27°/38°C[80°/100°F]	-	FIG-4	-	3	-
GM75552	AA		120	1800	15.0	-	-	27°/38°C[80°/100°F]	-	FIG-2	-	2	IN-BASE SENSING UNIT ONLY
GM75553	AA		240	2000	8.3	-	-	27°/38°C[80°/100°F]	-	FIG-3	-	2	IN-BASE SENSING UNIT ONLY
GM83980	AD	□	120	1000	8.3	-	-	16°/27°C[60°/80°F]	-	FIG-1	1524 [60.0]	2	IN-BASE SENSING UNIT ONLY INCLUDES THERMOSTAT TEMPERATURE DECAL
GM83981	AB		120	1500	12.5	-	-	16°/27°C[60°/80°F]	-	FIG-1	1219 [48.0]	2	IN-BASE SENSING UNIT ONLY INCLUDES THERMOSTAT TEMPERATURE DECAL

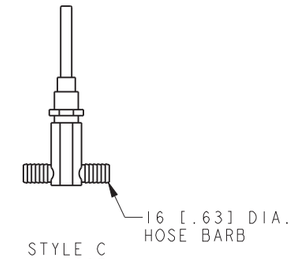
THIS IS AN MANUAL TABLE.



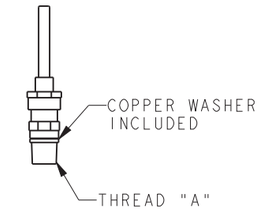
STYLE A
IN-BLOCK
THERMOSTAT



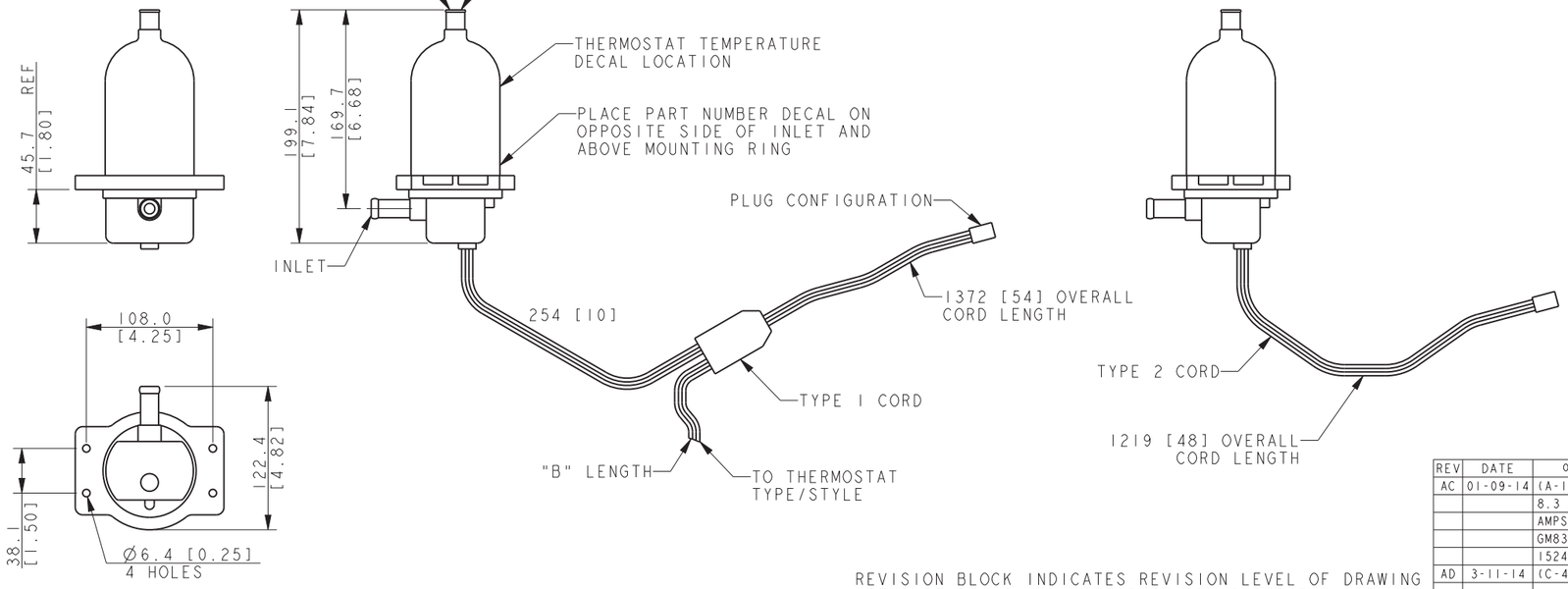
STYLE B
IN-BLOCK
THERMOSTAT

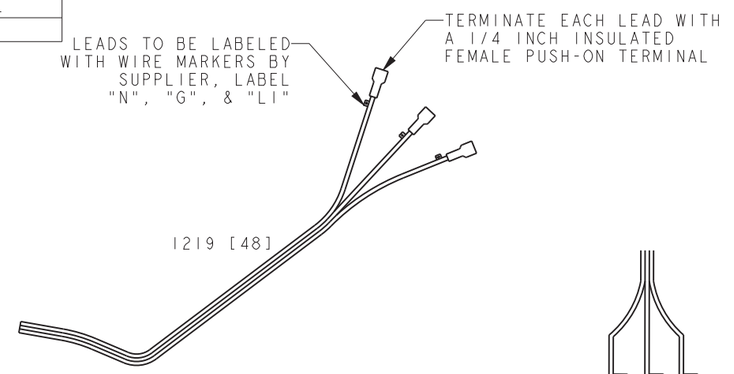


STYLE C
IN-HOSE
THERMOSTAT



STYLE D
IN-BLOCK
THERMOSTAT





120 V. 15 A.
NEMA 5-15P

FIGURE 1

120 V. 20 A.
NEMA 5-20P

FIGURE 2

240 V. 15 A.
NEMA 6-15P

FIGURE 3

120 V. 15 A.

FIGURE 4

PLUG CONFIGURATION

□ INDICATES PART NUMBERS AFFECTED BY LATEST REVISION

REVISION BLOCK INDICATES REVISION LEVEL OF DRAWING NOT PART REVISION. SEE PART REVISION LEVEL BEHIND PART NUMBER FOR CURRENT PART REVISION LEVEL.

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
AC	01-09-14	(A-1) 326220-CMP WAS 326220; (C-8) 358311 AMPS	
		8.3 WAS 4.2; GM31942 AMPS 8.3 WAS 12.5; GM31943	
		AMPS 4.2 WAS 6.3; GM62682 AMPS 8.3 WAS 4.2;	
		GM83980 AMPS 8.3 WAS 4.2; (D-4) 352945 "LENGTH	
		1524 WAS 1219" [CT68393]	PAS
AD	3-11-14	(C-4) GM83980 "LENGTH" 1524 WAS 1219 [CT74793]	JMR

UNLESS OTHERWISE SPECIFIED -
1) DIMENSIONS ARE IN MILLIMETERS
2) TOLERANCES ARE:
X.XX ± 0.25
X.X ± 1.0
X ± 1.5
ANGLES ± 0° 30'
SURFACE FINISH MAX.
THIRD ANGLE PROJECTION

APPROVALS	DATE
DRAWN SAM	9-22-11
CHECKED CF	9-22-11
APPROVED CF	9-22-11

KOHLER CO. METRIC PRO-E

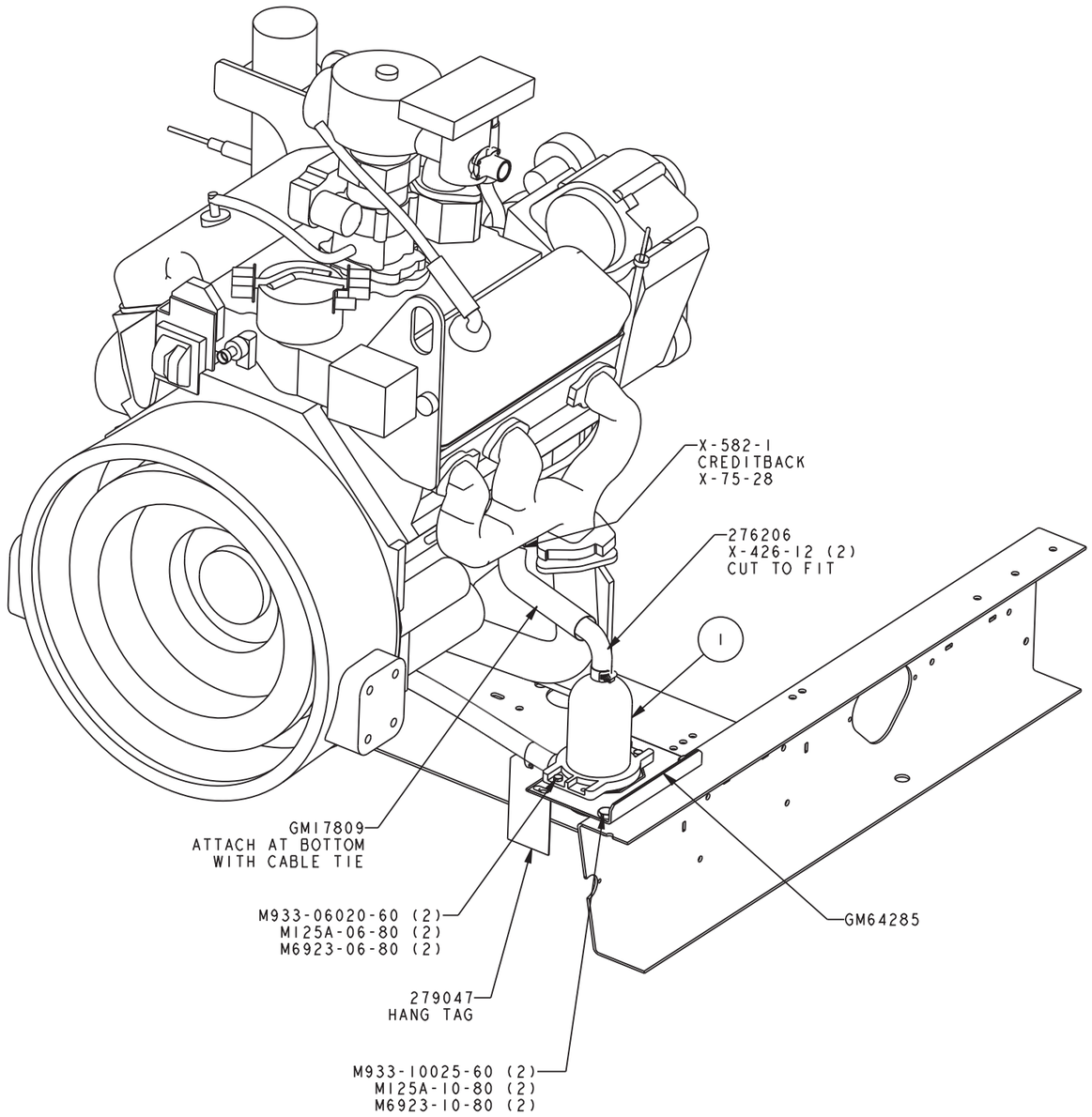
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

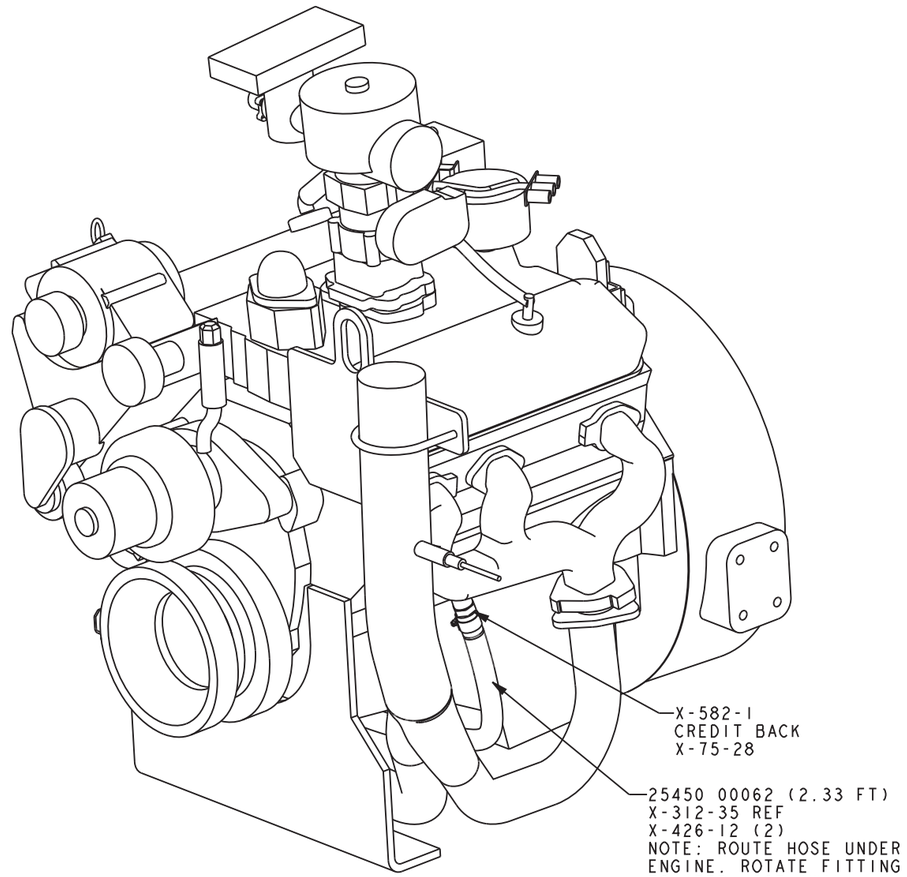
TITLE
DWG, HEATER, BLOCK

SCALE 0.40 | CAD NO. | SHEET 1 of 1

DWG NO. **326220-CMP** | **D**

MODULE NO.	BASE GRP	VOLTAGE	ITEM 1
GM75565-KA1	GM75565-KB	120 V	352945
~~GM75565-KA2~~		~~240 V~~	~~352946~~





NOTE:
FOR PROPER ASSEMBLY METHOD OF HARDWARE, USE G-585 AS A GUIDELINE.

BLOCK HEATER KITS
120/240 V
30-60 GM 2009 EMISSIONS

REV	DATE	ON COMPOSITE DWGS, SEE PART NO. FOR REVISION LEVEL	BY
-	8-16-10	NEW DRAWING [90293-1]	GFR

UNLESS OTHERWISE SPECIFIED -
1) DIMENSIONS ARE IN MILLIMETERS
2) TOLERANCES ARE:
X.XX ± 0.25
X.X ± 1.0
X ± 1.5
ANGLES ± 0° 30'
SURFACE FINISH MAX.
THIRD ANGLE PROJECTION

APPROVALS		DATE
DRAWN	GFR	8-16-10
CHECKED	JMS	8-16-10
APPROVED	WRD	8-16-10

KOHLER CO. METRIC PRO-E
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

TITLE: DWG, ASSY BLOCK HEATER

SCALE 0.30 | CAD NO. | SHEET 1 of 1

DWG NO. GM75565 | D

KOHLER. POWER SYSTEMS

Sound Data

KOHLER POWER SYSTEMS

TIB-114

TECHNICAL INFORMATION BULLETIN

Generator Set Sound Data Sheet

			Sound Pressure Data in dB(A)			
Generator Set Model	**Hz**	**Load**	**Raw Exhaust**	**Open Unit, Isolated Exhaust**	**Weather Enclosure**	**Sound Enclosure**
45REZG	60	100% Load	112.7	78.2	76.3	65.7
		No Load	101.1	77.2	75.3	64.6
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.						

45REZG	**60 Hz**

				Sound Pressure Levels dB(A)								
Load	Distance, m (ft.)		Measurement Position	Octave Band Center Frequency (Hz)								Overall Level
				63	125	250	500	1000	2000	4000	8000	
100% Load	7 (23)	Open Unit, Isolated Exhaust	Right	44.4	58.2	68.6	70.0	70.5	70.2	66.5	60.4	76.6
			Front-Right	42.6	54.4	64.3	69.2	76.1	70.2	69.1	62.1	78.6
			Front	55.2	63.5	69.5	72.4	74.1	72.7	70.5	64.4	79.4
			Front-Left	58.7	70.1	68.4	70.0	73.9	75.6	73.8	68.3	80.8
			Left	59.5	67.2	68.7	69.6	71.3	71.8	69.3	66.6	78.1
			Back-Left	54.8	61.3	69.5	69.7	71.3	71.5	68.9	63.7	77.6
			Back	47.1	56.8	66.4	69.4	68.7	67.8	62.6	57.3	74.7
			Back-Right	45.7	57.0	65.3	70.8	71.8	70.8	67.3	60.8	77.0
			8-pos. log avg.	54.8	64.2	67.9	70.3	72.8	71.9	69.5	64.2	78.2

			Sound Pressure Levels dB(A)								
Load	Distance, m (ft.)	Exhaust	Octave Band Center Frequency (Hz)								Overall Level
			63	125	250	500	1000	2000	4000	8000	
100% Load	1 (3.3)	Raw Exhaust (No Silencer)	90.0	94.7	107.4	103.6	102.0	105.1	105.5	102.8	112.7

45REZG	60 Hz

Load	Distance, m (ft.)		Measurement Position	Sound Pressure Levels dB(A)								
				Octave Band Center Frequency (Hz)								Overall Level
				63	125	250	500	1000	2000	4000	8000	
No Load	7 (23)	Open Unit, Isolated Exhaust	Right	37.2	57.0	63.7	68.5	70.0	70.1	65.5	58.1	75.4
			Front-Right	39.4	51.6	58.6	68.5	75.6	69.6	68.7	60.8	78.0
			Front	47.0	60.0	65.0	72.2	74.1	72.3	69.5	60.1	78.6
			Front-Left	51.7	63.5	67.7	70.2	73.7	75.4	73.1	65.1	80.0
			Left	46.5	57.5	64.9	69.1	70.7	71.1	66.8	59.6	76.3
			Back-Left	40.9	50.7	62.7	69.5	70.6	71.0	66.6	58.2	76.1
			Back	43.9	52.2	61.5	67.6	67.8	67.0	61.1	52.0	73.0
			Back-Right	41.6	54.8	61.7	70.2	71.5	70.6	66.7	59.2	76.4
			8-pos. log avg.	45.9	58.0	64.0	69.7	72.4	71.5	68.4	60.3	77.2

Load	Distance, (ft.)	Exhaust	Sound Pressure Levels dB(A)								
			Octave Band Center Frequency (Hz)								Overall Level
			63	125	250	500	1000	2000	4000	8000	
No Load	1 (1.1)	Raw Exhaust (No Silencer)	71.1	83.4	98.9	95.2	89.6	86.6	82.9	76.6	101.1

KOHLER. POWER SYSTEMS

Emissions Data

KOHLER.
Power Systems

PSI 2016 Stationary 60 Hz Emergency Standby1 and Prime Certified Power Generation Rating Data													
Generator Model	**Engine**	**Speed**	**Freq**	**Fuel**	**Duty Cycle**	**Flywheel power [2,3]**		**Engine Family**	**C02**	**THC+NOx**	**CO**	**bsfc[5]**	**Catalyst**
		RPM	**Hz**			**HP**	**kW**		**(g/KW-hr)**	**(g/KW-hr)**	**(g/KW-hr)**	**(g/KW-hr)**	
45REZG	4.3L	1800	60	LP	Emergency	71.4	53.2	GPSIB4.302ED	873.7	8.17	32.02	234.1	No
	4.3L	1800	60	NG	Emergency	66.5	49.6	GPSIB4.302ED	713.29	7.03	21.96	225.7	No
	4.3L	1800	60	LP	Prime	71.4	53.2	GPSIB4.30GLP	800.96	0.07	0.59		Yes
	4.3L	1800	60	NG	Prime	66.5	49.6	GPSIB4.30GLP	824.88	0.92	0.36		Yes

[1] Standby and overload ratings based on ISO3046. Continuous ratings based on ISO 8528.

[2] All ratings are gross flywheel horsepower corrected to 77ºF at an altitude of 328 feet with no cooling fan or alternator losses using heating value for NG of 1015 BTU/SCF.

[3] Production tolerances in engines and installed components can account for power variations of +/- 5%. Altitude, temperature and excessive exhaust and intake restrictions should be applied to power calculations.

[4] Electrical ratings are an estimated based on assumed fan and generator losses and may vary depending on actual equipment losses.

[5] Bsfc is based on 100% gross flywheel power rating and does not include fan or generator losses.

For additional questions contact:
Power Solutions International, Inc.
201 Mittel Drive, Wood Dale, IL 60191
630.350.9400 (Main) – 630.350.9900 (Fax)
www.psiengines.com info@psiengines.com

KOHLER. POWER SYSTEMS

Warranty

Stationary Standby Industrial Generator Set Extended Five-Year or Three Thousand (3000)-Hour Comprehensive Limited Warranty

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	**Warranty Coverage**
Stationary Standby Generator Set & Accessories	Five (5) years from registered startup or three thousand (3000) hours (whichever occurs first).

This warranty is not effective unless a proper extended warranty registration form and warranty fee have been sent to Kohler Co. within one year of registered startup. The extended warranty start date is determined by the standard warranty requirements and runs concurrent with the standard warranty during the first year. To receive extended warranty coverage, the provisions of the standard warranty registration must be met.

The following will **not** be covered by the warranty:

1. Normal engine wear, routine tuneups, tuneup parts, adjustments, and periodic service.
2. Damage caused by accidents, improper installation or handling, faulty repairs not performed by an authorized Kohler service representative, or improper storage.
3. Damage caused by operation with improper fuel or at speeds, loads, conditions, modifications, or installation contrary to published specifications or recommendations.
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 expense related to battery service.
7. Engine coolant heaters, heater controls, and circulating pumps after the first year.
8. Additional expenses for repair after normal business hours, i.e. overtime or holiday labor rates.
9. Rental of equipment during performance of warranty repairs.
10. Removal and replacement of non-Kohler-supplied options and equipment.
11. 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., Kohler Power Systems 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®
Power Systems

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-5561 8/13d

Automatic Transfer Switches

KOHLER. Power Systems

ISO 9001 KOHLER POWER SYSTEMS NATIONALLY REGISTERED

Transfer Switch Standard Features

- UL 1008 listed at 480 VAC file #E58962 (automatic), #E86894 (non automatic)
- CSA certification available at 600 VAC
- IBC seismic certification available
- Available in 2, 3, or 4 pole configurations
- Electrically operated, mechanically held mechanism
- High withstand and close-on ratings
- Design suitable for emergency and standby applications on all classes of load, 100% tungsten rated through 400 amps
- Silver alloy main contacts
- Gold-flashed engine start contacts rated 2 amps @ 30 VDC/250 VAC
- Front-accessible contacts for easy inspection
- Front-replaceable main and arcing contacts (800-4000 amps)
- Reliable, field-proven solenoid mechanism
- Switching mechanisms lubricated for the expected life of the transfer switch
- Internal manual operating handle
- Main shaft auxiliary position-indicating contacts rated 10 amps @ 32 VDC/250 VAC
- NEMA type 1, 12, 3R, 4, and 4X enclosures available
- Standard one-year limited warranty. Extended limited warranties are available

Programmed-Transition Models (KCP)

- Programmed-transition operation with either automatic or non-automatic control
- Programmed-transition operation provides a center OFF position that allows residual voltages in the load circuits to decay
- Programmable OFF time
- Double-throw, mechanically interlocked design (break-before-make power contacts)
- Solid or switched neutral

Decision-Maker® MPAC 1200 Controller

- LCD display, 4 lines x 20 characters, backlit
- Complete programming and viewing capability at the door using the keypad and LCD display
- LED indicators: Source available, transfer switch position, service required (fault), and "not in auto"
- Programmable voltage and frequency pickup and dropout settings
- Programmable time delays
- Programmable generator exerciser
- Time-based load control
- Two programmable inputs and two programmable outputs
- Up to four I/O extension modules available
- Modbus communication standard
- RS-485 communication standard
- Ethernet communication optional For more information about Decision-Maker® MPAC 1200 features and functions, see sepcification sheet G11-127

Environmental Specifications	
Operating Temperature	-20°C to 70°C (-4°F to 158°F)
Storage Temperature	-40°C to 85°C (-40°F to 185°F)
Humidity	5% to 95% noncondensing

Input and Output Connection Specifications	
Component	Wire Size Range
Main board I/O terminals	#12-24 AWG
I/O module terminals	#14-24 AWG

Auxiliary Position Indication Contacts (rated 10 Amps @ 32 VDC/250 VAC)	
Switch Rating, amps	Number of Contacts Indicating Normal, Emergency
225	8, 8

Cable Sizes

Note: Cable size data is subject to change. Refer to the transfer switch dimension drawings and wiring diagrams for planning and installation.

UL-Listed Solderless Screw-Type Terminals for External Power Connections			
Range of Wire Sizes, Copper or Aluminum*			
Switch Rating, Amps	Normal, Emergency, and Load	Neutral	Ground

Withstand and Close-On Ratings (WCR)

Maximum current in RMS symmetrical amperes when coordinated with customer-supplied fuses or circuit breakers. All values are available symmetrical RMS amperes and tested in accordance with the withstand and close-on requirements of UL 1008. Application requirements may permit higher withstand ratings for certain size switches. Contact the factory for assistance.

	Withstand Current Ratings in RMS Symmetrical Amperes							Short Time Ratings (sec.)**							
	Current Limiting Fuses				Time-Based Rating*			480 V Max.				600 V Max.			
Switch Rating, Amps	Amps @ 480 V	Amps @ 600 V	Amps, Max.	Fuse Class	Amps @ 240 V	Amps @ 480 V	Amps @ 600 V	0.1	0.13	0.3	0.5	0.1	0.13	0.3	0.5
225	200000	200000	600	J	65000	42,000***	35000	-	-	-	-	-	-	-	-
225	200000	200000	800	L	65000	42,000***	35000	-	-	-	-	-	-	-	-

* Based on a 0.025 seconds (approximately 1.5 cycles) for 30-230 amps and 0.050 seconds for 260-4000 amps. Applicable to breakers with instantaneous trip elements.
** Short time ratings are provided for applications involving breakers that utilize trip delay settings for system selective coordination.
*** Applicable to 2-pole, 3-pole, and conventional 4-pole switches only. Overlapping neutral switches have "any" breaker ratings of 35,000 A at 480 V.

Weights and Dimensions

See ADV drawings for weights and dimensions. Allow 15% additional weight for packing materials.

Ratings with Specific Manufacturer's Circuit Breaker

The following charts list power switching device withstand and close-on ratings (WCR) in RMS symmetrical amperes for specific manufacturers' circuit breakers. Circuit breakers are supplied by the customer.

Molded-Case Circuit Breakers					
Switch Rating, Amps	WCR, Amps, RMS	Voltage, Max.	Manufacturer	Type	Max. Size, Amps
225	50000	480	Eaton	HJD, JDC, JGH, JGC	250
225	50000	480	Eaton	HKD, CHKD, KDC	400
225	50000	480	Eaton	HLD, CHLD, LDC, CLDC	600
225	50000	480	Eaton	MDL, CMDL, HMDL, CHMDL, NGS, NGH, NGC	800
225	50000	480	GE	SFL, SFP	250
225	50000	480	GE	TBC4	600
225	50000	480	GE	SGL1, SGL4, SGL6, SGP1, SGP4, SGP6, TBC6, TJL4V, TJL1S-6S	600
225	50000	480	GE	SKL8, SKP8, SKH8, TBC8, TKL4V, TKH8S-12S	800
225	50000	480	Siemens/ITE	HFD, HFXD	250
225	50000	480	Siemens/ITE	HJD, HJXD, SHJD	400
225	50000	480	Siemens/ITE	HLD	600
225	50000	480	Siemens/ITE	HLMD, HLMXD, HMG, HMD, HMXD, LMD, LMXD, MXD, SMD, SHMD	800
225	50000	480	SquareD	KC	250
225	50000	480	SquareD	CK400N, CK400NN	400
225	50000	480	SquareD	LC	600
225	50000	480	SquareD	CK800N, CK800NN	800
225	42000	600	Eaton	JGC	250
225	42000	600	Eaton	KDC	400
225	42000	600	Eaton	LDC, CLDC	600
225	42000	600	GE	TBC4	400
225	42000	600	GE	TBC6, SGL1, SGL4, SGL6, SGP1, SGP4, SGP6	600
225	42000	600	GE	TBC8, TKL4V, TKL8S-12S, SKL8, SKP8	800
225	42000	600	Siemens/ITE	HLMD, HLMXD, HMXD, SHMD	800

Codes and Standards

The ATS meets or exceeds the requirements of the following specifications:

- CSA C22.2 No. 178 certification 208-600 VAC available, file LR58301
- EN61000-4-4 Fast Transient Immunity Severity Level 4
- EN61000-4-5 Surge Immunity Class 4 (voltage sensing and programmable inputs only)
- EIC Spedifications for EMI/EMC Immunity:
    - CISPR 11, Radiated Emissions
    - IEC 1000–4–2, Electrostatic Discharge
    - IEC 1000–4–3, Radiated Electromagnetic Fields
    - IEC 1000–4–4, Electrical Fast Transients (Bursts)
    - IEC 1000–4–5, Surge Voltage
    - IEC 1000–4–6, Conducted RF Disturbances
    - IEC 1000–4–8, Magnetic Fields
    - IEC 1000–4–11, Voltage Dips and Interruptions
- IEC 609047-6-1, Low Voltage Switchgear and Control Gear; Multifunction Equipment; Automatic Transfer Switching Equipment
- IEEE Standard 446, IEEE Recommended Practice for Emergency and Standby Power Systems for Commercial and Industrial Applications
- IEEE 472 (ANSI C37.90A) Ring Wave Test
- NEMA Standards ICS 10-2005, Electromechanical AC Transfer Switch Equipment
- NFPA 70, National Electrical Code
- NFPA 99, Essential Electrical Systems for Health Care Facilities
- NFPA 110, Emergency and Standby Power Systems
- Seismic certification in accordance with the International Building Code is available. (Accessory kit is required for seismic certification)
    - IBC 2000, referencing ASCE 7-98 and ICC AC-156
    - IBC 2003, referencing ASCE 7-02 and ICC AC-156
    - IBC 2006, referencing ASCE 7-05 and ICC AC-156
    - IBC 2009, referencing ASCE 7-05 and ICC AC-156
    - IBC 2012, referencing ASCE 7-10 and ICC AC-156
- Underwriters Laboratories UL 1008, Standard for Automatic Transfer Switches for Use in Emergency Standby Systems for #E58962 (automatic), #E86894 (nonautomatic)

Accessories

Accessories are available either factory-installed or as loose kits, unless otherwise noted.

CSA Certification

Current Sensing Kit

- Monitor current on all phases with 1% accuracy

Warranty

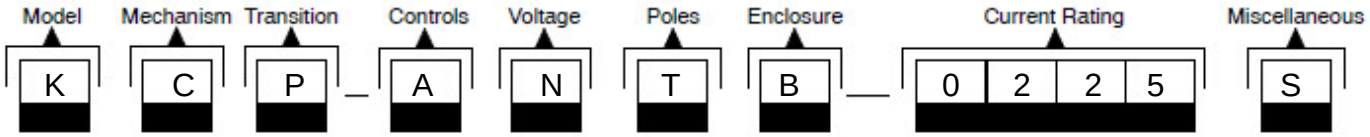
Neutral Assembly

- Available as loose kit for open units

Line-to-Neutral Voltage Monitoring

- Monitors all line–to–neutral voltages

Model Designation



Record the transfer switch model designation in the boxes. The transfer switch model designation defines characteristics and ratings as explained below.

Sample Model Designation: KCS-DNTA-0400B

Model

K: Kohler

Mechanism

C: Standard (Any Breaker)

Transition

S: Standard
P: Programmed
C: Closed

Controller

A: Decision-Maker® MPAC 1200, Automatic
B: Decision-Maker® MPAC 1200, Non-Automatic
D: Decision-Maker® MPAC 1500, Automatic
F: Decision-Maker® MPAC 1500, Non-Automatic

Voltage/Frequency

C: 208 Volts/60 Hz
D: 220 Volts/50 Hz
F: 240 Volts/60 Hz
G: 380 Volts/50 Hz
H: 400 Volts/50 Hz
J: 416 Volts/50 Hz
K: 440 Volts/60 Hz
M: 480 Volts/60 Hz
N: 600 Volts/60 Hz
P: 380 Volts/60 Hz
R: 220 Volts/60 Hz

Number of Poles/Wires

N: 2 Poles/3 Wires, Solid Neutral
T: 3 Poles/4 Wires, Solid Neutral
V: 4 Poles/4 Wires, Switched Neutral
W: 4 Poles/4 Wires, Overlapping Neutral

Enclosure

A: NEMA 1
B: NEMA 12
C: NEMA 3R
D: NEMA 4
F: NEMA 4X
G: Open Unit

Current, Amps

0030	0230	1200
0070	0260	1600
0104	0400	2000
0150	0600	2600
0200	0800	3000
0225	1000	4000

Connections

S: Standard
F: Front (1600 and 2000 amp only)

Note: Some selections are not available for every model. Contact your Kohler distributor for availability.

Automatic Transfer Switch Controller

KOHLER. Power Systems

Decision-Maker® MPAC 1200

ISO 9001 KOHLER POWER SYSTEMS NATIONALLY REGISTERED

Model KCS with Decision-Maker® MPAC 1200 Controller

Applicable Models

Model	Description
KCS	Standard-Transition Any Breaker ATS ‡
KCP	Programmed-Transition Any Breaker ATS ‡
KCC	Closed-Transition Any Breaker ATS §
KSS	Standard-Transition Specific Breaker ATS ‡
KSP	Programmed-Transition Specific Breaker ATS ‡

‡ Available with automatic or non-automatic controller
§ Available with automatic controller only

Decision-Maker® MPAC 1200 Controller Standard Features

- Microprocessor-based controller
- Environmentally sealed user interface
- LCD display, 4 lines x 20 characters, backlit
- Dynamic function keypad with tactile feedback pushbuttons allows complete programming and viewing capability at the door
- LED indicators: Source available, transfer switch position, service required (fault), and not in auto
- Broadrange voltage sensing (208–600 VAC) on all phases
- Phase-to-phase sensing and monitoring with 0.5% accuracy on both sources
- Frequency sensing with 0.5% accuracy on both sources
- Anti-single phasing protection
- Phase rotation sensing for three-phase systems
- Real-time clock with automatic adjust for daylight saving time and leap year
- Run time clock and operation counter
- Time-stamped event log
- Fail-safe transfer for loaded test and exercise functions
- DIP switches: password disable and maintenance
- Isolated RS-485 ports for Modbus connections (9.6, 19.2, and 57.6 kbps)
- Modbus® RTU protocol (Modbus register map available)
- USB port. Connect a personal computer and use Kohler® SiteTech™ software to view events and adjust settings. *
- Available in automatic and non-automatic versions; see supervised transfer control switch on page 5

Programmable Features

- Programming and monitoring methods:
  - Monitoring and password-protected programming at the door using the keypad and display
  - Program using a PC with Kohler® SiteTech™ software (available to Kohler-authorized distributors and dealers)
- Over/undervoltage for all phases of the normal and emergency sources
- Over/underfrequency for the emergency source
- Adjustable time delays
- Load/no load/auto-load test and load/no-load exercise functions
- Programmable inputs and outputs
- Load bank control for exercise or test
- Time-based load control, nine individual time delays for selected loads
- In-phase monitor (3-phase only)
- Password protection, three security levels
- See pages 2 and 3 for additional programmable features

* SiteTech software is available to Kohler-authorized distributors and dealers.

Modbus is a registered trademark of Schneider Electric.

Decision-Maker® MPAC 1200 Controller Features

User Interface LED Indicators

- Contactor position: source N and source E
- Source available: source N and source E
- Service required (fault indication)
- Not in automatic mode

LCD Display

- System status
- Line-to-line voltage
- Line-to-neutral voltage
- Active time delays
- Source frequency
- Preferred source selection
- System settings
- Common alarms
- Load current, each phase (current sensing kit required)
- Inputs and outputs
- Faults
- Time/date
- Address
- Event history
- Maintenance records
- Exerciser schedule
- Exerciser mode
- Time remaining on active exercise

Dynamic Function Tactile Keypad Operations

- Scroll up/down/forward/back
- Increase/decrease/save settings
- End time delay
- Start/end test or exercise
- Reset fault
- Lamp test

DIP Switches

- Maintenance mode
- Password disable

Event History

- View time and date-stamped events on the display or on a personal computer equipped with Kohler® SiteTech™ software. *****
- Download complete event history files using Kohler SiteTech software and a PC connected to the USB port. *****

Main Logic Board Inputs and Outputs

- Two (2) programmable inputs
- Two (2) programmable outputs

Communications

- Optional Ethernet communications with RJ45 connector for 10/100 Ethernet connection
- Isolated RS-485 ports for Modbus communications
- Modbus® RTU and Modbus® TCP/IP protocols (Modbus® register map available)
- USB Port. Use SiteTech software to upload or download files and adjust transfer switch settings *****
  - Application software
  - Event history files
  - Language files
  - Parameter settings
  - Usage reports
  - Feature configuration

Programmable Features

- System voltage, 208–600 VAC †
- System frequency, 50/60 Hz †
- Single/three-phase operation †
- Standard/programmed/closed-transition operation †
- Preferred source selection allows the normal or emergency source to be used when both sources are available (alarm module required)
- Phase rotation: ABC/BAC/none selection with error detection
- Overvoltage and undervoltage pickup and dropout settings, both sources
- Overfrequency and underfrequency pickup and dropout settings, Emergency source
- Voltage unbalance, enable/disable
- In-phase monitor: enable/disable and phase angle
- Transfer commit/no commit
- Passwords, system and test
- Time, date, automatic daylight saving time enable/disable
- Time delays (see table)
- Exerciser: calendar mode, loaded/unloaded up to 21 events
- Test: loaded/unloaded/auto load (1–60 minutes)
- Remote test: loaded/unloaded
- Automatic override on generator failure (loaded test and exercise)
- Peak shave delay enable/disable
- Current monitoring (current sensing kit required)
- Load control pre/post-transfer delays, 9 individual time delays for selected loads
- Resettable historical data

***** SiteTech software is available to Kohler-authorized distributors and dealers.

† System parameters are factory-set per order.

Modbus is a registered trademark of Schneider Electric.

Decision-Maker® MPAC 1200 Controller Features, Continued

Programmable Inputs

- Forced transfer to OFF (programmed-transition models only; requires load shed accessory)
- Inhibit transfer
- Low battery voltage (external battery supply module required)
- Peak shave/area protection input
- Remote common fault
- Remote test
- Remote end time delay
- Remotely monitored inputs, four (4) available

Programmable Outputs

- Alarm silenced
- Audible alarm
- Chicago alarm control
- Common alarm events
- Contactor position
- Exercise active
- Failure to acquire standby source
- Failure to transfer
- Generator engine start, source E
- I/O module faults
- In-phase monitor synch
- Load bank control
- Load control active (pre/post transfer delay, up to 9 outputs)
- Loss of phase fault, source N and E
- Low battery fault (external battery supply module required)
- Maintenance mode
- Non-emergency transfer
- Not in automatic mode
- Over/undervoltage faults, source N and E
- Peak shave/area protection active
- Phase rotation error, source N and E
- Preferred source supplying load
- Software-controlled relay outputs (four maximum)
- Source available, preferred and standby
- Standby source supplying load
- Test active
- Transfer switch auxiliary contact fault
- Transfer switch auxiliary contact open
- Voltage unbalance, source N and E

Voltage and Frequency Sensing

Parameter	Default	Adjustment Range
Undervoltage dropout	90% of pickup	75%–98%
Undervoltage pickup	90% of nominal	85%–100%
Overvoltage dropout *	115% of nominal*	106%–135%
Overvoltage pickup	95% of dropout	95%–100%
Unbalance enable	Disable	Enable/Disable
Unbalance dropout	20%	5%–20%
Unbalance pickup	10%	3%–18%
Voltage dropout time	0.5 sec.	0.1–9.9 sec.
Underfrequency dropout †	99% of pickup	95%–99%
Underfrequency pickup †	90% of nominal	80%–95%
Overfrequency dropout †	101% of pickup	101%–115%
Overfrequency pickup †	110% of nominal	105%–120%
Frequency dropout time †	3 sec.	0.1–15 sec.

* 690 volts, maximum. Default = 110% for 600 volt applications.

† Emergency source only

Adjustable Time Delays

Time Delay	Default	Adjustment Range
Engine start	3 sec.	0–6 sec. †
Engine cooldown	5 min.	0–60 min.
Fail to acquire standby source	1 min.	
Transfer, preferred to standby	3 sec.	
Transfer, standby to preferred	15 min.	
Transfer, off to standby	1 sec.	1 sec. – 60 min.
Transfer, off to preferred	1 sec.	
Fail to synchronize	60 sec.	10 sec – 15 min.
Auto load test termination after transfer	1 sec.	1 sec.–60 min.
Load Control Time Delays:		
Pretransfer to preferred	0 sec.	0–60 min.
Post-transfer to preferred	0 sec.	
Pretransfer to standby	0 sec.	
Post-transfer to standby	0 sec.	

Note: Time delays are adjustable in 1 second increments, except as noted.

† Engine start time delay can be extended to 60 minutes with an External Battery Supply Module Kit.

Accessory Modules

The mounting kit holds up to five optional modules.

Module Current Draw Specifications, mA	
Alarm Module	75
Standard I/O Module	75
High Power I/O Module	100
Maximum Total Current *	300

* If an External Battery Module is installed, there is no current restriction.

❑ Standard Input/Output Module

Inputs	
Available Inputs	2
Input Definition	Contact closure
Current	5 mA Max
Connection Type	Terminal Strip
Wire Size	#14-24 AWG
Max Distance	700 feet
Outputs	
Outputs Available	6
Contact Type	Form C (SPDT)
Contact Voltage Rating	2 A @ 30 VDC 500 mA @ 125 VAC
Connection Type	Terminal Strip
Wire Size	#14-24 AWG

❑ High-Power Input/Output Module

Inputs	
Available Inputs	2
Input Definition	Contact closure
Current	5 mA Max
Connection Type	Terminal Strip
Wire Size	#14-24 AWG
Max Distance	700 feet
Outputs	
Outputs Available	3
Contact Type	Form C (SPDT)
Contact Voltage Rating	12 A @ 24 VDC 12 A @ 250 VAC 10 A @ 277 VAC 2 A @ 480 VAC
Connection Type	Terminal Strip
Wire Size	#14-24 AWG
Environmental Specifications	
Temperature	-40°C to 85°C (-40°F to 185°F)
Humidity	35% to 85% noncondensing

❑ Alarm Module

- 90 dB Audible alarm
- Any alarm function can be programmed to trigger the audible alarm
- Chicago alarm function
- Preferred source selection
- Supervised transfer control (supervised transfer control switch required)
- Connection for external alarm

External Alarm Connection Specifications	
Wire Size	#12-22 AWG Cu
Contact Voltage Rating	500 mA @ 120 VAC
	250 mA @ 240 VAC

❑ External Battery Supply Module

- Energizes the ATS controls using an external battery when no source power is available
- Allows extended engine start time delays
- Allows the use of any combination of accessory modules (no current draw restriction, maximum of five modules total)
- Connects to one or two batteries, 12 VDC or 24 VDC system
- Current draw, 140 mA @ 12 VDC, 86 mA @ 24 VDC
- Provides low external battery voltage indication to the transfer switch controller
- Reverse-polarity protected

Other Controller Accessories

Accessories are available either factory-installed or as loose kits, unless otherwise noted.

❑ Controller Disconnect Switch

- Disconnects power to the controller without disconnecting the load
- Mounts inside the enclosure

☑ Current Sensing Kit

- Monitor current on all phases with 1% accuracy

❑ Digital Meter

- Measure and display voltage, current, frequency, and power for both sources
- Programmable visual alarms for high voltage, low voltage, and high current
- Three digital outputs
- Serial port for optional network connections
- Password-protected programming menus
- Joystick operation
- Factory-installed

❑ Ethernet Communications

- RJ-45 connector
- Supports Internet Protocol version 4 (IPv4)
- Supports Modbus TCP/IP protocol

☑ Line-to-Neutral Voltage Monitoring

- Monitors all line-to-neutral voltages

❑ Load Shed Kit

- Forced transfer from Emergency to OFF for programmed-transition models
- Customer-supplied signal (contact closure) is required for the forced transfer to OFF function
- Factory-installed only

❑ Padlockable User Interface Cover

- Provides additional protection against unauthorized access
- Cover standard on NEMA 3R enclosures

❑ RSA III Remote Serial Annunciator

- Monitors the generator set
- Monitors ATS common alarm, Normal source, and Emergency source status and connection
- Allows remote testing of the ATS
- For more information about RSA III features and functions, see specification sheet G6-139

❑ Supervised Transfer Control Switch

- Standard on models with non-automatic controls
- Optional for models with automatic controls
- Auto, manual, and transfer positions
- Automatic and non-automatic modes
- Alarm module required

Supervised Transfer Control Switch Operation for Automatic and Non-Automatic Transfer Switches		
Switch Position	**Automatic Switches**	**Non-Automatic Switches**
AUTO	• Automatically transfers to the standby source, when available, if the preferred source is lost. • Transfers back to the preferred source when it becomes available.	
MANUAL	• Automatically transfers to an available source if the connected source is lost. • Test, peak shave, and loaded exercise commands will transfer to the standby source. • Does not automatically transfer back to preferred when both sources are available.	• Does not automatically transfer to an available source when the connected source is lost. • Test, peak shave, and loaded exercise commands are ignored. • Does not automatically transfer back to preferred when both sources are available. • Transfers only when the switch is manually moved to the TRANSFER position as described below.
TRANSFER (momentary switch position)	• Does not initiate an engine start sequence. Generator set engine must be signalled to start by an event such as a loss of utility, loaded test, loaded exercise, etc. • Allows transfer to the other source, if available. An event such as a loss of utility, loaded exercise, or loaded test must first initiate the transfer sequence. • Time delays will operate. Wait for time delays to expire, or press the End Time Delay button. • Operates pre- and post-transfer load control time delays if both sources are available. • MANUAL TRANSFER is displayed when the ATS is ready to transfer.	

KOHLER CO., Kohler, Wisconsin 53044 USA
Phone 920-457-4441, Fax 920-459-1646
For the nearest sales and service outlet in the
US and Canada, phone 1-800-544-2444
KOHLERPower.com

Kohler Power Systems
Asia Pacific Headquarters
7 Jurong Pier Road
Singapore 619159
Phone (65) 6264-6422, Fax (65) 6264-6455

Environmental Specifications	
Operating Temperature	-20°C to 70°C (-4°F to 158°F)
Storage Temperature	-40°C to 85°C (-40°F to 185°F)
Humidity	5% to 95% noncondensing

Main Board I/O Specifications	
Output contact type	Isolated form C (SPDT)
Output contact rating	1 amp @ 30 VDC, 500 mA @120 VAC
I/O terminals wire size	#12-24 AWG

DISTRIBUTED BY:

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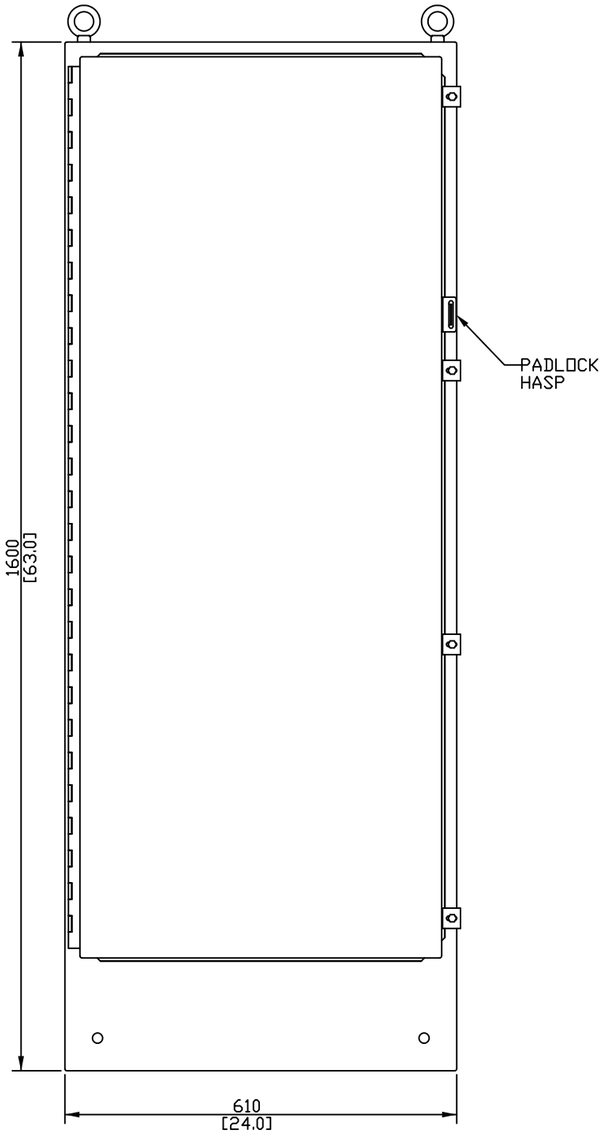
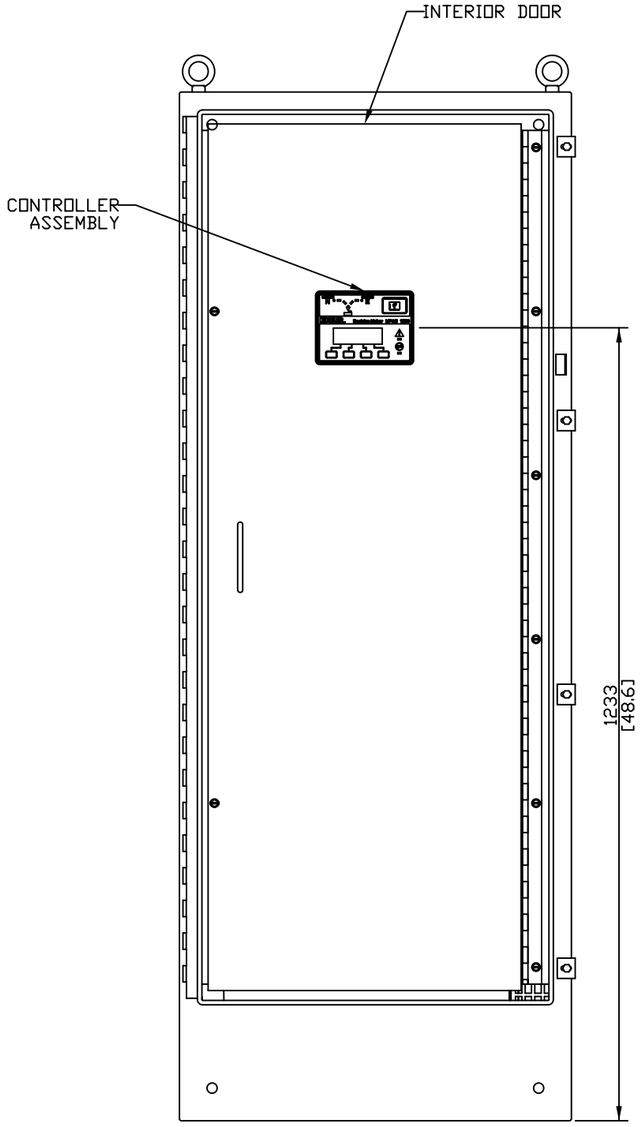


FRONT VIEW
610 [24.0] MINIMUM DOOR SWING SPACE REQUIRED



FRONT VIEW
WITH OUTER DOOR REMOVED

NOTES:
1. DIMENSIONS IN [ ] ARE INCHES.
2. FINISH:
   NEMA 4 & 12: ANSI 49 GRAY.
   NEMA 4X: STAINLESS STEEL.
3. DOOR CLAMPS VARY WITH NEMA TYPE.
4. REFER TO OPERATOR'S MANUAL PRIOR TO INSTALLATION & OPERATION OF SWITCH.
5. FOR UNITS WITH OPTIONAL SEISMIC CERTIFICATION, REFER TO ADV-7456 AND INSTALLATION INSTRUCTIONS.

SEE ADV-8565 FOR FULL MODEL CODE DEFINITION

STYLE	MECHANISM	TRANSITION	MPAC LOGIC	VOLTS	POLES	NEUTRAL	ENCLOSURE	AMPS	CONNECTION
KCS	STANDARD	STANDARD	1200	600	4	SWITCHED	4,4X,12	230	STANDARD
KCS	STANDARD	STANDARD	1200	208-600	4	SWITCHED	4,4X,12	260,400	STANDARD
KCS	STANDARD	STANDARD	1200	600	2,3,4	SOLID,SW,OVLP	4,4X,12	230	STD SEISMIC
KCS	STANDARD	STANDARD	1200	208-600	2,3,4	SOLID,SW,OVLP	4,4X,12	260,400,600	STD SEISMIC
KCS	STANDARD	STANDARD	1500	600	2,3,4	SOLID,SW,OVLP	4,4X,12	230	STANDARD
~~KCS~~	~~STANDARD~~	~~STANDARD~~	~~1500~~	~~208-600~~	~~2,3,4~~	~~SOLID,SW,OVLP~~	~~4,4X,12~~	~~260,400,600~~	~~STANDARD~~
KCP	STANDARD	PROGRAMMED	1200,1500	208-600	2,3,4	SOLID,SW	4,4X,12	150,225,260,400,600	STANDARD
~~KCS~~	~~STANDARD~~	~~CLOSED~~	~~1200,1500~~	~~208-600~~	~~2,3,4~~	~~SOLID,SW~~	~~4,4X,12~~	~~150,225,260,400,600~~	~~STANDARD~~

REV	DATE	REVISION	BY
-	9-11-13	NEW DRAWING [CT54441]	BTW

UNLESS OTHERVISE SPECIFIED -
1) DIMENSIONS ARE IN MILLIMETERS
2) TOLERANCES ARE:

SURFACE FINISH MAX.

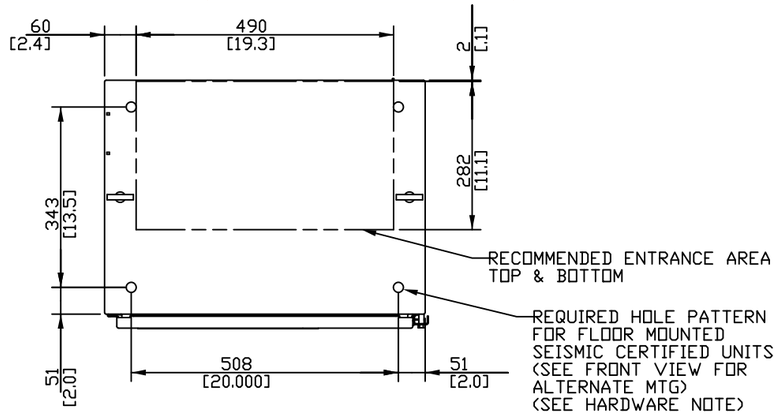
THIRD ANGLE PROJECTION

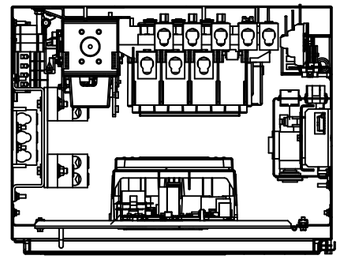
APPROVALS	DATE
DRAWN WSD	7-28-06
CHECKED WSD	7-28-06
APPROVED AJH	7-28-06

KOHLER CO. METRIC PRO-E
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

TITLE
DIMENSION PRINT

SCALE | CAD NO. | SHEET 1 of 2
SVG NO. ADV-8571 | D



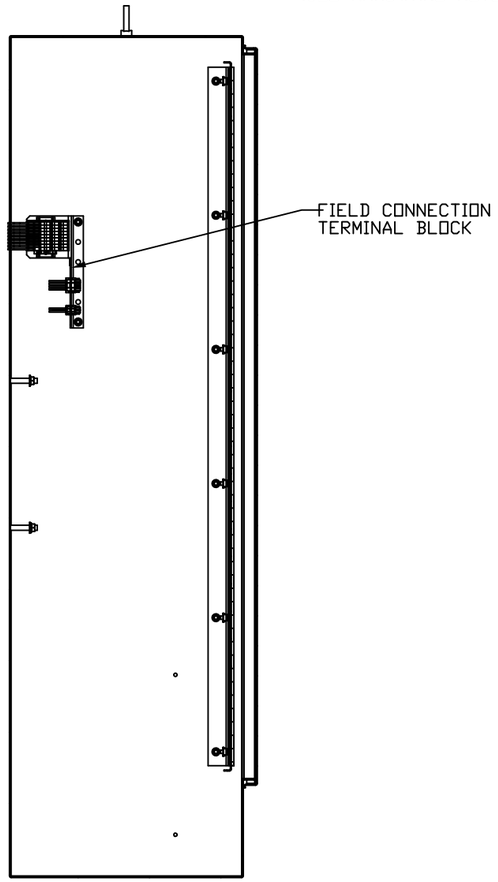


SEISMIC MOUNTING HARDWARE

FLOOR MOUNTED:
Ø15.88 [.625] BOLT (4)
Ø44.5 [1.75] X 3.4 [.134] THICK WASHER (4)

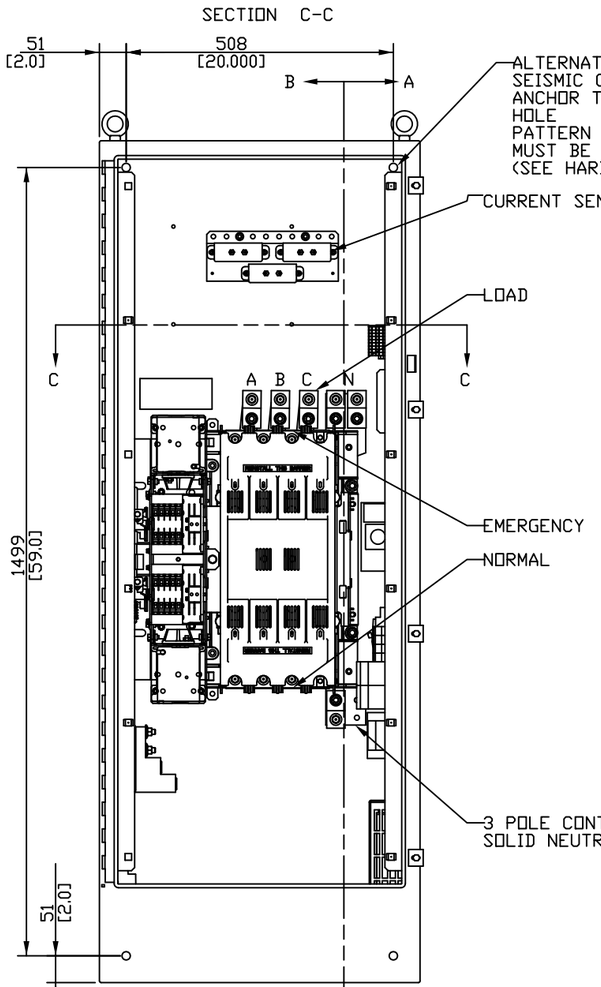
WALL MOUNTED:
Ø12.70 [.500] BOLT (4)
Ø35.1 [1.38] X 2.77 [.109] THICK WASHER (4)

ALL HARDWARE MUST COMPLY WITH
SPECIFICATIONS ON ADV-7456.

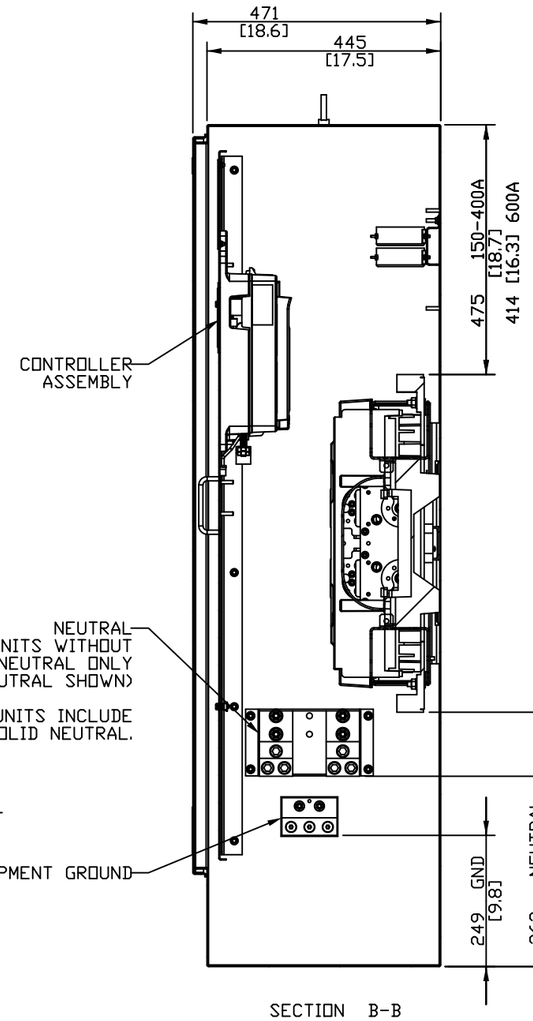


SECTION A-A

SECTION C-C



FRONT VIEW B ⟷ A
DOORS NOT SHOWN



SECTION B-B

SCREW TYPE TERMINALS FOR EXTERNAL POWER CONNECTION			
SWITCH RATING (AMPS)	RANGE OF AL-CU WIRE SIZES		
	CONTACTOR (PER PHASE)	NEUTRAL (SEE NOTE)	GROUND
150-400	(1) #4 TO 600 KCMIL OR (2) 1/0 TO 250 KCMIL	(3) #4 TO 600 KCMIL OR (6) 1/0 TO 250 KCMIL	(3) #4 TO 600 KCMIL OR (6) 1/0 TO 250 KCMIL

WEIGHT KG [LBS]
3 POLE
193 [427]

REV	DATE	REVISION	BY
-	9-11-13	NEW DRAWING [CT54441]	BTW

UNLESS OTHERWISE SPECIFIED -
1) DIMENSIONS ARE IN MILLIMETERS
2) TOLERANCES ARE:

SURFACE FINISH MAX.

THIRD ANGLE PROJECTION

APPROVALS	DATE
DRAWN WSD	7-28-06
CHECKED WSD	7-28-06
APPROVED AJH	7-28-06

KOHLER CO. METRIC PRO-E
POWER SYSTEMS, KOHLER, WI 53044 U.S.A.

TITLE: DIMENSION PRINT

SCALE | CAD NO. | SHEET 2 of 2

DWG NO. ADV-8571 D

KOHLER. POWER SYSTEMS

Wiring Schematics

REV	DATE	REVISION	BY	APP'D
–	11-7-13	NEW DRAWING [CT55090]	DFS	

MPAC POWER/CONTROL BOARD

P14 (MEMBRANE SW.)
P17 (LCD DISPLAY)
P9 (ETHERNET)

ETHERNET INTERFACE
STANDARD ON MPAC1500
OPTIONAL ON MPAC750, MPAC1200

MEMBRANE SWITCH
LCD DISPLAY

TB2 (MODBUS): OUT 1 NC C NO 4 5 6; OUT 2 NC C NO 10 11 12

P12 USB PORT (ON BACK OF BOARD)

P16 (OPTION BOARDS): 1 2 3 4 5

TB1 (PROGRAMMABLE INPUTS/OUTPUTS): OUT 1 NC C NO 4 5 6; OUT 2 NC C NO 10 11 12; IN1 1 2; IN2 7 8

SW1: 1 PASSWORD, 2 MAINTENANCE, 3 POWER DISABLE, 4 SPARE

P3-1 (1A)
P3-2 (1AR)
P3-3 (1B)
P3-4 (1BR)
P3-5 (1C)
P3-6 (1CR)
CURRENT SENSING

K1
K2

P2 (PROGRAMMED TRANSITION.)
TO PROGRAMMED TRANSITION INTERFACE BOARD (P10)

CONTACTOR

(GEN_START_2) P1-9
(GEN_START_1) P1-8
(GROUND) P1-10
(POSITION_SOURCE2) P1-13
(POSITION_SOURCE1) P1-14
(SOURCE2_C2) P1-16
(SOURCE1_NO2) P1-15
(SOURCE1_C2) P1-5
(SOURCE1_C1) P1-2
(SOURCE2_C1) P1-1
(SOURCE1_NO1) P1-3

* POWER SUPPLY
SOURCE 2 AC VOLTAGE SENSING
*(SOURCE2_A) P1-7
(SOURCE2_B) P1-18
*(SOURCE2_C) P1-6
(SOURCE2_N) P1-23

* POWER SUPPLY
SOURCE 1 AC VOLTAGE SENSING
*(SOURCE1_A) P1-12
(SOURCE1_B) P1-11
*(SOURCE1_C) P1-4
(SOURCE1_N) P1-22

TO EMERGENCY SOURCE
EN EC EB EA
LN LC LB LA
NN NC NB NA
TO LOAD
TO NORMAL SOURCE

BR (AC1, AC2, CN COIL)
CR3 (AC2, AC1, CE COIL)

TS-1 TS-2 TS-3 TS-4 TS-5 TS-6 TS-7 TS-8 TS-9 TS-10 TS-11 TS-12

CN 16 15 CN 20 19
CE 17 18
CE 19 20
CN 17 18
CN 13 14
CE 13 14
CE 15 16
CN 22 21 CE 22 21
CE 24 25

POSITION INDICATION

8 J3-1 TBF-1
9 J3-2 TBF-2
ENGINE START

AUX. CONTACT RATING
10A, 32VDC
10A, 250VAC

J4-2 5 TBF-5
J4-1 4 TBF-4
J4-3 6 TBF-6
J4-5 8 TBF-8
J4-4 7 TBF-7
J4-6 9 TBF-9
J4-8 11 TBF-11
J4-7 10 TBF-10
J4-9 12 TBF-12
J4-12 15 TBF-15
J4-10 13 TBF-13
J4-11 14 TBF-14
J4-15 17 TBF-18
J4-13 16 TBF-16
J4-14 18 TBF-17
J4-18 20 TBF-21
J4-16 19 TBF-19
J4-17 21 TBF-20
J4-21 23 TBF-24
J4-19 22 TBF-22
J4-20 24 TBF-23
J4-24 26 TBF-27
J4-22 25 TBF-25
J4-23 27 TBF-26

P11-16 P11-1 P10
P11-5
P11-15
P11-3
P11-2
K1 (NR1) K2 (ER1)
PROGRAMMED TRANSITION INTERFACE BOARD

TO MPAC POWER/ CONTROL BOARD (P2)

LEGEND
BR, CR(#) – BRIDGE RECTIFIER
CE – CLOSED IN EMERGENCY
CN – CLOSED IN NORMAL
J(#) – CONNECTOR (JACK)
K(#) – RELAY
LCD – LIQUID CRYSTAL DISPLAY
P(#) – CONNECTOR (PLUG)
SW(#) – DIP SWITCH
TB1 – PROGRAMMABLE INPUT/OUTPUT TERMINAL BLOCK
TB2 – MODBUS TERMINAL BLOCK
TS – TRANSFER SWITCH

CE CONTROL CONTACTS

CE	SOLENOID POSITION				
	OPEN	BEFORE TDC*>	> <	BEFORE TDC*>	CLOSED EMER
13–14				X	X
15–16				X	X
17–18	X	X			
19–20	X	X			

CN CONTROL CONTACTS

CN	SOLENOID POSITION				
	CLOSED NORMAL	BEFORE TDC*>	> <	BEFORE <*TDC	OPEN
13–14				X	X
15–16				X	X
17–18	X	X			
19–20	X	X			

TDC (TOP DEAD CENTER)
TRANSFER SWITCH TEST & ADJUSTMENT PROCEDURE SPECIFIES CONTROL CUT-OFF (CONTACT OPENING) SETTING.

NOTE:
DIAGRAM SHOWN WITH "NORMAL" ENERGIZED AND CONTACTOR IN THE NORMAL POSITION.

MODEL KCP
150-600A
STANDARD MECHANISM
PROGRAMMED TRANSITION
FOR WIRING DIAGRAM SEE GM89657

UNLESS OTHERWISE SPECIFIED – 1) DIMENSIONS ARE IN INCHES 2) TOLERANCES ARE: .XXX± .010 ANGLES± 1/2° .XX ± .030 .X ± .060 FRACTIONS ± SURFACE FINISH √ MAX.

APPROVALS	DATE
DRAWN DFS	11-7-13
CHECKED MTL	11-7-13
APPROVED HCC	11-7-13

TITLE: DIAGRAM, SCHEMATIC
SCALE: / / / CAD NO. SHEET 1-1
PLOTTED DWG. NO. GM89656 D

REV	DATE	REVISION	BY	MFG
–	11–20–13	NEW DRAWING [CT55090]	DFS	

RIGHT SIDE WALL

DOOR

ENCLOSURE

J4 CONNECTIONS

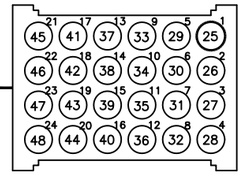
PIN					
#1	25	(CN–27)	13	37	(CN–39)
2	26	(CE–28)	14	38	(CN–41)
3	27	(CN–28)	15	39	(CE–41)
4	28	(CN–30)	16	40	(CN–42)
5	29	(CE–31)	17	41	(CN–44)
6	30	(CN–31)	18	42	(CE–44)
7	31	(CN–33)	19	43	(CN–45)
8	32	(CE–34)	20	44	(CN–47)
9	33	(CN–34)	21	45	(CE–47)
10	34	(CN–36)	22	46	(CN–48)
11	35	(CN–38)	23	47	(CN–50)
12	36	(CE–38)	24	48	(CE–50)

AUXILIARY CONTACTS/
ENGINE START
CONNECTIONS

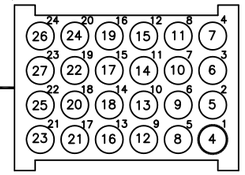
TBF

3	6	9	12	15	18	21	24	27
2	5	8	11	14	17	20	23	26
1	4	7	10	13	16	19	22	25

J4



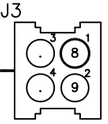
P4



P4 CONNECTIONS (AUXILIARY CONTACTS)

PIN					
#1	4	(TBF–4)	13	16	(TBF–16)
2	5	(TBF–5)	14	18	(TBF–17)
3	6	(TBF–6)	15	17	(TBF–18)
4	7	(TBF–7)	16	19	(TBF–19)
5	8	(TBF–8)	17	21	(TBF–20)
6	9	(TBF–9)	18	20	(TBF–21)
7	10	(TBF–10)	19	22	(TBF–22)
8	11	(TBF–11)	20	24	(TBF–23)
9	12	(TBF–12)	21	23	(TBF–24)
10	13	(TBF–13)	22	25	(TBF–25)
11	14	(TBF–14)	23	27	(TBF–26)
12	15	(TBF–15)	24	26	(TBF–27)

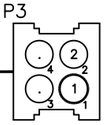
J3



J3 CONNECTIONS

PIN			
#1	8	(CE–24)	
2	9	(CE–25)	
3	N/C	.	
4	N/C	.	

P3



P3 CONNECTIONS (ENGINE START)

PIN			
#1	1	(TBF–1)	
2	2	(TBF–2)	
3	N/C	.	
4	N/C	.	

MEMBRANE SWITCH

LCD DISPLAY

STANDARD ON MPAC1500
OPTIONAL ON MPAC750,
MPAC1200

ETHERNET
INTERFACE

P14 P17 P9

TB2
MODBUS

OUT 1		
NC	C	NO
4	5	6

OUT 2		
NC	C	NO
10	11	12

P16

1 2 3 4 5

(OPTION BOARDS)

P12

USB PORT

TB1
PROGRAMMABLE
INPUTS/OUTPUTS

OUT 1				OUT 2			
NC	C	NO		NC	C	NO	
4	5	6		10	11	12	
IN1			IN2				
1	2		7	8			

SW1

1	2	3	4
PASSWORD	MAINTENANCE	POWER DISABLE	SPARE

P2
PROGRAMMED
TRANSITION

K1

K2

P3

CURRENT SENSING
(OPTIONAL)

MPAC POWER/
CONTROL BOARD

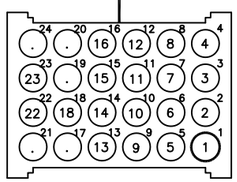
PROGRAMMED TRANSITION
INTERFACE BOARD

P10

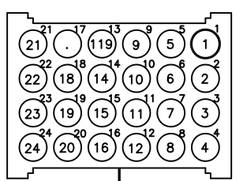
K1 (NR1)

K2 (ER1)

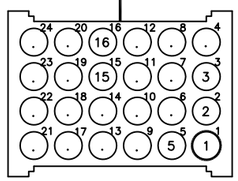
P1



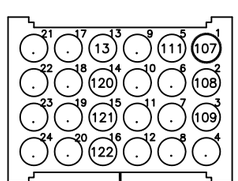
P



J11



P11



P11 CONNECTIONS

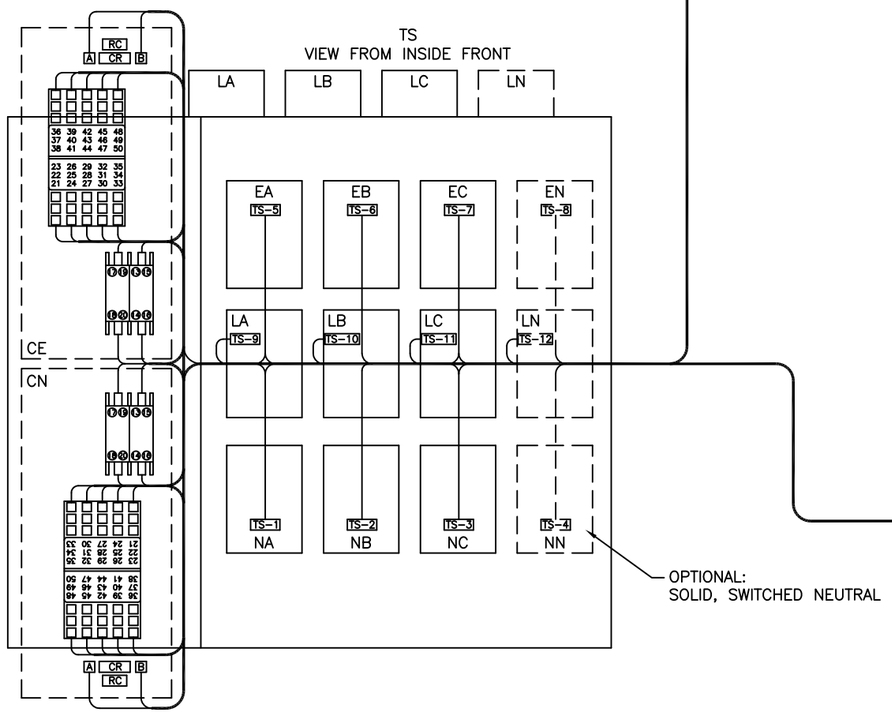
1	107	(CE–18)	9	N/C	.	17	N/C	.
2	108	(CE–A)	10	N/C	.	18	N/C	.
3	109	(CE–14)	11	N/C	.	19	N/C	.
4	N/C	.	12	N/C	.	20	N/C	.
5	111	(CE–B)	*13	13	(CN–67)	21	N/C	.
6	N/C	.	14	120	CE–67)	22	N/C	.
7	N/C	.	15	121	(CE–16)	23	N/C	.
8	N/C	.	16	122	(CE–20)	24	N/C	.

P CONNECTIONS (CONTACTOR TO MAIN LOGIC BOARD)

1	1	(CN–18)	*13	119	(CE–22)
2	2	(CN–A)	14	14	(CN–22)
3	3	(CN–14)	15	15	(CN–16)
4	4	(TS–3)	16	16	(CN–20)
5	5	(CN–B)	17	N/C	.
6	6	(TS–7)	18	18	(TS–6)
7	7	(TS–5)	19	19	(TS–9)
8	8	(CE–24)	20	20	(TS–10)
9	9	(CE–25)	21	21	(TS–11)
10	10	(CN–21)	22	22	(TS–4)
11	11	(TS–2)	23	23	(TS–8)
12	12	(TS–1)	24	24	(TS–12)

*P–13 & P11–13 CONNECTIONS SHOWN MODIFIED
FROM ORIGINAL CONTACTOR.

TS
VIEW FROM INSIDE FRONT



OPTIONAL:
SOLID, SWITCHED NEUTRAL

LEGEND

CE – CLOSED IN EMERGENCY
CN – CLOSED IN NORMAL
J(#) – CONNECTOR (JACK)
K(#) – RELAY
P(#) – CONNECTOR (PLUG)
SW(#) – DIP SWITCH
TB1 – PROGRAMMABLE INPUT/OUTPUT TERMINAL BLOCK
TB2 – MODBUS TERMINAL BLOCK
TBF – FIELD CONNECTION TERMINAL BLOCK
TS – TRANSFER SWITCH

MODEL KCP
150–600A
STANDARD MECHANISM
PROGRAMMED TRANSITION
FOR SCHEMATIC DIAGRAM SEE GM89656

UNLESS OTHERWISE SPECIFIED –
1) DIMENSIONS ARE IN INCHES
2) TOLERANCES ARE:
.XXX ± .010 ANGLES ± 1/2°
.XX ± .030 SURFACE FINISH
.X ± .060 √ MAX.
FRACTIONS ±

APPROVALS		DATE
DRAWN	DFS	11–20–13
CHECKED	MTL	11–20–13
APPROVED	HCC	11–20–13

TITLE: DIAGRAM, WIRING

SCALE: /// | CAD NO. | SHEET 1–1

PLOTTED | DWG. NO. GM89657 | D

KOHLER. POWER SYSTEMS

Warranty

Transfer Switch Extended Five-Year Comprehensive Limited Warranty

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	**Warranty Coverage**
Transfer switch and factory-supplied transfer switch accessories	Five (5) years from registered startup date.
Transfer switch main contacts	Ten (10) years from the registered startup date.

This warranty is not effective unless a proper extended warranty registration form and warranty fee have been sent to Kohler Co. within one year of registered startup. The extended warranty start date is determined by the standard warranty requirements and runs concurrent with the standard warranty during the first year. To receive extended warranty coverage, the provisions of the standard warranty registration must be met.

The following will **not** be covered by the warranty:

1. Normal wear, periodic service, and routine adjustments.
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:
   a. Operation above or below rated capacity, voltage, or frequency.
   b. Modifications.
   c. Installation contrary to published specifications and codes.
4. Damage caused by negligent maintenance such as:
   a. Failure to provide a clean, dry environment.
   b. Failure to perform recommended exercising.
   c. Failure to perform scheduled maintenance as prescribed in supplied manuals.
   d. Use of parts and/or procedures other than factory-supplied or -approved replacement parts and/or procedures.
5. Non-Kohler replacement parts. Replacement of a failed Kohler part with a non-Kohler part voids the warranty on that part.
6. Original installation charges and startup costs.
7. Additional expenses for repair after normal business hours, i.e. overtime or holiday labor rates.
8. Rental of equipment during performance of warranty repairs.
9. Removal and replacement of non-Kohler-supplied options and equipment.
10. Non-Kohler-authorized repair shop labor without prior approval from Kohler Co. Warranty Department.
11. Expenses incurred investigating performance complaints unless the problem is caused by defective Kohler materials or workmanship.
12. Maintenance items such as fuses, lamps, and adjustments.
13. Labor and travel charges after the fifth year of the transfer switch main contacts warranty period.
14. 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., Kohler Power Systems 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®
Power Systems

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-6087 4/15c

KOHLER. POWER SYSTEMS

Certification

Certificate US95/0189

The management system of

Kohler Power Systems, a Business Unit of Kohler Co.

N7650 Lakeshore Drive (known as Mosel Plant)
Sheboygan, WI, 53083, United States

has been assessed and certified as meeting the requirements of

ISO 9001:2008

For the following activities

Design, manufacture, and distributor support for electrical generators, alternators, automatic transfer switches, and switchgear.

Further clarifications regarding the scope of this certificate and the applicability of ISO 9001:2008 requirements may be obtained by consulting the organization

This certificate is valid from 6 November 2015 until 15 September 2018 and remains valid subject to satisfactory surveillance audits.
Recertification audit due a minimum of 60 days before the expiration date.
Issue 12 : 14 October 2015. Certified since November 2003

This is a multi-site certification.
Additional site details are listed on subsequent pages.

Authorized by

John Woodman
Senior Vice President SSC, North America
SGS Systems & Services Certification, a Division of SGS North America, Inc.
201 Route 17 North, Rutherford, NJ 07070, USA
t (201) 508-3000 f (201) 935-4555 www.us.sgs.com

This certificate remains the property of SGS and shall be returned upon request

Kohler Power Systems, a Business Unit of Kohler Co.

ISO 9001:2008

Issue 12 : 14 October 2015

Additional facilities

.300 N. Dekora Woods Blvd., Saukville, WI 53080 (Known as Sauk)
Scope: Manufacturer of fuel tanks, skids, fabricated components, enclosures, and assembly of enclosures and generators.

4327 County EE, Sheboygan, WI 53081 (Known as KWIP Warehouse)
Scope: Receiving and storage of generator components & receiving and shipping of generator sets.

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.
- 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.

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.

KOHLER®
POWER SYSTEMS

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
KohlerPowerSystemscom

G18-56 12/05a