PROCOM®

OPERATING INSTRUCTIONS
ECON-ABT-REL (CAN)

INDEX

1.0 Introduction

ECON is a universal controller for DG Set which can be configured as both automatic or manual controller.

- AMF Controller
  - Three Phase Mains Three Phase DG
  - Three Phase Mains Single Phase DG
  - Single Phase Mains Single Phase DG
- Operating modes of AMF Controller
  - Manual Mode
  - Auto Mode
    [This mode can be selected by pulling low the pin 63 (A/M)]
  - Test Mode
    This mode can be selected by pressing the mode switch while unit in auto mode

- Display: 128*64 pixel graphical backlit LCD for ease of readout and symbolic representation.
- Cyclic Timer based Engine Operation. Maximum engine on time as well as rest time are programmable
- Provision to Monitor 2 BTS voltages based Generator start.
- 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.
- Periodic Automatic Start of engine if not used for a predefined time to charge the battery as well as maintenance.
- 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.
- Programmable DG on delay, DG continuous on time, DG Rest Time, warm-up time along with 33 other timer.
- Automatic real time based DG Start and Stop(Manual Control Configuration.).
- Dimensions 167 x 129 x 41.8 mm.

2.0 Salient Features, Protection and Supervision
Mains Measurements
- 1 Phase/ 3 Phase Voltage
- 1 Phase/ 3 Phase Current
- Frequency
- PF, KW, KVA,KVAR, KWH, KVAh,
- Run Hour .

- **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 Mains**
  - Under/Over Voltage
  - Under/Over Frequency
  - Phase Sequence
  - Voltage Unbalance
  - Overload

- **Protection / Supervision DG**
  - Under/Over Voltage
  - Under/Over Speed
  - Current Unbalance
  - Overload
  - RWL
  - LLOP
  - Charging Alternator/V-belt
  - Emergency off
  - Service Due
  - Fail To Start(only when configured as AMF controllers).
  - Fail To Stop(only when configured as AMF controllers)
  - Oil Level
  - Oil Temp.
  - Canopy Temp
  - Fire
  - HET
  - LFL
- **Digital Input :** 13 digital [5 fixed, 8 programmable]
- **Analog Input:** Three Analog input (sensor measurement)
- **Output:** 21 digital
- **AMF Operation:** 9 outputs (five fixed and three programmable) and one for charging Alternator
- **Annunciation:** 12 Outputs
- **Modes:** Configurable Auto, Manual and Test mode of operation.
- **Fault Data Recording:** Last 64 fault with date and time stamping
- **Event Recording:** Last 64 event with date and time stamping
- **Display Diagnostics:** Upto 10 running P Codes shall be display
- **History Diagnostics:** Last 64 shutdown P codes error with date and time stamping

- **Password Protection:** Three digit password protection for system settings.
- Real Time Clock (RTC)
- **Communication:** USB, Fully Isolated RS485(Optional), CAN J1939
- 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**
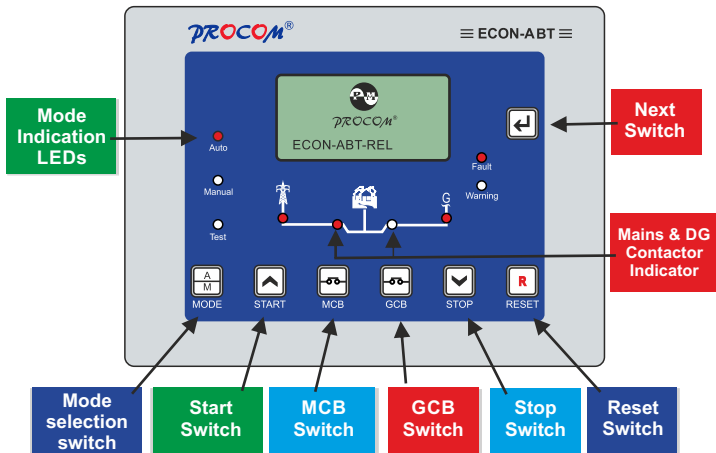
- 128x64 pixels Graphical LCD Display for ease of readout. Parameters are displayed in English along with symbolic representation. Normally the display auto scrolls and displays a parameter for 10 seconds, but any time the Next key (⏎) can be pressed to select the next parameter window.

- **4.0 Switches Description**
  ECON has 7 switches provided on its front panel. The table below describes the operation of these.

Switch Symbol	Switch Function	Description
⏎	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.
⌃	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
⌄	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
R	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.
R ⏎	Programming /History Fault Mode Entry	If both the keys are pressed simultaneously the unit will enter in Programming Mode History Fault/Service Hours
⌁	MCB	In Manual Mode this toggles the mains contactor, On/Off
⌁	GCB	In Manual Mode this toggles the generator contactor, On/Off
A/M	MODE	Toggle between Auto & Test Mode

• **5.0 LED Annunciations Description:** ECON has nine annunciations on its front panel. These either announce the faults or indicate status of the system.

Nomenclature	Symbol	Description
Auto		Led lights up when ECON is in Auto mode
Manual Mode		Led lights up when ECON is in manual mode

Test Mode		Led lights up when ECON is in Test Mode
Mains Voltage	⛫	This symbol lights up continuously if Main is healthy else starts blinking.
MCB	⛫	LED turns on in case the mains breaker is switched on or else turned off In manual mode ,this LED is switched on by feedback from mains contact on pin 29
GCB	⛫	LED turns on in case the DG breaker is switched on or else turned off In manual mode ,this LED is switched on by feedback from DG contact on pin 28
DG Voltage	Ḡ	This indication glows continuously when the generator is running.
Warning	Warning	This LED blinks in case of a warning.
Fault	Fault	This LED blinks in case of a fault

• **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 13 digital input as below
• **Fixed Inputs**
  - Emergency
  - Mains Contact
  - DG Contact
  - Remote
  - A/M

• **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 Switch
  - Canopy Temperature Switch

• **Programmable 4(DIN 5 - DIN 8) inputs each can be programmed as one of the following inputs.**
  - Canopy door open
  - Oil Temp.
  - V-belt
  - Half Fuel Warning
  - Oil Level
  - Canopy Temp.
  - Ext-1
  - Ext-2
  - Fire
  - Mains Charger

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

8.0 Analog Input: ECON has three Analog input:
- Low Lube Oil Pressure Sensor
- High Water Temperature Sensor
- Low Fuel Level Sensor

9.0 Digital Output: ECON has 21 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 6 digital outputs are fixed:
  - Charging Alt(Battery Voltage)
  - Solenoid
  - Mains Contactor
  - Crank
  - Hooter
  - Generator Contactor

- **Annunciation Outputs:**
  - 12 contacts can be assigned to announce system status/faults out of 32 possible conditions. Each annunciation can be assigned to one or more contacts. This is described latter in edit annunciation section

- **10.0 Operating Mode:** Auto, or Test Mode can be toggled by pressing MODE switch from the front panel.
  Do not enter in manual mode while test mode is operating. Firstly enter in auto mode then manual mode

- **10.1 Auto Mode (With cyclic & real time cyclic operation)**
  ECON monitors the Mains supply, if Mains supply varies beyond set limit of under/over voltage or under/over frequency or voltage unbalance or phase sequence for more than their individual programmed supervision time, ECON releases the MCB contactor (to protect the contactor from failure because of low input voltage) and attempts to starts the generator after the following conditions are meet:
  1. If the BTS voltage settings are enabled, the engine shall wait for Unhealthy Condition of BTS-Voltage.
  This feature can be disable by pulling down the remote pin (PIN NO-57)
  2. If gen start delay is enabled then the unit will wait to expire the gen start delay before switching on the engine
  3. In case the mains voltage returns to normal before cranking the engine shall not be cranked.
  In case the heater time is set Heater contact along with Fuel Pump contact is switched on else only the Fuel Pump contact is switched on.
  After 1 second the ECON gives cranks the engine by activating the inbuilt, potential free, crank contact.

Crank command is withdrawn if the engine start is detected, either by LLOP pressure or by build-up of generator voltage, as per the setting done by the user. Max duration of crank command is user settable.

In case of non-start of the engine ECON re-cranks it till engine starts or user programmed crank attempts are exhausted. If generator fails to start after the maximum programmed crank attempts, fault LED starts blinking, indicating start failure and the hooter is switched on.

After successful start of the generator, it is allowed to warm up for a user programmed time before the load is transferred to generator.

While the generator is running ECON monitors it for external fault and internal faults (Measured Values faults: LLOP, HET, Fuel, Over Load, voltage and frequency).

On persistence of any fault for more than the programmed supervision delay, for that fault, generator is stopped, corresponding fault is announced & hooter is switched on.

On restoration of healthy mains supply, continuously, for the programmed duration the load is transferred to the mains and generator is stopped after expiry of re-cooling time. In case mains again become unhealthy during the re-cooling period the load is switched to generator.

Cyclic Operation: ECON can be programmed to automatically shut down the engine, for a predefined duration, after a predefined duration of operation, even if the mains is unhealthy. In case the mains continue to be unhealthy this cyclic operation will continue till the mains is restored.

Real Time Cyclic Operation:

This mode is applicable only when the unit is in auto mode. In this mode, DG will shutdown at the engine off time irrespective of mains & BTS voltage status & shall restart depending on mains & BTS voltage status after the engine on time. This setting is referred as NESA mode.

• **10.2 Manual Mode**

Engine has to be started manually by manually pressing "Start" switch . *The "Start" switch shall not operate if GCB contact is closed, to provide protection to generator.* Once the generator is started the load can be switched to generator by feedback from DG contact on pin 28 or to mains by feedback from mains contact on pin 29. At any given time, either of GCB or MCB can be operational. Attempt to switch on GCB while MCB is on will be ignored and vice versa. Both MCB and GCB key have dual function of either switching ON or OFF the respective contactor. A press shall toggle the state. Continuously pressing these keys shall keep toggling the status. To stop the generator, switch off the GCB contactor and press "STOP" switch.

Any attempt to stop the generator, while the GCB contact is engaged, shall be ignored.

• **10.3 Test Mode:**
 Test mode is a very special mode for testing the panel and the engine. The unit can be put on test mode from the mode switch. In this mode the engine is switched on irrespective of the mains voltage but the load is not transferred to the generator. The load can be manually transferred to either generator or mains if desired. In case of mains failure the load is automatically transferred to Generator.

 Please note: Operating Mode cannot be changed if the unit has stopped on a fault condition or the engine is cranking.
 Auto, Manual and Test is Radio buttons and only one can be active at a time.
 Do not enter in manual mode while test mode is oprating. Firstly enter in auto mode then manual mode

• **11.0 Setting Procedure: How to Enter in Parameter Mode**
 Press Next 🔲 & Reset 🔳 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.

 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 **"AMF Parameter"** To enter AMF 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
"**BTS Parameter** "
To enter BTS 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
"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 Key the LCD shall display **"Adjust Clock"** To enter Adjust Clock setting mode press Next Key. For setting up of the time, press ⌂ Start switch and ⌄ Stop switch.
Press Next Key the LCD shall display DD/MM/YYYY. For setting up of the date, press ⌂ Start switch and ⌄ Stop switch

To go to next menu press Start Key the LCD shall display **"Reset Password"**
To enter Reset Password setting mode
Press ⏎ **"Enter Password"** then Press ⏎ **"Change Password"** the LCD shall display

          "**Press START to Change
          Press STOP to ESC"**
• **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 & Icon	Explanation of Parameter	Setting Range	No Access Through Key
Suppliers	Company logo and default parameter is set as per system suppliers.	PROCOM TMTL Greaves Cotton	✓
System Config A/M ⏀	ECON provides complete flexibility in system designing; it is possible to select auto and manual operation for any combination of mains and DG phases.	AMF-M:3P/G:1P AMF-M:3P/G:3P AMF-M:1P/G:1P	
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 genset 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 genset is running. For stopping the generator this contact closes for a user programmed time.	Pull to Stop Pull to Start	✓
CAN J1939 (CAN)	This is enable then RPM, LLOP, HWT, OIL TEMP. data taken from CAN J1939.	Enabled Disabled	
LLOP Sensor Type	Select the installed sensor for LLOP	User Defined Type A M&M MNEPL VE TMTL HUAFANG TATA GC(VDO) GC(MURPHY) 4-20 MA Disabled *	

LLOP Sensor R1	R1 to R10 = Resistance Value	0-999	
LLOP Sensor V1	V1 to V10 = Corresponding pressure value.	0.0-10.0	
LLOP Sensor R2	These table are used when sensor type is selected as user defined.	0-999	
LLOP Sensor V2		0.0-10.0	
LLOP Sensor R3		0-999	
LLOP Sensor V3		0.0-10.0	
LLOP Sensor R4		0-999	
LLOP Sensor V4		0.0-10.0	
LLOP Sensor R5		0-999	
LLOP Sensor V5		0.0-10.0	
LLOP Sensor R6		0-999	
LLOP Sensor V6		0.0-10.0	
LLOP Sensor R7		0-999	
LLOP Sensor V7		0.0-10.0	
LLOP Sensor R8		0-999	
LLOP Sensor V8		0.0-10.0	
LLOP Sensor R9		0-999	
LLOP Sensor V9		0.0-10.0	
LLOP Sensor R10		0-999	
LLOP Sensor V10		0.0-10.0	

Fuel Sensor	Select the installed sensor for Fuel The installed sensor should be Electronics or Linear if system suppliers as TMTL	User Defined Type A Sam-0 Sam-1 Electronics Linear 0-5V(0-100%) Disabled*	✓
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	✓
Fuel Sensor V1		0-100	✓
Fuel Sensor R2		0-999	✓
Fuel Sensor V2		0-100	✓
Fuel Sensor R3		0-999	✓
Fuel Sensor V3		0-100	✓
Fuel Sensor R4		0-999	✓
Fuel Sensor V4		0-100	✓
Fuel Sensor R5		0-999	✓
Fuel Sensor V5		0-100	✓
Fuel Sensor R6		0-999	✓
Fuel Sensor V6		0-100	✓
Fuel Sensor R7		0-999	✓
Fuel Sensor V7		0-100	✓
Fuel Sensor R8		0-999	✓
Fuel Sensor V8		0-100	✓
Fuel Sensor R9		0-999	✓

Fuel Sensor V9		0-100	✓
Fuel Sensor R10		0-999	✓
Fuel Sensor V10		0-100	✓
Fuel Tank Capacity ⛽	The capacity of the fuel tank in litres.	Disabled 0-999Lt	✓
HET 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	User Defined Type A M&M MNEPL VE TMTL RANGE 1 TMTL RANGE 2 TMTL WATER HUAFANG TATA GC(VDO) GC(MURPHY) Disabled *	
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	
HET Sensor V1		0-300	
HET Sensor R2		0-9999	
HET Sensor V2		0-300	
HET Sensor R3		0-9999	
HET Sensor V3		0-300	
HET Sensor R4		0-9999	
HET Sensor V4		0-300	
HET Sensor R5		0-9999	
HET Sensor V5		0-300	

HET Sensor R6		0-9999	
HET Sensor V6		0-300	
HET Sensor R7		0-9999	
HET Sensor V7		0-300	
HET Sensor R8		0-9999	
HET Sensor V8		0-300	
HET Sensor R9		0-9999	
HET Sensor V9		0-300	
HET Sensor R10		0-9999	
HET Sensor V10		0-300	
Oil Temp Sensor ●F	This is enable when can J1939 enable otherwise disable	CAN J1939	
Sensor Open ⌇✕ 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	
CT Ratio ⨍⨍⨍ CTR	Current Transformer ratio	1-1999	✓
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	
Contact ON Pin 30	These are three programmable output which can be configured for any one function from the list	None	
Over Load KW 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	8	✓
Over Current CTR	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	46	✓
Over Load Delay OL	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	5 Sec	✓
Digital Input 1	This can be configured for one out the listed below Parameters. RWL Oil Level Oil Temperature Canopy Temperature	RWL	
Digital Input 1 Polarity	The polarity of digital input can be changed either normally open or normally close.	Normally Open	

Digital Input 2	This can be configured for one out the listed below Parameters. LLOP Oil Level Oil Temperature Canopy Temperature	LLOP	
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. Low Fuel Oil Level, Oil Temperature Canopy Temperature	Low 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 Oil Level Oil Temperature Canopy Temperature	HET 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. Canopy door open Oil Level Oil Temperature Canopy Temperature V-belt, Ext-1, Ext-2 Mains Charger	C door open Oil Level Oil Temp. Canopy Temp. V-belt Ext-1, Ext-2 Mains Charger	
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 ,Mains Charger	Fire Oil Level Oil Temp. Canopy Temp. V-belt Ext-1, Ext-2 Mains Charger	
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. Half Fuel Warning Oil Level Oil Temperature Canopy Temperature V-belt Ext-1, Ext-2 , Mains Charger	Half Fuel Oil Level Oil Temp. Canopy Temp. V-belt Ext-1, Ext-2 Mains Charger	✓
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 , Mains Charger	Oil Level Oil Temp. Canopy Temp. V-belt Ext-1, Ext-2 Mains Charger	
Digital Input 8 Polarity	The polarity of digital input can be changed either normally open or normally close.	Normally Open Normally Close	
MCB Polarity	This parameter define the polarity MCB operation	Normally Open Normally Close	

Fan High Current ✈>	Maximum limit for fan current	Disabled. 0-3.5	
Fan Low Current ✈<	Minimum limit for fan current. This parameter is disabled if the above parameter is disabled.	0-3.5	
Fan Current Delay ✈⊕	This is the timer for fan current trip.	1-100	

• **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.	50-300V	
Generator U/V ∿↓	Min. permissible Generator voltage, below this the Generator voltage is treated unhealthy & the Generator is stopped on voltage fault.	50-300V	✓
Gen Voltage Delay ∿⊕ VOLT	Duration for which generator Over/Under voltage condition can be tolerated before stopping the Generator.	1-999 Sec	
Generator Over RPM Hz↑	Max. Permissible Generator RPM, above this the Generator RPM is treated unhealthy & the Gene-rator is stopped on RPM fault.	25-70Hz Disable*	

Generator Under RPM $Hz\downarrow$	Min. permissible Generator RPM, below this the Generator RPM is treated unhealthy & the Generator is stopped RPM fault.	Disable* 25-70Hz	✓
Gen RPM Delay $Hz^{\oplus}$	Duration for which Generator Over /Under RPM condition can be tolerated before stopping the Generator. This setting is not available if (4)&(5) are disabled	1-999 Sec.	
Current Unbalance IN	The maximum permissible current unbalance in %. The unbalance starts only after the system is loaded to 25% of its capacity	5-100% Disable	✓
Current Unbalance Delay	Duration for which the current unbalance can be tolerated before triggering the fault	1-999Sec	✓
Pickup Voltage $_{U}U$	This parameter specifies the generator voltage at which it is presumed to have started and crank has to be terminated	80-150V	
Pick Up RPM $_{U}U$	This parameter specifies the edge RPM (define for DG voltage) at which crank shall be terminated.	600-3000	
Service Due Hr	Time, in hours, for next service due warning.	10-999 Hrs	

Crank Cut Method ⨯⌐	Auto disconnects the crank command on detection of either voltage buildup/ voltage or oil pressure build up	V+Hz V+Hz+Switch V+Hz+Sensor V+Hz+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 KVA ⚠🕒	The supervision time for the above 2 parameters.	1-999Sec	
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	1-999Sec	

12.3 AMF Parameter

Mains O/V ∼↑	Max. Permissible Mains voltage, above this the Mains voltage is treated unhealthy & Generator is started	50-300V	
Mains U/V ∼↓	Min. permissible voltage, below this the voltage is treated unhealthy & Generator is started	80-300V	

Mains Voltage Delay $\sim\circled{}$ VOLT	Duration for which Mains Over/Under voltage condition can be tolerated before starting the Generator.	1-999 Sec	
Mains O/F Hz↑	Max. Permissible Mains frequency, above this frequency the Mains is treated unhealthy & Generator is started.	40-70Hz Disable*	
Mains U/F Hz↓	Min. permissible Mains frequency, below this frequency the Mains is treated unhealthy & Generator is started.	Disable* 40-70Hz	
Mains Freq Delay Hz$\circled{}$	Duration for which Mains Over/Under frequency condition can be tolerated before starting the Generator.	1-999 Sec.	
Voltage Unbalance	Max. allowed voltage unbalance in volt	10-100 Volt Disable*	
Voltage Unbalance Time	Duration for which unbalance can be allowed before starting the Generator. This parameter is not available if above is set to disabled.	1-999Sec	
Phase Sequence Delay	This setting determines if the engine shall be started and load switch to generator in case of reverse phase sequence of mains.	Disable 1-999 Sec	
Mains Restoration Time	The time for which Mains should be continuously healthy before stopping the Generator and load transferred to Mains.	1-999 Sec	
Warm Up Time $\circled{}$	The load is transferred to generator after expiry of this time	0-999 Sec	

Gen Start Delay	The starting of generator is delayed by this time after the mains unhealthy timers have expired and the mains contact has been released. This is required in certain applications where immediate generator starting is not required but the mains contactors are to be protected. This timer is automatically reset, if during this duration the mains become healthy for "Mains Restoration Delay"	Disable* 1-999 Mins	✓
Gen. 0n Time	Max. duration for which the generator is allowed to work continuously	Disable* 1-999 Mins	
Gen Rest Time	If the generator has run continuously as per above parameter, the generator is given rest irrespective of the mains condition. In case of mains unhealthy during this time the mains contact is deactivated but the generator is not started. This is unavailable if above is Disabled This timer is automatically reset, if during this duration the mains become healthy for "Mains Restoration Delay"	Disable * 1-999 mins	
Mains Over Load	ECON can protect contactors from mains over load. If this setting is enabled than the mains contactor shall drop after the mains current crosses the set limit for a programmed duration	Disable* 2-9999Amps	
Mains O/L Delay	The monitoring duration for the above parameter before the fault is triggered.	1-999 Sec	

Contactor Protection	In case of the unit placed under manual mode of tripped due to a fault condition and the mains voltage falls below the safe limit of the contactor, the contactor burns after chattering. This can be avoided by enabling this protection. If enabled the mains contactor shall drop if the mains voltage becomes unhealthy and the contactor will again engage after the mains voltage turns healthy	Disable / Enable	
Mains Fail X 1/3	Some application require the generator to start on failure of one or more phases Other wants all the 3 phases to become unhealthy before starting the generator ECON can handle both situations	Any Phase Fail/ All Phase Fail	
GCB to MCB Delay	User programmable delay when the load is transferred from Generator to Mains.	1-10 Sec	
Recool Time	The time for which generator is allowed to run on no load before switching off	0-999Sec	
Service Delay hour	In AMF mode,if this parameter is enabled, the engine will automatically start after this periodic time lapse from the last start. This is meant for periodic function	2-999 Hrs	
Service Run min.	The genset will work for this duration in service run mode. It will stop automatically after expiry of this time. During this time if the mains become unhealthy the generator contactor shall be engaged and the engine shall be stopped after the mains is healthy	1-999 Min Disabled	

- **12.4 Protection Parameter**

Fuel Warn Level	Monitoring value of fuel level below which fuel level warning is generated.	Disable* 11-80 %	✓
Fuel Warn Delay	Monitoring time of fuel level after which fuel level warning is generated.	1-999Sec	✓
Fuel Trip Level	Monitoring value of fuel level below which fuel level trip is generated.	10-80 % Disable	✓
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.	0.4-8.5 Kg/cm^2 Disable	
LLOP Trip Delay	Monitoring time of lube oil pressure after which LLOP trip is generated.	0-999 Sec	
HET Trip Level	Monitoring value of water temperature above which HET trip is generated.	40-250 Disabled*	
HET Trip Delay	Monitoring time of water temperature after which HET trip is generated.	1-999 Sec	

Oil Temp. Trip ●_F	Monitoring value of Oil temperature below which Oil Temp. trip is generated. This is enable when can J1939 enable otherwise disable.	40-250 °C Disabled*	
Oil Temp. Delay ⏱●_F	Monitoring time of Oil temperature after which OIL Temp. trip is generated. This is enable when can J1939 enable otherwise disable.	1-999 Sec	
Digital Input 1 Delay ⌐⏱	Delay for programmable digital input. Digital input are explained above.	1-999 Sec	
Digital Input 2 Delay ⌐⏱	Delay for programmable digital input. Digital input are explained above.	1-999 Sec	
Digital Input 3 Delay ⌐⏱	Delay for programmable digital input. Digital input are explained above.	1-999 Sec	✓
Digital Input 4 Delay ⌐⏱	Delay for programmable digital input. Digital input are explained above.	1-999 Sec	
Digital Input 5 Delay ⌐⏱	Delay for programmable digital input. Digital input are explained above.	1-999 Sec	
Digital Input 6 Delay ⌐⏱	Delay for programmable digital input. Digital input are explained above.	1-999 Sec	

Digital Input 7 Delay ⏻	Delay for programmable digital input. Digital input are explained above.	1-999 Sec	✓
Digital Input 8 Delay ⏻	Delay for programmable digital input. Digital input are explained above.	1-999 Sec	
Chg Alt-V Belt Delay ⏻	Duration for which the V-Belt signal should be continuously deactive to be recognized as a fault and action initiated. This fault is only enabled while the generator is running.	Disable* 2-999 Sec	
Hooter ON Time ⏻	Duration for which the hooter shall be ON, if not externally reset, while announcing a fault.	1-999 Sec	
Crank ON Time ⏻	Maximum crank time	1-999 Sec	
Crank Gap Time ⏻	The delay between two successive cranks	1-999 Sec	
Crank Attempts ⏻	The maximum number of cranks that shall be issued to start the Engine	1-10	
Solenoid ON time ⏻	The time for which stop solenoid will be kept active while stopping the engine	1-999Sec	
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	
Battery UV Warning ⏻	Min. permissible battery voltage, below this the voltage is treated unhealthy & warning is generated.	Disabled* 9-35V	

Battery OV Warning ⊣⊢↓	Max. permissible battery voltage, above this the voltage is treated unhealthy & warning is generated.	9-35V Disabled*	
Remote On	BTS voltage feature can be disable by enabled the remote on	Disable Enable	
NESA MODE	NESA Mode Disable / Enable	Disable Enable	
Engine Off Time E ✗	In auto mode, some time its required to switch off the engine at a predetermined time. This setting set the time for automatic switch off of the engine	00:01 to 23:59	
Engine On Time E✓	In auto mode, some time its required to switch on the engine at a predetermined time. This setting set the time for automatic switch ON of the engine	00:01 to 23:59	

• **12.5 Comm RS485 Parameter**

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

• **12.6 BTS Parameter**

BTS Under Voltage 🗼	BTS Voltage (if enabled) will delay the start of engine.	15.0-75.0 V Disabled*	

BTS Volt Delay 🗼⏲	The monitoring time for BTS voltage before its declared unhealthy.	1-999 secs	

• **12.7 Edit Annunciation**

Ann. Mains OK ⋈	Selected contact is activated if Mains Supply healthy.	Disabled Contact on pin 1-12
Ann. Mains NOK ⋈	Selected contact is activated if Mains Supply unhealthy.	Disabled Contact on pin 1-12
Ann. Generator On ⋈	Selected contact is activated if Generator is on.	Disabled Contact on pin 1-12
Ann. Generator Off ⋈	Selected contact is activated if Generator is off.	Disabled Contact on pin 1-12
Ann. Fuel Trip ⋈	Selected contact is activated if fuel fault registerd	Disabled Contact on pin 1-12
Ann. LLOP Trip ⋈	Selected contact is activated if LLOP fault registered	Disabled Contact on pin 1-12
Ann. HET Trip ⋈	Selected contact is activated if HET fault registered.	Disabled Contact on pin 1-12
Ann. Generator Voltage ⋈	Selected contact is activated if Generator voltage is healthy.	Disabled Contact on pin 1-12
Ann. Emergency ⋈	Selected contact is activated if emergency fault is registered.	Disabled Contact on pin 1-12

Ann. Generator Overload ⋈	Selected contact is activated if generator is overloaded.	Disabled Contact on pin 1-12
Ann. Generator Frequency ⋈	Selected contact is activated if generator over frequency/under frequency fault tregistered	Disabled Contact on pin 1-12
Ann. RWL Fault ⋈	Selected contact is activated if RWL fault registered.	Disabled Contact on pin 1-12
Ann. Charging alternator/ V-belt ⋈	Selected contact is activated if Charging alternator/V-belt fault registered.	Disabled Contact on pin 1-12
Ann. Fail to Start ⋈	Selected contact is activated if Fail to Start fault registered.	Disabled Contact on pin 1-12
Ann. Fail to stop ⋈	Selected contact is activated if Fail to stop fault registered.	Disabled Contact on pin 1-12
Ann. Current Unbalance ⋈	Selected contact is activated if Current Unbalance fault registered.	Disabled Contact on pin 1-12
Ann. Fuel Open ⋈	Selected contact is activated if fuel sensor is open.	Disabled Contact on pin 1-12
Ann. LLOP Open ⋈	Selected contact is activated if LLOP sensor is open.	Disabled Contact on pin 1-12
Ann. HET Open ⋈	Selected contact is activated if HET sensor is open.	Disabled Contact on pin 1-12

Ann. Canopy Temperature ⋈	Selected contact is activated if Canopy Temperature is high.	Disabled Contact on pin 1-12
Ann. Fire ⋈	Selected contact is activated if fire fault registered.	Disabled Contact on pin 1-12
Ann. Oil Temperature ⋈	Selected contact is activated if Oil Temperature is high	Disabled Contact on pin 1-12
Ann. Oil level ⋈	Selected contact is activated if Oil level is low.	Disabled Contact on pin 1-12
Ann. Mains Overload ⋈	Selected contact is activated if mains is overloaded	Disabled Contact on pin 1-12
Ann. Service Due ⋈	Selected contact is activated if Service is due.	Disabled Contact on pin 1-12
Ann. Battery Voltage NOK ⋈	Selected contact is activated if battery voltage is unhealthy	Disabled Contact on pin 1-12
Ann. BTS1 NOK ⋈	Selected contact is activated if BTS1 voltage is unhealthy.	Disabled Contact on pin 1-12
Ann. Reserved	Reserved For Future Purpose	Disabled Contact on pin 1-12

Ann. Any Fault ⋈	Selected contact is activated if generator stopped on any fault	Disabled Contact on pin 1-12
Ann. Half Fuel Warning ⋈	Selected contact is activated if low fuel warning is generated	Disabled Contact on pin 1-12
Ann. C Door Open ⋈	Selected contact is activated if Canopy Door is opened	Disabled Contact on pin 1-12

• **12.8 Reset Service Alarm**

	Press START to Reset Press STOP to esc	

• **12.9 Adjust Clock**

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

• **12.10 Reset Password**

	Three digit password protection for system settings Password can be change easily.	

* This parameter can be disabled while programming

✓ These Parameters can't be change from keypad

• 13.0 Load Management

ECON-ABT-REL has programmable contact Load management function. The load management contact will switch on when the current on the generator has crossed a programmed limit and will reset when the current has fallen below the reset programmed limit. This function can be used to cut-off unnecessary loads or start a second generator when the load goes above a limit.

• 14.0 Event Recording:

ECON keeps a log of last 64 events. Setting change and warning are considered as event. Events are stamped along with date and time

• 15.0 Faults

ECON keeps a log of last 64 Faults. These Faults are stamped along with date and time **There are two categories of faults**

- • Internal Faults
- • External faults

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

• 15.2 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.

• 15.3 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

• 16.0 Communication

- • CAN J1939
- • USB
- • Modbus on Isolated Rs485

• 17.0 Display Diagnostics:
ECON display upto 10 P Codes error if there is no P Codes then they can not display any P Codes and jump to the main window. These P Codes are cyclic, next with enter switch and stop with reset switch.

• 18.0 History Diagnostics:
ECON keeps a log of last 64 shutdown P Codes. P Codes are stamped along with date and time.

Mod-Bus communication Guide.
- Protocol : MODBUS RTU (RS485)
- Data bits : 8
- Baud rate : Default: 19200
  : Setting: 1200/2400/4800/9600/19200
- Parity : Default: None
  : Setting: Even/Odd/None
- Device ID : Default: 26
  : Setting: 1-247
- Stop bit : Default: 1
  : Setting: 1 or 2
- Function Code : 04H (Read)
- Data type : 16 Bit Integer

Mod-Bus Address Table:

Sr. No.	Parameter Name	Type	Address	Note
1	Digital Alarm 1	int	0x4001	
2	Digital Alarm 2	int	0x4002	
3	Solid State O/P	int	0x4003	
4	Mains Phase 1 Volt	int	0x4004	
5	Mains Phase 2 Volt	int	0x4005	
6	Mains Phase 3 Volt	int	0x4006	
7	DG Phase 1 Volt	int	0x4007	
8	DG Phase 2 Volt	int	0x4008	
9	DG Phase 3 Volt	int	0x4009	
10	Load Current Phase 1	int	0x400A	
11	Load Current Phase 2	int	0x400B	
12	Load Current Phase 3	int	0x400C	

13	Mains KWH (long)	int	0x400D	bit0 to bit15
14		int	0x400E	bit16 to bit31
15	DG KWH (long)	int	0x400F	bit0 to bit15
16		int	0x4010	bit16 to bit31
17	DG Run Hour	int	0x4011	Hour
18		int	0x4012	Minute
19	Mains Run Hour	int	0x4013	Hour
20		int	0x4014	Minute
21	DG Battery Voltage	int	0x4015	Value x10
22	BTS Battery Voltage	int	0x4016	Value x10
23	Fuel in Liter	int	0x4017	
24	Mains KW R	int	0x4018	Value x10
25	Mains KW Y	int	0x4019	Value x10
26	Mains KW B	int	0x401A	Value x10
27	DG KW R	int	0x401B	Value x10
28	DG KW Y	int	0x401C	Value x10
29	DG KW B	int	0x401D	Value x10
30	BTS Run Hour	int	0x401E	Hour
31		int	0x401F	Minute
32	Tamper Run Hour	int	0x4020	Hour
33		int	0x4021	Minute

34	Tamper DG KWH (long)	int	0x401E	bit0 to bit15
35		int	0x401F	bit16 to bit31

Alarm and Solid State O/P Bit-wise details:

	Digital Alarm 1	Digital Alarm 2	Solid State O/P
Bit0	Door Open	Mains Cont. In	Output8
Bit1	Smoke Fire	Overload	Output7
Bit2	LLOP	Mains Fail	Output6
Bit3	HCT	NA	Output5
Bit4	DG Contactor On	DG Fail To Start	Output4
Bit5	V-belt Fail	NA	Output3
Bit6	Half Fuel	Over Speed	Output2
Bit7	Low Fuel	Under Speed	Output1
Bit8	Emergency	DG On	NA
Bit9	Auto/Manual Mode	NA	NA
Bit10	NA	Remote Start	DG Contactor Relay
Bit11	Ext1	Canopy THigh	Mains Contactor Relay
Bit12	Ext2	Alternator Fault	RESERVE
Bit13	Low Water Level	RESERVE	RESERVE
Bit14	NA	Mains Charger Fail	RESERVE
Bit15	NA	RESERVE	RESERVE

• 19.0 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
16	V-Mains-N
17	V-Mains-B
18	V-Mains-Y
19	V-Mains-R
20	CAN+
21	CAN-
22	D Input 5 (C Door Open)
23	D Input 4 (HET)
24	D Input 3 (Low Fuel)
25	D Input 2 (LLOP)
26	D Input 1 (RWL)
27	Emergency
28	DG Contactor
29	Mains Contactor
30	Programmable Output 3
31	Programmable Output 2
32	Programmable Output 1
33	Hooter

34	Solenoid
35	Crank
36	GCB
37	MCB
38	Chg. Alt. Contact
39	Battery(+ve)(8-35 V DC)
40	Battery(-ve)
41	Sensor(-ve)
42	Annunciation 1 (LLOP Trip)
43	Annunciation 2
44	Annunciation 3 (DG O/L)
45	Annunciation 4 (Common Fault)
46	Annunciation 5 (DG Frequency)
47	Annunciation 6 (Chg / Vbelt)
48	Annunciation 7 (Canopy Temp)
49	Annunciation 8 (C Door Open)
50	Annunciation 9
51	Annunciation 10
52	Annunciation 11
53	Annunciation 12
54	D Input 6 (Mains Charger)
55	D Input 7 (Half Fuel Warning)
56	D Input 8 (Canopy Temp)
57	Remote
58	BTS 1(-)
59	BTS 1(+)
60	Blank
61	Blank
62	Blank
63	A / M
64	Blank
65	⏚
66	Blank
67	D(-):RS485
68	D(+): RS485

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

MRM *PROCOM* Pvt. Ltd.
www.mrmprocom.com
ECON-ABT-REL (**CAN**)

Fan Current — S1 — 1
— S2 — 2
— 3
CT Com. — 4
CT B — 5
CT Y — 6
CT R — 7

20 — CAN+
21 — CAN-
22 — Digital Input
23
24
25
26
27 — E/Stop
28 — DG Contact
29 — Mains Contact

X	X	X	X	X	X	X	X
42	43	44	45	46	47	48	49

Annunciation

8 — LLOP
9 — SENSORS
10 — HCT
11 — Fuel

X	X	X	X	X	X	X	X
50	51	52	53	54		55	56	57

Annunciation — Digital Input — Remote

30 — Prog. O/P
31
32
33 — Hooter
34 — Stop
35 — Start
36 — GCB
37 — MCB
38 — Chg. Alt.
39 — +ve
40 — -ve — Aux. 8-35V DC
41 — Sensor (-ve)

X	X	X	X	X	X	X
58	59	60	61	62	63	64
(-)	(+)					A/M

BTS 1

12 — N — DG Voltage
13 — B
14 — Y
15 — R

16 — N — MAINS Voltage
17 — B
18 — Y
19 — R

X	X	X	X
65	66	67	68
⊥		(-)	(+)

RS-485

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	5KV
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
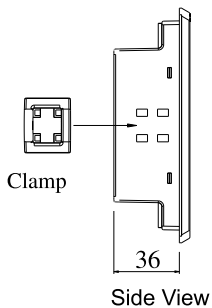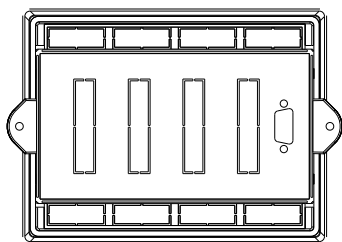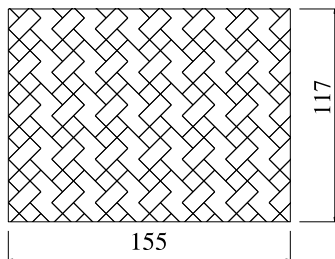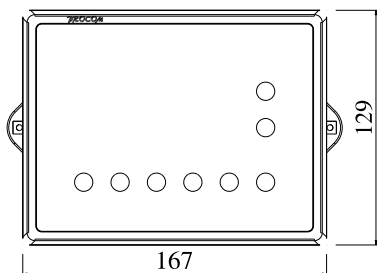|	
Depth	41.8 mm
Digital Input Level	Battery Voltage (Negative)

• 21.0 Operating Processor For Switching ON/OFF Controller and 48V

1) Switching the controller Off / On: If any time the controller is switched off, It's advisable to switch off the 48V. On switching ON the controller, wait for the controller to stabilize and than switch on the 48V supply.

2) Switching the 48V supply Off / On: If its required to switch off the 48V while the controller is ON give a gap of 5-7 seconds before switching back the 48V.

Please do not switch OFF/ON power to controller while DG is running as the run hour shall not be recorded instead tamper run hour shall start increasing.

• **22.0 Dimensions**

Front View

Cut Out

Rear View

Clamp

Side View

NOTES

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