

Setup Guide
EMS39V2 Generator Protection Module
Firmware Version 2.0.2

1. Introduction

The EMS39 is an integrated Genset controller which incorporates full engine protection. LCD display of engine temperature, oil pressure, battery volts, speed and genset hours provides manual start and stop buttons, autostart, and controls excitation of the battery charging alternator.

2. Set-up

The EMS39 is set-up by using the buttons on the front panel. A secret button is located the element midway between start and stop buttons. This button is used to enter set-up mode and to increment through the set-up items list. The Start and Stop buttons are used to increment and decrement the values for each item.

Set-up is initiated by holding down the secret set-up button for 10 seconds when the unit is in the "Ready" mode. Set-up mode automatically terminates if no button is pressed for 60 seconds, or when the Exit item at the bottom of the setup list is set to 1 item highlighted in bold text MUST be set-up before running. Items not highlighted are discretionary.

Display	Item	Selections	Default	Comment
OSEN	Oil Sensor Type	0: Switch: Close on Fault 1: Sender: 0-90R 2: Sender: 10-180R 3: Sender: 120-16R 4: Sender: 240-33R 5: Sender: 19-112R	2	Selects type of oil sensor being used. Datcon Sensor Datcon Sensor Mitsubishi Sensor
OFSD	Oil Full Scale	5 - 7.5- 10 Bar	5	Used to select the full scale of the oil sensor being used.
OALM	Oil Alarm Set-point	0.5 to 30 Bar	0.7	Sets the minimum allowable oil pressure before alarm/shutdown
OCHK	Oil Pressure check before cranking	0: Does not check before starting 1: Checks before starting	1	Selects oil level or oil pressure sensing
TSEN	Temperature Sensor Type	0: Switch: Close on Fault 1: Sender TS120°C 2: Sender TS150°C 3: Sender TS200°C 4: Sender CM120°C 5: Sender DW120°C 6: Sender MS120°C 7: Sender DAL 8: Sender DAH 9: Sender Curtis 120°C	1	Selects temperature sensor type. If temperature is not used select TSEN=0 Cummins Sensor Daewoo Sensor Mitsubishi Sensor Datcon Low Range Sensor Datcon High Range Sensor Curtis Sensor
TALM	Temperature Alarm Set-point	70-200°C	98	Set maximum allowable temp before alarm/shutdown
TDLY	Temperature Hold Off delay time	1-4 Min	1	Sets time after completion of run up before temperature is monitored. This is to allow the starting of overheated engines.
SDIS	Display Mode Select	0: Hz Only 1: RPM only 2: Hz and RPM	0	May be set for Hz display, RPM display or both.
SCYC	Set Display update time	2-10 sec	2	Sets the update period of the display
SHZ	Set Display update time	50-60Hz	50	Selects frequency output
SRPM	Engine speed range select	3000-6000RPM	3000	Selects the nominal engine speed range.
CHZ	Crank Disconnect Frequency	5-40 Hz	20	Selects the crank disconnect speed.
UHZ%	Under Frequency Alarm Set point	0 to 20%	0	Selects the minimum allowable generator Frequency as a percentage of the nominal Frequency before alarm/shutdown. 0 disables this setting
OHZ%	Over Frequency Alarm Set point	0 to 20%	10	Selects the maximum allowable generator Frequency as a percentage of the nominal Frequency before alarm/shutdown. 0 disables this setting

FUEL	Fuel Solenoid Type	0: Energise to run 1: Energise to stop	0	Selects for fuel control type.
BATY	Battery Voltage	10.0-25.0 Volts	11.2	Set Point for low battery warning
CHGV	Charge Voltage	10.0-28.0 Volts	13.1	Set Point for charging failure
EXTD	Excitation disconnect	0: ignore excitation During cranking 1: Use excitation voltage as a secondary test for engine running	1	If set to 0, excitation is initiated once the engine is running, thus minimising mechanical loading during starting, If set to 1, excitation occurs during cranking and excitation voltage is used to detect engine running if the AC system is not working. Note that this facility will not function if excitation feedback is not provided by the alternator.(see next item)
EXTW	Excitation Warning enable	0: Excitation monitoring not enabled 1: Excitation monitoring enabled	1	This function should be disabled if excitation monitoring is not required.
CTRY	Crank Retries	1-5	3	Selects the maximum number of retries if engine fails to start.
SUNT	Start Delay Units	0: Seconds 1: Minutes	0	Start delay units.
STTM	Start delay time	0-240	3	Time between activation of Autostart and initiation of start sequencing
PHTM	Preheat time	0-20 Seconds	0	Sets the preheat time.
CATM	Crank Active Time	1-30 Seconds	15	Sets maximum crank time in any single crank cycle
CPTM	Crank Active Time	2-25 Seconds	5	Sets crank pause time between crank cycles
TRTM	Trip Time	0-120 Seconds	0	If trip time is zero, trip input is used as an immediate stop. Otherwise it is a delayed stop.
RUTM	Run Up Time	2-60 Seconds	5	Only HIHZ is monitored during this time. Oil pressure, OHZ and UHZ are not monitored
WUTM	Warm UP Time	2-60 Seconds	5	OLL, OHZ and UHZ are monitored. Run output is off. Run output is turned on at completion of Warm up time
ROTM	Run On Time	0-60 Minutes	1	During Run on Time the run output remains on. Reactivation of the start input will return the engine to running.
CDTM	Cool Down Time	0-60 Minutes	1	During the Cool Down time, the engine continues to run but the run output is turned off.
SHTM	Stop Hold Time	10-120 Seconds	10	Sets the wait time before the engine is considered stopped. Prevents engine restarting when HZ and Oil indicate zero but engine is still rotating.
SRTM	Stop Rest Time	3-60 Seconds	4	
OFTM	Scheduler Time between starts	0-750 hours	0	Time in hours between scheduled genset starts, 0 disables this function
RNTM	Scheduled run time	0-720 minutes	30	Time in minutes for which the genset is to run when controlled by the scheduler
SCTM	System Check Time	0-750 hours	24	The time between battery and oil sensor checks during low power mode. 0 disables this function.
ALTM	Maximum Alarm Time	0-60 minutes	0	Maximum time that the alarm output remains on. 0 indicates it will be on for the duration of the alarm.
OUT1	Output 1 Configuration	1: Preheat 2: Alarm 3: FPull 4: Run 5: High Engine Temp 6: Low Oil Pressure 7: Fail to Start	1	Selects the configuration of Output 1

OUT2	Output2 configuration	1: Preheat 2: Alarm 3: Fpull 4: Run 5: High Engine Temp 6: Low Oil Pressure 7: Fail to Start	3	Selects the configuration of Output 2
EXIT	Exit Set up	0-1	0	Exit the set-up mode by changing the value to 1

3. Manual Operation

To start Genset manually

Push the start button (I) briefly. The Genset will perform the starting sequence as follows.

PREHEAT	On for Preheat time if enabled
FUEL ON	For Energise to Run fuel control, FUEL ON activates the fuel output 1 second prior to cranking. If an output is configured for Fpull, then that output will also turn on, but for 1 second only.
CRANKING	The Genset cranks for Crank Active Time (CATM) to until Genset starts.
RESTING	If the engine fails to start, a rest pause (CPTM) is inserted before the next crank retry.
RUN UP	The genset has started. Only excessive speed and loss of AC voltage is checked during run up.
WARM UP	Oil pressure (OALM), and frequency are checked (if selected in the set-up routine).
RUN MAN	The run output is energised on completion of the Warm up time

Retries occur as selected by (CTRY). A fail to start alarm occurs (RUN FAIL) if the Genset does not start after completion of the selected retries.

To stop the Genset manually

Push the stop button (O) briefly. The EMS39 shows STOPPING on the display. If energise to stop fuel solenoid is selected, the fuel solenoid is energised for the Stop Hold Time (SHTM) or until the Genset stops.

If the Genset does not stop the EMS39 displays STOP FALL.

When oil pressure decays and tachometer indicates zero speed, after the Stop Rest Time (SRTM), the EMS39 displays READY.

4. Auto Operation

The Genset is started using the same sequencing as above for a manual start when the auto input is activated. When running the EMS39 displays "RUN AUTO"

When the auto input is deactivated, the Genset proceeds to the RUNON state. During RUNON, reactivating the auto input will automatically restore the Genset to run mode. Once RUNON state has expired, the Genset will proceed to the COOL state.

The Run output turns off.

Once the COOL state has expired, the Genset shuts down as above.

5. Viewing static parameters

View engine static parameters by holding in the stop button for 10 seconds when the controller is in the ready mode. The controller displays the following parameters in sequence.

-Genset Hz –Engine RPM (if enabled) –Oil Pressure –Engine Temperature –Battery Volts –Engine Hours –Alarm Status –If the stop button is released or the end of the sequence is reached, the controller will display Ready.

Note that the above values are not dynamic but are a simple snapshot of the values.

6. Alarm Icons

The EMS39 is fitted with 4 alarm icons. These icons are described below;

Oil Pressure

The Oil Pressure Alarm icon indicates red if oil pressure is low while the engine is running.

If, prior to starting, Engine Oil Pressure is detected it flashes.

Engine Temperature

The Engine Temperature icon indicates red if engine temperature exceeds the high engine temperature set point 1 minute after the engine has entered the running state.

Battery Alarm

The Battery Alarm icon flashes briefly once every 10 seconds if the battery voltage is below the low battery set point. This condition normally occurs when the engine has been standing for some time without the battery being on charge.

The icon indicates red when the engine is running if the battery alternator excitation voltage is low. This alarm occurs if the battery excitation fails.

The icon flashes if the charging voltage is less than the charge voltage set point. This will occur if the alternator fails, or the belt breaks.

Speed Icon

The speed icon flashes quickly if an over hertz alarm occurs

It flashes slowly if an under hertz alarm occurs. It also flashes quickly if the genset is in the start delay mode and about to start, or if the genset is running in cool down and about to stop.

7. Scheduled Running

The EMS39 has the ability to provide a scheduled start of the genset at preset intervals. The run time (RNTM) gives the duration of the running period in minutes. The off time (OFTM) gives the time in hours between completion of the last run time and the next start. If the engine runs before the off time is completed, the off time will restart from when the engine stopped. The first scheduled running of the genset will occur once the OFTM has expired after the scheduling is enabled. When the genset is running in scheduled start mode, it shows "RUN SCHD" on its display.

8. Standby operation

The EMS39 is designed to operate in standby with a very low standby current eliminating the need for an isolation switch. When in standby mode, the unit may sample the battery voltage and check oil sensor integrity at preset time interval. If it detects a low battery voltage, it will flash the battery icon briefly once per 10 seconds. A warning message indicating BAT LOW will be cycled on the display. If it detects an open circuit oil sensor it will flash the oil pressure alarm LED.

9. Trouble shooting

The EMS39 displays the following messages when an alarm occurs. These alarms shut down the engine, set the alarm output and show the alarm indicator.

Message	Cause
LOW OIL	Oil pressure has not reached the Oil Alarm set point (OALM) at the end of the run up time (RUTM) or has dropped below this value when the engine is running. The Oil Icon turns on
OIL FLT	An open circuit oil sensing circuit has been detected. The Oil Icon turns on.
HIGHTEMP	Engine temperature has exceeded the high temperature set point (TALM). The temperature icon turns on.
UNDER HZ	Engine speed has dropped below the under HZ set point (OHZ%). The speed icon flashes slowly.
OVER HZ	Engine speed has exceeded over HZ set point (OHZ%). The speed icon flashes quickly.
HIGH HZ	Engine has exceeded safe operating speed The speed icon flashes very quickly.
LOST HZ	Engine has lost AC signals while running
TRIPSTOP	The external shut down input has stopped the engine.
HZ FAULT	Indicates speed signal during ready. The speed icon flashes slowly.
RUN FAIL	The genset has failed to start.
STOPFALL	The genset has failed to stop
ERROR	The EMS39 has detected an error in its internal memory. This is usually due to poor connections between battery and controller. To clear turn off the controller for 30 seconds and repower.

The following warning messages indicate potential problems.

Message	Cause
EXC WARN	Excitation voltage is low when engine is running. This indicates a probable charging fault or broken belt. This warning restores when the excitation voltage returns to a normal value. The battery icon turns on.
CHG WARN	Battery voltage is below the charging voltage set point when the engine is running. Indicates that the alternator is not charging the battery. The battery icon flashes.
LOW BAT	Battery voltage is below the low battery set point. Flashes the battery icon once every 10 seconds.
TRIPLOCK	The trip input is preventing the engine from starting. The trip input must be deactivated followed by pressing the stop button to clear the condition.
AUTOLOCK	Autolock indicates that the engine has stopped either by manual intervention or on alarm with the autostart still active. Pressing the start button will resume auto running. This condition is cleared by deactivating the autostart input.

10. Installation diagram

