PROCOM®

OPERATING INSTRUCTIONS
ECON-MAN-IND

Installation Guide

Ver-2.3

INDEX

• **1.0 Introduction**

ECON-MAN-IND is universal controller for DG Set which can be configured as manual controller.

This is a pure manual controller for manual operation only.
This model can be ordered with optional features such as USB, Rs485 communication. This manual has to be read along with the controller selected and all the features may not be available in all the models.

- Display: 128*64 pixel graphical backlit LCD for ease of readout and symbolic representation.
- Fan Current monitoring for canopy fan (Optional)
- Menu driven MMI for easy in field configuration without PC or any customized equipment.
- Load Management . Load Dependent start/stop of 2nd DG in case of two DG application.
- ECON reminds user for timely service by indicating service due alarm.
- True RMS measurement of all measured parameters with 1% accuracy of measured value.
- Plug in connectors for error free replacement.
- Automatic real time based DG Start and Stop.
- Dimensions 167 x 129 x 41.8 mm.

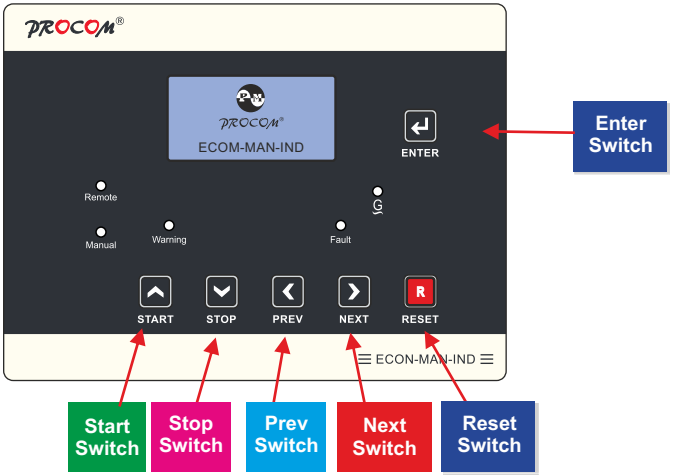
• **2.0 Salient Features, Protection and Supervision**

• Generator Measurements

- 1 Phase / 3 Phase Voltage
- 1 Phase / 3 Phase Current
- Frequency
- PF, KW, KVA, KVAR, KWH, KVAh .
- Battery Voltage
- Water Temperature
- Oil Pressure
- Fuel Level (Both in percentage and Litre)
- RPM
- Run Hour
- Service Due Hour

- **Protection / Supervision DG**
  - Under/Over Voltage
  - Under/Over Speed
  - Current Unbalance
  - Under/Over load
  - RWL
  - LLOP
  - Charging Alternator/V-belt
  - Emergency off
  - Service Due
  - Fail To Start
  - Fail To Stop
  - EGR Fault
  - Fan Current
  - Oil Level
  - Oil Temp.
  - Canopy Temp
  - Fire
  - HET
  - Low Fuel
  - Ext 1 , Ext 2
  - High Load
  - Under/Over Frequency
  - General Rev. Power
  - Common Fault
  - NCD Fault
- **Warning**
  - Main Charger
  - Half Fuel
  - Battery / Super Capacitor Warn
  - EGR
  - Half Fuel Open Sensor
  - LLOP Open Sensor
  - Temp. Sensor Open
  - Valve Sensor Open
  - Valve Not Lift
  - NCD Override
  - C Door Open
  - Service Due Hour
  - NCD
  - Mode Change Warning
  - HET Open Sensor
  - EGR - Ecu Unhealthy
  - Temp. Sensor Fault
  - Valve Sensor Fault
  - Valve Not Close
- **Digital Input :** 12 digital Input [4 fixed, 8 programmable]
- **Analog Input:** 4 Analog input (3 for sensor measurement & 1 for chg. alt.)
- **Output:** 19 digital output
- **Annunciation:** 12 Outputs
- **Modes:** Configurable Remote start / stop & Manual mode of operation.
- **Fault Data Recording:** Last 1000 fault with date and time stamping
- **Event Recording:** Last 1000 event with date and time stamping.
- **Start Stop Data Reading:** last 5000 start stop data with date & time stamping
- **Energy Recording:** Last 384 energy stored with date and time stamping.
- **Instant Recording:** Last 5 days instant parameter stored with date and time stamping.
- **Password Protection:** Three digit password protection for system settings.
- Real Time Clock (RTC)
- **Communication:** USB, Fully Isolated RS485(Optional).
- Provision for switching ON or OFF the measurement for individual sensors.
- Option of warning when open sensor is detected
- Programmable crank cut off method based on voltage & frequency / Voltage, Hz & LLOP switch / Voltage, Hz & LLOP sensor / Voltage, Hz, LLOP sensor & LLOP switch.

- **3.0 Display / Front Panel**



- 128x64 pixels Graphical LCD Display for ease of readout. Parameters are displayed in English along with symbolic representation. Normally the display auto scrolls and displays a parameter for 10 seconds, but any time the Next key (↵) can be pressed to select the next parameter window.

- **4.0 Switches Description**
  ECON-man-IND has 6 switches provided on its front panel. The table below describes the operation of these.

Switch Symbol	Switch Function	Description
 ENTER	Next	**Normal operation mode:** In this mode, it is used to change the parameters being displayed on LCD. **Programming Mode:** Next key is used to select the next parameter to be programmed.
 START	Increment /Start	This key has dual function **Programming Mode:** It is used to increment the value of the parameters under programming. **Manual mode:** it is used to issue the crank/ start command to DG
 STOP	Decrement /Stop	This key has dual function **Programming mode:** It is used to decrement the value of the parameter under programming. **Manual mode:** It is used to issue the stop command to DG
 RESET	Reset	Reset key resets the Hooter and Fault signals. The first press shall reset the hooter and next shall reset the faults. A long press of 1 Sec shall reset both.
 NEXT	Next	This key used to moving right side of parameter of value.
 PREV	Prev	This key used to moving left side of parameter of value.
	Programming /History Fault Mode Entry	If both the keys are pressed simultaneously the unit will enter in Programming Mode History Fault/Service Hours

- **5.0 LED Annunciations Description:** IND has Five annunciations on its front panel.

Nomenclature	Symbol	Description
Warning	Warning	This LED blinks in case of a warning
Fault	Fault	This LED blinks in case of a fault
Remote	Remote	This LED glows permanently when the controller is in Remote mode.
Manual	Manual	This LED glows permanently when the controller is in Manual mode.
Generator	G	This LED glows permanently when the Generator is ON.

- **6.0 Lamp Test:**
  If the ECON is switched on while the reset switch is pressed, all the LEDs start blinking till reset switch is kept pressed.. This state shall persist till the switch is kept pressed and on release of the switch ECON shall start functioning normally.

- **7.0 Digital Input:**
  ECON has 12 digital input as below
- **Fixed Inputs**
  - Emergency
  - R/M
  - Remote Start
  - Remote Stop

- **Programmable 4(DIN 1 - DIN 4) inputs each can be programmed as one of the following inputs.**
  - RWL Switch
  - Fuel Switch
  - Oil Level Switch
  - Oil Temperature Switch
  - LLOP Switch
  - HET/HCT Switch
  - Canopy Temperature Switch
- **Programmable 4(DIN 5 - DIN 8) inputs each can be programmed as one of the following inputs.**
  - C Door Open
  - Oil Temp.
  - V-belt
  - EGR Warning
  - NCD Override
  - Oil Level
  - Canopy Temp.
  - Half Fuel Warning
  - EGR Fault
  - Ext-2
  - Fire
  - Ext-1
  - Padmini EGR

* In case LLOP switch is not used, do not select LLOP as any Digital Input.

- **8.0 Analog Input:** ECON has Four Analog input:
  - Low Lube Oil Pressure Sensor
  - High Water Temp. Sensor / Oil Temp. Sensor
  - Low Fuel Level Sensor
  - Charging Alternator

- **9.0 Digital Output:** ECON has 19 digital outputs :
- **Programmable output**
  Three digital outputs can independently be configured for the any functions from the list below.
  - Unit Healthy
  - Fuel Pump
  - Pull Solenoid
  - Load Warning
  - Heater/Choke
  - None

- **Fixed output:** The remaining 4 digital outputs are fixed:
  - Crank
  - Solenoid
  - GCB
  - Hooter
- **Annunciation Outputs:**
  - 12 contacts can be assigned to announce system status/faults out of 34 possible conditions. Each annunciation can be assigned to one or more contacts. This is described later in edit annunciation section

- **10.0 Operating Mode:** Remote and Manual mode of operation.

• 10.1 Remote Mode

There are two ways to select the Remote mode.

1. engine has to be started by pulling down R/M pin (pin no-62) once. Remote led will glow. pull down pin no. 29 (R.start) to start the generator. once the start signal is given to the unit , the unit is now function like Remote mode with three crank attempts. the unit can be stopped by pulling down pin no. 28 (R stop) .both R start & stop are one touch and hence should not be continuously activated. to stop the generator, press R stop switch.

2. you can also used front key . press remote switch once then Remote led will glow. pull down pin no. 29 (R.start) to start the generator. once the start signal is given to the unit , the unit is now function like auto mode with three crank attempts. the unit can be stopped by pulling down pin no. 28 (R stop) .both R start & stop are one touch and hence should not be continuously activated. to stop the generator, press R stop switch.

- **10.2 Manual Mode**

Engine has to be started manually by manually pressing “Start” switch . Once the generator is started the load can be switched to generator.
To stop the generator press “STOP” switch.

- **11.0 Setting Procedure: How to Enter in Parameter Mode**

Press Next ↵ & Reset R switches simultaneously. The LCD shall display, **“System Parameter”**
To enter System Parameter setting mode, press **Next Switch ↵ ,** the LCD shall display, **“Enter Password”** and default password is 123 then press **Next** Switch. For any change in value, press ▲ **Start** switch and ▼ **Stop switch.** For next parameter, press Next Switch.

“Generator Parameter”
To go to next menu press Start Switch the LCD shall display **“Generator Parameter”** To enter Generator Parameter setting mode press **Next Switch.** For any change in value, press ▲ **Start** switch and ▼ **Stop** switch. For next parameter, press **Next Switch.**

To go to next menu press Start Switch the LCD shall display **"protection parameter"** To enter **protection parameter** setting mode press **Next** Switch. For any change in value, press Start switch and **Stop** switch. For next parameter, press **Next** Switch.

To go to next menu press Start Switch the LCD shall display **"Comm RS485 Parameter"**
To enter Comm RS-485 Parameter setting mode press **Next** Switch. For any change in value, press **Start** switch and **Stop** switch. For next parameter, press **Next** Switch.

To go to next menu press Start Switch the LCD shall display **" Edit Annunciation "** To enter Edit Annunciation setting mode press **Next** Switch. For any change in value, press **Start** switch and **Stop** switch
For next parameter, press **Next** Switch.

To go to next menu press Start Switch the LCD shall display
"Display History" To View Display History mode press Next Switch.

To go to next menu press Start Switch the LCD shall display **"Display Event"**
To View Display Event mode press Next Switch.

To go to next menu press Start Switch the LCD shall display
"Display start stop" To View Display start stop mode press Next Switch.

To go to next menu press Start Switch the LCD shall display
"Display energy data" To View Display energy data press Next Switch.

To go to next menu press Start Switch the LCD shall display
"Reset Service Alarm"
To enter Reset Service Alarm mode press Next Switch. The LCD shall display
"Press START to Reset
Press STOP to ESC"
The unit shall ask for confirmation to reset the service hours pressing desired Switch.
To go to next menu press Start Switch the LCD shall display
"TOGGLE MODE"
To enter Toggle mode press Next Switch. The LCD shall display
"Press START to Confirm
Press STOP to ESC"

To go to next menu press Start Key the LCD shall display **"set / view commission date"** you can set the clock only through USB

To go to next menu press Start Key the LCD shall display **"Display Product Info".**
To View Display start stop mode press Next Switch.

- **12.0 Parameter Mode:**

The following tables give the detailed descriptions. Please note that 20sec of inactivity will take the unit back in normal mode and all the changes done shall be cancelled.

- **12.1 System Parameter**

Parameter Name on LCD	Explanation of Parameter	Setting Range
Suppliers	Company logo and default parameter is set as per system suppliers.	PROCOM TMTL M&M Koel
System Config R/M R/M	ECON provides complete flexibility in system designing; it is possible to select manual operation for DG phases.	Generator 1P Generator 3P
Solenoid Type 	**Pull To Start** In this mode fuel solenoid contact changes from Open to Close at the time of cranking and remains close till the gen set is running. For stopping the generator this contact opens. **Pull To Stop** In this mode fuel solenoid contact remains open at the time of cranking and till the gen set is running. For stopping the generator this contact closes for a user programmed time.	Pull to Stop Pull to Start
J1939 GCU ADD.	The source address of the controller over CAN BUS for J1939 communication.	0-253 Disabled
J1939 ECU ADD.	The source address of the controller over CAN BUS for J1939 communication.	0-255
LLOP Sensor Type 	Select the installed sensor for LLOP	Disabled * User Defined Type A M&M MNEPL VE TMTL HUAFANG TATA GC(VDO) GC(MURPHY) 4-20MA M&M-2

LLOP Sensor R1	R1 to R10 = Resistance Value V1 to V10 = Corresponding pressure value. These table are used when sensor type is selected as user defined.	0-999 ohm
LLOP Sensor V1		0-10 Bar
LLOP Sensor R2		0-999 ohm
LLOP Sensor V2		0-10 Bar
LLOP Sensor R3		0-999 ohm
LLOP Sensor V3		0-10 Bar
LLOP Sensor R4		0-999 ohm
LLOP Sensor V4		0-10 Bar
LLOP Sensor R5		0-999 ohm
LLOP Sensor V5		0-10 Bar
LLOP Sensor R6		0-999 ohm
LLOP Sensor V6		0-10 Bar
LLOP Sensor R7		0-999 ohm
LLOP Sensor V7		0-10 Bar
LLOP Sensor R8		0-999 ohm
LLOP Sensor V8		0-10 Bar
LLOP Sensor R9		0-999 ohm

LLOP Sensor V9		0-10 Bar
LLOP Sensor R10		0-999 ohm
LLOP Sensor V10		0-10 Bar
Fuel Sensor 	Select the installed sensor for Fuel The installed sensor should be Electronics or Linear if system suppliers as TMTL	Disabled* User Defined Type A SAM-0 SAM-1 Electronics Linear 0-5V(0-100%) 0.5-4.5V(0-100%)
Fuel Sensor R1	R1 to R10 = Resistance Value V1 to V10 = Corresponding fuel level in %. These table are used when sensor type is selected as user defined.	0-999 ohm
Fuel Sensor V1		0-100%
Fuel Sensor R2		0-999 ohm
Fuel Sensor V2		0-100%
Fuel Sensor R3		0-999 ohm
Fuel Sensor V3		0-100%
Fuel Sensor R4		0-999 ohm
Fuel Sensor V4		0-100%
Fuel Sensor R5		0-999 ohm

Fuel Sensor V5		0-100%
Fuel Sensor R6		0-999 ohm
Fuel Sensor V6		0-100%
Fuel Sensor R7		0-999 ohm
Fuel Sensor V7		0-100%
Fuel Sensor R8		0-999 ohm
Fuel Sensor V8		0-100%
Fuel Sensor R9		0-999 ohm
Fuel Sensor V9		0-100%
Fuel Sensor R10		0-999 ohm
Fuel Sensor V10		0-100%
Fuel Tank Capacity	The capacity of the Fuel Tank in litres.	Disabled 1-999Ltr
HET/ Oil Temp. Sensor	Select the installed sensor for HET The installed sensor should be either TMTL AIR 1C or TMTL AIR 3C or TMTL WATER if system suppliers as TMTL.	Disabled * User Defined Type A M&M MNEPL VE TMTL RANGE 1 TMTL RANGE 2 TMTL WATER HUAFANG TATA GC(VDO) GC(MURPHY) M&M 2

HET Sensor R1	R1 to R10 = Resistance Value V1 to V10 = Corresponding temperature in °C. These table are used when sensor type is selected as user defined.	0-9999 ohm
HET Sensor V1		0-300 Celsius
HET Sensor R2		0-9999 ohm
HET Sensor V2		0-300 Celsius
HET Sensor R3		0-9999 ohm
HET Sensor V3		0-300 Celsius
HET Sensor R4		0-9999 ohm
HET Sensor V4		0-300 Celsius
HET Sensor R5		0-9999 ohm
HET Sensor V5		0-300 Celsius
HET Sensor R6		0-9999 ohm
HET Sensor V6		0-300 Celsius
HET Sensor R7		0-9999 ohm
HET Sensor V7		0-300 Celsius
HET Sensor R8		0-9999 ohm
HET Sensor V8		0-300 Celsius
HET Sensor R9		0-9999 ohm
HET Sensor V9		0-300 Celsius
HET Sensor R10		0-9999 ohm
HET Sensor V10		0-300 Celsius

Sensor Open 	User can select the action to be taken in case of sensor open, it can be configured as a fault, or as warning.	Disabled * Warning Fault
CT Ratio 	Current Transformer ratio.	1-100
Gen. RPM 	Engine RPM Type.	1500RPM 3000RPM
Contact ON Pin 32 	These are three programmable output which can be configured for any one function from the list.	None Unit Healthy Load Warning Fuel Pump Heater /Choke Pull Solenoid
Contact ON Pin 31 	These are three programmable output which can be configured for any one function from the list.	None Unit Healthy Load Warning Fuel Pump Heater /Choke Pull Solenoid
Contact ON Pin 30 	These are three programmable output which can be configured for any one function from the list.	None Unit Healthy Load Warning Fuel Pump Heater /Choke Pull Solenoid
Over Load KW 	The Power(KW) above which the over load fault monitoring will start. The timer for it is over load delay. This fault is only enabled while the generator is running. On expiry of the timer the generator is stopped.	1.0-999.9KW

Over Current 	The current above which the over current fault monitoring will start. The timer for it is over load delay. This fault is only enabled while the generator is running. On expiry of the timer the generator is stopped.	1.0-999.9 Amps
Over Load Delay 	This is the timer for the over load condition either due to over KW or over current. On expiry of this timer the engine shall be stopped.	1-15 Sec
High load KW	The Power(KW) above which the High load fault monitoring will start. The timer for it is High load delay. This fault is only enabled while the generator is running. On expiry of the timer the generator is stopped.	Disabled* 1.0-999.9KW
High load delay	This is the timer for the High load Condition. On expiry of this timer the engine shall be stopped.	1-9999Sec
Reverse power	The Power(KW) above which the Res. Power fault monitoring will start. The timer for it is Res. Power delay. This fault is only enabled while the generator is running. On expiry of the timer the generator is stopped.	Disable* 0.5-999.9 KW
Reverse power delay	This is the timer for the Res. Power Condition. On expiry of this timer the engine shall be stopped.	1-999 Sec
Digital Input 1 	This can be configured for one out the listed below Parameters. RWL Oil Level Oil Temperature Canopy Temperature	RWL Oil Level Oil Temp. Canopy Temp.

Digital Input 1 Polarity	The polarity of digital input can be changed either normally open or normally close.	Normally Open Normally Close
Digital Input 2 	This can be configured for one out the listed below Parameters. LLOP Oil Level Oil Temperature Canopy Temperature	LLOP Oil Level Oil Temp. Canopy Temp.
Digital Input 2 Polarity	The polarity of digital input can be changed either normally open or normally close.	Normally Open Normally Close
Digital Input 3 	This can be configured for one out the listed below Parameters. Fuel Oil Level, Oil Temperature Canopy Temperature	Fuel Oil Level Oil Temp. Canopy Temp.
Digital Input 3 Polarity	The polarity of digital input can be changed either normally open or normally close.	Normally Open Normally Close
Digital Input 4 	This can be configured for one out the listed below Parameters. HET / HWT Oil Level Oil Temperature Canopy Temperature	HET/HWT/HCT Oil Level Oil Temp. Canopy Temp.
Digital Input 4 Polarity	The polarity of digital input can be changed either normally open or normally close.	Normally Open Normally Close
Digital Input 5 	This can be configured for one out the listed below Parameters. C door open Oil Level Oil Temperature Canopy Temperature V- belt, Ext-1, Ext-2 EGR Warning EGR Fault Padmini EGR	C door open Oil Level Oil Temp. Canopy Temp. V-Belt Ext-1 Ext-2 EGR Warning EGR Fault Padmini EGR NCD Override

Digital Input 5 Polarity	The polarity of digital input can be changed either normally open or normally close.	Normally Open Normally Close
Digital Input 6 	This can be configured for one out the listed below Parameters. Fire Oil Level Oil Temperature Canopy Temperature V- belt Ext-1 Ext-2, EGR Warning EGR Fault Padmini EGR NCD Override	Fire Oil Level Oil Temp. Canopy Temp. V-belt Ext-1 Ext-2 EGR Fault EGR Warning Padmini EGR NCD Override
Digital Input 6 Polarity	The polarity of digital input can be changed either normally open or normally close.	Normally Open Normally Close
Digital Input 7 	This can be configured for one out the listed below Parameters. Fuel Warning Oil Level Oil Temperature Canopy Temperature V- belt Ext-1, Ext-2 EGR Warning EGR Fault Padmini EGR NCD Override	Fuel Warning Oil Level Oil Temp. Canopy Temp. V-belt Ext-1, Ext-2 EGR Fault EGR Warning Padmini EGR NCD Override
Digital Input 7 Polarity	The polarity of digital input can be changed either normally open or normally close.	Normally Open Normally Close
Digital Input 8 	This can be configured for one out the listed below Parameters. Oil Level Oil Temperature Canopy Temperature V-belt, Ext-1, Ext-2 EGR Warning EGR Fault Padmini EGR NCD Override	Oil Level Oil Temp. Canopy Temp. V-belt Ext-1 Ext-2 EGR Fault EGR Warning Padmini EGR NCD Override
Digital Input 8 Polarity	The polarity of digital input can be changed either normally open or normally close.	Normally Open Normally Close

Fan High Current	Maximum limit for Fan High Current	Disable* 0.0-3.5 A
Fan Low Current	Minimum limit for Fan Low Current. This parameter is disabled if the above parameters is disabled.	0.0-3.5 A
Fan Current Delay	This is the timer for Fan Current Trip.	1-60 sec

- **12.2 Generator Parameter**

Generator O/V	Max. Permissible Generator voltage, above this the Generator voltage is treated unhealthy & the Generator is stopped on voltage fault.	150-300V
Generator U/V	Min. permissible Generator voltage, below this the Generator voltage is treated unhealthy & the Generator is stopped on voltage fault.	100-300V
Gen Voltage Delay 	Duration for which generator Over/Under voltage condition can be tolerated before stopping the Generator.	1-300 Sec
Generator Over Frq. 	Max. Permissible Generator Frq., above this the Generator Frq. is treated unhealthy & the Generator is stopped on Frq. fault.	25-69.9Hz Disable*
Generator Under Frq. 	Min. permissible Generator Frq., below this the Generator Frq. is treated unhealthy & the Generator is stopped Frq. fault.	Disable* 25.1-70Hz
Gen Frq. Delay 	Duration for which Generator Over/Under Frq. condition can be tolerated before stopping the Generator. This setting is not available if (4)&(5) are disabled	1-300 Sec.

Current Unbalance IN 	The maximum permissible current unbalance in %. The unbalance starts only after the system is loaded to 25%of its capacity	6-100% Disable
Current Unbalance Delay 	Duration for which the current unbalance can be tolerated before triggering the fault	1-999Sec
Pickup Voltage 	This parameter specifies the generator voltage at which it is presumed to have started and crank has to be terminated	30-150V
Pick Up RPM 	This parameter specifies the edge RPM (defined for DG voltage) at which crank shall be terminated.	300-1200
First Service Due Hr 	Time, in hours, for next service due warning.	1-999 Hrs
Later service due hr	Time, in hours, for next service due warning.	1-999 Hrs
Crank Cut Method 	Auto disconnects the crank command on detection of either voltage build-up/ voltage or oil pressure build up	Disabled V+Hz V+Hz+LLOP Switch V+Hz+LLOP Sensor V+Hz+LLOP Sensor+Switch
Pick Up KVA warning KVA 	If the current level crosses this limit the contact is energized after the programmed supervision time	1-9999
Reset KVA warning KVA 	If the current level falls below this limit the contact is de-energized after the programmed supervision time.	1-9999

KVA Warning Delay 	The supervision time for the above 2 parameters.	1-999 Sec
Choke Pre time 	Keep the choke for this time before the engine has started.	Disable* 1-999 Sec
Choke Post time 	Keep the choke for this time after the engine has started.	Disable* 1-999 Sec
Pump Pre Time 	Activate the Pump by this time before cranking	1-9999Sec
Generator Warmup Delay	The load is switched to Generator after expiry of this time	0-999Sec
Generator Recooling Delay	The time for which the Generator is allowed to run on no load before switching off	0-999Sec

- **12.3 Protection Parameter**

Fuel Warn Level 	Monitoring value of fuel level below which fuel level warning is generated.	10-80 %
Fuel Warn Delay 	Monitoring time of fuel level after which fuel level warning is generated.	1-99 Sec
Fuel Trip Level 	Monitoring value of fuel level below which fuel level trip is generated.	10-81 %
Fuel Trip Delay 	Monitoring time of fuel level after which fuel level trip is generated.	1-999 Sec

LLOP Trip Level 	Monitoring value of lube oil pressure below which LLOP trip is generated.	0.3-8.5 Kg/cm2
LLOP Trip Delay 	Monitoring time of lube oil pressure after which LLOP trip is generated.	0-999 Sec
HET Trip / Oil Temp. Level 	Monitoring value of water temperature above which HET / Oil Temp. trip is generated.	40-250 Disable
HET Trip / Oil Temp. Delay 	Monitoring time of water temperature after which HET / Oil Temp. trip is generated.	10-60 Sec
Digital Input 1 Delay	Delay for programmable digital input. Digital input are explained above.	1-99 Sec
Digital Input 2 Delay	Delay for programmable digital input. Digital input are explained above.	1-99 Sec
Digital Input 3 Delay	Delay for programmable digital input. Digital input are explained above.	1-99 Sec
Digital Input 4 Delay	Delay for programmable digital input. Digital input are explained above.	1-99 Sec
Digital Input 5 Delay	Delay for programmable digital input. Digital input are explained above.	1-99 Sec

Digital Input 6 Delay	Delay for programmable digital input. Digital input are explained above.	1-299 Sec
Digital Input 7 Delay	Delay for programmable digital input. Digital input are explained above.	1-99 Sec
Digital Input 8 Delay	Delay for programmable digital input. Digital input are explained above.	1-99 Sec
Chg Alt-V Belt Delay	Duration for which the V-Belt signal should be continuously de-active to be recognized as a fault and action initiated. This fault is only enabled while the generator is running.	Disable* 1-299 Sec
Hooter ON Time 	Duration for which the hooter shall be ON, if not externally reset, while announcing a fault.	1-299 Sec
Crank ON Time 	Maximum crank time	0.5-20 Sec
Crank Gap Time 	The delay between two successive cranks	1-99 Sec
Crank Attempts 	The maximum number of cranks that shall be issued to start the Engine	3-5
Solenoid ON time 	The time for which stop solenoid will be kept active while stopping the engine	1-99 Sec

Disp Auto Scroll 	Setting ON will enable Auto Scroll of display. OFF: No scroll and next parameter can be viewed by pressing next switch	ON/OFF
Scrolling Delay	After this duration next parameter Displayed on Display.	5-99Sec
Battery UV Warning 	Min. permissible battery voltage, below this the voltage is treated unhealthy & warning is generated.	Disabled* 8-12V
Battery OV Warning 	Max. permissible battery voltage, above this the voltage is treated unhealthy & warning is generated.	Disabled* 12.0-30.0V
Canopy Over Temp. 	Monitoring value of Canopy Temp. Above which Canopy temp. Is generated.	Disabled* 15.1-99.9°C
Canopy Over Temp. Delay	Monitoring Time value of Canopy Temp. After which Canopy temp. Is generated.	1-999 Sec
NCD Strategy 	Enable or Disable NCD (NOx Control Diagnostic) System as per CPCB4+ guidelines	Disabled* 0.01-99.99Hrs
NCD Warn Hrs	Set the time in Hrs while Generator is running after which NCD Warning will get activated if any EGR warning remains in the system during this whole period.	0.01-99.99Hrs
NCD Fault Hrs	Set the time in Hrs while Generator is running after which NCD Fault will get activated if any EGR warning remains in the system during this whole period.	0.01-99.99 Hrs
NCD Heal Hrs	Set the time in Hrs while Generator is running after which NCD Error timer will get reset if no EGR warning remains in the system during this whole period.	0.01-99.99 Hrs

- **12.4 Comm RS485 Parameter**

Device Id	Modbus device ID	1	1-247
Baud Rate	RS 485 Communication Baudrate	9600	1200 2400 4800 9600 19200
Parity	RS 485 Communication Parity Bits	None	Even Odd None
Stop Bit	RS 485 Communication Stop Bits	1	1 2

- **12.5 Edit Annunciation**

Ann. DG On	Selected contact is activated if Generator is on.	No Annunciation Contact on pin 1-12
Ann. DG Off	Selected contact is activated if Generator is off.	No Annunciation Contact on pin 1-12
Ann. DG On Load	Selected contact is activated if Generator is On load.	No Annunciation Contact on pin 1-12
Ann. Unit OK	Selected contact is activated if unit is ok.	No Annunciation Contact on pin 1-12
Ann. Fuel Trip	Selected contact is activated if fuel fault registered	No Annunciation Contact on pin 1-12
Ann. LLOP Trip	Selected contact is activated if LLOP fault registered	No Annunciation Contact on pin 1-12

Ann. HET/HCT Trip 	Selected contact is activated if HET/HCT fault registered.	No Annunciation Contact on pin 1-12
Ann. DG Voltage 	Selected contact is activated if Generator voltage is healthy.	No Annunciation Contact on pin 1-12
Ann. Emergency 	Selected contact is activated if emergency fault is registered.	No Annunciation Contact on pin 1-12
Ann. DG Overload 	Selected contact is activated if generator is overloaded.	No Annunciation Contact on pin 1-12
Ann. DG High Load 	Selected contact is activated if generator is high loaded.	No Annunciation Contact on pin 1-12
Ann. DG Frequency 	Selected contact is activated if generator over frequency/under frequency fault registered	No Annunciation Contact on pin 1-12
Ann. RWL Fault 	Selected contact is activated if RWL fault registered.	No Annunciation Contact on pin 1-12
Ann. Charging alternator/ V-belt	Selected contact is activated if Charging alternator/V-belt fault registered.	No Annunciation Contact on pin 1-12
Ann. Fail to Start 	Selected contact is activated if Fail to Start fault registered.	No Annunciation Contact on pin 1-12
Ann. Fail to stop 	Selected contact is activated if Fail to stop fault registered.	No Annunciation Contact on pin 1-12
Ann. Current Unbalance	Selected contact is activated if Current Unbalance fault registered.	No Annunciation Contact on pin 1-12
Ann. Fuel Open 	Selected contact is activated if fuel sensor is open.	No Annunciation Contact on pin 1-12

Ann. LLOP Open 	Selected contact is activated if LLOP sensor is open.	No Annunciation Contact on pin 1-12
Ann. HET/ Oil Temp. Open 	Selected contact is activated if HET / Oil Temp. sensor is open.	No Annunciation Contact on pin 1-12
Ann. Canopy Temperature 	Selected contact is activated if Canopy Temperature is high.	No Annunciation Contact on pin 1-12
Ann. Fire 	Selected contact is activated if fire fault registered.	No Annunciation Contact on pin 1-12
Ann. Oil Temperature 	Selected contact is activated if Oil Temperature is high	No Annunciation Contact on pin 1-12
Ann. Oil level 	Selected contact is activated if Oil level is low.	No Annunciation Contact on pin 1-12
Ann. Service Due 	Selected contact is activated if Service is due.	No Annunciation Contact on pin 1-12
Ann. Battery NOK 	Selected contact is activated if battery voltage is unhealthy	No Annunciation Contact on pin 1-12
Ann. common Fault 	Selected contact is activated if generator stopped on any fault	No Annunciation Contact on pin 1-12
Ann. Low/Half Fuel Warning 	Selected contact is activated if low fuel warning is generated	No Annunciation Contact on pin 1-12
Ann. C Door Open 	Selected contact is activated if Canopy Door is opened	No Annunciation Contact on pin 1-12
Ann. Gen. Rev. power 	Selected contact is activated if Res. Power High	No Annunciation Contact on pin 1-12

Ann. EGR Warn 	Selected contact is activated if any EGR Warning is active	No Annunciation Contact on pin 1-12
Ann. NCD Warn 	Selected contact is activated if NCD Warning is active	No Annunciation Contact on pin 1-12
Ann. NCD Fault 	Selected contact is activated if NCD Fault is active	No Annunciation Contact on pin 1-12
Ann. CPCB4+ Audio 	Selected contact is activated according to CPCB4+ Audio indication requirements (Active every 5 seconds for 2 seconds when NCD Warning active and Active every 2 seconds for 2 seconds when NCD Fault is acive other wise not active)	No Annunciation Contact on pin 1-12
Ann. J1939 1	selected contact is activated when a user selected J1939 DTC is present over CAN BUS.	No Annunciation Contact on pin 1-12
Ann. J1939 2	selected contact is activated when a user selected J1939 DTC is present over CAN BUS.	No Annunciation Contact on pin 1-12
Ann. J1939 3	selected contact is activated when a user selected J1939 DTC is present over CAN BUS.	No Annunciation Contact on pin 1-12
Ann. J1939 4	selected contact is activated when a user selected J1939 DTC is present over CAN BUS.	No Annunciation Contact on pin 1-12

- **12.6 Reset Service Alarm**

	Press START to Reset Press STOP to esc	

- **12.7 Adjust Clock**

	RTC Time and Date can be easily entered by pressing the increment & decrement switch	00.00 DD/MM/YYYY

- **13.0 Event Recording:**
  ECON keeps a log of last 1000 events. Last 64 events will show in the display. you can check last 1000 events from USB. Setting change and warning are considered as event. Events are stamped along with date and time
- **14.0 Faults**
  ECON keeps a log of last 1000 Faults. Last 64 faults will show in the display. you can check last 1000 faults from USB. These Faults are stamped along with date and time **There are two categories of faults**
    - Internal Faults
    - External faults

- **14.1 Internal Faults**

  Internal faults are the faults, which do not need any external signals and are detected by the system itself. They are:

  - Generator Fails to Start.
  - Generator Under RPM.
  - Generator Fails to Stop.
  - Generator Voltage Unhealthy
  - Generator Over RPM.
  - Over Load

- **14.2 External Faults**

  Those faults which cannot be sensed by the unit itself (these faults are not reflected by the generator voltage) and are to be provided externally. They are:

  - LLOP
  - HET
  - Fire
  - RWL
  - Fuel
  - Oil Level
  - Emergency
  - V-Belt
  - Oil Temp.
  - Canopy Temp.

- **14.3 Fault Reset**

  Internal Faults & LLOP fault:

  All internal faults and LLOP fault can be reset by pressing (R) switch after the generator is stopped.

  External Fault except LLOP & V-Belt faults:

  These faults cannot be reset till the engine is running and/or fault conditions persist. Once the faults are rectified, the fault can be reset by pressing Reset switch (R). In case the engine fails to stop “STOP KEY” can be pressed for manual attempt to stop engine

- **15.0 Start Stop**

  ECON keeps a log of last 1000 Start Stop. Last 64 Start Stop will show in the display. you can check last 1000 Start Stop from USB. Start Stop are stamped along with date and time

- **16.0 Energy Data**

  First set start and end date then you can check the stored energy till the given date.

- **17.0 Communication**

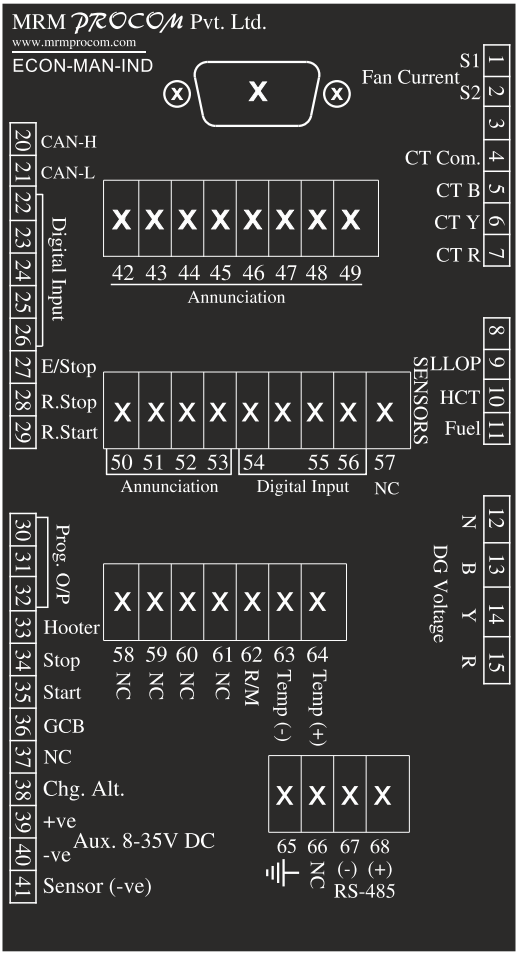
  - USB
  - Modbus on Isolated Rs485

• 18.0 Terminal Numbers

Terminal No.	Description
1	Fan Current S1
2	Fan Current S2
3	Blank
4	CT Common
5	CT B
6	CT Y
7	CT R
8	Blank
9	Sensor LLOP
10	Sensor HET
11	Sensor Fuel
12	V-DG-N
13	V-DG-B
14	V-DG-Y
15	V-DG-R
20	CAN-H
21	CAN-L
22	D Input 5
23	D Input 4
24	D Input 3
25	D Input 2
26	D Input 1
27	Emergency Stop
28	R Stop
29	R Start
30	Programmable Output 3
31	Programmable Output 2
32	Programmable Output 1
33	Hooter
34	Solenoid
35	Crank

36	GCB
37	NC
38	Chg. Alt. Contact
39	Battery(+ve)(8-35 V DC)
40	Battery(-ve)
41	Sensor(-ve)
42	Annunciation 1
43	Annunciation 2
44	Annunciation 3
45	Annunciation 4
46	Annunciation 5
47	Annunciation 6
48	Annunciation 7
49	Annunciation 8
50	Annunciation 9
51	Annunciation 10
52	Annunciation 11
53	Annunciation 12
54	D Input 6
55	D Input 7
56	D Input 8
57	NC
58	NC
59	NC
60	NC
61	NC
62	Remote / Manual
63	Temp (-)
64	Temp (+)
65	⏚
66	NC
67	D(-):RS485
68	D(+): RS485

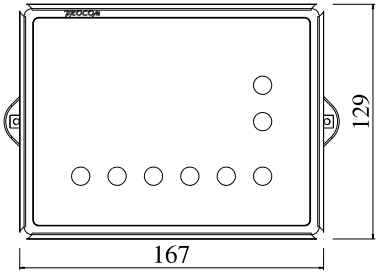
Connect the wires as per the labelling done in back sticker:



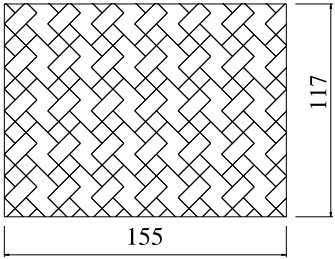
- **20.0 Technical Specifications**

Reverse Voltage Protection	
Load Dump protection	
AC voltage	
Measurement	300 VAC (Phase to Neutral)
Surge 1.2/50Usec	2.5KV
Continuously	350 VAC (Phase to Neutral)
Swell For 200msec	600 VAC (Phase to Neutral)
Measurement Accuracy	
Voltages & Current	1% of Reading
Power & Energies	2% of Reading
Battery Voltage	9-35 V DC
DC Interruption time	0.4 Sec
Temperature	
Operating	(-)20°C to (+)70°C
Storage	(-)30°C to (+)85°C
Enclosure Withstand Temperature	110°C
RS-485	
Surge Protection	9KV
ESD Protection	30KV
Input voltage tolerance on D+ & D-	70V
Isolation b/w RS 485 ground & battery ground	
Continuously	3750V
Transient	20KV/usec
Cut out Dimensions	155mm X 117mm
Depth	41.8 mm
Digital Input Level	Battery Voltage (Negative)

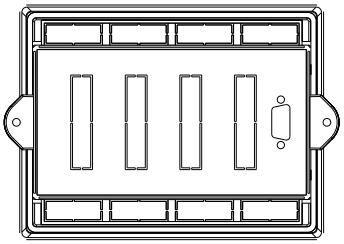
- **21.0 Dimensions**



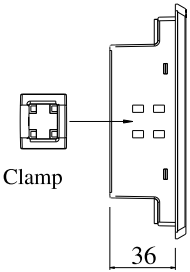
Front View



Cut Out



Rear View



Side View

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