A TOGNUM GROUP BRAND

DIESEL ENGINE-GENERATOR SET
2000-XC6DT2

2000 kWe / 60 Hz / Standby
1800 kWe / 60 Hz / Prime
480 - 13.8kV

SYSTEM RATINGS

Standby

Voltage (L-L)	480V**	600V	4160V	12470V	13200V	13800V
Phase	3	3	3	3	3	3
PF	0.8	0.8	0.8	0.8	0.8	0.8
Hz	60	60	60	60	60	60
kW	2000	2000	2000	2000	2000	2000
kVA	2500	2500	2500	2500	2500	2500
AMPS	3007	2406	347	116	109	105
skVA@30% Voltage Dip	5800	3600	5100	C/F	C/F	C/F
Generator Model*	744RSL4054	744RSS4292	744FSM4374	1020FDH5582	1020FDH5582	1020FDH5582
Temp Rise	130°C/27°C	125°C/40°C	130°C/27°C	130°C/27°C	130°C/27°C	130°C/27°C
Connection	4 BAR WYE	4 BAR WYE	4 BAR WYE	4 BAR WYE	4 BAR WYE	4 BAR WYE

Prime

Voltage (L-L)	480V	600V	4160V	12470V	13200V	13800V
Phase	3	3	3	3	3	3
PF	0.8	0.8	0.8	0.8	0.8	0.8
Hz	60	60	60	60	60	60
kW	1800	1800	1800	1800	1800	1800
kVA	2250	2250	2250	2250	2250	2250
AMPS	2710	2168	312	104	99	94
skVA@30% Voltage Dip	5800	3600	5100	C/F	C/F	C/F
Generator Model*	744RSL4054	744RSS4292	744FSM4374	1020FDH5582	1020FDH5582	1020FDH5582
Temp Rise	105°C/40°C	105°C/40°C	105°C/40°C	105°C/40°C	105°C/40°C	105°C/40°C
Connection	4 BAR WYE	4 BAR WYE	4 BAR WYE	4 BAR WYE	4 BAR WYE	4 BAR WYE

* The Generator Model Number identified in the table is for standard C Series Configuration. Consult the factory for alternate configuration.

** UL2200 Offered

STANDARD FEATURES

// EPA Tier 2 Certified
// Engine-Generator Set Tested to ISO 8528-5 for Transient Response
// UL2200, CSA Listing Offered
// Accepts Rated Load in One Step Per NFPA 110
// All engine-generator sets are prototype and factory tested
// MTU Onsite Energy is a single source supplier
// Global Product Support
// 2 Year Standard Warranty
// 16V 4000 Diesel Engine
- 76.3 Liter Displacement
- Common Rail Fuel Injection
- 4-Cycle

// Complete Range of Accessories
// Permanent Magnet Generator (PMG)
- Brushless, Rotating Field
- 300% Short Circuit Capability
- 2/3 Pitch Windings
- Standard for 570 frame and larger
- Optional for 430 frame and smaller

// Digital Control Panel(s)
- UL Recognized, c UL us, NFPA 110
- Complete System Metering
- LCD Display

// Cooling System
- Integral Set-Mounted
- Engine Driven Fan

STANDARD EQUIPMENT

// Engine

Air Cleaner
Oil Pump
Full Flow Oil Filter
Closed Crankcase Ventilation
Jacket Water Pump
Inter Cooler Water Pump
Thermostats
Exhaust Manifold – Dry
Blower Fan & Fan Drive
Radiator - Unit Mounted
Electric Starting Motor - 24V
Governor – Electronic Isochronous
Base - Structural Steel
SAE Flywheel & Bell Housing
Charging Alternator - 24V
Battery Box & Cables
Flexible Fuel Connectors
Flexible Exhaust Connection
EPA Certified Engine

// Generator

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
Self-Ventilated and Drip-Proof
Superior Voltage Waveform
Digital, Solid State, Volts-per-Hertz Regulator
No Load to Full Load Regulation
Brushless Alternator with Brushless Pilot Exciter
4 Pole, Rotating Field
130°C Standby Temperature Rise
1 Bearing, Sealed
Flexible Coupling
Full Amortisseur Windings
125% Rotor Balancing
3-Phase Voltage Sensing
±0.25% Voltage Regulation
100% of Rated Load - One Step
3% Maximum Harmonic Content

// Digital Control Panel(s)

Digital Metering
Engine Parameters
Generator Protection Functions
Engine Protection
SAE J1939 Engine ECU Communications
Windows-Based Software
Multilingual Capability
Remote Communications to our RDP-110 Remote Annunciator
16 Programmable Contact Inputs
7 Contact Outputs
UL Recognized, c UL us, CE Approved
Event Recording
IP 54 Front Panel Rating with Integrated Gasket
NFPA110 Level Compatible

APPLICATION DATA

// Engine

Manufacturer	MTU
Model	16V 4000 G43 (T1638A36)
Type	4-Cycle
Arrangement	16-V
Displacement: L (in^3)	76.3 (4,656)
Bore: cm (in)	17 (6.69)
Stroke: cm (in)	21 (8.27)
Compression Ratio	16.5:1
Rated RPM	1,800
Engine Governor	Electronic Isochronous (ADEC)
Maximum Power: Standby: kWm (bhp)	2,280 (3,058)
Maximum Power: Prime: kWm (bhp)	2,020 (2,709)
Speed Regulation	±0.25%
Air Cleaner	Dry

// Liquid Capacity (Lubrication)

Total Oil System: L (gal)	300 (79.3)
Engine Jacket Water Capacity: L (gal)	175 (46.2)
After Cooler Water Capacity: L (gal)	50 (13.2)
System Coolant Capacity: L (gal)	651 (172)

// Electrical

Electric Volts DC	24
Cold Cranking Amps Under -17.8°C (0°F)	2,600

// Fuel System

Fuel Supply Connection Size	1" NPT
Fuel Return Connection Size	3/4" NPT
Maximum Fuel Lift: m (ft)	1 (3)
Recommended Fuel	Diesel #2
Total Fuel Flow: L/hr (gal/hr)	1,020 (269)

// Fuel Consumption

	STANDBY	PRIME
At 100% of Power Rating: L/hr (gal/hr)	558 (147.3)	487 (128.6)
At 75% of Power Rating: L/hr (gal/hr)	426 (112.6)	381 (100.7)
At 50% of Power Rating: L/hr (gal/hr)	299 (78.9)	265 (69.9)

// Cooling - Radiator System

	STANDBY	PRIME
Ambient Capacity of Radiator: °C (°F)	40 (104)	40 (104)
Maximum Restriction of Cooling Air, Intake, and Discharge Side of Rad.: kPa (in. H_20)	0.12 (0.5)	0.12 (0.5)
Water Pump Capacity: L/min (gpm)	1,350 (357)	1,350 (357)
After Cooler Pump Capacity: L/min (gpm)	583 (154)	583 (154)
Heat Rejection to Coolant: kW (BTUM)	874 (49,704)	770 (43,790)
Heat Rejection to After Cooler: kW (BTUM)	671 (38,160)	572 (32,530)
Heat Radiated to Ambient: kW (BTUM)	184 (10,478)	173.6 (9,871)

// Air Requirements

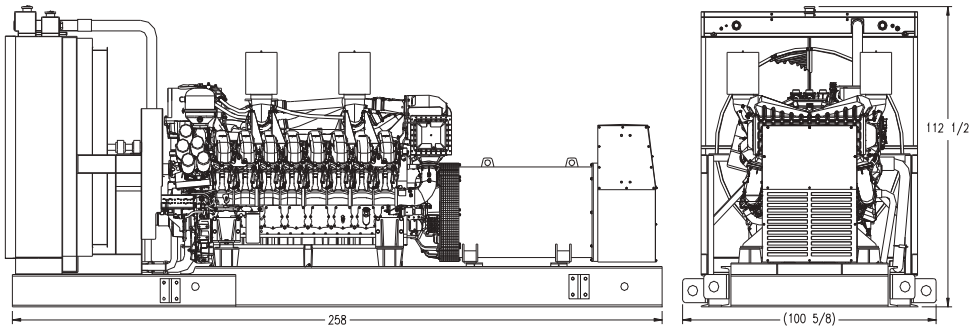
	STANDBY	PRIME
Aspirating: *m^3/min (SCFM)	186 (6,569)	180 (6,357)
Air Flow Required for Rad. Cooled Unit: *m^3/min (SCFM)	2,270 (80,160)	2,270 (80,160)
Air Flow Required for Heat Exchanger/Remote Rad. based on 25°F Rise: *m^3/min (SCFM)	673 (23,631)	634 (22,262)

* Air density = 1.184 kg/m^3 (0.0739 lbm/ft^3)

// Exhaust System

	STANDBY	PRIME
Gas Temp. (Stack): °C (°F)	480 (896)	435 (815)
Gas Volume at Stack Temp: m^3/min (CFM)	456 (16,103)	426 (15,044)
Maximum Allowable Back Pressure: kPa (in. H_20)	8.5 (34.1)	8.5 (34.1)

WEIGHTS AND DIMENSIONS



Drawing above for illustration purposes only, based on standard open power 480 volt engine-generator set. Lengths may vary with other voltages. Do not use for installation design. See website for unit specific template drawings.

System	Dimensions (L x W x H)	Weight (less tank)
OPU	6,550 x 2,560 x 2,860 mm (258 x 100.6 x 112.5 in)	16,477 kg (36,326 lb)

Weights and dimensions are based on open power units and are estimates only. Consult the factory for accurate weights and dimensions for your specific engine-generator set.

SOUND DATA

Unit Type	Standby Full Load	Standby No Load	Prime Full Load	Prime No Load
OPU w/Critical Grade Muffler (dBA)	104	97	102.5	97

Sound data is provided at 7 m (23 ft).

EMISSIONS DATA

NO_x + NMHC	CO	PM
C/F	C/F	C/F

All units are in g/hp-hr and are EPA D2 cycle values. Emission levels of the engine may vary as a function of ambient temperature, barometric pressure, humidity, fuel type and quality, installation parameters, measuring instrumentation, etc. The data provided are laboratory results from one engine representing this rating. The data was obtained under controlled environmental conditions with calibrated instrumentation traceable to the United States National Bureau of Standards and in compliance with US EPA regulations found within 40 CFR Part 89. The weighted cycle value from each engine is guaranteed to be below the US EPA Standards at the US EPA defined conditions.

RATING DEFINITIONS AND CONDITIONS

// 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. No overload capability for this rating. Ratings are in accordance with ISO-3046/1, BS 5514, AS 2789, and DIN 6271.

// 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.

// Deration Factor:
Altitude: 1.2% per 100 m (328 ft) above 1,700 m (5,577 ft) at 25°C (77°F). Maximum operation height 3,000 m (9,842 ft). Consult your local MTU Onsite Energy Power Generation Distributor for other altitudes.
Temperature: 1% per 5°C (9°F) over 45°C (113°F) at 100 m (328 ft).

Materials and specifications subject to change without notice.
C/F = Consult Factory/MTU Onsite Energy Distributor

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF TRANSPORTATION AND AIR QUALITY
WASHINGTON, DC 20460

CERTIFICATE OF CONFORMITY
2010 MODEL YEAR

Manufacturer:	**MTU DETROIT DIESEL, INC.**
Engine Family:	**AMDDL95.4XTR**
Certificate Number:	**MDD-NRCI-10-06**
Intended Service Class:	**NR 9 (>560)**
Fuel Type:	**DIESEL**
FELs:	NMHC +NOx: **N/A** NOx: **N/A** PM: **N/A**
Effective Date:	**12/17/2009**
Date Issued:	**12/17/2009**

Karl J. Simon, Director
Compliance and Innovative Strategies Division
Office of Transportation and Air Quality

Pursuant to Section 111 and Section 213 of the Clean Air Act (42 U.S.C. sections 7411 and 7547) and 40 CFR Part 60 and Part 89, and subject to the terms and conditions prescribed in those provisions, this certificate of conformity is hereby issued with respect to the test engines which have been found to conform to applicable requirements and which represent the following stationary and nonroad engines, by engine family, more fully described in the documentation required by 40 CFR Part 60 and 89, and produced in the stated model year.

This certificate of conformity covers only those new stationary and nonroad compression-ignition engines which conform in all material respects to the design specifications that applied to those engines described in the documentation required by 40 CFR Part 60 and 89 and which are produced during the model year stated on this certificate of the said manufacturer, as defined in 40 CFR Part 60 and 89.

It is a term of this certificate that the manufacturer shall consent to all inspections described in 40 CFR 89.129-96 and 89.506-96 and authorized in a warrant or court order. Failure to comply with the requirements of such a warrant or court order may lead to a revocation or suspension of this certificate for reasons specified in 40 CFR Part 89. It is also a term of this certificate that this certificate may be revoked or suspended or rendered void ab initio for other reasons specified in 40 CFR Part 89.

This certificate does not cover stationary and nonroad engines sold, offered for sale, or introduced, or delivered for introduction, into commerce in the U.S. prior to the effective date of the certificate.

California Environmental Protection Agency AIR RESOURCES BOARD	MTU DETROIT DIESEL, INC.	EXECUTIVE ORDER U-R-052-0014 New Off-Road Compression-Ignition Engines

Pursuant to the authority vested in the Air Resources Board by Sections 43013, 43018, 43101, 43102, 43104 and 43105 of the Health and Safety Code; and

Pursuant to the authority vested in the undersigned by Sections 39515 and 39516 of the Health and Safety Code and Executive Order G-02-003;

IT IS ORDERED AND RESOLVED: That the following compression-ignition engines and emission control systems produced by the manufacturer are certified as described below for use in off-road equipment. Production engines shall be in all material respects the same as those for which certification is granted.

MODEL YEAR	ENGINE FAMILY	DISPLACEMENT (liters)	FUEL TYPE	USEFUL LIFE (hours)
2010	AMDDL95.4XTR	57.2, 76.3, 95.4	Diesel	8,000

SPECIAL FEATURES & EMISSION CONTROL SYSTEMS	TYPICAL EQUIPMENT APPLICATION
Electronic Direct Injection, Turbocharger, Charge Air Cooler, Electronic Control Module	Loader, Tractor, Pump, Compressor, Generator Set

The engine models and codes are attached.

The following are the exhaust certification standards (STD) and certification levels (CERT) for hydrocarbon (HC), oxides of nitrogen (NOx), or non-methane hydrocarbon plus oxides of nitrogen (NMHC+NOx), carbon monoxide (CO), and particulate matter (PM) in grams per kilowatt-hour (g/kW-hr), and the opacity-of-smoke certification standards and certification levels in percent (%) during acceleration (Accel), lugging (Lug), and the peak value from either mode (Peak) for this engine family (Title 13, California Code of Regulations, (13 CCR) Section 2423):

RATED POWER CLASS	EMISSION STANDARD CATEGORY		EXHAUST (g/kW-hr)					OPACITY (%)		
			HC	NOx	NMHC+NOx	CO	PM	ACCEL	LUG	PEAK
kW > 560	Tier 2	STD	N/A	N/A	6.4	3.5	0.20	20	15	50
		CERT	--	--	5.9	1.9	0.20	4	2	5

BE IT FURTHER RESOLVED: That for the listed engine models, the manufacturer has submitted the information and materials to demonstrate certification compliance with 13 CCR Section 2424 (emission control labels), and 13 CCR Sections 2425 and 2426 (emission control system warranty).

Engines certified under this Executive Order must conform to all applicable California emission regulations.

This Executive Order is only granted to the engine family and model-year listed above. Engines in this family that are produced for any other model-year are not covered by this Executive Order.

Executed at El Monte, California on this 11 day of February 2010.

Annette Hebert, Chief
Mobile Source Operations Division

TKF-Nr. 1127-07
Anlage

Emission (Nominal)[1]

Engine	Unit	16V4000G43 3D (Standby)			
		2280 kWm	**1710 kWm**	**1140 kWm**	**570 kWm**
NOx	g/kWh	6.933	5.456	4.64	4.549
HC	g/kWh	0.134	0.17	0.236	0.494
CO	g/kWh	0.799	0.831	0.905	1.883
PM	g/kWh	0.074	0.114	0.182	0.427

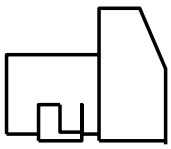
Emission (Nominal)[1]

Engine	Unit	16V4000G43 3B (Prime)			
		2020 kWm	**1515 kWm**	**1010 kWm**	**505 kWm**
NOx	g/kWh	7.192	5.533	5.136	4.89
HC	g/kWh	0.164	0.199	0.291	0.641
CO	g/kWh	0.604	0.695	0.794	1.908
PM	g/kWh	0.086	0.115	0.198	0.383

[1] Emission data measurement procedures are consistent with those described in EPA CFR 40 Part 89, and ISO 8178-1 for measuring NOx, HC, CO, and PM. Data shown is based on steady state operating conditions of 25°C and 960 mbar and diesel fuel due to EN 590. The nominal emission data shown is subject to instrumentation, measurement, facility, and engine-to-engine variations. Field emission test data are not guaranteed to these values. Emission data cannot be used to compare to EPA regulations which use values based on weighted cycle.

MARATHON ELECTRIC GENERATORS

TYPICAL SUBMITTAL DATA



MODEL : 744FSM4374

BASE MODEL: 744FSM4374 **Winding H-SG740240**

Submittal Data: 4160 Volts*, 2050.4 kW, 2563 kVA, 0.8 P.F., 1800 RPM, 60 Hz, 3 Phase

2/18/2009

Kilowatt ratings at	**1800 RPM**		**60 Hertz**		**6 LEADS**	**Standard Medium Voltage**		
kW (kVA)		**3 Phase**	**0.8 Power Factor**			**Dripproof or Open Enclosure**		
	Class B	**Class F**				**Class H**		
Voltage*	**80° C ① Continuous**	**90° C ① Lloyds**	**95° C ① ABS**	**105° C British Standard**	**105° C Continuous**	**130° C ① Standby**	**125° C British Standard**	**125° C Continuous**	**150° C ① Standby**
4160	1525 (1906)	1680 (2100)	1680 (2100)	1860 (2325)	1875 (2344)	2050 (2563)	1860 (2325)	2050 (2563)	2050 (2563)

① *Rise by resistance method, Mil-Std-705, Method 680.1b.* *British Standard Rating per BS 5000*

Submittal Data: 4160 Volts*, 2050.4 kW, 2563 kVA, 0.8 P.F., 1800 RPM, 60 Hz, 3 Phase **STD. CONNECTION**

Mil-Std-705B Method	**Description**	**Value**
301.1b	Insulation Resistance	>10 Meg
302.1a	High Potential Test	
	Main Stator	9320 Volts
	Main Rotor	1500 Volts
	Exciter Stator	1500 Volts
	Exciter Rotor	1500 Volts
	PMG Stator	1500 Volts
401.1a	Stator Resistance, Line to Line	
	High Wye Connection	0.072 Ohms
	Rotor Resistance	1.196 Ohms
	Exciter Stator	22.1 Ohms
	Exciter Rotor	0.066 Ohms
	PMG Stator	2.1 Ohms
410.1a	No Load Exciter Field Amps	0.79 A DC
	at 4160 Volts Line to Line	
420.1a	Short Circuit Ratio	0.575
421.1a	Xd Synchronous Reactance	2.108 pu
		14.222 ohms
422.1a	X2 Negative Sequence React.	0.207 pu
		1.397 ohms
423.1a	X0 Zero Sequence Reactance	0.023 pu
		0.155 ohms
425.1a	X'd Transient Reactance	0.126 pu
		0.85 ohms
426.1a	X''d Subtransient Reactance	0.098 pu
		0.661 ohms
--	Xq Quadrature Synch. React.	Not Available
427.1a	T'd Transient Short Circuit	
	Time Constant	0.178 sec.
428.1a	T''d Subtransient Short Circuit	
	Time Constant	0.013 sec.
430.1a	T'do Transient Open Circuit	
	Time Constant	2.55 sec.
432.1a	Ta Short Circuit Time	
	Constant of Armature Winding	0.055 sec.

Mil-Std-705B Method	**Description**	**Value**
505.3b	Overspeed	2250 RPM
507.1c	Phase Sequence CCW-ODE	ABC
508.1c	Voltage Balance, L-L or L-N	0.20%
601.4a	L-L Harmonic Maximum - Total	5.0%
	(Distortion Factor)	
601.4a	L-L Harmonic Maximum - Single	3.0%
601.1c	Deviation Factor	5.0%
---	TIF (1960 Weightings)	< 50
---	THF (IEC, BS & NEMA Weightings)	< 2 %
652.1a	Shaft Current	< 0.1 ma
---	Main Stator Capacitance to ground	0.06 mfd
	Additional Prototype Mil-Std Methods are Available on Request.	
--	Generator Frame	744
--	Type	MAGNAMAXDVR
--	Insulation	Class H
--	Coupling - Single Bearing	Flexible
--	Amortisseur Windings	Full
--	Excitation	Ext. Voltage Regulated, Brushless
--	Voltage Regulator	DVR2000E
--	Voltage Regulation	0.25%
--	Cooling Air Volume	3400 CFM
--	Heat rejection rate	5655 Btu's/min
--	Full load current	356 amps
--	Minimum Input hp required	2881.8
	Efficiency at rated load :	95.4%
--	Full load torque	8405 Lb-ft

(3) Excitation support system or PMG required to sustain short circuit currents.

** Voltages refer to wye (star) connection, unless otherwise specified.*

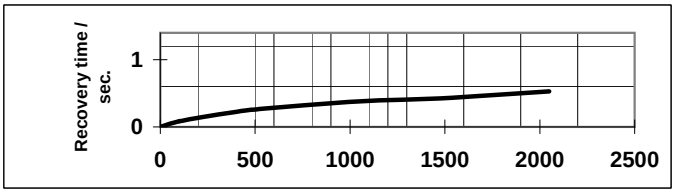
MARATHON ELECTRIC GENERATORS

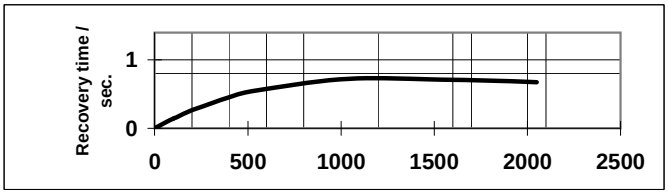
TYPICAL DYNAMIC CHARACTERISTICS

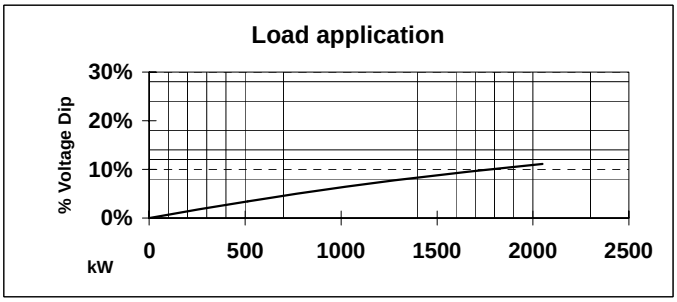
MODEL : 744FSM4374

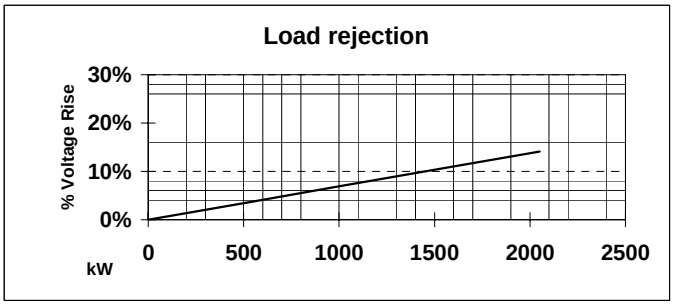
BASE MODEL: 744FSM4374 **Winding H-SG740240**

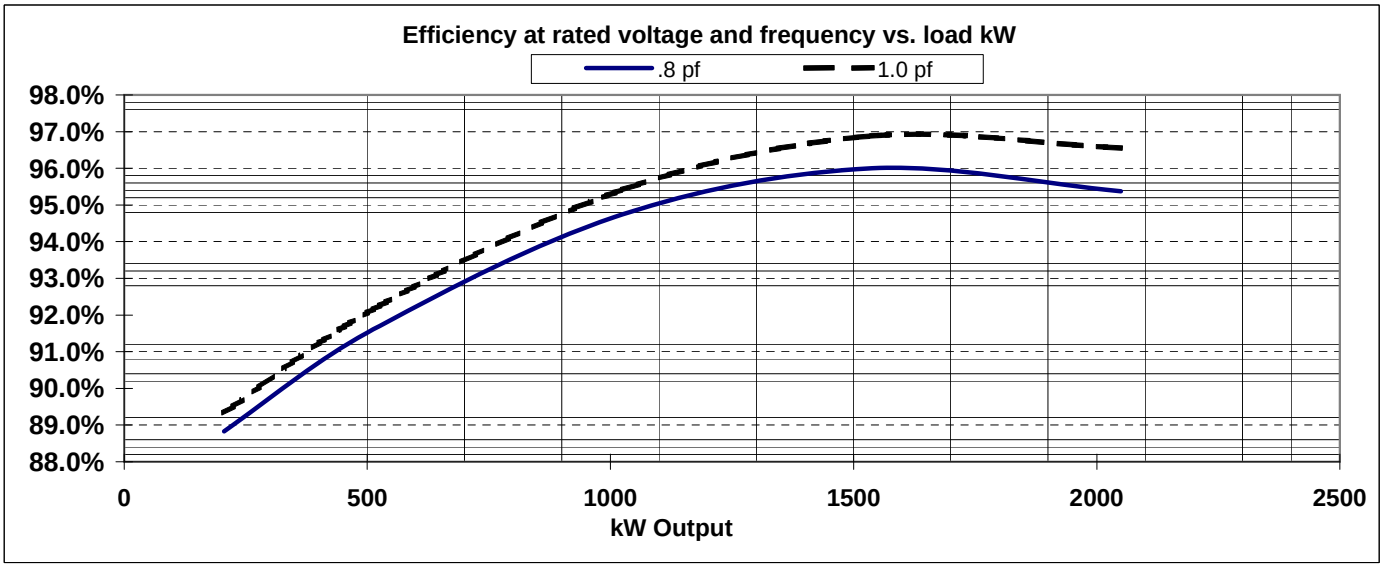
Submittal Data: 4160 Volts*, 2050.4 kW, 2563 kVA, 0.8 P.F., 1800 RPM, 60 Hz, 3 Phase

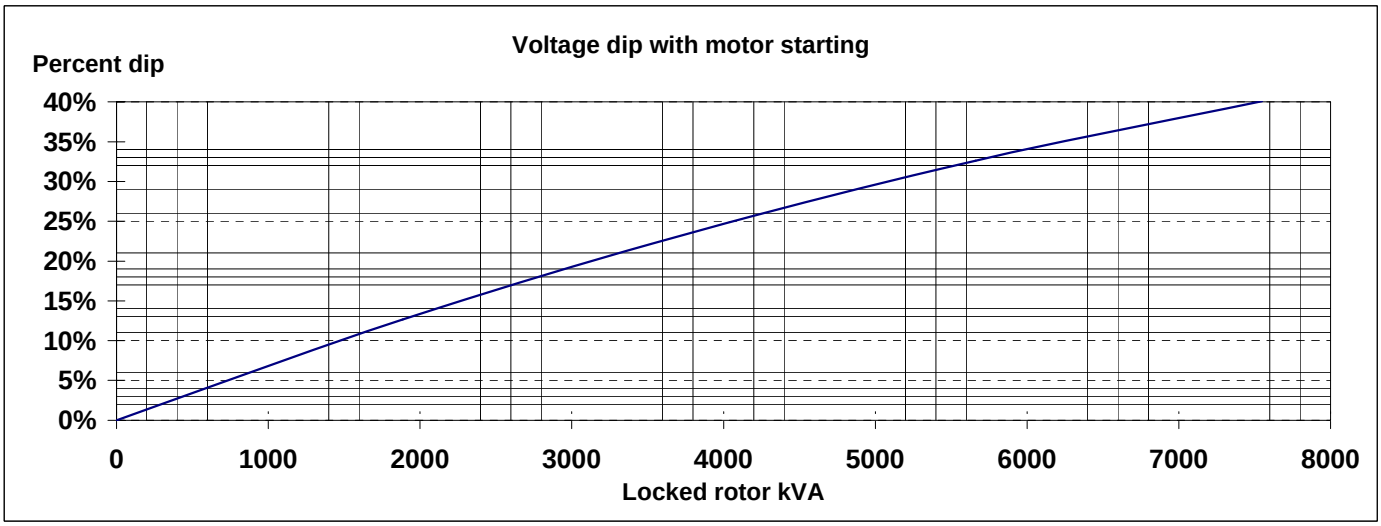




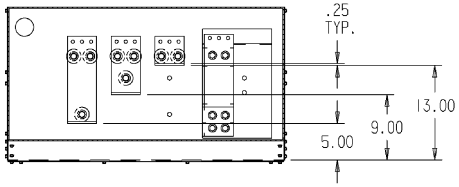




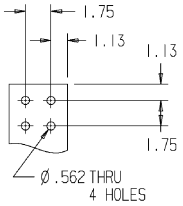




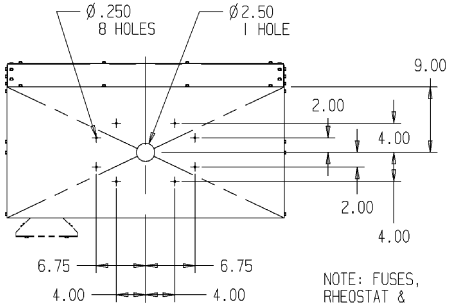
B-SS525998



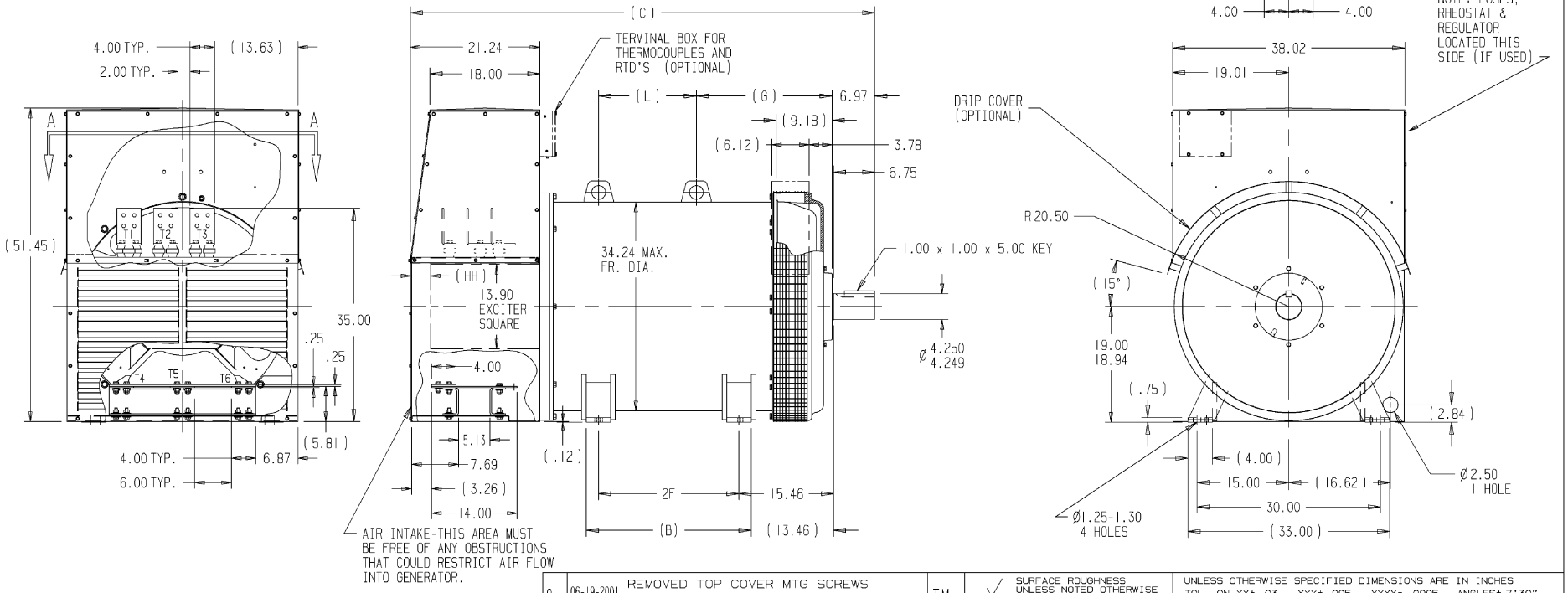
SECT. A-A



BUSBAR DETAIL
SCALE: 1:8



NOTE: FUSES, RHEOSTAT & REGULATOR LOCATED THIS SIDE (IF USED)



DASH	FRAME	C	G	L	HH	2F	B
370	741	76.02	22.20	16.00	3.18	23.00	27.00
440	742	83.02	20.70	24.00	3.18	23.00	27.00
505	743	89.52	20.70	29.00	2.68	37.00	41.00
570	744	96.02	20.20	34.00	2.68	37.00	41.00

REV	DATE	CHANGE	NAME
9	06-19-2001	REMOVED TOP COVER MTG SCREWS CN 34022	TM
8	07-28-1994	REV. JACKSCREW HOLE LOC. CN 18358	TM
7	02-23-1993	REV. METER PANEL MTG HOLES CN 15272	TM

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SURFACE ROUGHNESS UNLESS NOTED OTHERWISE

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOL. ON XX± .03 XXX± .005 XXXX± .0005 ANGLES± 7'30"

MATL SPEC: 742RDL2509AA

U.S. CUSTOMARY - 500
METRIC - 600

MARATHON ELECTRIC
WAUSAU, WISCONSIN 54401

DRAWN BY	TM	07-15-1988
CHKD BY	FG	07-15-1988
APPD BY	LC	07-15-1988

PART NAME: OUTLINE
740 FR. GEN. - DBL. BRG - 6 BUSBARS

DRWG NO: B-SS525998

CADD FILE NO.: SS525998

Digital Genset Controller

DGC-2020

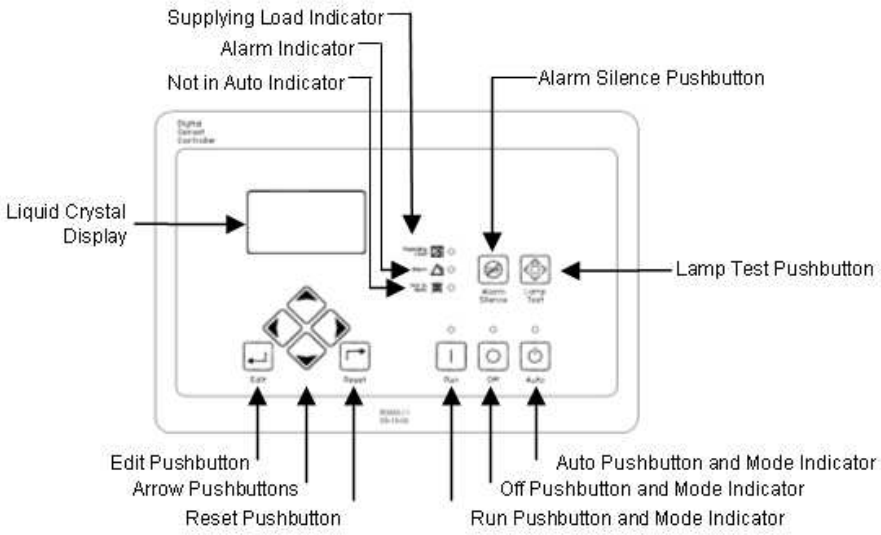
HIGHLIGHTS

- UL Recognized, c UL us , CE approved
- NFPA-110 compatible
- Microprocessor based
- Windows-based software for optional remote operation (Software can be downloaded at www.mtuonsitenergy.com)
- Complete system metering
- Expandable to meet customer needs
- Optional accessories for Ethernet communication

DESCRIPTION

MTU Onsite Energy's Digital Genset Controller (DGC-2020) is a highly advanced integrated genset control system. The DGC-2020 is perfectly focused, combining rugged construction and microprocessor technology to offer a product that will hold up to almost any environment and flexible enough to meet your application's needs. This device provides genset control, transfer switch control, metering, protection and programmable logic in a simple, easy to use, reliable, rugged, and cost effective package.

DIAGRAM



Front Panel LED Indicators:

- Run: Green - Indicates the DGC is in the RUN mode.
- Off: Red - Indicates the DCG is in the OFF mode.
- Auto: Green - Indicates the unit is in the AUTO mode of operation.
- Not in Auto: Red - Indicates unit is not in the AUTO mode.
- Supplying Load: Green - Indicates the system is supplying current to a connected load.
- Alarm: Red - Indicates an alarm situation by continuous illumination. Indicates a Pre-alarm by flashing.

Digital Genset Controller

DGC-2020

Standard Features	Level 1	Level 2	Level 3
Generator Metering	√	√	√
Engine Monitoring	√	√	√
Genset Control	√	√	√
Emergency Stop	√	√	√
Engine Protection	√	√	√
Windows-Based Software (BESTCOMSPlus)	√	√	√
Automatic Transfer Switch Control	√	√	√
Event Recording	√	√	√
Suitable for use on rental gensets with Hi/Lo line sensing or single or three phase sensing override	√	√	√
SAE J1939 Engine ECU Communications (Expandable I/O Capability)	√	√	√
Modbus Communications via RS-485	√	√	√
Multilingual Capability (English, Spanish, Chinese)	√	√	√
Extremely Rugged, Fully Encapsulated Design	√	√	√
16 Programmable Contact Inputs	√	√	√
12 Programmable 2 Adc Form A Rated Contact Outputs	√	√	√
Wide Ambient Temperature Range (-40 to -70°C / -40 to -158°F)	√	√	√
NFPA110 Compatible	√	√	√
HALT (Highly Accelerated Life Tests) Tested	√	√	√
IP 54 Front Panel Rating with Integrated Gasket	√	√	√
LCD Heater	√	√	√
UL-508 Compatible	√	√	√
UL Recognized, c UL us, CE Approved	√	√	√
Current Sensing (5A CT Inputs)	√	√	√
Generator Frequency - 50/60 Hz	√	√	√
Battery Backup for Real Time Clock	√	√	√
Generator Protection (27, 32, 40Q, 59, 81O, 81U)	√	√	√
Generator Protection (47, 51)		√	√
Internal Dial-Out Modem (Remote Dial-Out and Dial-In Capability)		√	√
Automatic Synchronizer			√

Optional Accessories	Level 1	Level 2	Level 3
Analog Extension Module 2020 (AEM-2020)	√	√	√
Load Share Module 2020 (LSM-2020)			
• Ethernet	√	√	√
• Parallel (*Must have autosync panel to loadshare)*			√
Contact Expansion Module 2020 (CEM-2020)	√	√	√
Modbus RTU-TCP Gateway	√	√	√
Remote Communications to RDP-110 Remote Annunciator Option	√	√	√

FUNCTIONS

Genset Protection:

Generator (All Levels):	Undervoltage (27)	Overvoltage (59)
ANSI Codes	Reverse Power (32)	Overfrequency (81O)
	Loss of Excitation (40Q)	Underfrequency (81U)
Generator (Level 2 / 3 only):	Phase Imbalance (47)	Generator Overcurrent (51)
ANSI Codes		

All Generator Protection features are programmable as alarms, pre-alarms, status or not used.

Engine:	*Alarms (Shutdowns)*	*Pre-Alarms (Warnings)*
	Low Oil Pressure	Low Oil Pressure
	High Coolant Temperature	High Coolant Temperature
	Low Coolant Level	Low Coolant Temperature
	Low Fuel Level	Battery Overvoltage
	Overspeed	Weak Battery
	Overcrank	Battery Charger Failure
	Engine Sender Unit Failure	Engine Sender Unit Failure
	Fuel Leak/Fuel Sender Failure	Engine kW Overload (3 levels)
	Emergency Stop	Maintenance Interval Timer
	Battery Charger Failure	Low Coolant Level
	Critical Low Fuel Shutdown	Low Fuel Level
		Fuel Leak Detect
		High Fuel Level

All alarms and pre-alarms can be enabled or disabled via the BESTCOMSPlus PC software or the front panel. Additional custom alarms and pre-alarms are available upon request.

Genset Metering:

- Generator parameters consist of 8 standard parameters including, but not limited to voltage, current, Hz, real power (watts), apparent power (VA), and power factor. The view can be programmed to display up to 20 parameters using the scrolling and time delay feature.
- Engine parameters include oil pressure, coolant temperature, RPM, battery voltage, fuel level, engine runtime, and various J1939 supported parameters.

Engine Control:

- Cranking Control: Cycle or Continuous (Quantity and Duration Fully Programmable)
- Engine Cooldown: Smart Cooldown function saves fuel and engine life.
- Successful Start Counter: Counts and records successful engine starts
- Timers including, but not limited to:
  - Engine Cooldown Timer
  - Engine Maintenance Timer
  - Pre-Alarm Time Delays for Weak/Low Battery Voltage
  - Alarm Time Delay for Overspeed
  - Alarm Time Delay for Sender Failure
  - Arming Time Delays after Crank Disconnect:
    - Low Oil Pressure
    - High Coolant Temperature

FUNCTIONS

Event Recording
The DGC-2020 has an event recorder that provides a record of alarms, pre-alarms, engine starts, engine runtime loaded, engine runtime unloaded, last run date, and many other events that are all date and time stamped to help the user determine the cause and effect of issues related to the generator set. Contains 30 event records each retaining up to 99 occurrences in memory. Time, date and engine hour detail is available for the most current 30 occurrences within each event record.

Transfer Switch Control (Mains Failure) - Level 3 only
The DGC-2020 monitors utility (mains) and determines if it is providing voltage that is suitable for the loads. If the utility (mains) goes beyond predetermined levels, the generator is started and the utility (mains) is disconnected from the load and the generator is connected. When the utility (mains) returns to acceptable levels for a sufficient time, the generator is disconnected and the utility (mains) is reconnected to the load. It also includes appropriate adjustable timers or time delays for establishing stable utility (mains) operation. Utility breakers must be electronically operated.

RS-485 Communications
When utilized, the user can send and receive information from the DGC-2020 via the RS-485 communications port and Modbus-RTU protocol. This feature allows the DGC-2020 controlled genset to be fully integrated into the building management system. Please see the Instruction Manual for the Modbus register list.

Programmable Logic
The DGC-2020 offers a very powerful, yet easy to use, programmable logic scheme for custom programming of the various inputs, outputs, alarms, and pre-alarms. It allows these elements to be integrated into a complete logic scheme so that the user can meet even the most complex specification. The Programmable Logic control includes the selection of logic gates and timers with drag-and-drop technology to make it fast and simple.

Remote Display Panel Annunciation
The DGC-2020 can communicate to a remote display panel, Model RDP-110. This requires only two wires to annunciate all of the alarms and pre-alarms required by NFPA-110 Level I and II. External power is required.

Modem - Level 2 and 3 only
A dial-out modem enables remote control, monitoring, and setting of the DGC-2020. When an alarm or pre-alarm condition occurs, the DGC-2020 can dial up to four telephone numbers, in sequence, until an answer is received and the condition is annunciated.

J1939 Communications
J1939 CANBUS communications allows the DGC-2020 to communicate to the engine's ECU (Engine Control Unit) to gather critical engine information like oil pressure, engine coolant temperature, RPM, battery voltage, and many more. By utilizing the ECU, adding analog engine senders is no longer required. This can save substantial money for the installer. It also eliminates any errors or discrepancies between the ECU data and the data displayed on the DGC-2020 that may be present due to analog sender inaccuracies or incompatibility. A total of 47 engine parameters can be obtained via the ECU. You also can derive the added benefit of having access to the ECU's diagnostic troubleshooting codes, or DTCs. The DTCs provide information about the engine's operating conditions and communicates these via J1939, to the DGC, thus eliminating the need for hand-held service tools to diagnose simple engine issues. With the optional modem, the DTCs can be accessed remotely, and valuable service time can be saved by remote diagnostics and taking the right parts to fix the problem the first time.

SPECIFICATIONS

Operating Power:

- Nominal: 12 or 24 Vdc
- Range: 6 to 32 Vdc
- Power Consumption:
  - Sleep Mode: 5W with all relays non-energized
  - Typical Operational Mode: 14.2W - Run mode, LCD heater on, 6 relays energized
- Battery Ride Through: Withstands cranking ride-through down to 0 V for 50 ms (typical)

Current Sensing: **5 Amps AC Current Sensing**

Continuous Rating ..... 0.1 to 5.0 Amps AC
1 Second Rating ..... 10 Amps AC
Burden ..... 1 VA

Voltage Sensing:

- Range: 12 to 576 V rms, line-to-line
- Frequency Range:10 to 72 Hz for 50/60 style
- Burden: 1 VA
- 1 Second Rating: 720 V rms

Contact Sensing/Input Contacts:

- Contact sensing inputs include 1 emergency stop input and 16 programmable inputs. The factory utilizes up to (3) of these inputs. The emergency stop input accepts normally closed, dry contacts. The remote emergency stop is limited to 75 ft. standard. Extended runs are available with optional relay. All programmable inputs accept normally open, dry contacts.

Engine System Inputs:

- Fuel Level Sensing Resistance Range: 33 to 240 Ω nominal
- Coolant Temperature Sensing Resistance Range: 62.6 to 637.5 Ω nominal
- Oil Pressure Sensing Resistance Range: 34 to 240 Ω nominal
- Engine Speed Sensing:
  - Magnetic Pickup
  - Frequency Range: 32 to 10,000 Hz
  - Voltage Range: 3 to 35 V peak (6 to 70 V peak-peak)
  - Generator Voltage Range: 12 to 576 V rms

Output Contacts:

- 15 Form A Total Programmable Outputs: (3) 30 Adc and (12) 2 Adc
  - The factory typically utilizes (5) on each gen-set which can be reprogrammed as needed:
    - (3) 30 Adc for Run, Start and Pre-Start
    - (2) 2 Adc for Audible Alarm and Alarm Output
  - (10) 2 Adc remain as user-defined outputs

SPECIFICATIONS

Metering:

- Generator Voltage (rms)
  - Metering Range: 0 to 576 Vac (direct measurement), 577 to 9,999 Vac (through VT using VT ratio setting)
  - Accuracy: ±1.0% of programmed rated voltage or ±2 Vac
- Generator Current (rms)
  - Generator current is measured at the secondary windings of user-supplied 1 A or 5 A CTs.
  - Metering Range: 0 to 5,000 Aac
  - CT Primary Range: 1-5,000 Aac,in primary increments of 1 Aac
  - Accuracy: ±1.0% of programmed rated current or ±2 Aac
- Generator Frequency
  - Metering Range: 10 to 72 Hz (50/60 Hz), 10 to 480 (400 Hz)
  - Accuracy: ±0.25% or 0.05 Hz
- Apparent Power
  - Indicates total kVA and individual line kVA (4-wire, line-to-neutral or 3-wire, line-to-line).
  - Accuracy: ±3% or the full-scale indication or ±2 kVA
- Power Factor
  - Metering Range: 0.2 leading to 0.2 lagging
  - Accuracy: ±0.02
- Real Power
  - Indicates total kW and individual line kW (4-wire, line-to-neutral or 3-wire line-to-line)
  - Accuracy: ±3% of the full-scale indication or ±2 kW
- Oil Pressure
  - Metering Range: 0 to 145 psi or 0 to 1,000 kPa
  - Accuracy: ±3% of actual indication or ±2 psi or ±12 kPa (subject to accuracy of sender)
- Coolant Temperature
  - Metering Range: -40 to 410°F or -40 to 210°C
  - Accuracy: ±3% or actual indication or ±2° (subject to accuracy of sender)
- Fuel Level
  - Metering Range: 0 to 100%
  - Accuracy: ±2% (subject to accuracy of sender)
- Battery Voltage
  - Metering Range: 6 to 32 Vdc
  - Accuracy: ±3% of actual indication or ±0.2 Vdc
- Engine RPM
  - Metering Range: 0 to 4,500 rpm
  - Accuracy: ±2% of actual indication or ±2 rpm
- Engine Run Time
  - Engine run time is retained in nonvolatile memory.
  - Metering Range: 0 to 99,999 h, Update Interval: 6 min
  - Accuracy: ±1% of actual indication or ±12 min
- Maintenance Timer
  - Maintenance timer indicates the time remaining until genset service is due. Value is retained in nonvolatile memory.
  - Metering Range: 0 to 5,000 h, Update Interval: 6 min
  - Accuracy: ±1% of actual indication or ±12 min

SPECIFICATIONS

Generator Protection Functions:

- Overvoltage (59) and Undervoltage (27)
  - Pickup Range: 70 to 576 Vac
  - Activation Delay Range: 0 to 30 s
- Underfrequency (81U) and Overfrequency (81O)
  - Pickup Range: 45 to 66 Hz (50/60 Hz nominal), 360 to 440 Hz (400 Hz nominal)
  - Pickup Increment: 0.1 Hz (50/60 Hz nominal), 0.1 Hz (400 Hz nominal)
  - Activation Delay Range: 0 to 30 s
- Reverse Power (32)
  - Pickup Range: –50 to 5%
  - Pickup Increment: 0.1%
  - Hysteresis Range: 1 to 10%
  - Hysteresis Increment: 0.1%
  - Activation Delay Range: 0 to 30 s
  - Activation Delay Increment: 0.1 s
- Loss of Excitation (40Q)
  - Pickup Range: –150 to 0%
  - Pickup Increment: 0.1%
  - Hysteresis Range: 1 to 10%
  - Hysteresis Increment: 0.1%
  - Activation Delay Range: 0 to 30 s
  - Activation Delay Increment: 0.1 s
- Phase Imbalance (47): Level 2 and 3 only
  - Pickup Range: 5 to 100 Vac
  - Pickup Increment: 1 Vac
  - Activation Delay Range: 0 to 30 s, Activation Delay Increment: 0.1 s
- Overcurrent (51): Level 2 and 3 only
  - Pickup Range: 0.18 to 1.18 Aac (1 A current sensing), 0.9 to 7.75 Aac (5 A current sensing)
  - Time Dial Range: 0 to 30 s (fixed time curve), 0 to 9.9 (inverse curve time multiplier)
  - Inverse Time Curves: 17 selectable Time Overcurrent Characteristic Curves

Environmental:

- Temperature: Operating: -40 to 70°C (-40 to 158°F), Storage: -40 to 85°C (-40 to 185°F)
- Humidity: IEC 68-2-38
- Salt Fog: ASTM B 17-73, IEC 68-2-11 (tested while operational)
- Ingress Protection: IEC IP54 for front panel
- Shock: 15 G in 3 perpendicular planes
- Vibration:

5 to 29 to 5 Hz:	1.5 G peak for 5 min.
29 to 52 to 29 Hz:	0.036" DECS-A for 2.5 min.
52 to 500 to 52 Hz:	5 G peak for 7.5 min.

Swept over the above ranges for 12 sweeps in each of 3 mutually perpendicular planes with each 15-minute sweep.

Agency Approvals:

- UL/CSA Approvals: "cURus" approved to UL 508 R and CSA C22.2 No.14
- NFPA Compliance: Complies with NFPA Standard 110, Standard for Emergency and Standby Power.

CE Compliance:

This product complies with the requirements of the following EC Directives:

- Low Voltage Directive (LVD) - 73/23/EEC as amended by 93/68/EEC
- Electromagnetic Compatibility (EMC) - 89/336/EEC as amended by 92/31/EEC and 93/68/EEC
- EN 50178:1997 - Electronic Equipment for use in Power Installations
- EN 61000-6-4:2001 - Electromagnetic Compatibility (EMC), Generic Standards, Emission Standard for Industrial Environments
- EN 61000-6-2:2001 - Electromagnetic Compatibility (EMC), Generic Standards, Immunity for Industrial Environments

ADDITIONAL SPECIFICATIONS

The DGC-2020 has been designed to provide maximum functionality at a minimum price. You only buy what you need. Below are options selected to help maximize the value provided by the DGC-2020.

Battery Backup for Real Time Clock - All Levels
A ten-year (typical life) lithium battery is used to provide long-term maintenance of the real time clock setting. This battery is serviceable by removing the rear cover. The settings, programming, and event records are saved in nonvolatile memory and do not require battery backup.

Internal Dial-In / Dial-Out Modem - Levels 2 and 3
The DGC-2020 can provide long distance communications by including an internal modem. There are two modems available, one for U.S. and one for European telephone systems. When a modem is selected, the user can access the DGC-2020 from virtually anywhere via a telephone line. The user can control and monitor the genset as if standing right next to it. The DGC-2020 can also dial out for pre-programmed circumstances to alert the user of selected conditions.

Additional Generator Protection - Levels 2 and 3
In addition to the standard generator protection (27, 32, 40Q, 59, 81O, 81U), the DGC-2020 also can be equipped with a more sophisticated generator protection system. This option provides an overcurrent element (51) with 17 selectable time current characteristic curves and a voltage phase balance protection function (47).

Breaker Management - Level 3 only
The DGC-2020 is capable of controlling the generator breaker and the mains breaker. The status of the breakers is determined by using BESTLogicPlus Programmable Logic to setup the GENBRK and MAINSBRK logic blocks. These logic blocks have outputs that can be configured to energize an output contact and control a breaker as well as inputs for breaker control and status. The DGC-2020 will attempt to close a breaker only after verifying that it can be closed. If the breaker cannot be closed, the close request will be ignored. Only one breaker can be closed at a time. Synchronization is required before closing the breaker to a live bus. Closure to a dead bus can be performed after meeting dead bus threshold and timing requirements set by the user.

Auto-Synchronizer - Level 3 only
When the DGC-2020 is configured with this option, the user can select between 2 types of autosynchronizers, phase lock or anticipatory style. In both methods, the DGC-2020 adjusts generator frequency and voltage to match that of the bus (mains) via contact outputs, then connects the generator to the bus by closing the connecting breaker. When the control mode is set to Power Factor (PF) or kVar, the setpoint can be derived either from a user setting or from an analog input.

Multigen Management - Level 3 only
Enabling sequencing on a networked group of load share units allows these units to manage load by starting and stopping appropriate units based on a factor of load demand and available capacity. The mode of operation is used to determine the order in which each generator in a group will contribute to the systems power production upon a demand start/stop request.

Modes of operation include:
- Staggered service time
- Balanced service time
- Largest size first
- Smallest size first
- Smallest unit ID

OPTIONAL ACCESSORIES

Analog Extension Module 2020 (AEM–2020)
The optional AEM-2020 is a remote auxiliary device that provides additional DGC-2020 analog inputs and outputs. Its features include:

- 8 Analog Inputs: The AEM-2020 provides 8 analog inputs that are user-selectable for 4 to 20 mA or 0 to 10 Vdc. Each analog input has under/over thresholds that can be configured as status only, alarm, or pre-alarm. When enabled, an out of range alarm alerts the user of an open or damaged analog input wire. The label text of each analog input is customizable.

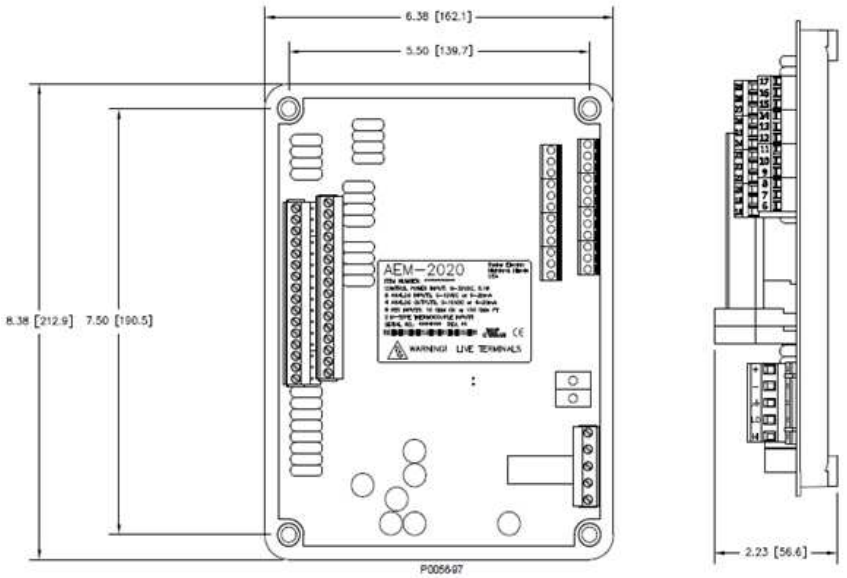
- 8 RTD Inputs: The AEM-2020 provides 8 user-configurable RTD inputs for monitoring gen-set temperature. Each RTD input can be configured as status only, alarm, or pre-alarm to protect against high or low temperature conditions. When enabled, an out of range alarm alerts the user of an open or damaged RTD input wire. The label text of each RTD input is customizable.

- 2 Thermocouple Inputs: The AEM-2020 provides 2 thermocouple inputs for monitoring gen-set temperature. Each thermocouple input can be configured as status only, alarm, or pre-alarm to protect against high or low temperature conditions. When enabled, an out of range alarm alerts the user of an open or damaged thermocouple input wire. The label text of each thermocouple input is customizable.

- 4 Analog Outputs: The AEM-2020 provides 4 analog outputs that are user-selectable for 4 to 20 mA or 0 to 10 Vdc. A wide selection of parameters including oil pressure, fuel level, generator voltage, and bus voltage can be configured as analog outputs. Refer to Section 4, *BESTCOMSPlus Software,* for a full list of parameter selections.

- Communications via CANbus: A Control Area Network (CAN) is a standard interface that enables communication between the AEM-2020 and the DGC-2020.

- Functionality of Inputs and Outputs assigned via BESTCOMSPlus software.



Input and Output Terminals

OPTIONAL ACCESSORIES

Load Share Module 2020 (LSM-2020) with Ethernet Capability

The LSM-2020 is an easy to connect and use add-on module that allows the DGC-2020 to control VAR/PF and kW load sharing of a paralleled generator set. The LSM-2020 is remotely mounted and communicates to the DGC-2020 via J1939 CANbus communications. With the Level 3 controller, this module provides the flexibility to use the same model DGC-2020 gen-set controller for single unit (standalone power) applications and parallel gen-set applications. Pure flexibility is one of the benefits of the DGC-2020, and this add-on module enhances that.

- Analog Input (Configurable): The LSM-2020 provides one analog input that is user-selectable for 4 to 20 mA or 0 to 10 Vdc. This input can be used to control the power factor (PF) or kVar setpoint when paralleled to the utility.
- Analog Outputs: The LSM-2020 has (3) analog outputs—one connected to the voltage regulator and one to the speed governor. There is also one output connected to the load sharing lines. All of these outputs can be selected via BESTCOMSPlus for 4-20 mA or ±10 Vdc. The analog outputs also can be scaled to adapt to the compatibility requirements of existing analog equipment.
- Multiple Generator Management: This module adds demand start/stop control and generator sequencing to the feature packed DGC-2020. The generator sequencing can be selected by priority number, generator size, service hours remaining, and balanced service hours. This sequencing function is even smart enough to determine if all the connected controllers are in the same mode.
- Ethernet Port: The LSM-2020 also adds Ethernet communications to the many communications features of the DGC-2020. It is IP addressable and allows all of the functionality of BESTCOMSPlus to be utilized via Ethernet. **Note: This option is only for use with the BESTCOMSPlus software.** For other Ethernet options, please refer to the Modbus RTU-TCP Gateway (Netbiter RTU-TCP Gateway).
- Communications via CANbus: The LSM-2020 is remotely mounted and communicates to the DGC-2020 via SAE J1939 CANbus communications.

Typical LSM-2020 Connections

LSM-2020 Overall Dimensions

OPTIONAL ACCESSORIES

Contact Expansion Module 2020 (CEM-2020)
The CEM-2020 is a remote device that provides additional DGC-2020 contact inputs and outputs giving the user flexibility to use the same model DGC-2020 genset controller for simple or more complicated applications that require contact functionality or duplication of contacts for remote annunciation. Its features include:

- 10 Contact Inputs: The CEM-2020 provides 10 programmable contact inputs with the same functionality as the contact inputs on the DGC-2020.

- 24 Output Contacts: The CEM-2020 provides 24 Form C programmable output contacts with the same functionality as the output contacts on the DGC-2020. The output ratings of the Form C contacts are:

Output No.	Rating (Cont.)	Additional Information
13-24	1 Adc @ 30 Vdc	This is a gold flash contact for low current circuits.
25-36	4 Adc @ 30 Vdc	

Alternate ratings shown in the following table may be used to allow a higher rating on selected contacts:

Output No.	Rating (Cont.)	Output No.	Rating (Cont.)
13-24	1 Adc @ 30 Vdc	25, 31, 36	7 Adc @ 30 Vdc
		26 – 30	4 Adc @ 30 Vdc
		32 -35	2 Adc @ 30 Vdc

- Communications via CANbus: The CEM-2020 communicates to the DGC-2020 via SAE J1939 CANbus communications and allows the user to program the functionality of these inputs and outputs in the BESTCOMSPlus software.

The user can add labels for the inputs and outputs that appear in BESTCOMSPlus, show up on the front panel, and in programmable logic. All the functionality can be assigned to these inputs and outputs as if they were an integrated part of the DGC-2020. The CEM-2020 module has all of the environmental ratings, like the DGC-2020, including a model for UL Class1 Div2 applications. The CEM-2020 terminals accept a ***maximum*** wire size of 12 AWG while the chassis ground ***requires*** 12 AWG wire. Flexibility is one of the benefits of the DGC-2020, and this add-on module enhances that benefit even further. The CEM-2020 is available for all levels, but is only functional for paralleling with Level 3.

CEM-2020 Overall Dimensions

OPTIONAL ACCESSORIES

Critical Low Fuel Shutdown

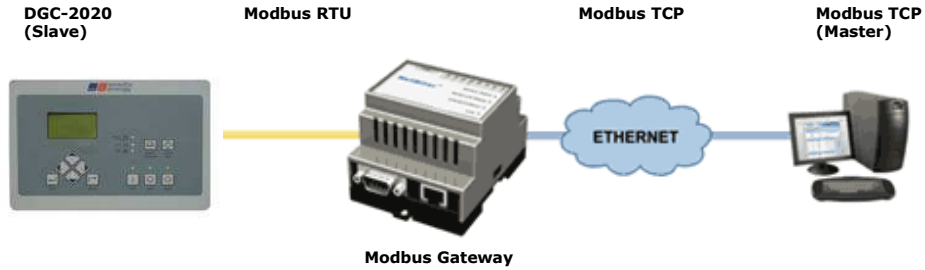
ModBus RTU-TCP Gateway connects the DGC-2020 with Ethernet and mobile networks. The gateway acts as a transparent bridge translating DGC-2020 Modbus registers allowing control systems, such as PLCs, SCADA, etc. to communicate over Ethernet. One gateway is required per generator allowing multiple generator sets to be accessed and monitored simultaneously. **Note: This option does not work with BESTCOMSPlus software.**

Features include:

- Connectivity between serial Modbus devices and the Modbus TCP
- RS-232, RS-485 and RS-422 connectivity
- Ethernet and mobile network connectivity
- 10/100 Mbit/s Ethernet
- Web-based configuration
- DIN rail mounting
- Network and serial status indicators

Below is a brief illustration of the integration of the RTU-TCP gateway with the DGC-2020 device.

Modbus RTU—Modbus TCP Gateway



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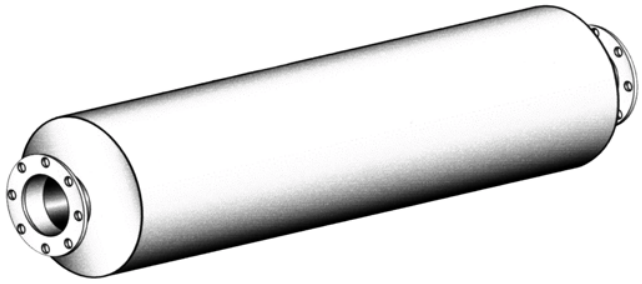
EM PRODUCTS™
PHILLIPS & TEMRO INDUSTRIES

Engine Exhaust Silencers

Model JH Series
Hospital Grade

Standard Silencer Application

- Heavy-duty hospital grade series silencer
- Designed for heavy duty stationary, marine systems and mobile power units
- JH Series is a premium, critical degree silencer for use in low-ambient noise area where the standard critical grade silencer will not satisfactorily control the noise problem

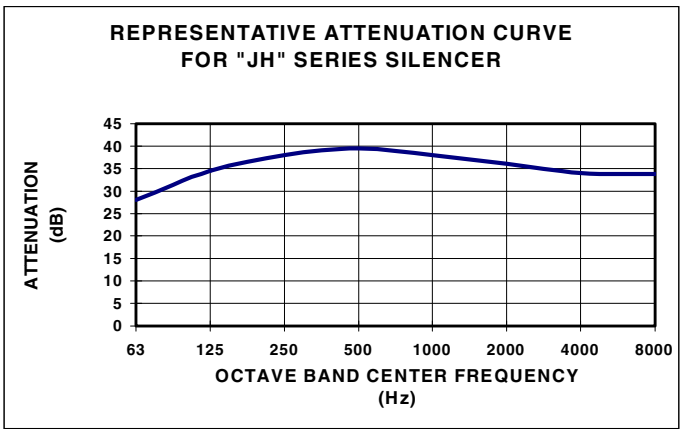


Standard Construction Features

- Aluminized steel standard for silencers up to 26 inch body diameter
- Silencers larger than 28 inch body diameter standard carbon steel
- All welded steel construction
- Can be mounted vertically or horizontally
- Standard high temperature (1200° F.) satin black finish
- Drains standard item
- Standard npt inlet and discharge connections on sizes 2 inch to 3.5 inch
- Standard 125/150# ASA drilled plate flanges on inlet and discharge of silencers 4 inch and larger
- Multi-chamber design
- Effectively attenuates the full range of sound frequencies

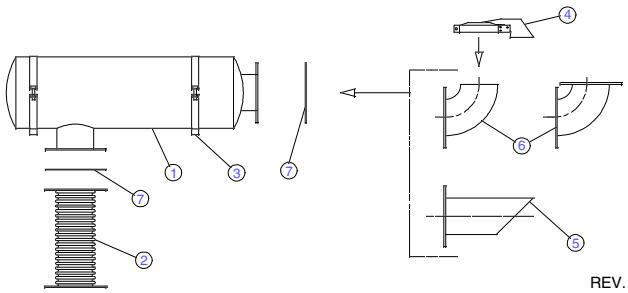
Optional Construction Features and Accessories

- Stainless steel and aluminum construction
- Special inlet and outlet connections
- Special inlet and outlet locations
- Special finishes available
- Vertical mounting legs
- Horizontal mounting saddles
- Mounting bands
- Horizontal and vertical shell legs
- Special acoustical designs
- Internal and external shell lagging
- Inspection openings
- Air leak tests
- ASME code construction
- Complete line of engine exhaust accessories



Engine Exhaust Silencer & Accessories:

1. Silencer
2. Flex Connector
3. Mounting Band
5. Mitered Exhaust
6. Elbows
7. Flange / Gasket



REV. 01/99
99EC-1000

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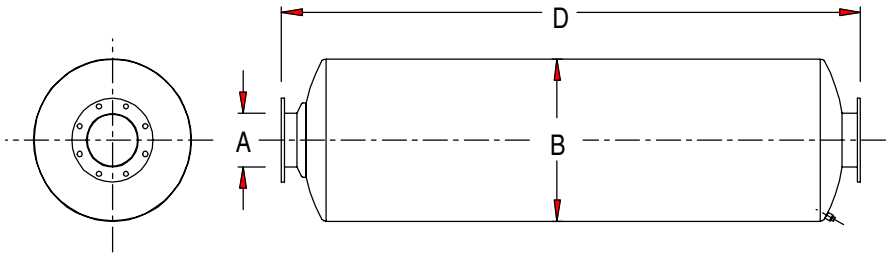
EM PRODUCTS™
PHILLIPS & TEMRO INDUSTRIES

Engine Exhaust Silencers

Model JH Series – Hospital Grade

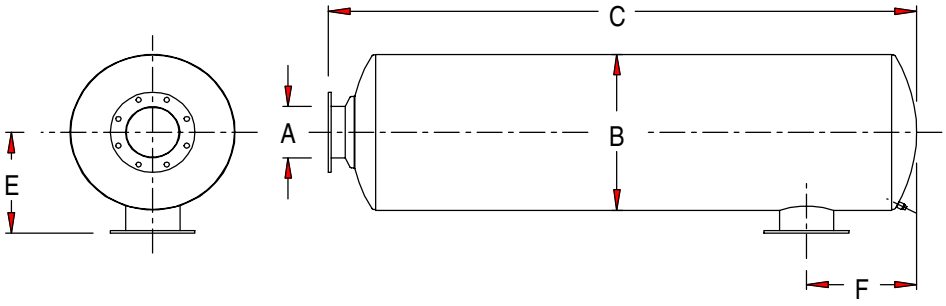
Average Attenuation Curve: 35 – 40 dBA

End Inlet/End Outlet



2 inch to 3 1/2 inch standard with male NPT connections; 4 inch and larger standard with 125/150# ANSI drilled plate flange connections.

Side Inlet/End Outlet



End Inlet/End Outlet					
Model No.	Part No.	A	B	D	WT
JHE-02	105030	2	10	44	55
JHE-25	105031	2.5	12	46	75
JHE-03	105032	3	12	46	75
JHE-35	105033	3.5	14	60	110
JHE-04	105034	4	14	60	115
JHE-05	105035	5	18	68	180
JHE-06	105036	6	18	68	185
JHE-08	105037	8	26	96	460
JHE-10	105038	10	30	110	680
JHE-12	105039	12	36	126	855
JHE-14	105040	14	42	138	1370
JHE-16	10541	16	42	162	1600
JHE-18	105042	18	48	205.5	2650
JHE-20	105051	20	60	220	4500

Side Inlet/End Outlet							
Model No.	Part No.	A	B	C	E	F	WT
JHS-02	205170	2	10	41.5	8.5	5.5	55
JHS-25	205171	2.5	12	42.5	10	7.75	75
JHS-03	205172	3	12	42.5	10	7.75	75
JHS-35	205173	3.5	14	56.5	11	9.5	110
JHS-04	205174	4	14	56.5	11	9.5	115
JHS-05	205175	5	18	66.5	13	10.5	180
JHS-06	205176	6	18	66.5	13	10.5	185
JHS-08	205177	8	26	93.5	17	17.5	460
JHS-10	205178	10	30	108	19	20	680
JHS-12	205179	12	36	122	22	23	855
JHS-14	205180	14	42	135	25	24	1370
JHS-16	205181	16	42	159	25	28	1600
JHS-18	205182	18	48	201.5	28	38	2650
JHS-20	205219	20	60	216	34	40	4500

- Larger sizes available upon request.

Dimensions in inches, weights in pounds. Dimensions and weights are nominal and may vary slightly with production models. Request certified drawings for exact dimensions.

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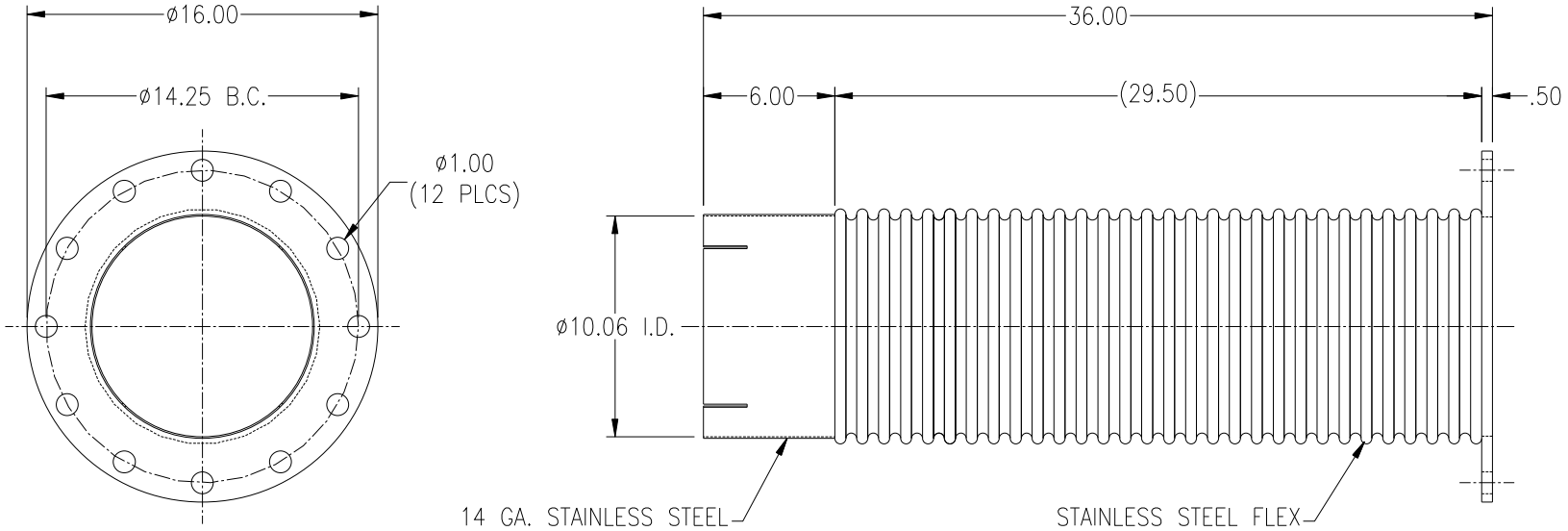
DWG. #: 105-1522-79



REV	ECO	REVISION DESCRIPTION	DATE	BY
01	73165	6" WAS 10.5"	3-4-09	AEF

TOLERANCES
.X = +/- .125
.XX = +/- .062
.XXX = +/- .031
FRACTIONAL = +/- 1/8
(UNLESS OTHERWISE SPECIFIED)

DRAWN TO SCALE
ALL DIMENSIONS ARE IN INCHES (B-6)

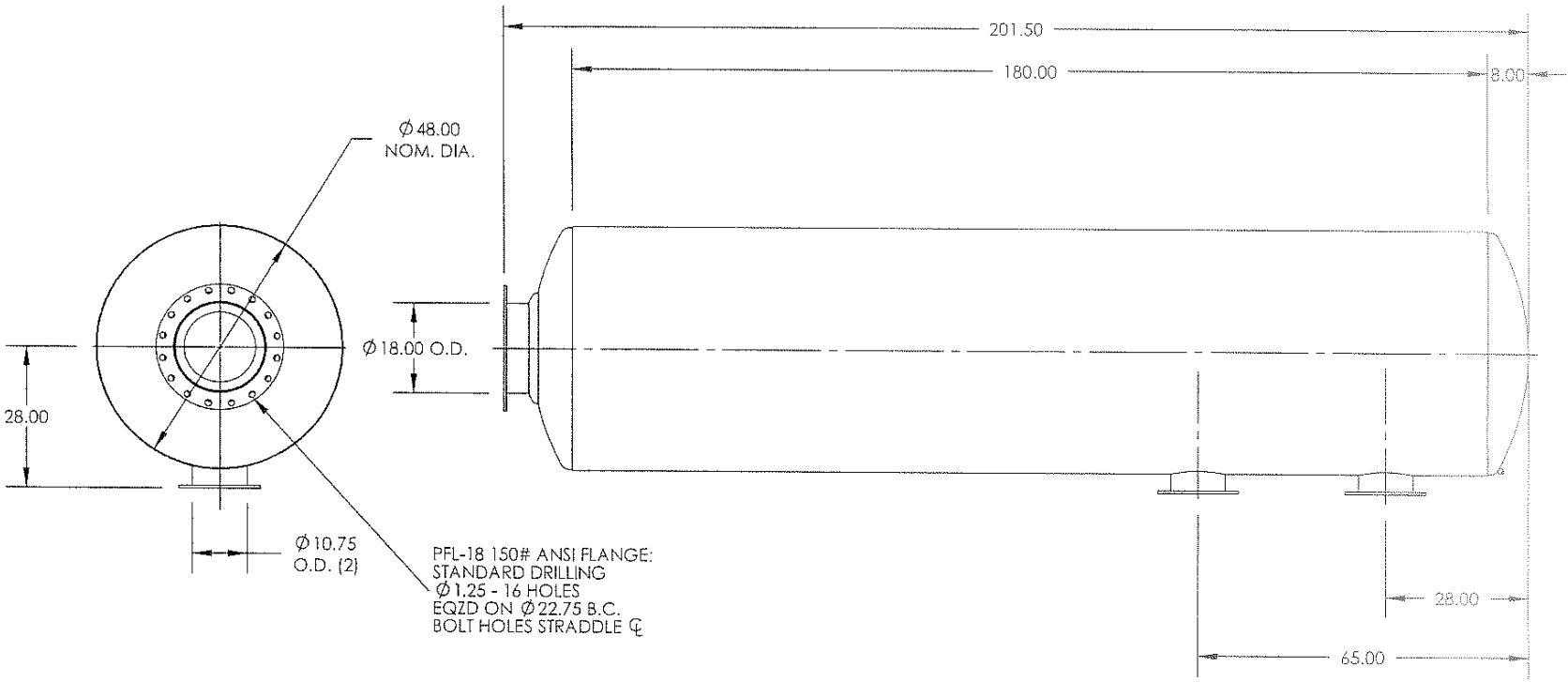
MATERIAL: AS NOTED
FINISH:
DATE: 7-17-00
DRAWN BY: SAA
PART NO.: 73165
WEIGHT:
SHEET: 1 OF 1

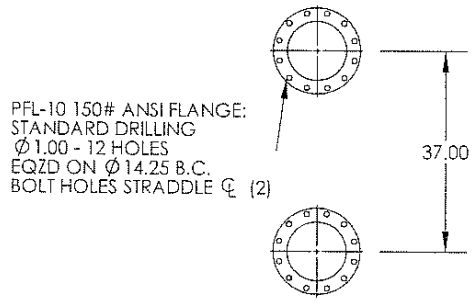
DESCRIPTION:
FLEX EXHAUST
SS OAL 36"
10 1/16"SLV TO 10" FLANGE

DWG. #: 105-1522-79

REVISION HISTORY				
No.	DATE	BY	ZONE	COMMENTS
A	1/15/2004	DWH		RELEASED FOR PRODUCTION

205445 | A





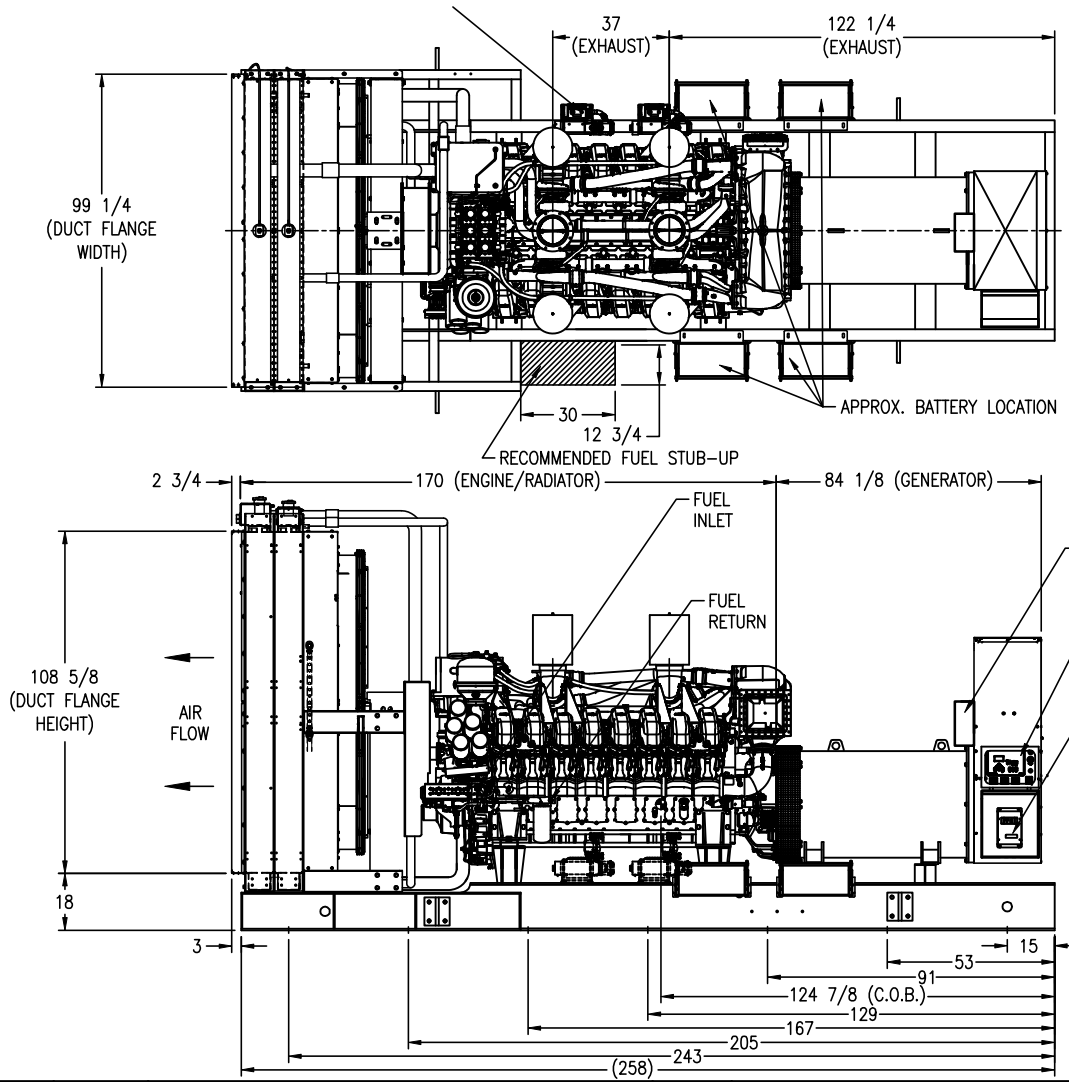
GAS FLOW

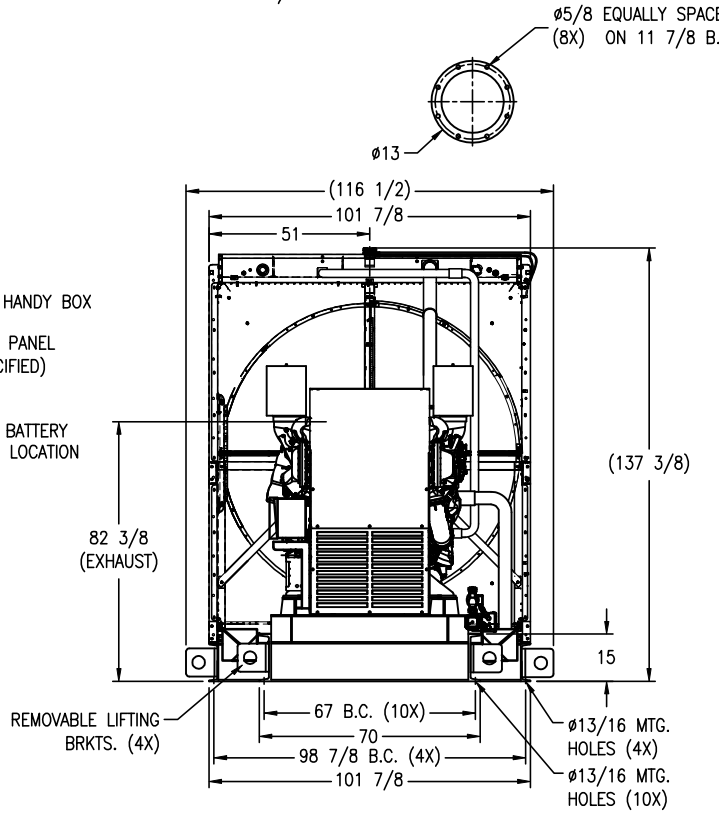
KATOLIGHT PART #74809

TEMTM PRODUCTS	PHILLIPS & TEMRO industries		
THIRD ANGLE PROJECTION	DRAWN BY: DWH	DATE: 1/1/01	DESCRIPTION: JHS-18X SS-E 10ANSI 18ANSI F = 28 & 65
	APPR BY: *	DATE: *	
DIMENSIONS ARE IN: X IN MM [MM]	DRAWING ORIGIN: PRIOR LAKE		REF: * MATERIAL: * SHEET 1 OF 1
UNLESS SPECIFIED DIMENSION TOLERANCES ARE: ANGLES ∠ ± 2°	INCHES .00 ± .13 .000 ± *	MILLIMETERS .00 ± * .0 ± *	SCALE: 1:32 SIZE: A TAB: A DRAWING No: 205445 REV: A

CUSTOMER * | WORK ORDER * | FINISH HIGH TEMP BLACK | WEIGHT *

DWG. #: 2000SXC6DT2(T1638A36)OPU-MGH-302





THIS PRINT CERTIFIED FOR
Nevada Generator Systems
MTU/OE QUOTE NO.: 201144
DATE: 10-21-10 CERTIFIED BY: MTH
ENGINEERING DEPT.
MTU ONSITE ENERGY

NOTES:
1) SUB-BASE FUEL TANK INFORMATION:
   OVERALL HEIGHT OF UNIT WILL INCREASE WITH USE OF OPTIONAL SUB-BASE FUEL TANK. REFERENCE SALES CATALOG FOR TANK HEIGHT AND GALLON CAPACITY INFORMATION.
2) FUEL SYSTEM CONNECTIONS:
   (FOR UNITS WITHOUT SUB-BASE FUEL TANKS)
   SUPPLY: 1 NPT RETURN: 3/4 NPT
3) UNIT IS TO BE IBC RATED
4) SPRINGS TBD

REVISION	DATE	REVISION DESCRIPTION	INITIALS
C	10-25-10	ADDED PAGE 2	MTH
B	10-21-10	ADDED LARGER GEN BOX PER C/O	MTH
A	09-23-10	INITIAL RELEASE TO SALES AND ENGINEERING	MTH

GEN-SET INFORMATION

ENGINE: T1638A36	ENCLOSURE: NA
GENERATOR: 744	BREAKER: NA
RADIATOR: 86763 (F67-4331B)	TANK: NA
RADIATOR AMBIENT: 50C	MUFFLER: NA
DUCT FLANGE: 105-4719	TRAILER: NA
CONTROL PANEL: DGC-2020	ISOLATORS: SPRINGS
BASE: 102-3037	

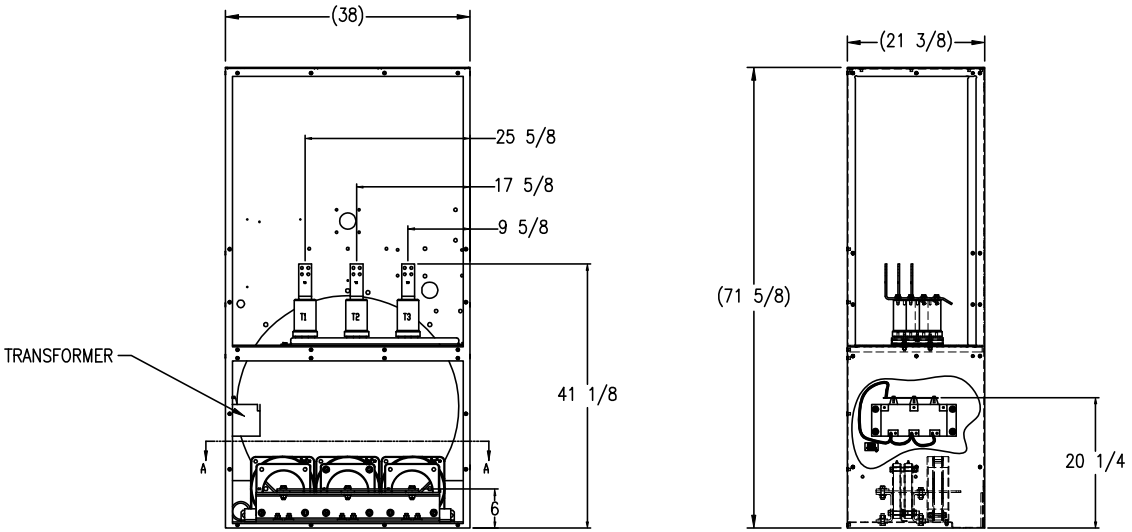
DIMENSIONAL LAYOUT

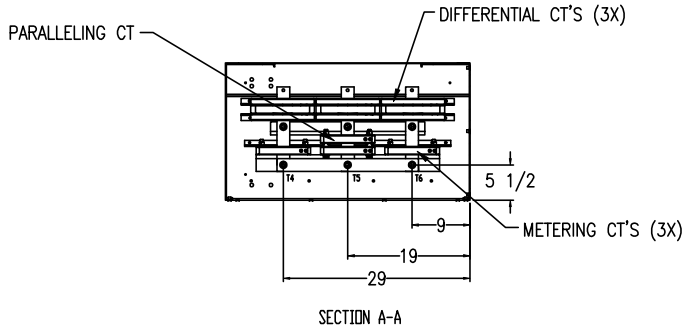
DRAWN TO SCALE
ALL DIMENSIONS ARE IN INCHES

MODEL: 2000SXC6DT2
DATE: 09-23-10
DWN.: MTH
SHEET.: 1-1

DWG. #: 2000SXC6DT2(T1638A36)OPU-MGH-302

DWG. #: 2000SXC6DT2(T1638A36)OPU-MGH-302





SECTION A-A

OUTLET BOX DETAIL
(SCALE 2:1)

REVISION	DATE	REVISION DESCRIPTION	INITIALS
C	10-25-10	ADDED PAGE 2	MTH
B	10-21-10	ADDED LARGER GEN BOX PER C/O	MTH
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GEN-SET INFORMATION

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GENERATOR: 744	BREAKER: NA
RADIATOR: 86763 (F67-4331B)	TANK: NA
RADIATOR AMBIENT: 50C	MUFFLER: NA
DUCT FLANGE: 105-4719	TRAILER: NA
CONTROL PANEL: DGC-2020	ISOLATORS: SPRINGS
BASE: 102-3037	

DIMENSIONAL LAYOUT

DRAWN TO SCALE
ALL DIMENSIONS ARE IN INCHES

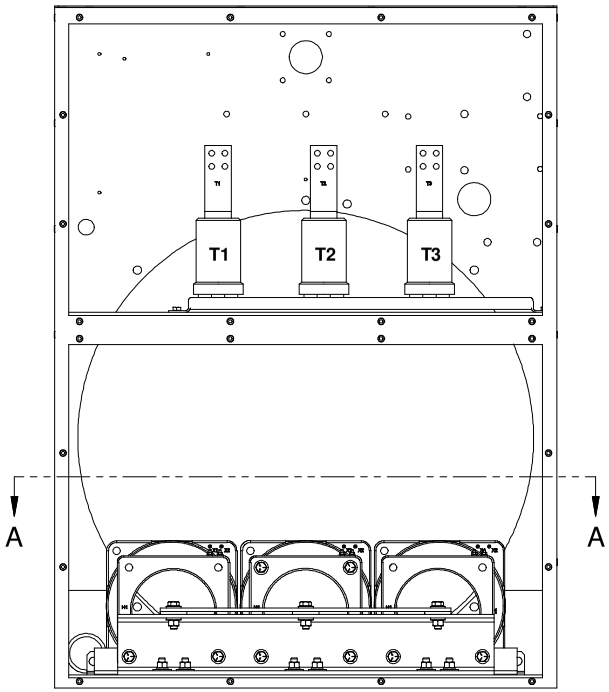
MODEL: 2000SXC6DT2

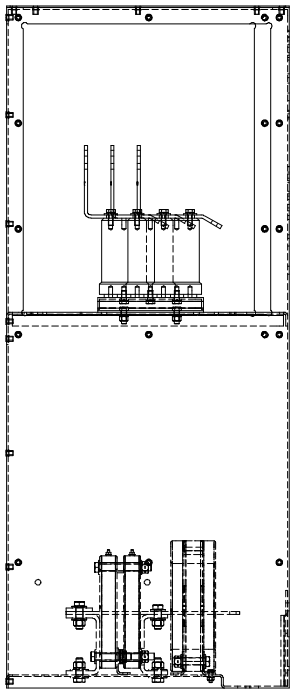
DATE: 09-23-10

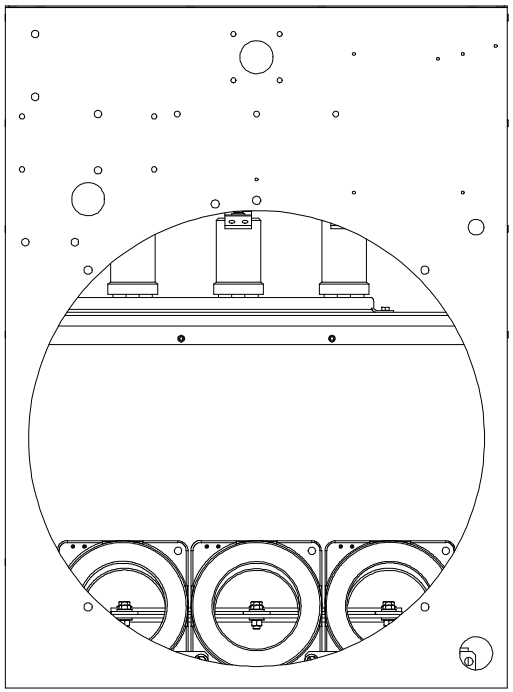
DWN.: MTH

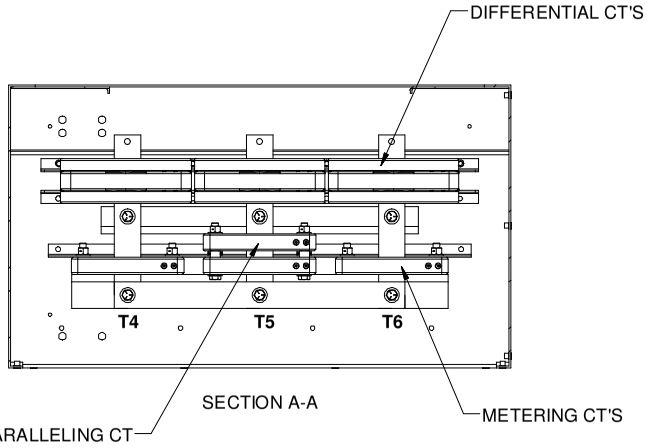
SHEET.: 1-1

DWG. #: 2000SXC6DT2(T1638A36)OPU-MGH-302









PRELIMINARY

				TOLERANCES UNLESS SPECIFIED		REGAL-BELOIT CORPORATION	DRAWN	TJW 10/6/2010
				DEC	INCHES		CHK	
				.X	-		APPR	
				.XX	-	TITLE CONDUIT BOX ASSY	SCALE	1:10
				.XXX	-		REF	
				.XXXX	-	MAT'L	FMF	
NO	REVISION	BY & DATE	CHK	ANG	-	FINISH	PAGE	OF
THIRD ANGLE PROJECTION			RFP			PREV	SIZE	DRAWING NO / REV
			NETWORK FILE NAME		525739		B	SKT04740