



PROCOM®

OPERATING INSTRUCTIONS (Telecom controller for TMTL Engines)*



ECON-T-312E
ECON-T-312EA (with potential free contact)

Installation Guide

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• **1.0 Introduction**

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

- Manual Controller
 - Single phase
 - Three phase
- 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
 - Semi-Auto Mode
 - Auto Mode
 - Test 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
- Fan Current monitoring for canopy fan
- Menu driven MM1 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 times.
- 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 .

• **Generator Measurements**

- 1 Phase / 3 Phase Voltage
- 1 Phase / 3 Phase Current
- Canopy Fan 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 Frequency
- Current Unbalance
- Over Speed
- Overload
- RWL
- LLOP
- HWT
- LFL
- 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)

• **Digital Input** : 7 digital (3 fixed, 4 programmable)

• **Analog Input**: Three Analog input (sensor measurement)

• **AMF Operation**: 9 outputs (Six fixed and three programmable)

• **Modes**: Configurable Auto, Semi auto, Manual and Test mode of operation.

• **Fault Data Recording**: Last 64 fault with date and time stamping

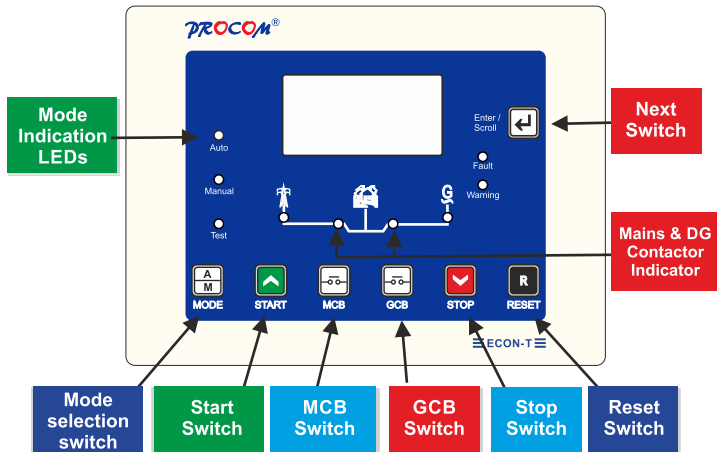
• **Event Recording**: Last 64 event with date and time stamping

• **Display Diagnostics**: up to 10 running P Codes shall be display

• **History Diagnostics**: Last 64 P codes with date and time stamping

- **Start Stop Recording:** Last 64 records with date and time stamping
- **Password Protection:** Three digit password protection for system settings.
- **Communication:** USB, Fully Isolated RS485(Optional), CAN J1939
- Real Time Clock (RTC)
- Provision for switching ON or OFF the measurement for individual sensors.
- Option of warning or tripping when open sensor is detected
- Programmable crank cut off method based on either voltage built up, or oil pressure build up & voltage built up









• 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
	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.
	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
	MODE	Toggle between Auto, Manual & 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 & Led blinks when Econ is in Semi Test Mode
Manual Mode		Led lights up when Econ is in manual mode

Nomenclature	Symbol	Description
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
GCB		LED turns on in case the DG breaker is switched on or else turned off
DG Voltage		This indication glows continuously when the generator is running.
Warning		This LED blinks in case of a warning.
Fault		This LED blinks in case of a fault

- **6.0 Lamp Test:**

ECON switches on with all its LEDs switched on and the software version number displayed. This condition will last for approx. 3 seconds

- **7.0 Digital Input:**

ECON has 7 digital input as below

- **Fixed Inputs**

- Remote Start,
- Remote Stop / Semi Auto
- Emergency

- **Programmable 4 inputs each can be programmed as one of the following inputs.**

- RWL Switch
- Fuel Switch
- Oil Level Switch
- Oil Temperature Switch
- LLOP Switch
- HWT Switch
- Canopy Temperature Switch

- **8.0 Analog Input:** ECON has three digital input:

- Low Lube Oil Pressure Sensor
- High Water Temperature Sensor
- Low Fuel Level Sensor

• **9.0 Digital Output:** ECON has 9 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

• **10.0 Operating Mode:** Auto, Manual or Test Mode can be toggled by pressing MODE switch from the front panel. Semi Auto mode can be activated by pulling the semi Auto pin low, while the unit was in Auto Mode. This is explained latter.

• **10.1 Auto Mode**

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 gen start delay is enabled then the unit will wait to expire the gen start delay before switching on the engine
2. 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 it 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, HWT, 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.

• 10.2 Manual Mode

In this mode, unit is operate under the manual control of the operator for starting and stopping of the generator. Engine has to be started manually by manually pressing "Start" switch or by pulling low pin 29. 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 pressing "GCB" switch or to mains by pressing MCB switch. 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 or by pulling low pin 28. Any attempt to stop the generator, while the GCB contact is engaged, shall be ignored.

* **RTC Based Start Stop Function:** In manual mode, some time its required to switch off/on the engine at a predetermined time. This feature only enabled by enabling the engine on time & engine off time in generator parameter.

- **10.3 Semi Auto Mode:**

This mode can be selected by pulling the pin 28(Semi Auto) low and selecting auto mode from the front panel. The Auto LED will blink indicating that the unit is in Semi-Auto Mode. In this mode the unit does not automatically starts the engine after the mains has failed and mains supervision timer has expired but waits for an external start signal pin 29 (Remote Start/Stop). Once the start signal is given the unit now functions like auto mode with crank attempts. The unit can be stopped by pulling low Pin 29(Remote Stop). Remote start / stop is one touch and hence should not be continuously activated. This pin shall only function during semi auto mode.

- **10.4 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.

- **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 **“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	Factory Setting	Setting Range
Enter Password	Systems setting are password protected. Password is a three digit number	123	0-999
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. E.g. mains 3 phase and DG single phase or vice versa, or three phase mains and DG, or single phase mains and DG.	-Mains 3P/G:3P,	AMF-Mains 3P/G:1P, AMF-Mains :3P/G:3P, AMF-Mains: 1P/G:1P, MANUAL1P, MANUAL 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 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 Stop Pull to Start
CAN J1939 	This is enable then RPM, LLOP, HWT, OIL TEMP. data taken from CAN J1939.	Disabled	Enabled Disabled
LLOP Sensor Type 	Select the installed sensor for LLOP	TMTL	User Define TMTL, 4-20mA, Disabled *




LLOP Sensor R1	<p>R1 to R10 = Resistance Value V1 to V10 = Corresponding pressure value. These table are used when sensor type is selected as user defined.</p>	10	0-999
LLOP Sensor V1		0.0	0.0-10.0
LLOP Sensor R2		29	0-999
LLOP Sensor V2		1.0	0.0-10.0
LLOP Sensor R3		38	0-999
LLOP Sensor V3		1.5	0.0-10.0
LLOP Sensor R4		48	0-999
LLOP Sensor V4		2.0	0.0-10.0
LLOP Sensor R5		57	0-999
LLOP Sensor V5		2.5	0.0-10.0
LLOP Sensor R6		67	0-999
LLOP Sensor V6		3.0	0.0-10.0
LLOP Sensor R7		86	0-999
LLOP Sensor V7		4.0	0.0-10.0
LLOP Sensor R8		105	0-999
LLOP Sensor V8		5.0	0.0-10.0
LLOP Sensor R9	124	0-999	
LLOP Sensor V9	6.0	0.0-10.0	
LLOP Sensor R10	143	0-999	
LLOP Sensor V10	7.0	0.0-10.0	

Fuel Sensor 	Select the installed sensor for Fuel	Electronics	User Define, 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.	10	0-999
Fuel Sensor V1		0	0-100
Fuel Sensor R2		29	0-999
Fuel Sensor V2		10	0-100
Fuel Sensor R3		48	0-999
Fuel Sensor V3		20	0-100
Fuel Sensor R4		67	0-999
Fuel Sensor V4		30	0-100
Fuel Sensor R5		86	0-999
Fuel Sensor V5		40	0-100
Fuel Sensor R6		105	0-999
Fuel Sensor V6		50	0-100
Fuel Sensor R7		124	0-999
Fuel Sensor V7		60	0-100
Fuel Sensor R8		143	0-999
Fuel Sensor V8		70	0-100
Fuel Sensor R9		181	0-999






Fuel Sensor V9		90	0-100
Fuel Sensor R10		200	0-999
Fuel Sensor V10		100	0-100
Fuel Tank Capacity 	The capacity of the fuel tank in litres.	250	Disabled 0-999Lt
HWT Sensor 	Select the installed sensor for HWT	TMTL AIR 3C	UserDefine, TMTL AIR 1C, TMTL AIR 3C, TMTL WATER Disabled *
HWT 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.	540	0-9999
HWT Sensor V1		40	0-300
HWT Sensor R2		458	0-9999
HWT Sensor V2		45	0-300
HWT Sensor R3		222	0-9999
HWT Sensor V3		65	0-300
HWT Sensor R4		120	0-9999
HWT Sensor V4		85	0-300
HWT Sensor R5		93	0-9999
HWT Sensor V5		90	0-300
HWT Sensor R6		80	0-9999
HWT Sensor V6		95	0-300
HWT Sensor R7		70	0-9999







HWT Sensor V7		100	0-300
HWT Sensor R8		60	0-9999
HWT Sensor V8		105	0-300
HWT Sensor R9		53	0-9999
HWT Sensor V9		110	0-300
HWT Sensor R10		46	0-9999
HWT Sensor V10		115	0-300
Oil Temp Sensor 	This is enable when can J1939 enable otherwise disable	TMTL AIR 3C	0-999 °C
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 or no action to be taken i.e. disable.	Disabled	Disabled * Fault Warning
CT Ratio  CTR	Current Transformer ratio	1	1-9999
Gen. RPM 	Engine RPM Type	1500RPM	1500RPM 3000RPM
Contact ON Pin 32,31,30 	These are three programmable output which can be configured for any one function from the list	None	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 as described in 13. This fault is only enabled while the generator is running. On expiry of the timer the generator is stopped	42	1-9999






<p>Over Current</p> 	<p>The current above which the over current fault monitoring will start. The timer for it is as described in 13. This fault is only enabled while the generator is running. On expiry of the timer the generator is stopped</p>	42	1-9999
<p>Over Load Delay</p> 	<p>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</p>	5 Sec	1-999 Sec
<p>Digital Input 1</p> 	<p>This can be configured for one out the listed below Parameters. RWL Oil Level Oil Temperature Canopy Temperature</p>	RWL	RWL Oil Level Oil Temperature Canopy Temperature
<p>Digital Input 2</p> 	<p>This can be configured for one out the listed below Parameters. LLOP Oil Level Oil Temperature Canopy Temperature</p>	LLOP	LLOP Oil Level Oil Temperature Canopy Temperature
<p>Digital Input 3</p> 	<p>This can be configured for one out the listed below Parameters. FUEL Oil Level, Oil Temperature Canopy Temperature</p>	FUEL	FUEL Oil Level Oil Temperature, Canopy Temperature
<p>Digital Input 4</p> 	<p>This can be configured for one out the listed below Parameters. HET Oil Level Oil Temperature Canopy Temperature</p>	HWT	HWT Oil Level Oil Temperature, Canopy Temperature
<p>Digital Input 1-4 Polarity</p>	<p>The polarity of digital input can be changed either normally open or normally close.</p>	Normally Open	Normally Open Normally Close
<p>MCB Polarity</p> 	<p>This parameter define the polarity MCB operation</p>	Normally Close	Normally Open Normally Close

Fan High Current 	Maximum limit for fan current	Disable	0-3.5
Fan Low Current 	Minimum limit for fan current	0.2	0-3.5
Fan Current Delay 	This is the timer for fan current trip.	5	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.	270V	50-300V
Generator U/V 	Min. permissible Generator voltage, below this the Generator voltage is treated unhealthy & the Generator is stopped on voltage fault.	180V	50-300V
Gen Voltage Delay  VOLT	Duration for which generator Over/Under voltage condition can be tolerated before stopping the Generator.	10 Sec	1-999 Sec
Generator Over RMP 	Max. Permissible Generator frequency, above this the Generator frequency is treated unhealthy & the Generator is stopped on frequency fault.	55Hz	25-70Hz Disable*
Generator Under RPM 	Min. permissible Generator frequency, below this the Generator frequency is treated unhealthy & the Generator is stopped frequency fault.	45Hz	Disable* 25-70Hz






Gen RPM Delay Hz 	Duration for which Generator Over /Under frequency condition can be tolerated before stopping the Generator. This setting is not available if (4)&(5) are disabled	5 Sec	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	Disable	5-100% Disable
Current Unbalance Delay 	Duration for which the current unbalance can be tolerated before triggering the fault	10 Sec	1-999Sec
Pickup Voltage UU	This parameter specifies the generator voltage at which it is presumed to have started and crank has to be terminated	100V	80-150V
Pick Up RPM UU	This parameter specifies the edge RPM (define for DG voltage) at which crank shall be terminated.	750	600-3000
Service Due Hr 	Time, in hours, for next service due warning.	500Hrs	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 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	8	1-9999







Reset KVA warning KVA 	If the current level falls below this limit the contact is de-energized after the programmed supervision time.	8	1-9999
KVA Warning Delay KVA 	The supervision time for the above 2 parameters.	5	1-999Sec
Choke Pre time 	Keep the choke for this time before the engine has started.	Disable	Disable* 1-999 Sec
Choke Post time 	Keep the choke for this time after the engine has started.	Disable	Disable* 1-999 Sec
Pump Pre Time 	Activate the Pump by this time before cranking	2	1-999Sec
Engine Off Time E x	In manual mode, some time its required to switch off/on the engine at a predetermined time. This setting set the time for automatic switch off of the engine	Disable	00:01 to23.59 Disable *
Engine On Time E ✓	In manual mode, some time its required to switch off/on the engine at a predetermined time. This setting set the time for automatic switch ON of the engine	Disable	00:01 to23.59 Disable*

12.3 AMF Parameter

Mains O/V 	Max. Permissible Mains voltage, above this the Mains voltage is treated unhealthy & Generator is started	270V	50-300V
Mains U/V 	Min. permissible voltage, below this the voltage is treated unhealthy & Generator is started	180V	80-300V








<p>Mains Voltage Delay</p>  <p>VOLT</p>	Duration for which Mains Over/Under voltage condition can be tolerated before starting the Generator.	5	1-999 Sec
<p>Mains O/F</p> 	Max. Permissible Mains frequency, above this frequency the Mains is treated unhealthy & Generator is started.	55Hz	40-70Hz Disable*
<p>Mains U/F</p> 	Min. permissible Mains frequency, below this frequency the Mains is treated unhealthy & Generator is started.	45Hz	Disable* 40-70Hz
<p>Mains Freq Delay</p> 	Time for which the Mains frequency has to be unhealthy (under or over frequency as defined above in 4 & 5) before starting the Generator.	5 Sec	1-999 Sec.
<p>Voltage Unbalance</p> 	Max. allowed voltage unbalance in volt	Disable	10-100 Volt Disable*
<p>Voltage Unbalance Time</p> 	Duration for which unbalance can be allowed before starting the Generator. This parameter is not available if above is set to disabled.	10	1-999Sec
<p>Phase Sequence Delay</p> 	This setting determines if the engine shall be started and load switch to generator in case of reverse phase sequence of mains.	Disable	Disable 1-999 Sec
<p>Mains Restoration Time</p> 	The time for which Mains should be continuously healthy before stopping the Generator and load transferred to Mains.	30 Sec	1-999 Sec
<p>Warm Up Time</p> 	The load is transferred to generator after expiry of this time	0 Sec	0-999 Sec









<p>Gen Start Delay</p> 	<p>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"</p>	<p>Disable</p>	<p>Disable* 1-999 Mins</p>
<p>Gen. On Time</p> 	<p>Max. duration for which the generator is allowed to work continuously</p>	<p>Disable</p>	<p>Disable* 1-999 Mins</p>
<p>Gen Rest Time</p> 	<p>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.</p> <p>This is unavailable if above is Disabled This timer is automatically reset, if during this duration the mains become healthy for "Mains Restoration Delay"</p>	<p>Disable</p>	<p>Disable * 1-999 mins</p>
<p>Mains Over Load</p> 	<p>Econ-A 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</p>	<p>Disable</p>	<p>Disable* 2-9999Amps</p>
<p>Mains O/L Delay</p> 	<p>The monitoring duration for the above parameter before the fault is triggered.</p>	<p>5 Sec</p>	<p>1-999 Sec</p>





<p>Contactor Protection</p> 	<p>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</p>	<p>Disable</p>	<p>Disable / Enable</p>
<p>Mains Fail</p> 	<p>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</p>	<p>Any Phase Fail</p>	<p>Any Phase Fail/ All Phase Fail</p>
<p>GCB to MCB Delay</p> 	<p>User programmable delay when the load is transferred from Generator to Mains.</p>	<p>5 Sec</p>	<p>1-10 Sec</p>
<p>Recool Time</p> 	<p>The time for which generator is allowed to run on no load before switching off</p>	<p>60 Sec</p>	<p>0-999Sec</p>
<p>Service Delay hour</p> 	<p>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</p>	<p>Disabled</p>	<p>2-999 Hrs</p>
<p>Service Run min.</p> 	<p>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</p>	<p>Disabled</p>	<p>1-999 Min Disabled</p>

Contact Type	This setting is for units which have external change over. The sections are change over(external) or contactors (built in and controlled by ECON)	Contactor	Change over Contactor
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• 12.4 Protection Parameter

Fuel Warn Level 	Monitoring value of fuel level below which fuel level warning is generated.	50 %	Disable* 11-80 %
Fuel Warn Delay 	Monitoring time of fuel level after which fuel level warning is generated.	10 Sec	1-999Sec
Fuel Trip Level 	Monitoring value of fuel level below which fuel level trip is generated.	15 %	Disable* 10-80 %
Fuel Trip Delay 	Monitoring time of fuel level after which fuel level trip is generated.	10 Sec	1-999 Sec
LLOP Trip Level 	Monitoring value of lube oil pressure below which LLOP trip is generated.	0.7 Kg/cm ²	Disable* 0-8.5 Kg/cm ²
LLOP Trip Delay 	Monitoring time of lube oil pressure after which LLOP trip is generated.	10 Sec	0-999 Sec
HWT Trip Level 	Monitoring value of water temperature below which HWT trip is generated.	Disable*	40-250 Disabled*

HWT Trip Delay 	Monitoring time of water temperature after which HWT trip is generated.	5 Sec	1-999 Sec
Oil Temp. Trip 	Monitoring value of Oil temperature below which Oil Temp. trip is generated.	100 °C	40-250 °C Disabled*
Oil Temp. Delay	Monitoring time of Oil temperature after which OIL Temp. trip is generated.	5 sec	1-999 Sec
D1-D4 Input Delay 	Delay for 4 programmable digital inputs . Digital input are explained above.	10 sec	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.	10 sec	Disable* 2-999 Sec
Hooter ON Time 	Duration for which the hooter shall be ON, if not externally reset, while announcing a fault.	30Sec	1-999 Sec
Crank ON Time 	Maximum crank time	3 Sec	1-999 Sec
Crank Gap Time 	The delay between two successive cranks	10 Sec	1-999 Sec
Crank Attempts 	The maximum number of cranks that shall be issued to start the Engine	3	1-10










Solenoid ON time 	The time for which stop solenoid will be kept active while stopping the engine	35 Sec	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	ON/OFF
Battery UV Warning 	Min. permissible battery voltage, below this the voltage is treated unhealthy & warning is generated.	9.5 V	Disabled* 9-35V
Battery OV Warning 	Max. permissible battery voltage, above this the voltage is treated unhealthy & warning is generated.	15 V	9-35V Disabled*
REMOTE OPEN	START & STOP though RS-485	Disabled	Enabled Disabled*









• 12.5 Comm RS485 Parameter (Only in ECON-T-312E)








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

• **12.6 Edit Annunciation :**

Potential free contact (optional) in model. (**ECON-T-312EA**)

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 registered	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 registered	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 K	Selected contact is activated if battery voltage is unhealthy	Disabled Contact on pin 1-12
Ann. Reserved K	Reserved For Future Purpose	Disabled Contact on pin 1-12
Ann. Any Fault K	Selected contact is activated if generator stopped on any fault	Disabled Contact on pin 1-12
Ann. Half Fuel Warning K	Selected contact is activated if low fuel warning is generated	Disabled Contact on pin 1-12
Ann. C Door Open K	Selected contact is activated if Canopy Door is opened	Disabled Contact on pin 1-12

• **12.7 Reset Service Alarm**

	Press INC to Reset Press DEC to esc		
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• **12.8 Adjust Clock**

	Automatic real time based DG Start & Stop (Manual Controller Configuration) RTC Time and Date can be easily entered	00.00	00.00 DD/MM/YYYY
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• **12.9 Reset Password**

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

*** This parameter can be disabled while programming**

• **13.0 Load Management**

ECON-T 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 Frequency Unhealthy.
- Generator Fails to Stop.
- Generator Voltage Unhealthy
- Generator over Speed.
- 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
- RWL
- Emergency
- HWT
- Fuel
- V-Belt

• 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 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.

• 17.0 History Diagnostics:

ECON keeps a log of last 64 shutdown P Codes. P Codes are stamped along with date and time.

• 18.0 Terminal Numbers

Terminal No.	Description
1	Fan Current S1
2	Fan Current S2
3	NC
4	CT Common
5	CT B
6	CT Y
7	CT R
8	NC
9	Sensor LLOP
10	Sensor HWT
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	NC
23	D Input 4
24	D Input 3

25	D Input 2
26	D Input 1
27	Emergency
28	Semi Auto
29	R Start/Stop
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	NC
43	D (+)
44	D (-)

• 19.0 Technical Specifications

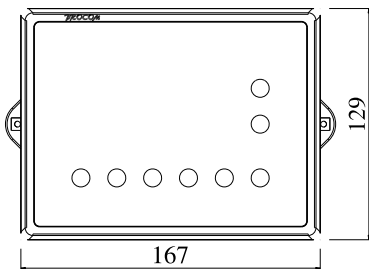
AC voltage withstand	330 VAC (Phase to neutral)
Measurement Accuracy	
Voltages & Current	1% of Reading
Power & Energies	2% of Reading
Surge 1.2/50Usec	2.5KV
Battery Voltage	9-35 V DC
DC Interruption time	0.4 Sec
Cut out Dimensions	155mm X 117mm
Depth	41.8 mm
Digital Input Level	Battery Voltage (Negative)

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

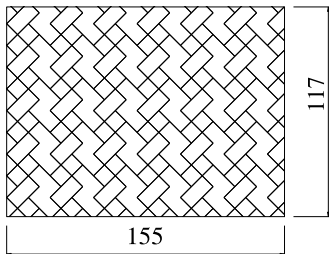
MRM <i>PROCOM</i> Pvt. Ltd.		
www.mrmprocom.com		
ECON-T-312E		
		1 S1
		* Fan Current 2 S2
		3 NC
		4 CT Common
		5 CT B
		6 CT Y
		7 CT R
20 CAN+		8 NC
21 CAN-		9 S LLOP
22 NC		10 S HWT
23 D In 4		11 S Fuel
24 D In 3		
25 D In 2		
26 D In 1		
27 Emr.		
28 Semi		
29 R Start /Stop		
		12 V-DGN
30 P/O 3		42 43 44
31 P/O 2		• • •
32 P/O 1		• • •
33 Hooter		NC *D(+) *D(-)
34 Solenoid		RS-485 COMM.
35 Crank		13 V-DGB
36 GCB		14 V-DGY
37 MCB		15 V-DGR
38 Chg. Alt.		
39 +ve		16 V-MainsN
40 -ve	Aux. 8-35V DC	17 V-MainsB
41 Sensor (-ve)		18 V-Mains Y
		19 V-MainsR

* MODEL (ECON-T-312E)

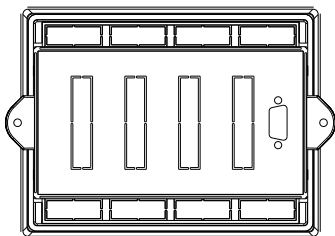
• 20.0 Dimensions



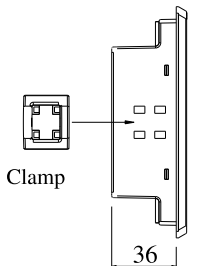
Front View



Cut Out



Rear View



Side View

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