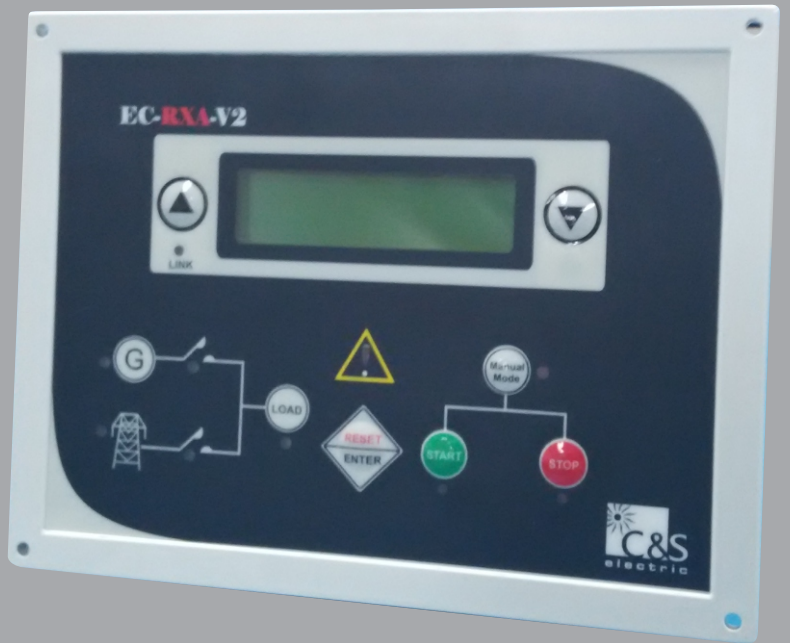


We touch your **electricity** everyday!

EC-RXA-V2

AMF Engine Controller Relay

AMF
AMF
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AMF
Series



Catalogue



PMD Division

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Introduction

EC-RXA-V2 is a AUTOMATIC/MANUAL Generator controller module including protection for (STAND BY) GEN-SETS. It uses single advanced micro controller chip for an easy and trouble free GEN-SET control. It is cost effective solution for AMF controlling system. If mains voltage in any phase fails (either voltage or frequency goes out of the selected range) EC-RXA-V2 initiates an automatic GEN-SET start cycle including load transfer by switching the contactors mounted in

the panel. After the mains is restored the load will be automatically removed from GEN-SET and transferred to mains. GEN-SET will stop after a set cool down time. During all cycles, generator is fully monitored and protected against any fault. All the alarm occurring at abnormal GEN-SET conditions are detected and displayed on LCD display and if necessary GEN-SET is stopped and hooter gets activated.

Features

- ❖ Display of 3 Phase Mains Parameters: Voltage and Frequency
- ❖ Display of Generator Parameters: Voltage, Frequency, Speed, Run Hours
- ❖ Measurement and display of Load current and Instantaneous load in kW
- ❖ 34 Programmable Parameters including settings of voltage, frequency, different delay times
- ❖ Site name and number are programmable
- ❖ 9 LEDs, 7 Digital inputs and 6 Potential outputs for driving of relays on external relay card
- ❖ Last 5 Fault records with date and time stamp
- ❖ Logical interlock for Mains & DG breaker for fail safe operation
- ❖ Wide array of time circuits for start delay, stop delay, mains restoration, re- cooling etc
- ❖ Full engine safety functions: The unit has LLOP, HCT, Over speed, Start Failure, Stop Failure, Fuel level trip, Emergency stop and Overload trip functions

Application

AMF RELAY EC-RXA-V2 plays an important & reliable role where minimal power supply interruption is desired. It provides the safe solution for DG automation in a compact design.

Hardware

- ❖ 6 Analog inputs
- ❖ 7 Digital inputs
- ❖ 9 LEDs for Annunciation
- ❖ CSE Bus on RS-485 for Add on modules

Protection Features

- ❖ Over/ Under Voltage /Frequency Indication / Shutdown
- ❖ DG faults like Fail to Start, Fail to Stop, Over Speed
- ❖ Protection against DG Overload with selectable overload setting
- ❖ Protection against engine faults like LLOP, HCT, Low Fuel monitored via digital inputs
- ❖ Protection against Mains Phase Reversal
- ❖ Emergency Stop
- ❖ Low Battery

Operating Modes

EC-RXA-V2 operates in one of the three modes as described below. The operating mode can be selected from MMI (or) Digital inputs. The Three modes are:

(a) Automatic Mode (b) Manual Mode (c) Remote Mode

Automatic Mode

This mode is selected thru' front 'Manual Mode' key. The LED closest to this key will remain off in this mode. In this mode of operation, if the mains either fail or exceed operating limits GEN-SET is started, mains CB is opened and generator CB is closed automatically. Mains three phase voltage is monitored continuously. If voltage falls below a safe lower limit or exceeds a safe upper limit then EC-RXA-V2 takes following actions:

During engine start delay it waits to see if mains has returned to normal. This avoids false starting of GEN-SET. Thereafter engine start relay (meant for operating cranking motor) is activated for a predetermined period (crank Period) and then the system waits for the engine to start and pick up the Ignition voltage within another predetermined period (Wait Period). If the engine does not start within wait period, then another attempt is made. In this way a certain number of attempts are made. If the engine fails to start after all these attempts, then "Fail to Start" annunciation is displayed. Delayed supervision of oil pressure is provided at the time of starting. This ensures that sufficient time is available for oil pressure to build up. If subsequently oil pressure is found to be low, then annunciation is given and engine is started.

When the mains is restored, the generator CB is opened after the Mains restoration time. Then after a preset re-cooling time, the GEN-SET is shut down.

The mains restoration time ensures that the mains supply voltage is stable before it is made available to consumer. While the GEN-SET is in operation, it is comprehensively protected against over-speeding, over-voltage and under-voltage conditions.

Manual Mode

This mode is selected thru' front 'Manual Mode' key. The LED closest to this key will remain on in this mode. This mode will be activated only from automatic mode. In this mode EC-RXA-V2 will be operated manually and it will ignore Mains voltage. It will only respond to START and STOP keys for Generator start and stop operation. These keys will be functional only when manual mode is active. Generator and Mains CBs will be operated externally without the control of EC-RXA-V2. Before giving start command to Generator one must ensure that Generator CB is open. Start key should be pressed until the engine reaches the threshold speed. Generator CB may now be closed provided that the Mains CB is open. Pressing of Stop key turns off the engine. Before giving stop command from keypad, the generator CB must be open. The generator is stopped without going thru recooling phase. In this mode all protection for Gen Set like under voltage, over voltage, HCT, LLOP etc. will remain active.

Remote Mode

This mode is selected thru Remote Digital input. This mode will be activated only from automatic mode. In this mode EC-RXA-V2 will be operated manually and it will ignore Mains voltage. It will only respond to Remote Start DI signal and Remote Stop DI signal for DG start and stop operation. Generator and Mains CBs will be operated externally without the control of EC-RXA-V2. Before giving start command to Generator one must ensure that Generator CB is open. Remote Start DI signal should be held down until the engine reaches the threshold speed. Generator CB may now be closed provided that the Mains CB is open. Remote Stop DI signal turns off the engine. Before giving stop command from DI, the generator CB must be open. The generator is stopped without going thru recooling phase. In this mode all protection for GEN-SET like under voltage, over voltage, HCT, LLOP etc. will remain active.







Note : User must ensure interlocking of Mains and Generator CB during Manual and Remote Mode of EC-RXA-V2.

Fault Recording










EC-RXA-V2 records last 5 faults in its non volatile memory with data and time stamp. Fault indicator helps the user to identify clearly the fault and to monitor relay setting and operation. Latest fault will be the 1st one.

Man Machine Interface (MMI)

It comprises 16 character x 2 Line bright Alphanumeric display, 9 LEDs indication with 6 Push buttons for setting and other operations for local access.

| Keys | Description |
|---|---|
|  | Scrolling down/Decrement key |
|  | Scrolling up/Increment key |
|  | DG START key [only in manual mode] |
|  | DG STOP key * [only in manual mode] |
|  | ENTER key & Fault RESET key (Long Press for 1 Sec.) |
|  | Enables the Manual Mode on pressing this key for 2 Sec. |

There are 9 LEDs cum symbols that help the user to know the necessary information like faults, Mains & Generator status etc. These are as follows:

| Symbols | Description |
|---|--|
|  | This symbol with glowing LED indicates fault in the system (DG/Mains). |
|  | This indicates DG is ON i.e. Volt/freq is healthy. During cranking this LED flashes fast and under recool time this LED flashes with slow rate. |
|  | indicates DG breaker status (LED ON : Breaker Close). |
|  | indicates Mains is available. |
|  | indicates Mains breaker status (LED ON : Breaker close). |
|  | This indicates status of load current ON: Load current is < overload limits not zero. OFF: Load current is zero. Flashes: Overload condition. |
|  | This LED indicates the E-STOP operation of STOP Key*. |
|  | This LED cum symbol indicates Manual Mode Selection. ON: START, STOP key active, Manual Mode active. OFF: START, STOP key inactive. |
|  | This symbol indicates healthy communication link with ADD-ON modules (in V3 and V4 models only). |

* Note: This key will act as E-STOP key in Automatic mode (if press down for more than 5 sec.).

Setting Ranges

| S.No. | Parameter | Min | Max | Step Size | Unit | Exit | Default Setting |
|-------------------------|-----------------------|---------|---------|-----------|------|------|-----------------|
| MAINS PARAMETERS | | | | | | | |
| 1 | MainsUnderVolt | 20 | 200 | 1 | V | YES | 90 |
| 2 | MainsOverVolt | 50 | 300 | 1 | V | YES | 300 |
| 3 | MainsUnderFreq | 30 | 99.9 | 0.1 | Hz | YES | 45 |
| 4 | MainsOverFreq | 40 | 99.9 | 0.1 | Hz | YES | 55 |
| 5 | MFreqBlkVolt | 50 | 200 | 1 | V | NO | 85 |
| 6 | MainRestoreTime | 1 | 999 | 1 | SEC | NO | 5 |
| 7 | Phase Reversal | DISABLE | ENABLE | - | NONE | - | DISABLE |
| 8 | Single Phase | DISABLE | ENABLE | - | NONE | - | DISABLE |
| GEN PARAMETERS | | | | | | | |
| 9 | GenUnderVolt | 20 | 200 | 1 | V | YES | 190 |
| 10 | GenOverVolt | 50 | 300 | 1 | V | YES | 260 |
| 11 | GenUnderFreq | 30 | 99.9 | 0.1 | Hz | YES | 47 |
| 12 | GenOverFreq | 40 | 99.9 | 0.1 | Hz | YES | 53 |
| 13 | GFreqBlkVolt | 50 | 200 | 1 | V | NO | 100 |
| 14 | IgnitionVolt | 50 | 250 | 1 | V | NO | 65 |
| 15 | GenCbOnDelay | 1 | 999 | 1 | SEC | NO | 5 |
| 16 | GenRecoolTime | 1 | 999 | 1 | SEC | NO | 30 |
| 17 | GenCrkWaitTime | 1 | 999 | 1 | SEC | NO | 10 |
| 18 | GenStartDelay | 1 | 30000 | 1 | SEC | NO | 10 |
| 19 | GenOffDelay | 1 | 999 | 1 | SEC | NO | 10 |
| 20 | GenTripDelay | 1 | 999 | 1 | SEC | NO | 25 |
| 21 | DelaySuperTime | 1 | 999 | 1 | SEC | NO | 15 |
| 22 | NoOfGenCrank | 1 | 9 | 1 | NONE | NO | 3 |
| 23 | GenCrankPeriod | 1 | 999 | 1 | SEC | NO | 5 |
| 24 | StopperTime | 1 | 999 | 1 | SEC | NO | 20 |
| 25 | BattLowIndicatr | 6 | 35.0 | 0.1 | V | NO | 10 |
| 26 | LLopCheck | DISABLE | ENABLE | ---- | NONE | ---- | DISABLE |
| 27 | Alternator_Protection | DISABLE | ENABLE | ---- | NONE | ---- | ENABLE |
| 28 | AlternatrFitTimer | 3 | 600 | 1 | SEC | NO | 25 |
| 29 | Overload_I(In=5A) | 10% In | 200% In | 5% | % | YES | 120 |
| 30 | OverloadTrpTime | 10 | 60 | 1 | SEC | NO | 20 |
| 31 | Over speed | 40 | 99.1 | 0.1 | Hz | YES | 55 |
| 32 | DG Type | 1 Phase | 3 Phase | ---- | NONE | ---- | 1 Phase |
| OTHER PARAMETERS | | | | | | | |
| 33 | CT_Ratio | | 1 | 999 | 1 | NONE | NO20 |
| 34 | HooterRstTime | 1 | 999 | 1 | SEC | NO | 10 |

Technical Data

(a) Performance Specifications

| S.No | Parameter | Specification |
|------|--------------------------------------|--|
| 1 | Aux. supply | 7-35V DC |
| 2 | Aux. supply Interruption Time | Half second sustains battery dip down to zero volts without requiring external capacitor bank. |
| 3 | Aux. supply burden | <1.5W @24V DC |
| 4 | Generator voltage | 50 to 300V AC (Ph-N) |
| 5 | Mains voltage | 50 to 300V AC (Ph-N) |
| 6 | Rated frequency | 50 / 60 Hz |
| 7 | VBatt supervision | 9.0 – 35.0V (DC) |
| 8 | Current measurement (secondary side) | 0.10-10A |

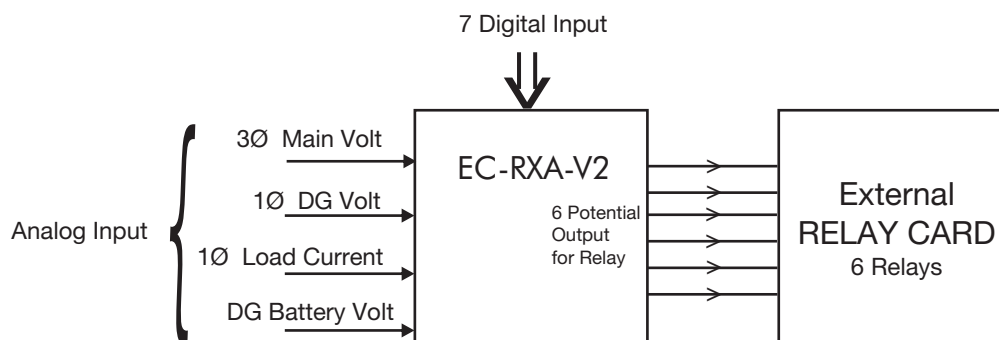
(b) Measurement Accuracy

| S.No | Parameter | Specification |
|------|--------------------------------|---------------|
| 1 | Voltage measuring tolerance | ± 3% |
| 2 | Freq. measuring tolerance | ± 0.5% |
| 3 | Tolerance of VBatt measurement | ± 1% |
| 4 | Current measurement tolerance | ± 3% |
| 5 | Power measurement tolerance | ± 5% at PF=1 |

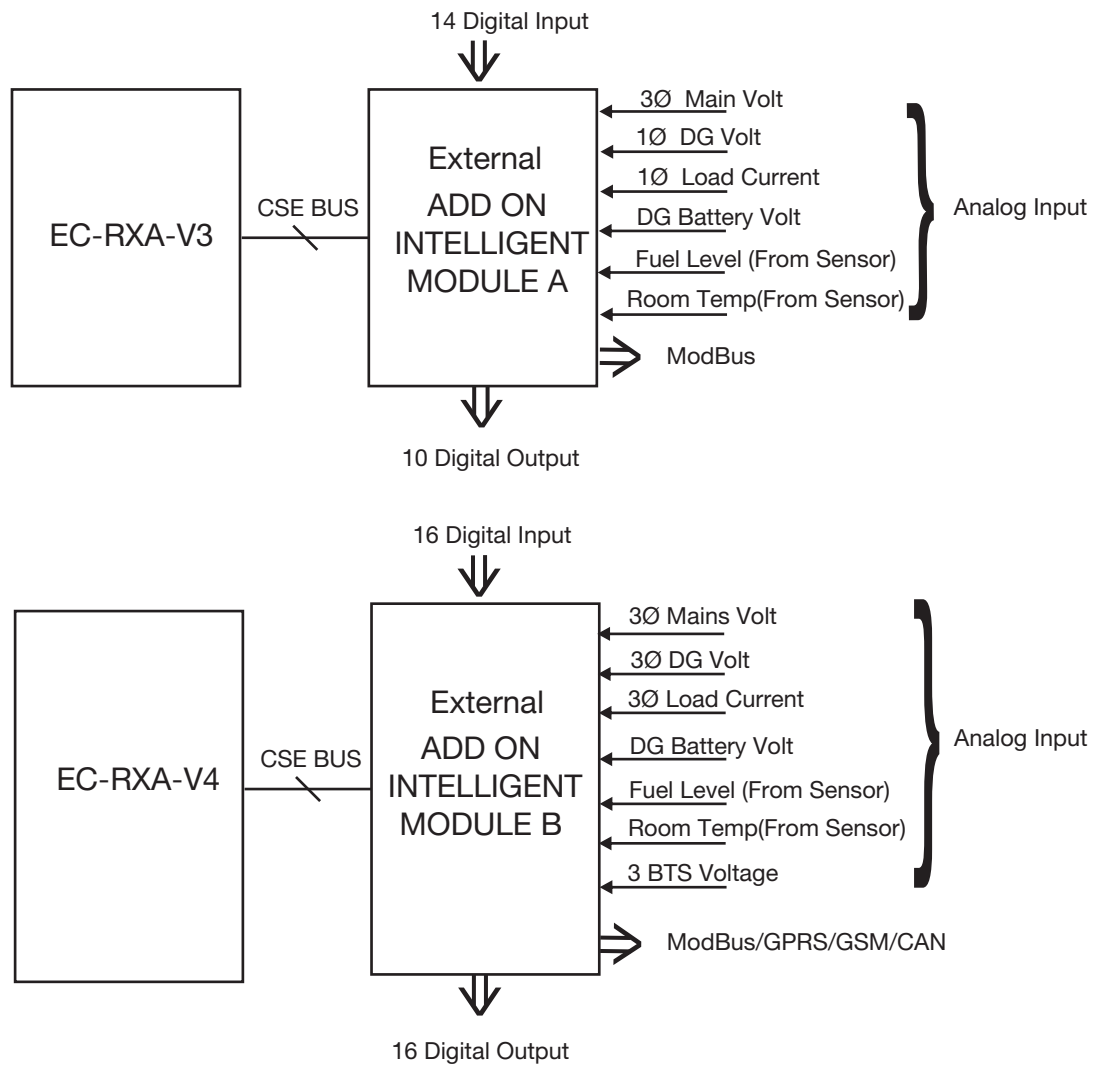
Note: EC-RXA-V2 will calculate power as $P = V_R \times I_L \times \text{Cos}\phi$.
In case of 3 phase mains and 3 phase DG, power will be calculated as 3xP.

Description of Modules

Basic Module



Other Variants in EC-RXA Family



Model Availability

EC-RXA AMF relay is available with following options with ADD-ON module.

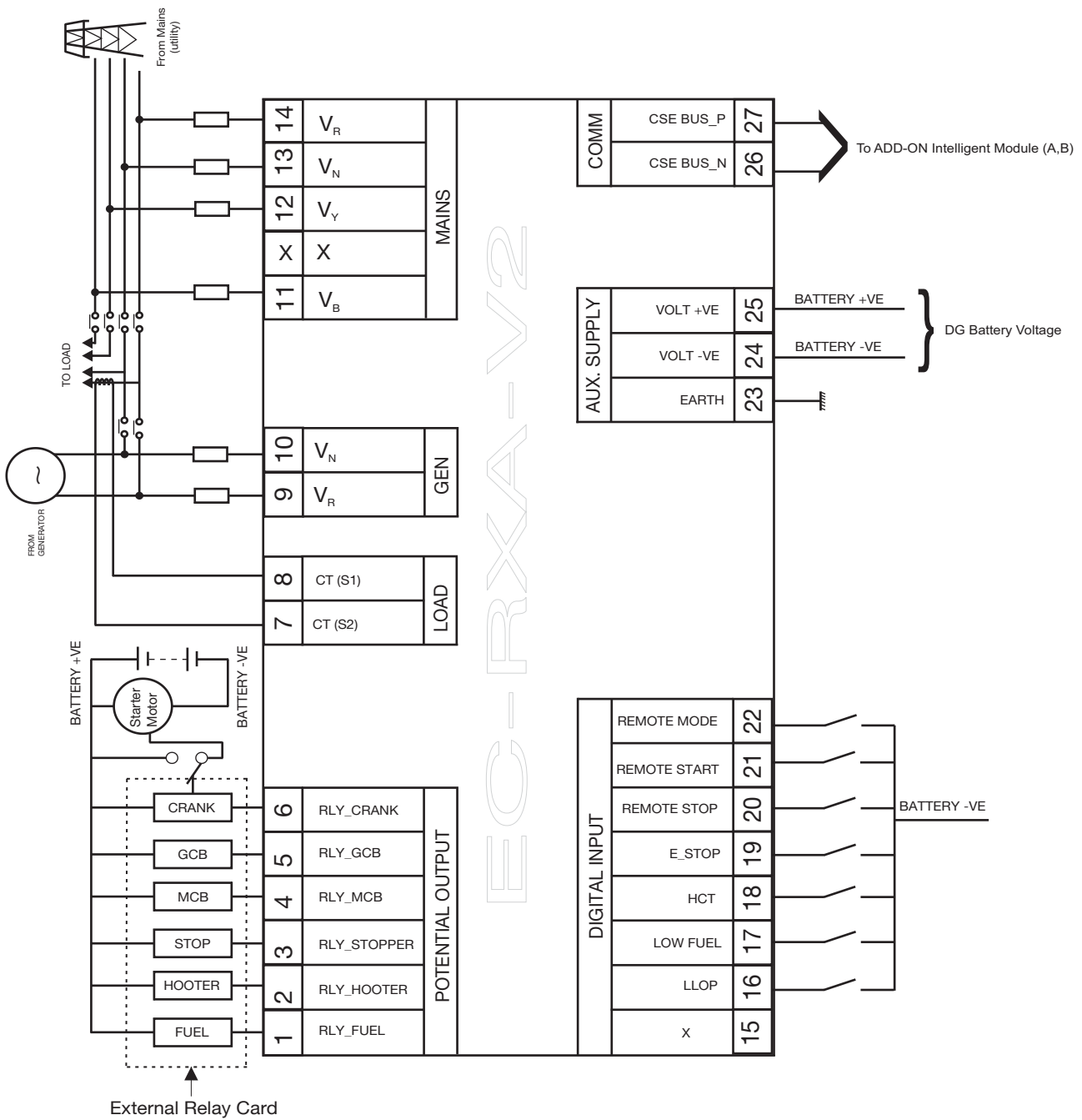
| Model Selection | Analog Measurements | Digital Input | Digital Output | Communication |
|--------------------------------|---|------------------------|--|--|
| EC-RXA-V2 Basic Module | 1) Three Phase Mains 2) Single Phase DG 3) Single Phase Load 4) DG Bat Voltage | 7 | 6 (Potential free with optional relay card) | X |
| EC-RXA-V3 with ADD-ON Module A | 1) Three Phase Mains 2) Single Phase DG 3) Single Phase Load 4) DG Bat Voltage 5) Fuel Level 6) Room Temperature | 14 (7 Programmable) | 10 Potential free O/P (4 Programmable) | Modbus RTU |
| EC-RXA-V4 with ADD-ON Module B | 1) Three Phase Mains 2) Three Phase DG 3) Three Phase Load 4) DG Bat Voltage 5) Fuel Level 6) Room Temperature 7) Three BTS Bat Voltage | 16 (8 Programmable) | 16 Potential free O/P (4 Programmable) | Modbus RTU or GPRS or GSM or CAN Bus |

Terminal Description

| Terminal No. | Connector | Connection Description |
|--------------|----------------|--|
| 1 | RLY_FUEL | Potential Output to external relay card |
| 2 | RLY_HOOTER | |
| 3 | RLY_STOPPER | |
| 4 | RLY_MCB | |
| 5 | RLY_GCB | |
| 6 | RLY_CRANK | |
| 7 | CT (S2) | External CT secondary for load current measurement |
| 8 | CT (S1) | |
| 9 | V _R | Generator R Phase Voltage |
| 10 | V _N | Generator Neutral |
| 11 | V _B | Mains B Phase Voltage |
| 12 | V _Y | Mains Y Phase Voltage |
| 13 | V _N | Mains Neutral |
| 14 | V _R | Mains R Phase Voltage |
| 15 | X | Not for the User |
| 16 | LLOP | Potential Free Digital Input |
| 17 | LOW FUEL | |
| 18 | HCT | |
| 19 | E_STOP | |
| 20 | REMOTE STOP | |
| 21 | REMOTE START | |
| 22 | REMOTE MODE | Earth Connection |
| 23 | EARTH | Aux. Supply -ve |
| 24 | VOLT (-VE) | Aux. Supply +ve |
| 25 | VOLT (+VE) | Communication Link for ADD-ON module |
| 26 | CSE Bus_N ** | |

** In V3 & V4 model only.

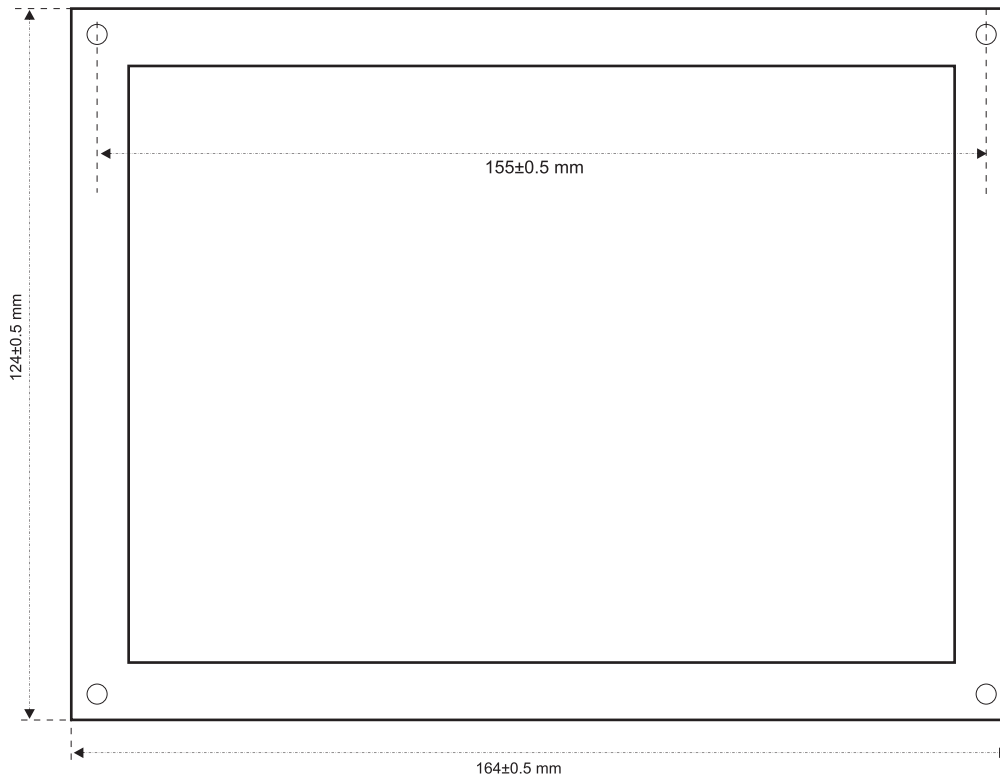
Connection Diagram



SPECIAL NOTE:

- DG Body (Battery-Ve) should be earthed properly.
- Use separate +Ve & -Ve supply from DG battery terminal for EC-RXA-V2. Do not Loop this wires to any other wires in side the control panel.
- Use RC snubber networks across contactor coil.
- Use RC filter across Start & Stop relay contacts.
- Use separate trays for AC & DC wirings.
- Please make sure that all above conditions are fulfilled properly for trouble free operations of the EC-RXA-V2.
- Put free wheeling diodes across relay coil in external relay card.

Dimensional Details



Flush Mounting

Panel Cut-Out : 145 mm \pm 0.5 x 105 mm \pm 0.5

Installation Depth: 55 mm

Ordering Information

| Model Type | | Order No. |
|------------|--|---------------|
| EC-RXA-V2 | Without Relay Card | EC-RXA-V2 |
| | With Relay Card (R) Coil Voltage: 12V | EC-RXA-V2-R12 |
| | Coil Voltage: 24V | EC-RXA-V2-R24 |

NOTE

The material in this catalog is for general information, performance data and proper model selection. Although every attempt has been made to ensure that the information contained in this catalog is correct. C&S reserves the right to change the design, material or specification contained in this catalog without prior notice.

For further information, please contact:

C&S Electric Ltd.
(Protection & Measurement Devices)

C-60, Wing-A, Phase-II, Noida - 201 305, Dist.: Gautam Budh Nagar (U.P) INDIA
Phone : +91-120-3874800/01, Fax: +91-120-3874802, E-mail: cspc@cselectric.co.in

Branch office

| Branch | Phone | Fax | E-mail |
|--------------|--------------------------------|------------------|--|
| Ahmedabad: | +91 79 30074534/35/36 | +91 79 30074519 | cspc.ahmedabad@cselectric.co.in |
| Bangalore: | +91 80 3057 0372/73, 3057 0347 | +91 2558 4839 | cspc.bangalore@cselectric.co.in |
| Bhubaneswar: | +91 674 2507265 | +91 674 2507265 | cspc.bhubaneswar@cselectric.co.in |
| Chennai: | +91 44 3918 0531-35 | +91 44 39180514 | cspc.chennai@cselectric.co.in |
| Cochin: | +91 0484 3071717 | +91 0484 3071716 | cspc.cochin@cselectric.co.in |
| Delhi: | +91 11 30838822-25 | +91 11 30838826 | cspc.delhi@cselectric.co.in |
| Hyderabad: | +91 40 3918 2496/97 | +91 40 3910 3631 | cspc.hyderabad@cselectric.co.in |
| Kolkata: | +91 33 22275850/51 | +91 33 2227 5849 | cspc.kolkata@cselectric.co.in |
| Mumbai: | +91 22 30487146/47/48 | +91 22 2412 6631 | cspc.mumbai@cselectric.co.in |
| Pune: | +91 20 30283244/45 | +91 20 30283244 | cspc.pune@cselectric.co.in |