



SUGGESTED SPECIFICATION

**MICROPROCESSOR
ENGINE/GENERATOR
CONTROLLER**

MEC 20

Specification No.ES015-MEC20

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ES015 Rev 2 01/07/06

1. SCOPE

Specification writer's notes:

This suggested specification is intended for a typical microprocessor engine/generator controller

Note:

The following information is provided by Thomson Technology as a guide only for use by specifying engineers in designing a generator standby system. All system designs and installations must be done in accordance with all applicable electrical regulation codes and practices as required. Please contact Thomson Technology for any additional information.

2. GENERAL REQUIREMENTS

2.1. GENERAL

2.1.1. The controller shall be manufactured in accordance with this specification and applicable standards.

2.2. RELATED INDUSTRY STANDARDS

2.2.1. **UL-508** Industrial Control Equipment

2.2.2. **CSA-C22.2 No.14** Industrial Control Equipment

2.3. ENVIRONMENTAL CONDITIONS

2.3.1. The controller shall be rated for indoor installation with ambient temperatures between -15° and $+50^{\circ}$ Celsius, relative humidity from 5-95% non-condensing.

2.4. ENGINE GENERATOR CONTROLLER

2.4.1. The engine generator controller shall be microprocessor based and shall contain the following basic features; automatic and manual start/stop control modes, monitoring and control of essential engine generator set parameters and automatic shutdown and/or alarm status of specified protection fault circuits. The automatic operation mode shall have provisions for accepting an automatic starting/stopping

signal from a remote device. Alarm and shutdown fault circuits provided shall meet CSA 282 building code standards and NFPA 110 level 1 regulatory standards. The following alarm and shutdown fault circuits shall be provided (but not be limited to):

Low Oil Pressure	Shutdown
High engine Temperature	Shutdown
Low Coolant Level	Shutdown
Low Fuel Level	Alarm
Overcrank	Shutdown
Overspeed	Shutdown
Loss of speed	Shutdown
Low battery voltage	Alarm
High battery voltage	Alarm
Weak battery	Alarm
Low oil pressure	Alarm
High engine temperature	Alarm
Low engine temperature	Alarm
Undervoltage	Shutdown
Overvoltage	Shutdown
Underfrequency	Shutdown
Overfrequency	Shutdown
Breaker Tripped	Shutdown
Emergency Stop	Shutdown
Switch not in auto	Alarm
Spare	Shutdown
Spare	Shutdown

2.4.2. Individual contacts shall be provided for each alarm/shutdown fault circuit. Contacts shall be user configurable for open or close upon initiation of the fault. Fault contacts shall be factory configured for “close on fail”. Contacts shall be rated 0.5Aac 120Vac, 1.0Adc 30Vdc resistive, maximum.

- 2.4.3. The engine generator controller software program shall include a 3 level security password system for access to all programming functions. Specific password levels shall be provided for “read only”, “read/write” and “master”. All programming set points for voltage, frequency and time delays shall be software programmable from the front panel mounted keypad, and all parameters shall be displayed in alpha numeric format.
- 2.4.4. The engine generator controller shall include an operator interface liquid crystal display (LCD) screen which is door mounted. The following parameters shall be displayable:
- Generator AC digital metering (3 phase V, A, F, KVA)
 - Timer countdown display
 - Operating status /switch position
 - Alarm/Shutdown fault display
 - Engine Hourmeter
 - Engine Oil Pressure (PSI or KPA)
 - Engine Coolant Temperature (Degrees C or F)
 - Engine RPM (Tachometer)
 - Battery Voltage
- 2.4.5. Generator AC digital metering shall be integral to the engine generator controller and shall have an accuracy of +/-1%. The digital metering shall be fully programmable from the front panel display. Programming for voltage and current PT/CT ratios and software calibration shall be provided for all input ranges. The following generator output AC parameters shall be monitored and displayed:
- AC Voltage -3 phase (line to line and average)
 - AC Current -3 phase (individual phases and average)
 - AC frequency (resolution to 0.1 Hz)
 - AC Volt-amperes, 3 phase or 1 phase displayed in KVA
- 2.4.6. Digital display of engine parameters shall be provided by the engine generator controller. Engine oil pressure and engine temperature shall be monitored and shall be displayed in metric or imperial engineering units. Oil pressure and temperature senders shall be supplied for mounting on the engine generator set.
- 2.4.7. Long life LED type pilot lights shall be provided on the engine generator controller to indicate general operating conditions as follows:

- Common Alarm (Flashing-Amber)
- Common Shutdown (Flashing-Red)
- System Ready (Green)
- Speed Signal Present (Green)

2.4.8. The engine generator controller shall contain the following protective functions utilizing analog input signals:

2.4.8.1. Three phase under/over voltage protection shall be provided for the engine generator. The under/over voltage protection function shall be programmable as follows:

- under voltage pick-up 70-100% of nominal, factory set at 90%.
- under voltage dropout 70-100% of nominal, factory set at 80%.
- under voltage delay 0 - 10 seconds, factory set at 3 seconds.
- over voltage pick-up 100-130% of nominal, factory set at 110%.
- over voltage dropout 100-130% of nominal, factory set at 108%.
- over voltage delay 0 - 10 seconds, factory set at 2 seconds.

2.4.8.2. Over/under frequency protection shall be provided for the engine generator. The over/under frequency protection function shall be programmable as follows:

- under frequency setpoint 70-100% of nominal, factory set at 90%.
- under frequency delay 0 - 10 seconds, factory set at 5 seconds.
- over frequency setpoint 100-130% of nominal, factory set at 110%.
- over frequency delay 0 - 10 seconds, factory set at 2 seconds.

2.4.8.3. Three phase over current alarm protection shall be provided for the engine generator. The over current protection function shall be programmable as follows:

- over current setpoint 100-150% of nominal, factory set at 110%.

- over current delay 0 - 10 seconds, factory set at 5 seconds.

2.4.8.4. Low/High battery voltage protection shall be provided for the control system. The protection function shall be programmable as follows:

- Low battery voltage set point 50-100% of nominal, factory set at 12.8Vdc (12Vdc systems) or 25.6Vdc (24Vdc systems).
- Low battery voltage delay 0-300 seconds, factory set at 120 seconds.
- High battery voltage set point 100-130% of nominal, factory set at 15.2Vdc (12Vdc systems); 30.4Vdc (24Vdc systems).
- High battery voltage delay 0-300 seconds, factory set at 10 seconds.

2.4.8.5. Weak battery sensing shall be provided to detect a low capacity engine starting battery system. This function shall be programmable as follows:

- Weak battery set point 50-100% of nominal, factory set at 8.0Vdc (12Vdc systems) 18.0Vdc (24Vdc systems).
- Weak battery transient delay 0-300 seconds, factory set at 3 seconds.

2.4.9. Diagnostic LED's shall be provided on the rear of engine generator control module to allow simple visual indication of operating status or mode. Individual LED's shall be provided for the following functions:

- Watchdog (CPU running)
- Remote start signal activated
- Crank output energized
- Run output energized
- Common fail alarm activated

2.4.10. The engine generator controller shall have an audible alarm feature to signal shutdown and alarm conditions.

2.4.11. The engine generator controller shall include the following operator control functions:

- Operation Mode (Auto/Off/Manual/LoadTest)
- Programming (Enter/Exit/Value Increment/Decrement)
- Lamp Test
- Fault Reset

- Alarm Horn Silence
 - Emergency Stop
- 2.4.12. LOAD TEST control feature shall be provided by the engine generator controller to remotely signal an automatic transfer switch for load testing purposes. The load test function shall be automatically bypassed should the engine generator set fail.
- 2.4.13. The engine generator controller shall provide cycle cranking control logic with programmable number of crank attempts (Adj. 1-99, factory set at 3 attempts) crank period time (Adj 0-99 sec, factory set at 15 sec) and rest period time (Adj 0-99 sec, factory set at 10 sec).
- 2.4.14. Engine control logic shall include the following sensing and protection circuits:
- Loss of speed signal sensing shutdown
 - Starter re-engage sensing control (to re-engage starter motor upon initial failure to engage).
 - Run output fail safe selection (to prevent engine starting if speed signal is not present).
- 2.4.15. Programmable output function contacts shall be provided by the engine generator controller. Contacts shall be type Form C, rated 10A, 240Vac, resistive, maximum. The following programmable output control functions shall be available for specific system applications:
- | | |
|----------------------|----------------------------|
| • energize to stop | • overcurrent |
| • cycle lube | • engine run |
| • system ready | • oil bypass delay expired |
| • air flap | • common fail |
| • preheat | • common alarm |
| • ATS test | • common shutdown |
| • switch not in auto | • ready to load |
- 2.4.16. A time delay on engine start shall be provided to delay the engine start signal. The time delay shall be programmable 0 - 60 seconds, factory set at 2 seconds.
- 2.4.17. A time delay for engine cooldown shall be provided which delays engine stopping. The time delay shall be programmable 0 - 30 minutes, factory set at 5 minutes.
- 2.4.18. The engine generator controller shall provide a lamp test

function to test all LED lights and the LCD display.

2.4.19. The engine generator controller shall have the ability for remote communication of all status points (alarms, shutdowns, switch position) and all measured analog values. Remote control and configuration of all switch functions and setups shall be supported. Communication shall be via RS 422 Comm Port allowing remote communication up to 1000 ft. distance from the unit.

2.4.20. The engine/generator controller shall have accessory modules available to allow remote communication with RS232/RS485 communication lines, Modbus™ protocol, direct telephone line (modem) interface and Windows™ based PC host software.

Acceptable controller will be a **Thomson Technology** MEC 20 series microprocessor engine/generator controller.

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