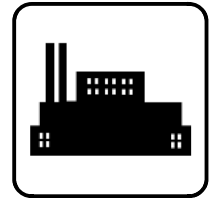
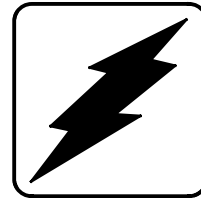


Service Parts

Generator Set Controllers



Models:

Decision-Maker® 3000 Controller

KOHLER®
POWER SYSTEMS

ISO 9001
KOHLER
POWER SYSTEMS
NATIONALLY REGISTERED

TP-6781 5/12b

Table of Contents

Table of Contents	2
Section 1 Introduction	3
Numbering System Significance	3
How to Find Part Numbers	3
Hardware References	3
Section 2: Controller Module Parts, 20–275 kW	4
4P/4Q/4S/4UA/4V Alternators (GM66921–)	4
Section 3: Controller Module Parts, 20–150 kW	6
4PX/4QX/4RX/4SX Alternators (GM77389–, GM77544–)	6
Section 4: Controller Module Parts, 180 kW	8
4M, 1 Phase Alternators (GM78706–)	8
Section 5: Controller Module Parts, 180–300 kW	10
4UA Alternators (GM70133–)	10
Section 6: Controller Module Parts, 350–1000 kW	12
GM75796–)	12
Section 7: Controller Assembly Parts	14
Section 8: Controller Assembly Parts, 350–1000 kW	16
Appendix A Abbreviations	18
Appendix B Common Hardware Application Guidelines	20
Appendix C General Torque Specifications	21
Appendix D Common Hardware Identification	22
Appendix E Common Hardware List	23
Index	26

Section 1 Introduction

This manual lists service replacement parts for Decision-Maker® 3000 controllers. See Figure 1 for controller identification.

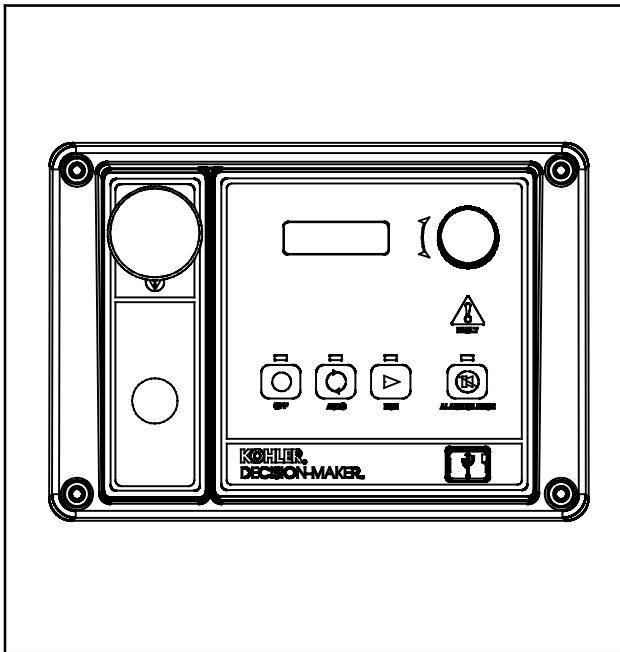


Figure 1 Decision-Maker® 3000 Controller

Information in this publication represents data available at the time of print. Kohler Co. reserves the right to change this publication and the products represented without notice and without any obligation or liability whatsoever.

This manual includes the following main sections:

Table of Contents. Lists the sections of the manual.

Introduction (and other information sections).

Contains introductory material about part numbers, illustrations, and hardware.

Module Parts Lists. Lists modules and their parts.

Appendices. Include Abbreviations, Common Hardware Application Guidelines, General Torque Specifications, Common Hardware Identification, and Common Hardware List.

Index. Lists part numbers and page number of modules listed in this manual.

Numbering System Significance

This manual uses the following numbering systems:

Module Number. A product identification number located on the generator set nameplate. Each module in this manual performs the same function with different parts lists. For example, a 12 volt controller and a 24 volt controller both perform the same function; however, with different parts. Each difference requires a module number.

Part Number. The part number identifies an individual assembly, subassembly, or component.

How to Find Part Numbers

The controller module contains the controller assembly, controller mounting hardware, transformers, wiring harnesses, and other related parts. Follow the steps below to identify controller group service part numbers.

1. Locate the generator set nameplate listing accessories to **identify an optional installed controller module number**. On some models this nameplate is mounted inside the generator junction box. See Figure 2 for an example of the nameplate.
2. **Use the Index at the back of the manual** to locate the module identified in step 1.
3. **Find the part on the illustration** and note the item number of the part or **find the part description in the parts list**.

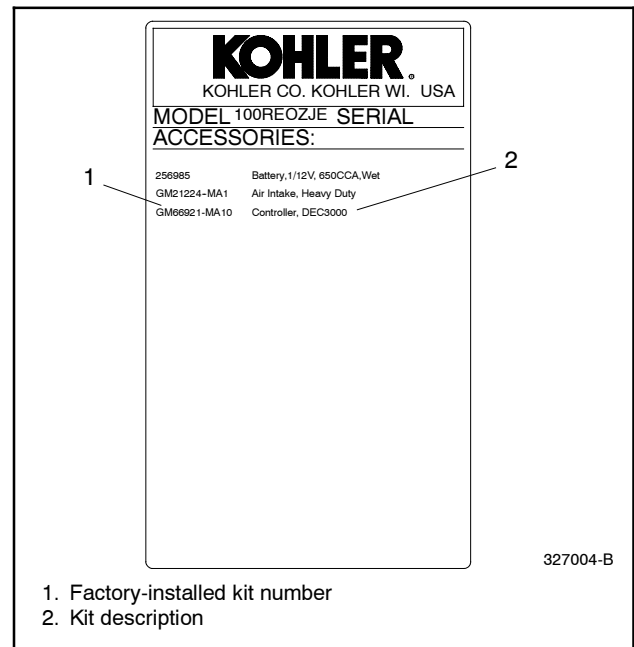


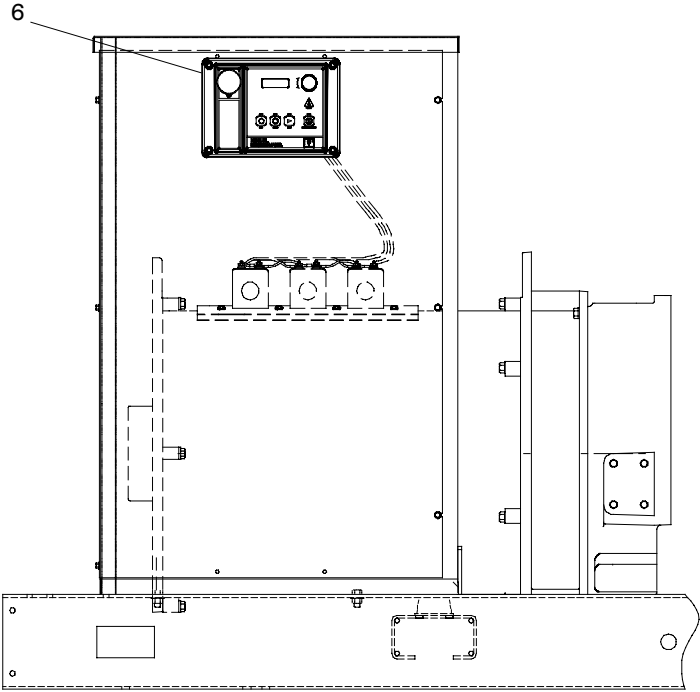
Figure 2 Generator Accessory Nameplate

Hardware References

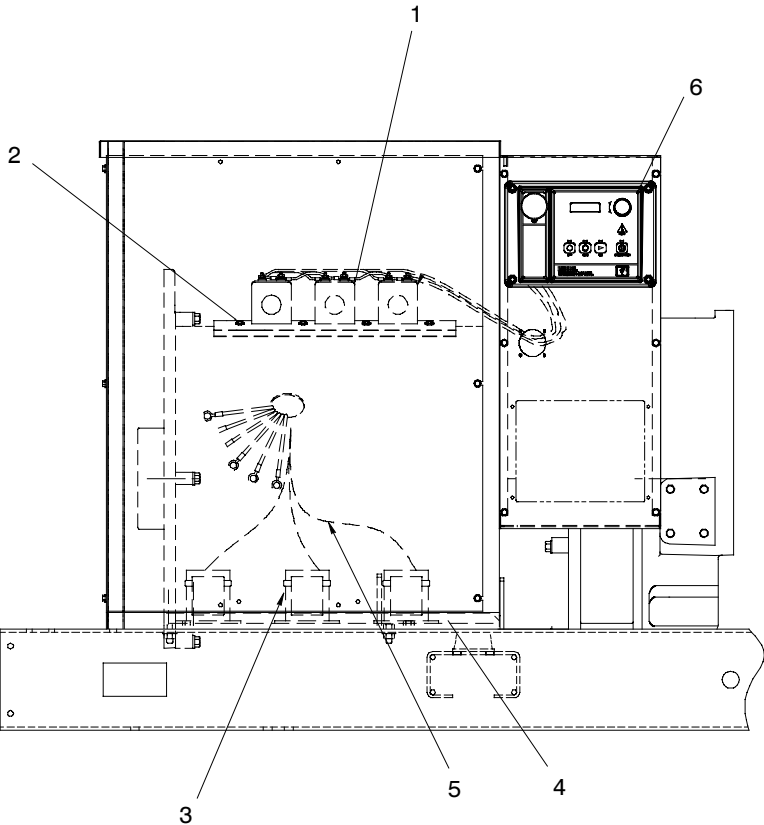
Many common hardware items do not appear in parts manuals. Obtain common hardware locally or, if contacting the factory, use the Common Hardware List in the appendix to identify the common hardware part number and specifications. See Common Hardware Application Guidelines in the appendix for mating hardware instructions.

Section 2: Controller Module Parts, 20-275 kW

4P/4Q/4S/4UA/4V Alternators (GM66921-)



20-100 kW with Taller Junction Box



125-275 kW with Add On Box

GM66921-J

Section 2: Controller Module Parts, 20-275 kW

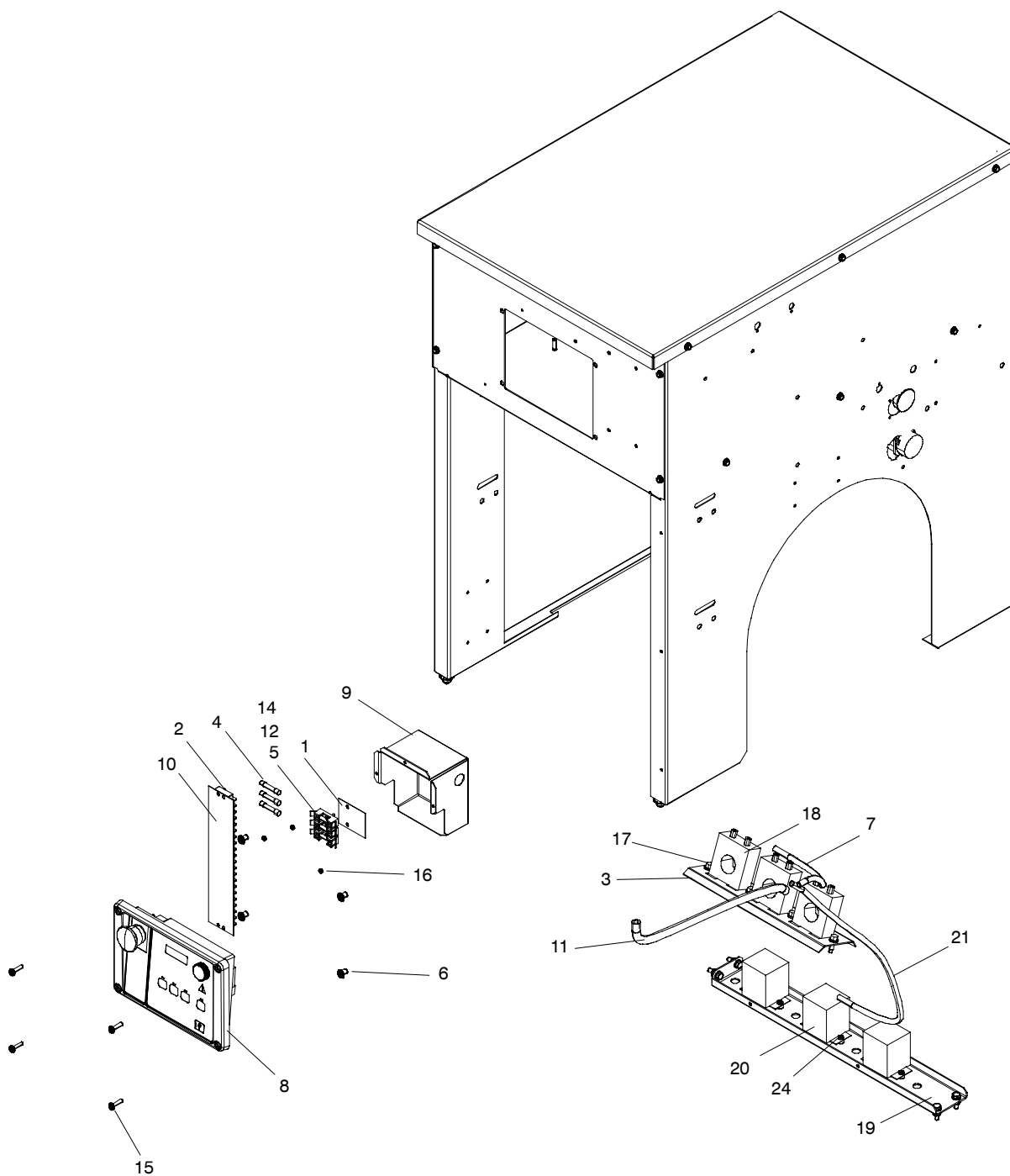
Kit No.	Aternator		Part Number				
			Item 1 Transformer	Item 2 CT Mtg. Bracket	Item 3 Potential Transformer	Item 4 Mtg. Bracket	Item 5 Harness
GM66921-MA1	4P, 4S7	200A:3VAC	GM16252 (3)	276417	-	-	-
GM66921-MA2	4P, 4S7	400A:3VAC	GM16257 (3)	276417	-	-	-
GM66921-MA3	4S9, 4S11	800A:3VAC	GM24898 (3)	299966	-	-	-
GM66921-MA4	4UA	400A:3VAC	GM16257 (3)	276417	-	-	-
GM66921-MA5	4UA	800A:3VAC	GM24898 (3)	299966	-	-	-
GM66921-MA6	4UA	1200A:3VAC	GM66775 (3)	299966	-	-	-
GM66921-MA7	4Q	200A:3VAC	GM16252 (2)	276417	-	-	-
GM66921-MA8	4Q, 4V	400A:3VAC	GM16257 (3)	276417	-	-	-
GM66921-MA9	4V	800A:3VAC	GM24898 (2)	299966	-	-	-
GM66921-MA10	4P, 4S7	200A:3VAC	GM16252 (3)	276417	-	-	-
GM66921-MA11	4P, 4S7	400A:3VAC	GM16257 (3)	276417	-	-	-
GM66921-MA12	4P, 600V	200A:3VAC	GM16252 (3)	276417	258990 (3)	GM58692	GM59009
GM66921-MA13	4S, 600V	200A:3VAC	GM16252 (3)	276417	258990 (3)	GM35175	GM59010
GM66921-MA14	4UA 600V	400A:3VAC	GM16257 (3)	276417	258990 (3)	-	GM59011
GM66921-MA15	4UA 600V	800A:3VAC	GM24898 (3)	299966	258990 (3)	-	GM59011
GM66921-MA16	4S, 600V	400A:3VAC	GM16257 (3)	276417	258990 (3)	GM35175	GM59010
GM66921-MA17	4Q	200A:3VAC	GM16252 (2)	276417	-	-	-
GM66921-MA18	4Q	400A:3VAC	GM16257 (2)	276417	-	-	-

Common Parts			
Item	Part Number	Description	Qty.
6	GM75376	Controller, DEC3000 Service Replacement*	1

* See Controller Assembly Parts on page 14 for parts list.

Section 3: Controller Module Parts, 20-150 kW

4PX/4QX/4RX/4SX Alternators (GM77389-, GM77544-)



GM75789_E
GM77544_D

Section 3: Controller Module Parts, 20-150 kW

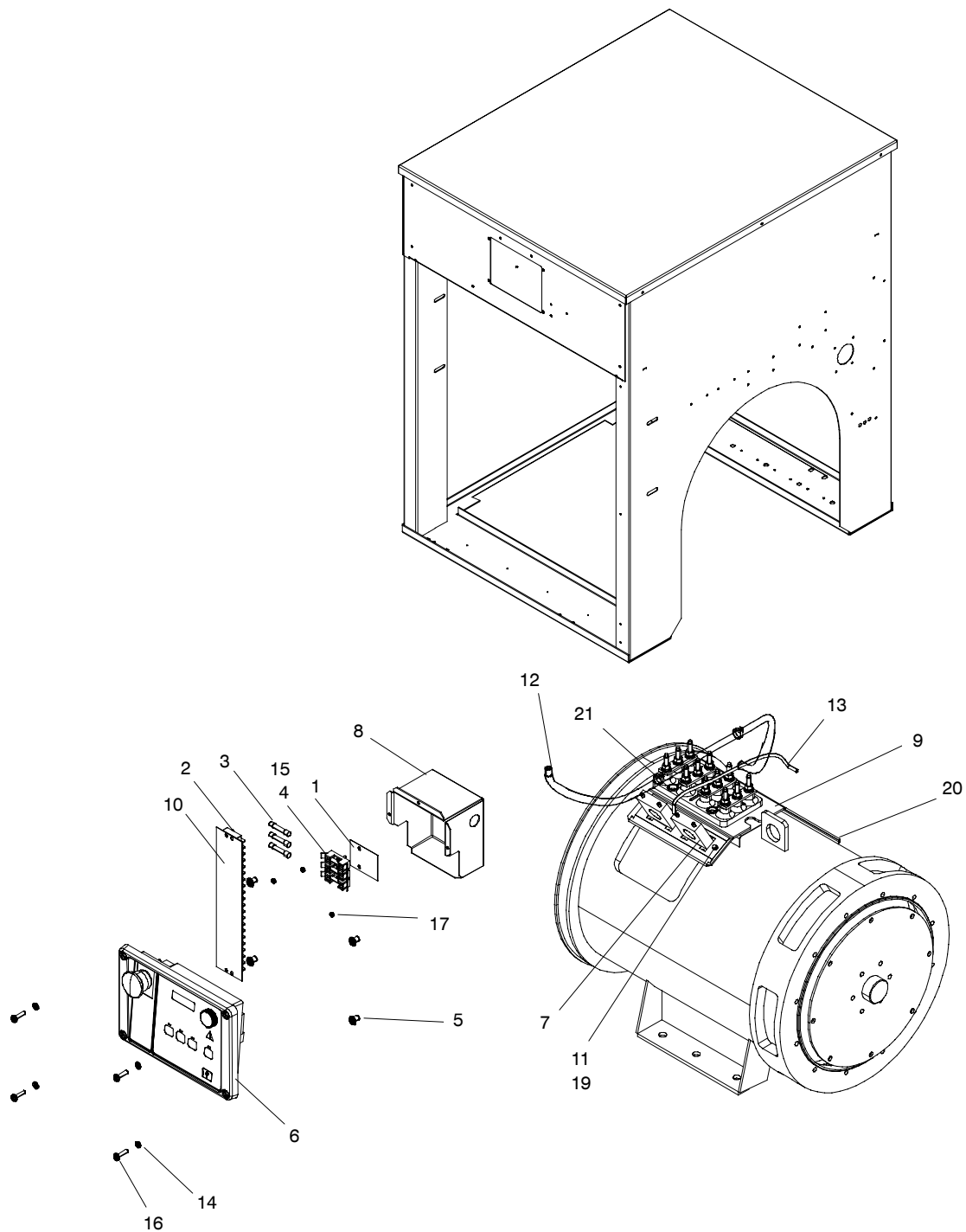
Kit No.	Part Number					
	Item 3 Bracket, CT Mounting	Item 18 Current Transformer	Item 19 Bracket, PT mounting	Item 20 Transformer, Potential	Item 21 Harness, wiring	Item 24 Spacer
GM77389-MA1	276417	GM16252 (3)	GM58692	258990 (3)	GM59009	X-400-145 (6)
GM77389-MA2	276417	GM16252 (3)	-	-	-	-
GM77389-MA3	276417	GM16257 (3)	-	-	-	-
GM77389-MA4	276417	GM16252 (2)	-	-	-	-
GM77389-MA5	276417	GM16257 (2)	-	-	-	-
GM77389-MA6	276417	GM16257 (2)	-	-	-	-
GM77544-MA1	276417	GM16252 (3)	GM35175	258990 (3)	GM59010	-
GM77544-MA2	276417	GM16257 (3)	-	-	-	-
GM77544-MA3	299966	GM24898 (2)	-	-	-	-
GM77544-MA4	299966	GM24898 (3)	-	-	-	-
GM77544-MA5	276417	GM16257 (3)	GM35175	258990 (3)	GM59010	X-400-145 (6)
GM77544-MA6	276417	GM16257 (2)	-	-	-	-

Common Parts			
Item	Part Number	Description	Qty.
1	225179	Strip, marker	1
2	273769	Terminal block	1
4	291207	Fuse, 1.5 A, 250 V	3
5	292821	Fuse holder	1
6	GM11040-6	Insert, Threaded, M5-0.8	4
7	GM17424	Harness, Wiring Current Transformer	1
8	GM75376	Controller, DEC3000 Service Replacement*	1
9	GM71802	Cover, Controller	1
10	GM75602	Strip, Marker	1
11	GM77888	Harness, A/C DEC3000	1
12	M125A-03-60	Washer, plain	2
14	M7985A-03012-20	Screw, pan head M3 X 12	2
15	M7985A-05020-20	Screw, Pan Head Machine	4
16	M934-03-50	Nut, Hex 3mm	6
17	X-794-1	Screw, hex wshr hd, drill 1/4- 14 x 5/8	4
-	-	Panel, Controller Face (See Generator Set Parts Manual)	1
-	-	Junction Box (See Generator Set Parts Manual)	1

* See Controller Assembly Parts on page 14 for parts list.

Section 4: Controller Module Parts, 180 kW

4M, 1 Phase Alternators (GM78706-)



GM78706-A

Section 4: Controller Module Parts, 180 kW

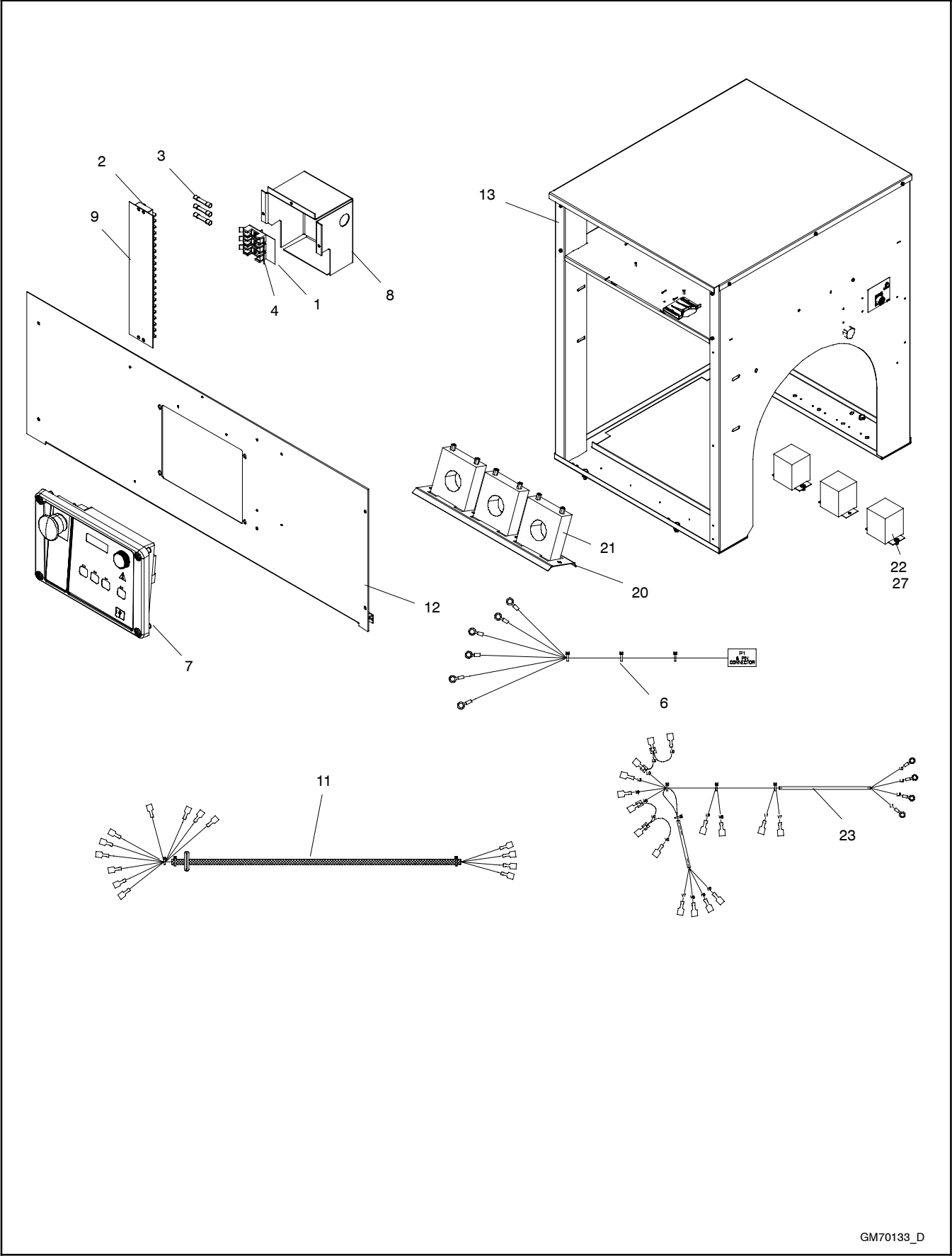
Kit No.	Part Number	
	Item 7 Current Transformer	Item 11 Bracket, CT Mounting
GM78706-MA1	GM66775 (2)	GM78701

Parts List			
Item	Part Number	Description	Qty.
1	225179	Strip, marker	1
2	273769	Terminal block	1
3	291207	Fuse, 1.5 A, 250 V	3
4	292821	Fuse holder	1
5	GM11040-6	Insert, Threaded, M5-0.8	4
6	GM75376	Controller, DEC3000 Service Replacement*	1
8	GM71802	Cover, Controller	1
9	GM75519	Bracket, CT support	1
10	GM75602	Strip, Marker	1
12	GM79626	Harness, A/C DEC3000, 1 Ph	1
13	GM79793	Harness, Wiring Current Transformer	1
14	M125A-05-80	Washer, plain	4
15	M7985A-03012-20	Screw, pan head M3 X 12	2
16	M7985A-05020-20	Screw, Pan Head Machine	4
17	M934-03-50	Nut, Hex 3mm	6
19	X-794-1	Screw, hex wshr hd, drill 1/4-14 x 5/8	4
20	X-6047-33	Channel, U	1
21	X-6238-4	Bolt, hex cap	4
	-	Panel, Controller Face (See Generator Set Parts Manual)	1
	-	Junction Box (See Generator Set Parts Manual)	1

* See Controller Assembly Parts on page 14 for parts list.

Section 5: Controller Module Parts, 180-300 kW

4UA Alternators (GM70133-)



GM70133_D

Section 5: Controller Module Parts, 180-300 kW

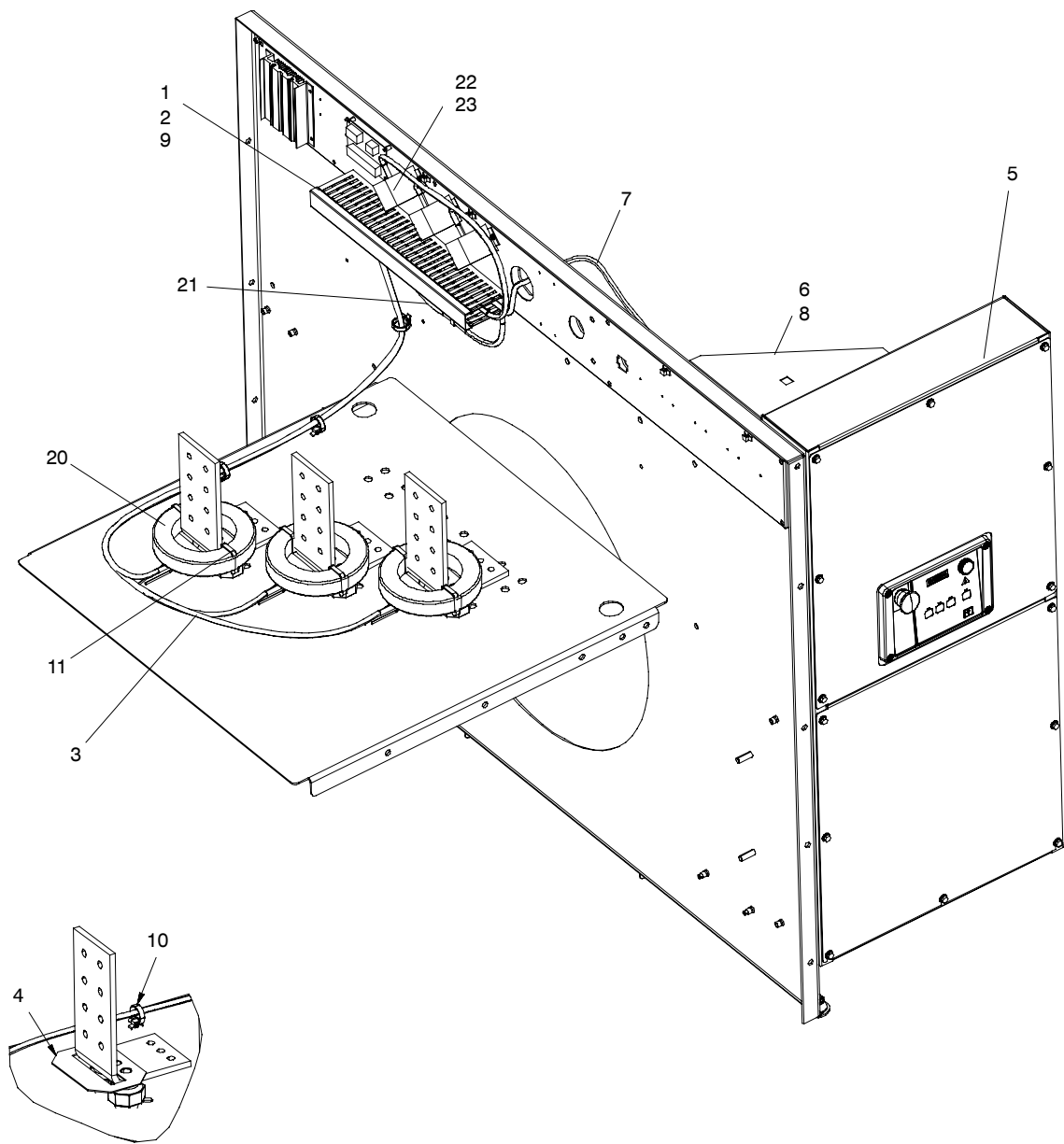
Kit No.	Part Number				
	Item 20 CT Mtg. Bracket	Item 21 Current Transformer	Item 22 Potential Transformer	Item 23 PT Harness	Item 27 Spacer
GM70133-MA1	299966	GM66775	-	-	-
GM70133-MA2	299966	GM24898	-	-	-
GM70133-MA3	299966	GM24898	-	-	-
GM70133-MA5	276417	GM16257	258990	GM75860	X-400-145

Common Parts			
Item	Part Number	Description	Qty.
1	225179	Strip, marker	1
2	273769	Terminal block	1
3	291207	Fuse, 1.5 A, 250 V	3
4	292821	Fuse holder	1
6	GM17424	Harness, Wiring Current Transformer	1
7	GM75376	Controller, DEC3000 Service Replacement*	1
8	GM71802	Cover, Controller	1
9	GM75602	Strip, Marker	1
11	GM77888	Harness, A/C DEC3000	1
12	-	Panel, Controller Face (See Generator Set Parts Manual)	1
13	-	Junction Box (See Generator Set Parts Manual)	1

* See Controller Assembly Parts on page 14 for parts list.

Section 6: Controller Module Parts, 350-1000 kW

GM75796-



GM75796_D

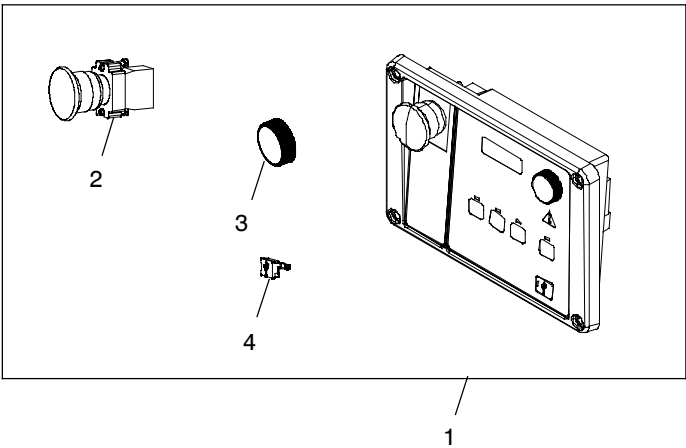
Section 6: Controller Module Parts, 350-1000 kW

Kit No.	Part Number			
	Item 20 Current Transformer	Item 21 Harness, V-Tap	Item 22 Potential Transformer	Item 23 Screw
GM75796-MA1	GM16269	GM77974	258990	X-67-59
GM75796-MA2	GM16260	GM77974	258990	X-67-59
GM75796-MA3	GM16265	GM78060	-	-
GM75796-MA4	GM16266	GM78060	-	-
GM75796-MA5	GM16267	GM78060	-	-
GM75796-MA6	GM16268	GM78060	-	-
GM75796-MA7	GM30579	GM78060	-	-
GM75796-MA8	GM16263	GM77974	258990	X-67-59
GM75796-MA9	GM16265	GM77974	258990	X-67-59
GM75796-MA10	GM16266	GM77974	258990	X-67-59
GM75796-MA11	GM16260	GM77974	276578	X-67-59
GM75796-MA12	GM16263	GM77974	276578	X-67-59
GM75796-MA13	GM16265	GM77974	276578	X-67-59
GM75796-MA14	GM16266	GM77974	276578	X-67-59
GM75796-MA15	GM16267	GM77974	276578	X-67-59
GM75796-MA16	GM16268	GM77974	276578	X-67-59
GM75796-MA17	GM16267	GM77974	258990	X-67-59

Common Parts			
Item	Part Number	Description	Qty.
1	29758-01020	Duct, Wire (1.4 ft.)	1
2	29759-00010	Cover, Wire Duct (1.4 ft.)	1
3	GM11501	Harness, CT	1
4	GM75902	Support, CT	3
5	GM77182-1	Controller Assy, DEC3000*	1
6	GM77907	Brace, Pedestal	2
7	GM77972	Harness, AC	1
8	M6921-06016-60	Screw, Hex Flange M6x16mm fully threaded js500	8
9	X-67-59	Screw, hex washer, thread-forming	2
10	X-468-1	Cable Tie	3
11	X-468-4	Cable Tie	6

* See Controller Assembly Parts on page 16 for parts list.

Section 7: Controller Assembly Parts



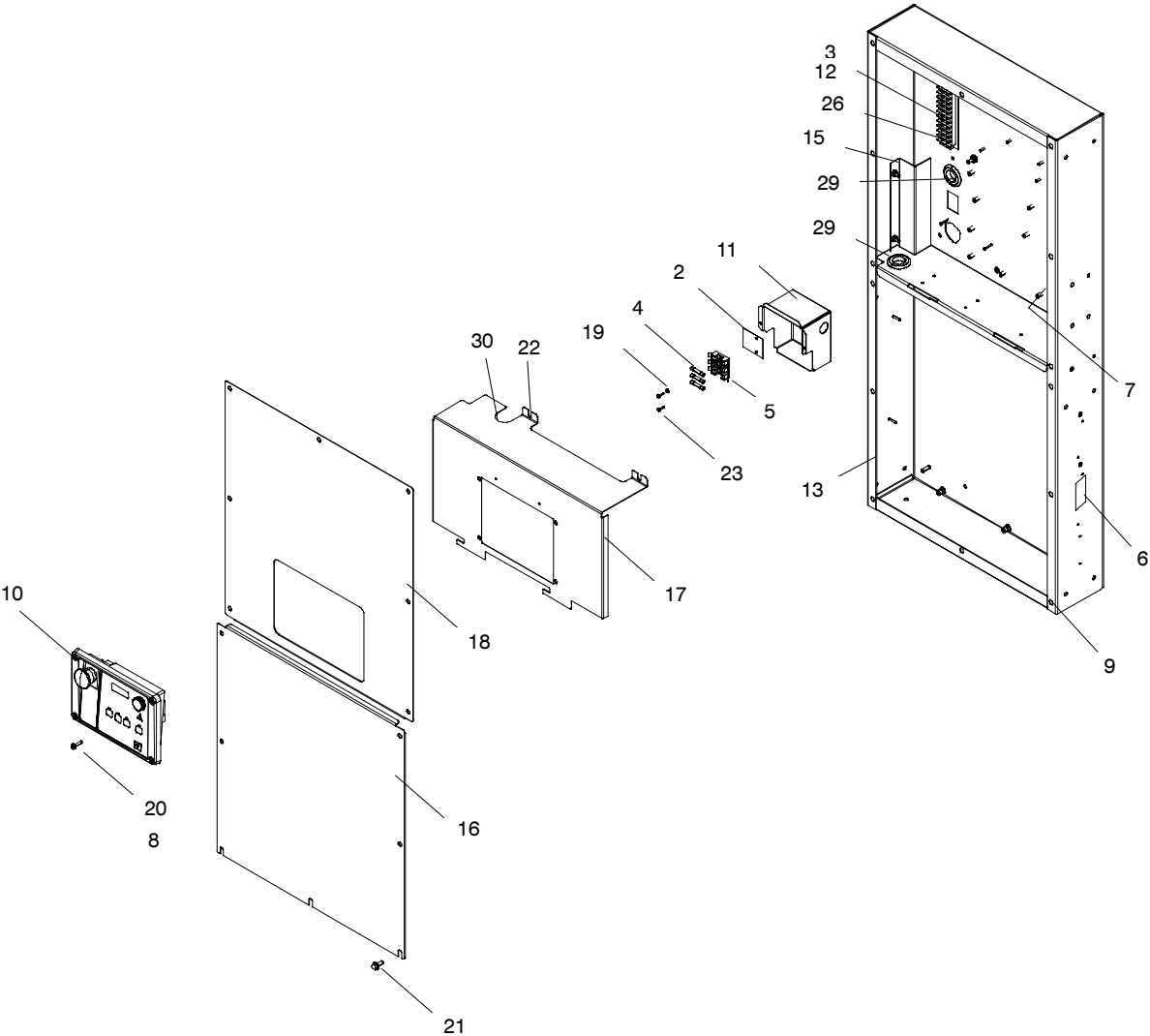
GM65741_B

Controller Part Numbers

Item	Description	Part Number
1	Controller, DEC3000 Service Replacement Controller Assembly (ref. GM65741-1)	GM75376
2	Switch, Emergency Stop Pushbutton	292364
3	Knob, Adjustment	GM58147
4	Plug, USB	GM60403
-	Shunt, programming (not shown)	294634
-	Replacement Kit Installation Instructions	TT-1545

Notes

Section 8: Controller Assembly Parts, 350-1000 kW



GM77182_F

Section 8: Controller Module Parts, 350-1000 kW

Controller Part Numbers			
Item	Part Number	Description	Qty.
-	GM77182-1	Controller Assy., DEC 3000 (includes items 2-31)	1
2	225179	Strip, marker	1
3	273769	Terminal block	1
4	291207	Fuse, 1.5 A, 250 V	3
5	292821	Fuse holder	1
6	294520	Decal, Danger, High Voltage	1
7	354362	Decal, UL	1
8	GM11040-6	Insert, Threaded, M5-0.8	4
9	GM11040-7	Insert, Threaded (M6 x 1.0 Hex)	20
10	GM75376	Controller, DEC3000 Service Replacement*	1
11	GM71802	Cover, Controller	1
12	GM75602	Strip, Marker	1
13	GM81354	Enclosure Assembly, Controller	1
15	GM76194	Cover, Wire	1
16	GM76128	Cover, Controller Bottom	1
17	GM77183	Panel, Controller	1
18	GM77184	Cover, Controller Top	1
19	M125A-03-60	Washer, Plain	2
20	M125A-05-80	Washer, Plain	5
21	M6921-06016-60	Screw, Hex Flange M6x16mm fly thrd js500	14
22	M6923-06-80	Nut, Hex 6mm	4
23	M7985A-03012-20	Screw, pan head M3X12	2
24	M7985A-03020-20	Screw, Pan Head Machine	2
25	M7985A-05020-20	Screw, Pan Head Machine	5
26	M934-03-50	Nut, Hex 3mm	6
27	M934-05-50	Nut, Hex 5mm	1
28	X-22-12	Washer, lock, .262 ID x .743 in. OD	2
29	X-284-3	Grommet, round	2
30	X-6033-8	Grommet, U-Channel	1
31	X-6046-12	Strap, Ground (20 in.)	1

* See Controller Assembly Parts on page 14 for parts list.

Appendix A Abbreviations

The following list contains abbreviations that may appear in this publication.

A, amp	ampere	cfm	cubic feet per minute	est.	estimated
ABDC	after bottom dead center	CG	center of gravity	E-Stop	emergency stop
AC	alternating current	CID	cubic inch displacement	etc.	et cetera (and so forth)
A/D	analog to digital	CL	centerline	exh.	exhaust
ADC	advanced digital control; analog to digital converter	cm	centimeter	ext.	external
adj.	adjust, adjustment	CMOS	complementary metal oxide substrate (semiconductor)	F	Fahrenheit, female
ADV	advertising dimensional drawing	cogen.	cogeneration	fglass.	fiberglass
Ah	amp-hour	com	communications (port)	FHM	flat head machine (screw)
AHWT	anticipatory high water temperature	coml	commercial	fl. oz.	fluid ounce
AISI	American Iron and Steel Institute	Coml/Rec	Commercial/Recreational	flex.	flexible
ALOP	anticipatory low oil pressure	conn.	connection	freq.	frequency
alt.	alternator	cont.	continued	FS	full scale
Al	aluminum	CPVC	chlorinated polyvinyl chloride	ft.	foot, feet
ANSI	American National Standards Institute (formerly American Standards Association, ASA)	crit.	critical	ft. lb.	foot pounds (torque)
AO	anticipatory only	CRT	cathode ray tube	ft./min.	feet per minute
APDC	Air Pollution Control District	CSA	Canadian Standards Association	ftp	file transfer protocol
API	American Petroleum Institute	CT	current transformer	g	gram
approx.	approximate, approximately	Cu	copper	ga.	gauge (meters, wire size)
AQMD	Air Quality Management District	cUL	Canadian Underwriter's Laboratories	gal.	gallon
AR	as required, as requested	CUL	Canadian Underwriter's Laboratories	gen.	generator
AS	as supplied, as stated, as suggested	cu. in.	cubic inch	genset	generator set
ASE	American Society of Engineers	cw.	clockwise	GFI	ground fault interrupter
ASME	American Society of Mechanical Engineers	CWC	city water-cooled	GND, ⊕	ground
assy.	assembly	cyl.	cylinder	gov.	governor
ASTM	American Society for Testing Materials	D/A	digital to analog	gph	gallons per hour
ATDC	after top dead center	DAC	digital to analog converter	gpm	gallons per minute
ATS	automatic transfer switch	dB	decibel	gr.	grade, gross
auto.	automatic	dB(A)	decibel (A weighted)	GRD	equipment ground
aux.	auxiliary	DC	direct current	gr. wt.	gross weight
avg.	average	DCR	direct current resistance	H x W x D	height by width by depth
AVR	automatic voltage regulator	deg., °	degree	HC	hex cap
AWG	American Wire Gauge	dept.	department	HCHT	high cylinder head temperature
AWM	appliance wiring material	DFMEA	Design Failure Mode and Effects Analysis	HD	heavy duty
bat.	battery	dia.	diameter	HET	high exhaust temp., high engine temp.
BBDC	before bottom dead center	DI/EO	dual inlet/end outlet	hex	hexagon
BC	battery charger, battery charging	DIN	Deutsches Institut für Normung e. V. (also Deutsche Industrie Normenausschuss)	Hg	mercury (element)
BCA	battery charging alternator	DIP	dual inline package	HH	hex head
BCI	Battery Council International	DPDT	double-pole, double-throw	HHC	hex head cap
BDC	before dead center	DPST	double-pole, single-throw	HP	horsepower
BHP	brake horsepower	DS	disconnect switch	hr.	hour
blk.	black (paint color), block (engine)	DVR	digital voltage regulator	HS	heat shrink
blk. htr.	block heater	E, emer.	emergency (power source)	hsg.	housing
BMEP	brake mean effective pressure	ECM	electronic control module, engine control module	HVAC	heating, ventilation, and air conditioning
bps	bits per second	EDI	electronic data interchange	HWT	high water temperature
br.	brass	EFR	emergency frequency relay	Hz	hertz (cycles per second)
BTDC	before top dead center	e.g.	for example (<i>exempli gratia</i>)	IC	integrated circuit
Btu	British thermal unit	EG	electronic governor	ID	inside diameter, identification
Btu/min.	British thermal units per minute	EGSA	Electrical Generating Systems Association	IEC	International Electrotechnical Commission
C	Celsius, centigrade	EIA	Electronic Industries Association	IEEE	Institute of Electrical and Electronics Engineers
cal.	calorie	EI/EO	end inlet/end outlet	IMS	improved motor starting
CAN	controller area network	EMI	electromagnetic interference	in.	inch
CARB	California Air Resources Board	emiss.	emission	in. H ₂ O	inches of water
CB	circuit breaker	eng.	engine	in. Hg	inches of mercury
cc	cubic centimeter	EPA	Environmental Protection Agency	in. lb.	inch pounds
CCA	cold cranking amps	ES	emergency power system	Inc.	incorporated
ccw.	counterclockwise	ESD	electrostatic discharge	ind.	industrial
CEC	Canadian Electrical Code			int.	internal
cert.	certificate, certification, certified			int./ext.	internal/external
cfh	cubic feet per hour			I/O	input/output
				IP	iron pipe
				ISO	International Organization for Standardization
				J	joule
				JIS	Japanese Industry Standard

k	kilo (1000)	MW	megawatt	rnd.	round
K	kelvin	mW	milliwatt	ROM	read only memory
kA	kiloampere	μF	microfarad	rot.	rotate, rotating
KB	kilobyte (2 ¹⁰ bytes)	N, norm.	normal (power source)	rpm	revolutions per minute
KBus	Kohler communication protocol	NA	not available, not applicable	RS	right side
kg	kilogram	nat. gas	natural gas	RTU	remote terminal unit
kg/cm ²	kilograms per square centimeter	NBS	National Bureau of Standards	RTV	room temperature vulcanization
kgm	kilogram-meter	NC	normally closed	RW	read/write
kg/m ³	kilograms per cubic meter	NEC	National Electrical Code	SAE	Society of Automotive Engineers
kHz	kilohertz	NEMA	National Electrical Manufacturers Association	scfm	standard cubic feet per minute
km	kilometer	NFPA	National Fire Protection Association	SCR	silicon controlled rectifier
kOhm, kΩ	kilo-ohm	Nm	newton meter	s, sec.	second
kPa	kilopascal	NO	normally open	SI	<i>Système international d'unités</i> , International System of Units
kph	kilometers per hour	no., nos.	number, numbers	SI/EO	side in/end out
kV	kilovolt	NPS	National Pipe, Straight	sil.	silencer
kVA	kilovolt ampere	NPSC	National Pipe, Straight-coupling	SN	serial number
kVAR	kilovolt ampere reactive	NPT	National Standard taper pipe thread per general use	SNMP	simple network management protocol
kW	kilowatt	NPTF	National Pipe, Taper-Fine	SPDT	single-pole, double-throw
kWh	kilowatt-hour	NR	not required, normal relay	SPST	single-pole, single-throw
kWm	kilowatt mechanical	ns	nanosecond	spec	specification
kWth	kilowatt-thermal	OC	overcrank	specs	specification(s)
L	liter	OD	outside diameter	sq.	square
LAN	local area network	OEM	original equipment manufacturer	sq. cm	square centimeter
L x W x H	length by width by height	OF	overfrequency	sq. in.	square inch
lb.	pound, pounds	opt.	option, optional	SS	stainless steel
lbm/ft ³	pounds mass per cubic foot	OS	oversize, overspeed	std.	standard
LCB	line circuit breaker	OSHA	Occupational Safety and Health Administration	stl.	steel
LCD	liquid crystal display	OV	overvoltage	tach.	tachometer
ld. shd.	load shed	oz.	ounce	TD	time delay
LED	light emitting diode	p., pp.	page, pages	TDC	top dead center
Lph	liters per hour	PC	personal computer	TDEC	time delay engine cooldown
Lpm	liters per minute	PCB	printed circuit board	TDEN	time delay emergency to normal
LOP	low oil pressure	pF	picofarad	TDES	time delay engine start
LP	liquefied petroleum	PF	power factor	TDNE	time delay normal to emergency
LPG	liquefied petroleum gas	ph., ∅	phase	TDOE	time delay off to emergency
LS	left side	PHC	Phillips® head CrimpTite® (screw)	TDON	time delay off to normal
L _{wa}	sound power level, A weighted	PHH	Phillips® hex head (screw)	temp.	temperature
LWL	low water level	PHM	pan head machine (screw)	term.	terminal
LWT	low water temperature	PLC	programmable logic control	THD	total harmonic distortion
m	meter, milli (1/1000)	PMG	permanent magnet generator	TIF	telephone influence factor
M	mega (10 ⁶ when used with SI units), male	pot	potentiometer, potential	TIR	total indicator reading
m ³	cubic meter	ppm	parts per million	tol.	tolerance
m ³ /hr.	cubic meters per hour	PROM	programmable read-only memory	turbo.	turbocharger
m ³ /min.	cubic meters per minute	psi	pounds per square inch	typ.	typical (same in multiple locations)
mA	milliampere	psig	pounds per square inch gauge	UF	underfrequency
man.	manual	pt.	pint	UHF	ultrahigh frequency
max.	maximum	PTC	positive temperature coefficient	UL	Underwriter's Laboratories, Inc.
MB	megabyte (2 ²⁰ bytes)	PTO	power takeoff	UNC	unified coarse thread (was NC)
MCCB	molded-case circuit breaker	PVC	polyvinyl chloride	UNF	unified fine thread (was NF)
MCM	one thousand circular mils	qt.	quart, quarts	univ.	universal
meggar	megohmmeter	qty.	quantity	US	undersize, underspeed
MHz	megahertz	R	replacement (emergency) power source	UV	ultraviolet, undervoltage
mi.	mile	rad.	radiator, radius	V	volt
mil	one one-thousandth of an inch	RAM	random access memory	VAC	volts alternating current
min.	minimum, minute	RDO	relay driver output	VAR	voltampere reactive
misc.	miscellaneous	ref.	reference	VDC	volts direct current
MJ	megajoule	rem.	remote	VFD	vacuum fluorescent display
mm	millimeter	Res/Coml	Residential/Commercial	VGA	video graphics adapter
mOhm, mΩ	milliohm	RFI	radio frequency interference	VHF	very high frequency
MOhm, MΩ	megohm	RH	round head	W	watt
MPa	megapascal	RHM	round head machine (screw)	WCR	withstand and closing rating
mpg	miles per gallon	rly.	relay	w/	with
mph	miles per hour	rms	root mean square	w/o	without
MS	military standard			wt.	weight
m/sec.	meters per second			xfmr	transformer
MTBF	mean time between failure				
MTBO	mean time between overhauls				
mtg.	mounting				
MTU	Motoren-und Turbinen-Union				

Appendix B Common Hardware Application Guidelines

Use the information below and on the following pages to identify proper fastening techniques when no specific reference for reassembly is made.

Bolt/Screw Length: When bolt/screw length is not given, use Figure 1 as a guide. As a general rule, a minimum length of one thread beyond the nut and a maximum length of 1/2 the bolt/screw diameter beyond the nut is the preferred method.

Washers and Nuts: Use split lock washers as a bolt locking device where specified. Use SAE flat washers with whiz nuts, spirallock nuts, or standard nuts and preloading (torque) of the bolt in all other applications.

See Appendix C, General Torque Specifications, and other torque specifications in the service literature.

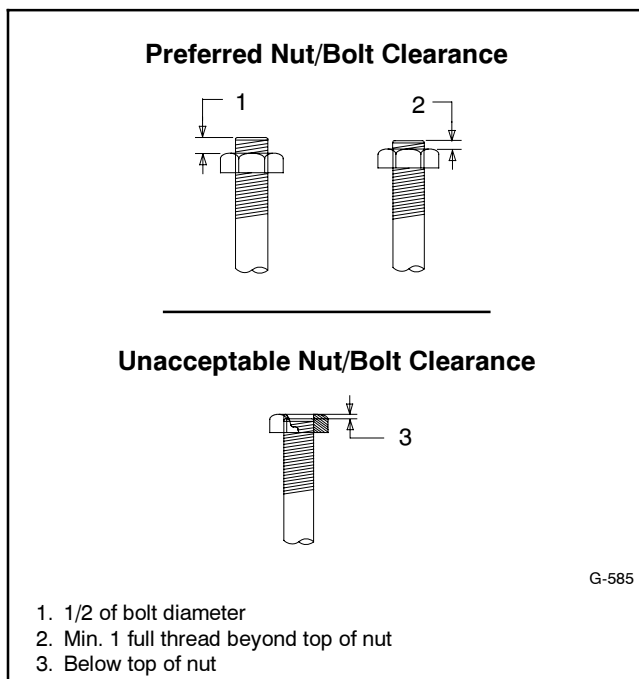


Figure 1 Acceptable Bolt Lengths

Steps for common hardware application:

1. Determine entry hole type: round or slotted.
2. Determine exit hole type: fixed female thread (weld nut), round, or slotted.

For round and slotted exit holes, determine if hardware is greater than 1/2 inch in diameter, or 1/2 inch in diameter or less. Hardware that is *greater than 1/2 inch* in diameter takes a standard nut and SAE washer. Hardware *1/2 inch or less* in diameter can take a properly torqued whiz nut or spirallock nut. See Figure 2.

3. Follow these SAE washer rules after determining exit hole type:
 - a. Always use a washer between hardware and a slot.
 - b. Always use a washer under a nut (see 2 above for exception).
 - c. Use a washer under a bolt when the female thread is fixed (weld nut).
4. Refer to Figure 2, which depicts the preceding hardware configuration possibilities.

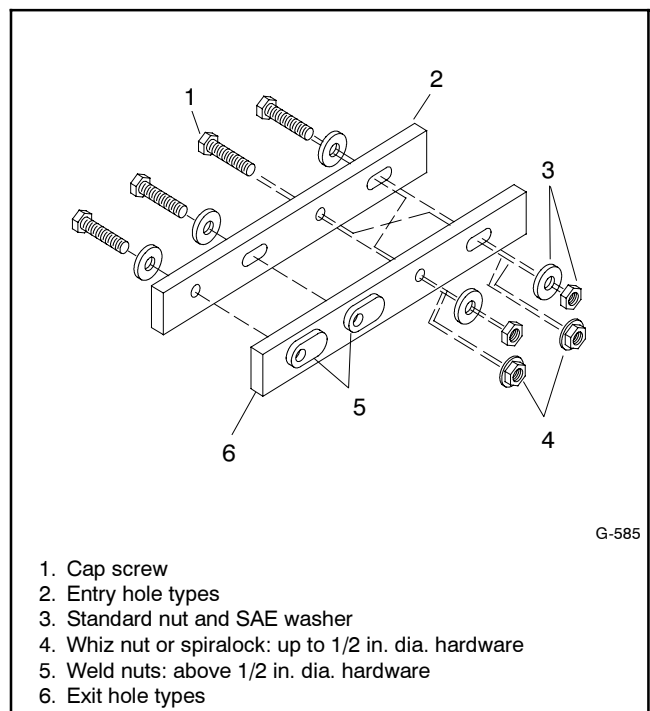


Figure 2 Acceptable Hardware Combinations

Appendix C General Torque Specifications

American Standard Fasteners Torque Specifications					
Size	Torque Measurement	Assembled into Cast Iron or Steel			Assembled into Aluminum Grade 2 or 5
		Grade 2	Grade 5	Grade 8	
8-32	Nm (in. lb.)	1.8 (16)	2.3 (20)	—	See Note 3
10-24	Nm (in. lb.)	2.9 (26)	3.6 (32)	—	
10-32	Nm (in. lb.)	2.9 (26)	3.6 (32)	—	
1/4-20	Nm (in. lb.)	6.8 (60)	10.8 (96)	14.9 (132)	
1/4-28	Nm (in. lb.)	8.1 (72)	12.2 (108)	16.3 (144)	
5/16-18	Nm (in. lb.)	13.6 (120)	21.7 (192)	29.8 (264)	
5/16-24	Nm (in. lb.)	14.9 (132)	23.1 (204)	32.5 (288)	
3/8-16	Nm (ft. lb.)	24.0 (18)	38.0 (28)	53.0 (39)	
3/8-24	Nm (ft. lb.)	27.0 (20)	42.0 (31)	60.0 (44)	
7/16-14	Nm (ft. lb.)	39.0 (29)	60.0 (44)	85.0 (63)	
7/16-20	Nm (ft. lb.)	43.0 (32)	68.0 (50)	95.0 (70)	
1/2-13	Nm (ft. lb.)	60.0 (44)	92.0 (68)	130.0 (96)	
1/2-20	Nm (ft. lb.)	66.0 (49)	103.0 (76)	146.0 (108)	
9/16-12	Nm (ft. lb.)	81.0 (60)	133.0 (98)	187.0 (138)	
9/16-18	Nm (ft. lb.)	91.0 (67)	148.0 (109)	209.0 (154)	
5/8-11	Nm (ft. lb.)	113.0 (83)	183.0 (135)	259.0 (191)	
5/8-18	Nm (ft. lb.)	128.0 (94)	208.0 (153)	293.0 (216)	
3/4-10	Nm (ft. lb.)	199.0 (147)	325.0 (240)	458.0 (338)	
3/4-16	Nm (ft. lb.)	222.0 (164)	363.0 (268)	513.0 (378)	
1-8	Nm (ft. lb.)	259.0 (191)	721.0 (532)	1109.0 (818)	
1-12	Nm (ft. lb.)	283.0 (209)	789.0 (582)	1214.0 (895)	

Metric Fasteners Torque Specifications, Measured in Nm (ft. lb.)				
Size (mm)	Assembled into Cast Iron or Steel			Assembled into Aluminum Grade 5.8 or 8.8
	Grade 5.8	Grade 8.8	Grade 10.9	
M6 x 1.00	6.2 (4.6)	9.5 (7)	13.6 (10)	See Note 3
M8 x 1.25	15.0 (11)	23.0 (17)	33.0 (24)	
M8 x 1.00	16.0 (11)	24.0 (18)	34.0 (25)	
M10 x 1.50	30.0 (22)	45.0 (34)	65.0 (48)	
M10 x 1.25	31.0 (23)	47.0 (35)	68.0 (50)	
M12 x 1.75	53.0 (39)	80.0 (59)	115.0 (85)	
M12 x 1.50	56.0 (41)	85.0 (63)	122.0 (90)	
M14 x 2.00	83.0 (61)	126.0 (93)	180.0 (133)	
M14 x 1.50	87.0 (64)	133.0 (98)	190.0 (140)	
M16 x 2.00	127.0 (94)	194.0 (143)	278.0 (205)	
M16 x 1.50	132.0 (97)	201.0 (148)	287.0 (212)	
M18 x 2.50	179.0 (132)	273.0 (201)	390.0 (288)	
M18 x 1.50	189.0 (140)	289.0 (213)	413.0 (305)	

Notes:

1. The torque values above are general guidelines. Always use the torque values specified in the service manuals and/or assembly drawings when they differ from the above torque values.
2. The torque values above are based on new plated threads. Increase torque values by 15% if non-plated threads are used.
3. Hardware threaded into aluminum must have either two diameters of thread engagement or a 30% or more reduction in the torque to prevent stripped threads.
4. Torque values are calculated as equivalent stress loading on American hardware with an approximate preload of 90% of the yield strength and a friction coefficient of 0.125.

Appendix D Common Hardware Identification

Screw/Bolts/Studs	
Head Styles	
Hex Head or Machine Head	
Hex Head or Machine Head with Washer	
Flat Head (FHM)	
Round Head (RHM)	
Pan Head	
Hex Socket Head Cap or Allen™ Head Cap	
Hex Socket Head or Allen™ Head Shoulder Bolt	
Sheet Metal Screw	
Stud	
Drive Styles	
Hex	
Hex and Slotted	
Phillips®	
Slotted	
Hex Socket	

Nuts	
Nut Styles	
Hex Head	
Lock or Elastic	
Square	
Cap or Acorn	
Wing	
Washers	
Washer Styles	
Plain	
Split Lock or Spring	
Spring or Wave	
External Tooth Lock	
Internal Tooth Lock	
Internal-External Tooth Lock	

Hardness Grades	
American Standard	
Grade 2	
Grade 5	
Grade 8	
Grade 8/9 (Hex Socket Head)	
Metric	
Number stamped on hardware; 5.8 shown	

Allen™ head screw is a trademark of Holo-Krome Co.

Phillips® screw is a registered trademark of Phillips Screw Company.

Sample Dimensions

American Standard (Screws, Bolts, Studs, and Nuts)

$\frac{1}{4}$ -20 x 1

- Length In Inches (Screws and Bolts)
- Threads Per Inch
- Major Thread Diameter In Fractional Inches Or Screw Number Size

Metric (Screws, Bolts, Studs, and Nuts)

M6 x 20

- Length In Millimeters (Screws and Bolts)
- Distance Between Threads In Millimeters
- Major Thread Diameter In Millimeters

Plain Washers

$\frac{9}{32}$ x $\frac{5}{8}$ x $\frac{1}{16}$

- Thickness
- External Dimension
- Internal Dimension

Lock Washers

$\frac{5}{8}$

- Internal Dimension

Appendix E Common Hardware List

The Common Hardware List lists part numbers and dimensions for common hardware items.

American Standard

Part No. Dimensions Hex Head Bolts (Grade 5)

X-465-17	1/4-20 x .38
X-465-6	1/4-20 x .50
X-465-2	1/4-20 x .62
X-465-16	1/4-20 x .75
X-465-18	1/4-20 x .88
X-465-7	1/4-20 x 1.00
X-465-8	1/4-20 x 1.25
X-465-9	1/4-20 x 1.50
X-465-10	1/4-20 x 1.75
X-465-11	1/4-20 x 2.00
X-465-12	1/4-20 x 2.25
X-465-14	1/4-20 x 2.75
X-465-21	1/4-20 x 5.00
X-465-25	1/4-28 x .38
X-465-20	1/4-28 x 1.00
X-125-33	5/16-18 x .50
X-125-23	5/16-18 x .62
X-125-3	5/16-18 x .75
X-125-31	5/16-18 x .88
X-125-5	5/16-18 x 1.00
X-125-24	5/16-18 x 1.25
X-125-34	5/16-18 x 1.50
X-125-25	5/16-18 x 1.75
X-125-26	5/16-18 x 2.00
230578	5/16-18 x 2.25
X-125-29	5/16-18 x 2.50
X-125-27	5/16-18 x 2.75
X-125-28	5/16-18 x 3.00
X-125-22	5/16-18 x 4.50
X-125-32	5/16-18 x 5.00
X-125-35	5/16-18 x 5.50
X-125-36	5/16-18 x 6.00
X-125-40	5/16-18 x 6.50
X-125-43	5/16-24 x 1.75
X-125-44	5/16-24 x 2.50
X-125-30	5/16-24 x .75
X-125-39	5/16-24 x 2.00
X-125-38	5/16-24 x 2.75
X-6238-2	3/8-16 x .62
X-6238-10	3/8-16 x .75
X-6238-3	3/8-16 x .88
X-6238-11	3/8-16 x 1.00
X-6238-4	3/8-16 x 1.25
X-6238-5	3/8-16 x 1.50
X-6238-1	3/8-16 x 1.75
X-6238-6	3/8-16 x 2.00
X-6238-17	3/8-16 x 2.25
X-6238-7	3/8-16 x 2.50
X-6238-8	3/8-16 x 2.75
X-6238-9	3/8-16 x 3.00
X-6238-19	3/8-16 x 3.25
X-6238-12	3/8-16 x 3.50
X-6238-20	3/8-16 x 3.75
X-6238-13	3/8-16 x 4.50
X-6238-18	3/8-16 x 5.50
X-6238-25	3/8-16 x 6.50

Part No. Dimensions Hex Head Bolts, cont.

X-6238-14	3/8-24 x .75
X-6238-16	3/8-24 x 1.25
X-6238-21	3/8-24 x 4.00
X-6238-22	3/8-24 x 4.50
X-6024-5	7/16-14 x .75
X-6024-2	7/16-14 x 1.00
X-6024-8	7/16-14 x 1.25
X-6024-3	7/16-14 x 1.50
X-6024-4	7/16-14 x 2.00
X-6024-11	7/16-14 x 2.75
X-6024-12	7/16-14 x 6.50
X-129-15	1/2-13 x .75
X-129-17	1/2-13 x 1.00
X-129-18	1/2-13 x 1.25
X-129-19	1/2-13 x 1.50
X-129-20	1/2-13 x 1.75
X-129-21	1/2-13 x 2.00
X-129-22	1/2-13 x 2.25
X-129-23	1/2-13 x 2.50
X-129-24	1/2-13 x 2.75
X-129-25	1/2-13 x 3.00
X-129-27	1/2-13 x 3.50
X-129-29	1/2-13 x 4.00
X-129-30	1/2-13 x 4.50
X-463-9	1/2-13 x 5.50
X-129-44	1/2-13 x 6.00
X-129-51	1/2-20 x .75
X-129-45	1/2-20 x 1.25
X-129-52	1/2-20 x 1.50
X-6021-3	5/8-11 x 1.00
X-6021-4	5/8-11 x 1.25
X-6021-2	5/8-11 x 1.50
X-6021-1	5/8-11 x 1.75
273049	5/8-11 x 2.00
X-6021-5	5/8-11 x 2.25
X-6021-6	5/8-11 x 2.50
X-6021-7	5/8-11 x 2.75
X-6021-12	5/8-11 x 3.75
X-6021-11	5/8-11 x 4.50
X-6021-10	5/8-11 x 6.00
X-6021-9	5/8-18 x 2.50
X-6239-1	3/4-10 x 1.00
X-6239-8	3/4-10 x 1.25
X-6239-2	3/4-10 x 1.50
X-6239-3	3/4-10 x 2.00
X-6239-4	3/4-10 x 2.50
X-6239-5	3/4-10 x 3.00
X-6239-6	3/4-10 x 3.50
X-792-1	1-8 x 2.25
X-792-5	1-8 x 3.00
X-792-8	1-8 x 5.00

Part No. Dimensions Type

Hex Nuts

X-6009-1	1-8	Standard
X-6210-3	6-32	Whiz
X-6210-4	8-32	Whiz
X-6210-5	10-24	Whiz
X-6210-1	10-32	Whiz
X-6210-2	1/4-20	Spiralock
X-6210-6	1/4-28	Spiralock
X-6210-7	5/16-18	Spiralock
X-6210-8	5/16-24	Spiralock
X-6210-9	3/8-16	Spiralock
X-6210-10	3/8-24	Spiralock
X-6210-11	7/16-14	Spiralock
X-6210-12	1/2-13	Spiralock
X-6210-15	7/16-20	Spiralock
X-6210-14	1/2-20	Spiralock
X-85-3	5/8-11	Standard
X-88-12	3/4-10	Standard
X-89-2	1/2-20	Standard

Washers

Part No.	ID	OD	Thick.	Bolt/ Screw
X-25-46	.125	.250	.022	#4
X-25-9	.156	.375	.049	#6
X-25-48	.188	.438	.049	#8
X-25-36	.219	.500	.049	#10
X-25-40	.281	.625	.065	1/4
X-25-85	.344	.687	.065	5/16
X-25-37	.406	.812	.065	3/8
X-25-34	.469	.922	.065	7/16
X-25-26	.531	1.062	.095	1/2
X-25-15	.656	1.312	.095	5/8
X-25-29	.812	1.469	.134	3/4
X-25-127	1.062	2.000	.134	1

Metric

Hex head bolts are hardness grade 8.8 unless noted.

Part No. Dimensions Hex Head Bolts (Partial Thread)

M931-05055-60	M5-0.80 x 55
M931-06040-60	M6-1.00 x 40
M931-06055-60	M6-1.00 x 55
M931-06060-60	M6-1.00 x 60
M931-06060-SS	M6-1.00 x 60
M931-06070-60	M6-1.00 x 70
M931-06070-SS	M6-1.00 x 70
M931-06075-60	M6-1.00 x 75
M931-06090-60	M6-1.00 x 90
M931-06145-60	M6-1.00 x 145
M931-06150-60	M6-1.00 x 150
M931-08035-60	M8-1.25 x 35
M931-08040-60	M8-1.25 x 40
M931-08045-60	M8-1.25 x 45
M931-08050-60	M8-1.25 x 50
M931-08055-60	M8-1.25 x 55
M931-08055-82	M8-1.25 x 55*
M931-08060-60	M8-1.25 x 60
M931-08070-60	M8-1.25 x 70
M931-08070-82	M8-1.25 x 70*
M931-08075-60	M8-1.25 x 75
M931-08080-60	M8-1.25 x 80
M931-08090-60	M8-1.25 x 90
M931-08095-60	M8-1.25 x 95
M931-08100-60	M8-1.25 x 100
M931-08110-60	M8-1.25 x 110
M931-08120-60	M8-1.25 x 120
M931-08130-60	M8-1.25 x 130
M931-08140-60	M8-1.25 x 140
M931-08150-60	M8-1.25 x 150
M931-08200-60	M8-1.25 x 200
M931-10040-82	M10-1.25 x 40*
M931-10040-60	M10-1.50 x 40
M931-10045-60	M10-1.50 x 45
M931-10050-60	M10-1.50 x 50
M931-10050-82	M10-1.25 x 50*
M931-10055-60	M10-1.50 x 55
M931-10060-60	M10-1.50 x 60
M931-10065-60	M10-1.50 x 65
M931-10070-60	M10-1.50 x 70
M931-10080-60	M10-1.50 x 80
M931-10080-82	M10-1.25 x 80*
M931-10090-60	M10-1.50 x 90
M931-10090-82	M10-1.50 x 90*
M931-10100-60	M10-1.50 x 100
M931-10110-60	M10-1.50 x 110
M931-10120-60	M10-1.50 x 120
M931-10130-60	M10-1.50 x 130
M931-10140-60	M10-1.50 x 140
M931-10180-60	M10-1.50 x 180
M931-10235-60	M10-1.50 x 235
M931-10260-60	M10-1.50 x 260
M960-10330-60	M10-1.25 x 330
M931-12045-60	M12-1.75 x 45
M960-12050-60	M12-1.25 x 50
M960-12050-82	M12-1.25 x 50*
M931-12050-60	M12-1.75 x 50
M931-12050-82	M12-1.75 x 50*
M931-12055-60	M12-1.75 x 55
M931-12060-60	M12-1.75 x 60
M931-12060-82	M12-1.75 x 60*
M931-12065-60	M12-1.75 x 65
M931-12075-60	M12-1.75 x 75
M931-12080-60	M12-1.75 x 80
M931-12090-60	M12-1.75 x 90
M931-12100-60	M12-1.75 x 100
M931-12110-60	M12-1.75 x 110

Part No. Dimensions Hex Head Bolts (Partial Thread), continued

M960-16090-60	M16-1.50 x 90
M931-16090-60	M16-2.00 x 90
M931-16100-60	M16-2.00 x 100
M931-16100-82	M16-2.00 x 100*
M931-16120-60	M16-2.00 x 120
M931-16150-60	M16-2.00 x 150
M931-20065-60	M20-2.50 x 65
M931-20090-60	M20-2.50 x 90
M931-20100-60	M20-2.50 x 100
M931-20120-60	M20-2.50 x 120
M931-20140-60	M20-2.50 x 140
M931-20160-60	M20-2.50 x 160
M931-22090-60	M22-2.50 x 90
M931-22120-60	M22-2.50 x 120
M931-22160-60	M22-2.50 x 160
M931-24090-60	M24-3.00 x 90
M931-24120-60	M24-3.00 x 120
M931-24160-60	M24-3.00 x 160
M931-24200-60	M24-3.00 x 200

Hex Head Bolts (Full Thread)

M933-04006-60	M4-0.70 x 6
M933-05030-60	M5-0.80 x 30
M933-05035-60	M5-0.80 x 35
M933-05050-60	M5-0.80 x 50
M933-06010-60	M6-1.00 x 10
M933-06012-60	M6-1.00 x 12
M933-06014-60	M6-1.00 x 14
M933-06016-60	M6-1.00 x 16
M933-06020-60	M6-1.00 x 20
M933-06025-60	M6-1.00 x 25
M933-06030-60	M6-1.00 x 30
M933-06040-60	M6-1.00 x 40
M933-06050-60	M6-1.00 x 50
M933-07025-60	M7-1.00 x 25
M933-08010-60	M8-1.25 x 10
M933-08012-60	M8-1.25 x 12
M933-08016-60	M8-1.25 x 16
M933-08020-60	M8-1.25 x 20
M933-08025-60	M8-1.25 x 25
M933-08030-60	M8-1.25 x 30
M933-08030-82	M8-1.25 x 30*
M933-10012-60	M10-1.50 x 12
M961-10020-60	M10-1.25 x 20
M933-10020-60	M10-1.50 x 20
M933-10025-60	M10-1.50 x 25
M961-10025-60	M10-1.25 x 25
M933-10025-82	M10-1.50 x 25*
M961-10030-60	M10-1.25 x 30
M933-10030-60	M10-1.50 x 30
M933-10030-82	M10-1.50 x 30*
M961-10035-60	M10-1.25 x 35
M933-10035-60	M10-1.50 x 35
M933-10035-82	M10-1.50 x 35*
M961-10040-60	M10-1.25 x 40

Part No. Dimensions Hex Head Bolts (Full Thread), continued

M933-12016-60	M12-1.75 x 16
M933-12020-60	M12-1.75 x 20
M961-12020-60F	M12-1.50 x 20
M933-12025-60	M12-1.75 x 25
M933-12025-82	M12-1.75 x 25*
M961-12030-60	M12-1.25 x 30
M933-12030-82	M12-1.75 x 30*
M961-12030-82F	M12-1.50 x 30*
M933-12030-60	M12-1.75 x 30
M933-12035-60	M12-1.75 x 35
M961-12040-82	M12-1.25 x 40*
M933-12040-60	M12-1.75 x 40
M933-12040-82	M12-1.75 x 40*
M961-14025-60	M14-1.50 x 25
M933-14025-60	M14-2.00 x 25
M961-14050-82	M14-1.50 x 50*
M961-16025-60	M16-1.50 x 25
M933-16025-60	M16-2.00 x 25
M961-16030-82	M16-1.50 x 30*
M933-16030-82	M16-2.00 x 30*
M933-16035-60	M16-2.00 x 35
M961-16040-60	M16-1.50 x 40
M933-16040-60	M16-2.00 x 40
M961-16045-82	M16-1.50 x 45*
M933-16045-82	M16-2.00 x 45*
M933-16050-60	M16-2.00 x 50
M933-16050-82	M16-2.00 x 50*
M933-16060-60	M16-2.00 x 60
M933-16070-60	M16-2.00 x 70
M933-18035-60	M18-2.50 x 35
M933-18050-60	M18-2.50 x 50
M933-18060-60	M18-2.50 x 60
M933-20050-60	M20-2.50 x 50
M933-20055-60	M20-2.50 x 55
M933-24060-60	M24-3.00 x 60
M933-24065-60	M24-3.00 x 65
M933-24070-60	M24-3.00 x 70

Pan Head Machine Screws

M7985A-03010-20	M3-0.50 x 10
M7985A-03012-20	M3-0.50 x 12
M7985A-04010-20	M4-0.70 x 10
M7985A-04016-20	M4-0.70 x 16
M7985A-04020-20	M4-0.70 x 20
M7985A-04050-20	M4-0.70 x 50
M7985A-04100-20	M4-0.70 x 100
M7985A-05010-20	M5-0.80 x 10
M7985A-05012-20	M5-0.80 x 12
M7985A-05016-20	M5-0.80 x 16
M7985A-05020-20	M5-0.80 x 20
M7985A-05025-20	M5-0.80 x 25
M7985A-05030-20	M5-0.80 x 30
M7985A-05080-20	M5-0.80 x 80
M7985A-05100-20	M5-0.80 x 100
M7985A-06100-20	M6-1.00 x 100

Flat Head Machine Screws

M965A-04012-SS	M4-0.70 x 12
M965A-05012-SS	M5-0.80 x 12
M965A-05016-20	M5-0.80 x 16
M965A-06012-20	M6-1.00 x 12

* This metric hex bolt's hardness is grade 10.9.

Metric, continued

Part No.	Dimensions	Type
Hex Nuts		
M934-03-50	M3-0.50	Standard
M934-04-50	M4-0.70	Standard
M934-04-B	M4-0.70	Brass
M934-05-50	M5-0.80	Standard
M934-06-60	M6-1.00	Standard
M934-06-64	M6-1.00	Std. (green)
M6923-06-80	M6-1.00	Spiralock
M982-06-80	M6-1.00	Elastic Stop
M934-08-60	M8-1.25	Standard
M6923-08-80	M8-1.25	Spiralock
M982-08-80	M8-1.25	Elastic Stop
M934-10-60	M10-1.50	Standard
M934-10-60F	M10-1.25	Standard
M6923-10-80	M10-1.50	Spiralock
M6923-10-62	M10-1.50	Spiralock†
M982-10-80	M10-1.50	Elastic Stop
M934-12-60	M12-1.75	Standard
M934-12-60F	M12-1.25	Standard
M6923-12-80	M12-1.75	Spiralock
M982-12-80	M12-1.75	Elastic Stop
M982-14-60	M14-2.00	Elastic Stop
M6923-16-80	M16-2.00	Spiralock
M982-16-80	M16-2.00	Elastic Stop
M934-18-80	M18-2.5	Standard
M982-18-60	M18-2.50	Elastic Stop
M934-20-80	M20-2.50	Standard
M982-20-80	M20-2.50	Elastic Stop
M934-22-60	M22-2.50	Standard
M934-24-80	M24-3.00	Standard
M982-24-60	M24-3.00	Elastic Stop
M934-30-80	M30-3.50	Standard

Washers

Part No.	ID	OD	Thick.	Bolt/ Screw
M125A-03-80	3.2	7.0	0.5	M3
M125A-04-80	4.3	9.0	0.8	M4
M125A-05-80	5.3	10.0	1.0	M5
M125A-06-80	6.4	12.0	1.6	M6
M125A-08-80	8.4	16.0	1.6	M8
M125A-10-80	10.5	20.0	2.0	M10
M125A-12-80	13.0	24.0	2.5	M12
M125A-14-80	15.0	28.0	2.5	M14
M125A-16-80	17.0	30.0	3.0	M16
M125A-18-80	19.0	34.0	3.0	M18
M125A-20-80	21.0	37.0	3.0	M20
M125A-24-80	25.0	44.0	4.0	M24

† This metric hex nut's hardness is grade 8.

Index

Listed below are part numbers and page numbers of modules listed in this manual. Italicized numbers refer to the page numbers on which modules appear.

GM66921-MA1, 5	GM66921-MA6, 5	GM75796-MA14, 13	GM77389-MA2, 7
GM66921-MA10, 5	GM66921-MA7, 5	GM75796-MA15, 13	GM77389-MA3, 7
GM66921-MA11, 5	GM66921-MA8, 5	GM75796-MA16, 13	GM77389-MA4, 7
GM66921-MA12, 5	GM66921-MA9, 5	GM75796-MA17, 13	GM77389-MA5, 7
GM66921-MA13, 5	GM70133-MA1, 11	GM75796-MA2, 13	GM77389-MA6, 7
GM66921-MA14, 5	GM70133-MA2, 11	GM75796-MA3, 13	GM77544-MA1, 7
GM66921-MA15, 5	GM70133-MA3, 11	GM75796-MA4, 13	GM77544-MA2, 7
GM66921-MA16, 5	GM70133-MA5, 11	GM75796-MA5, 13	GM77544-MA3, 7
GM66921-MA17, 5	GM75796-MA1, 13	GM75796-MA6, 13	GM77544-MA4, 7
GM66921-MA18, 5	GM75796-MA10, 13	GM75796-MA7, 13	GM77544-MA5, 7
GM66921-MA2, 5	GM75796-MA11, 13	GM75796-MA8, 13	GM77544-MA6, 7
GM66921-MA3, 5	GM75796-MA12, 13	GM75796-MA9, 13	GM78706-MA1, 9
GM66921-MA4, 5	GM75796-MA13, 13	GM77389-MA1, 7	

TP-6781 5/12b

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