

### EM/RX2 Three Phase Electricity Meter (with clip-on CT rings)



#### Description

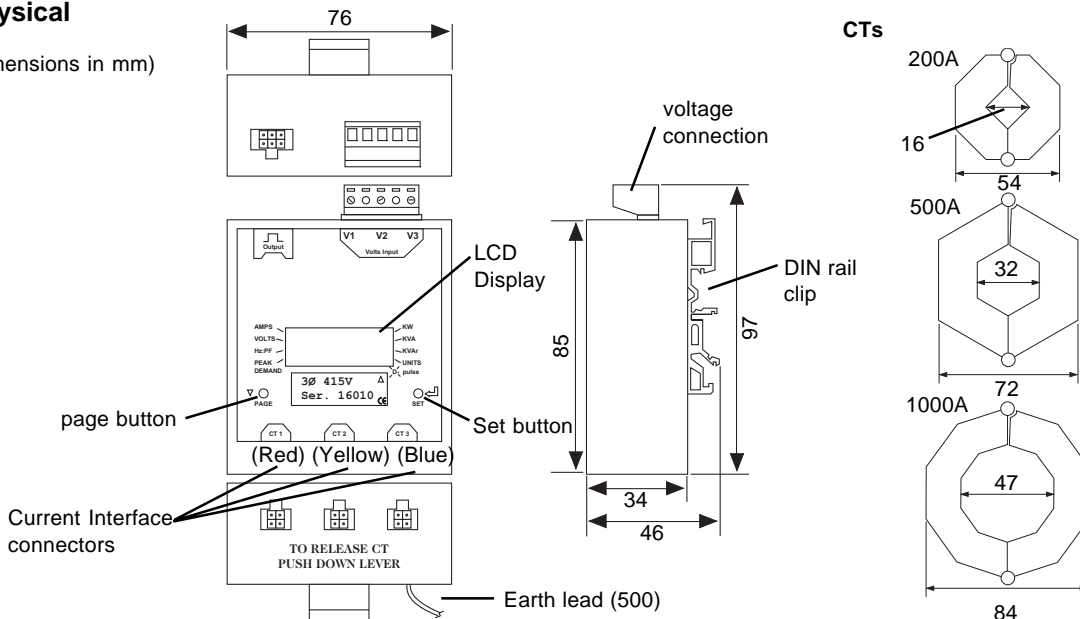
Compact DIN rail mounting multi-functional electricity meter with fully insulated split-core current transducers, ideal for retrofit applications. Lightweight air core CTs minimise installation time, and eliminate the need to disconnect the primary conductor. Meter is suitable for use on 3 phase balanced or unbalanced systems (3 wire or 4 wire) with sinusoidal or distorted waveforms and it provides an isolated kWh pulsed output for direct input to a Trend controller. The LCD display page is selected by the page button. There are pages for 3 current phases, Voltage, Frequency and Power Factor, Peak demand, kW, kVA, kVAR, kWh, kVAh, kVArh.

#### Features

- Meter
- Compact
  - DIN rail mounting
  - Plug-in CT rings
  - Voltage-free kWh pulsed output
  - LCD display of power and consumption
- Current transducers
- Compact clip-on split core design
  - Class 1 accuracy
  - Lightweight
  - Simple to install
  - Fully insulated
  - Available in 3 sizes: 200 A, 500 A, 1000 A

#### Physical

(dimensions in mm)



## FUNCTIONALITY

The EM/RX2 is a 3 phase kWh meter for balanced or unbalanced (3 or 4 wire) loads. It does not require a neutral connection. It is self-powered via its internal isolation transformers. It provides an optically isolated relay volt free normally open contact kWh pulse output.

The unit is supplied with 3 hinged clip-on CT rings and 2 m cables terminated in connectors. Cable ties are supplied to secure the CTs fully closed.

### Pulse Output:

The relay output pulses at a rate dependent on the current rating of the meter as shown in the table below:

rating	pulse value
200 A	0.1 kWh
500 A	0.1 kWh
1000 A	1.0 kWh

A six way plug is wired to a 2 m lead for connection of relay to controller. This may be extended up to 100 m using low grade cable.

### LCD Run Mode:

In normal mode the PAGE button can be pressed to scroll through the display pages as follows:

Page 1	Current phase 1 (Red) A1
2	Current phase 2 (Yellow)A2
3	Current phase 3 (Blue) A3
4	System Voltage
5	Frequency and Power Factor (Hz & PF) e.g. 60 : 1.00
6	Peak Demand (kW or kVA - see set up mode page 6)
7	Instantaneous Power (kW)
8	Instantaneous Apparent Power (kVA)
9	Instantaneous Reactive Power (kVAr)
10	Energy Consumption (kWh)
11	Apparent Energy Consumption (kVAh)
12	Reactive Energy Consumption (kVArh)

It will then scroll back to page 1. As each page is selected a D shaped annunciator moves down the sides of the display indicating the current parameter displayed. For pages 10 to 12, two annunciators are shown, one against kW, kVA, or kVAr respectively, and another against units indicating that the H unit is added to the units for energy consumption readings.

### Automatic Page Scroll:

If the PAGE button is pressed for 15 secs, the LCD display will change to auto page scroll mode whereby the page display steps through the parameters described above, changing the page every 5 secs. Pressing PAGE returns to manual scroll mode.

### Set up Mode:

Holding down the PAGE & Set buttons together for 15 s changes the LCD display to set up mode. This causes the following pages to be displayed, but any changes needed are selected using the PAGE (also identified as CHANGE) button, and the SET button both sets the value (or leaves it if no change is made) and scrolls to the next set up page.

Page 1; **Set up:** SET UP is displayed momentarily, then scrolls to page 2.

Page 2; **CT Primary Amps Rating:** This enables the primary amps (Axxxx) rating of the CT (Ip) to be selected. It can be set to a value between 10A and 3000A. The EM/RX2 has three versions (200 A, 500 A, 1000A) and the rating will be preset to the appropriate value. It will not normally need to be changed; change only if using different CTs. If set up for a balanced load, using 1 CT only, the Ip value should be set to 3 times the rated value of the CT (e.g. for EM/RX2/200 set to 600 A).

The front panel incorporates a multi-functional LCD display whose pages can be stepped through using the PAGE button. The PAGE button can also select and auto-scroll of the pages at 5 second intervals.

Use of PAGE and SET buttons together causes the display to enter set up mode enabling constants to be changed (e.g. integral period), and internal registers to be reset (e.g. kWh).

Page 3; **Second Pulse Relay:** This feature is not fitted to EM/RX2 so can be stepped through.

Page 4; **Integration Period:** This selects whether the peak demand is for kW or kVA and the integration period for the Demand calculation. The integration period can be 0.1 (6 secs), 10 (10 mins), 15 (15 mins) or 30 (30 mins). So as the PAGE button is pressed it steps through the following selections.

KW 0.1  
KW 10  
KW 15  
KW 30  
KVA 0.1  
KVA 10  
KVA 15  
KVA 30

Pressing the SET button at the appropriate setting, sets up the setting and scrolls to the next page.

The integration period defines the time window over which the peak demand is calculated. A time of 6 secs is instantaneous whereas the 10m, 15m and 30m periods are upgraded every 5 secs as a moving window predictive system.

Page 5; **Alarm Set Point:** This feature is not fitted to EM/RX2 so can be stepped through.

Page 6; **Reset Energy Registers and Peak Demand:** If it is required to reset the Energy Registers (kWh, kVAh, kVArh) and peak demand use the PAGE button to change No to Yes and then press SET. This will perform the reset and start the recalibration routine.

The LCD display will now show CAL9 and will step down to CAL0 as the automatic calibration proceeds. When complete the LCD display will return to normal mode page 1 (Current Phase 1, A1).

### Peak Demand Reset:

As well as being reset as part of the setup mode (Page 6 above), the peak demand may be reset by selecting the peak demand display (page 6) in normal mode and pressing the SET button for 15 secs.

### Current Transformers:

The EM/RX2 is supplied with 3 split-ring hinged clip-on air cored current transformers. They are suitable for single core plain, armoured, or sheathed cables. They must be connected to the correct phase connectors (indicated by colour coding on both CT and cable plug end (Red = CT1, Yellow + CT2, Blue = CT3). The arrow or dark side of the CT must be towards the system load. They are supplied with 2 m of cable to a 4 way connector that plugs into the meter. The CT must be fully closed over the conductor and held closed with a cable tie (supplied).

### Voltage Connection:

The voltage phase must correspond to the current phase (V1, CT1 : V2, CT2 : V3, CT3). It is recommended that voltage inputs are taken from MCBs or fused links (2A, HRC). The EM/RX2 takes its internal power from the voltage connection.

### Earthing:

All current and voltage elements are isolated, but the module should be grounded via the green and yellow earth lead to comply with EMC and installation standards.

### INSTALLATION

The procedure involves:

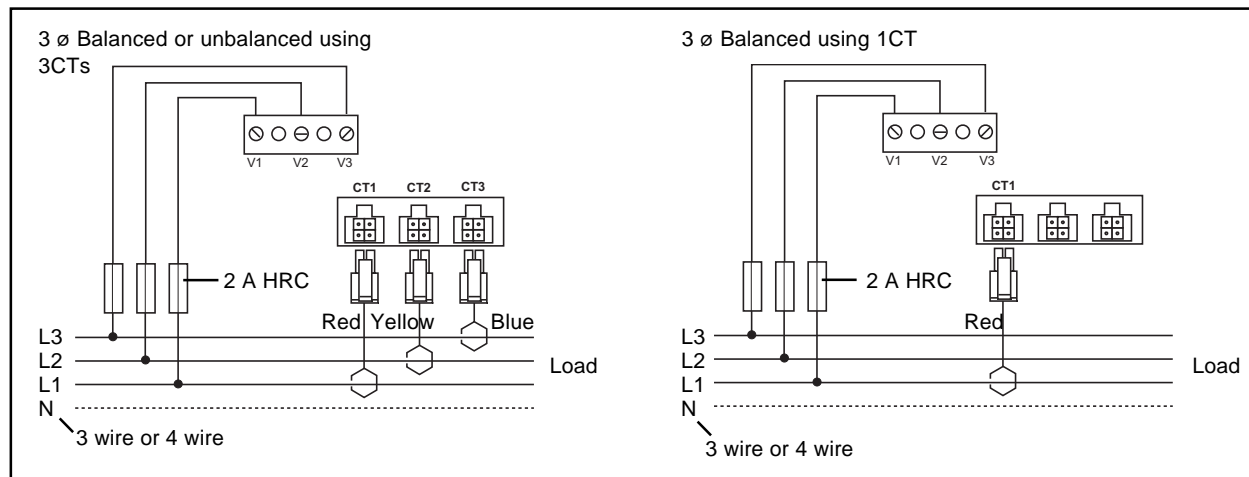
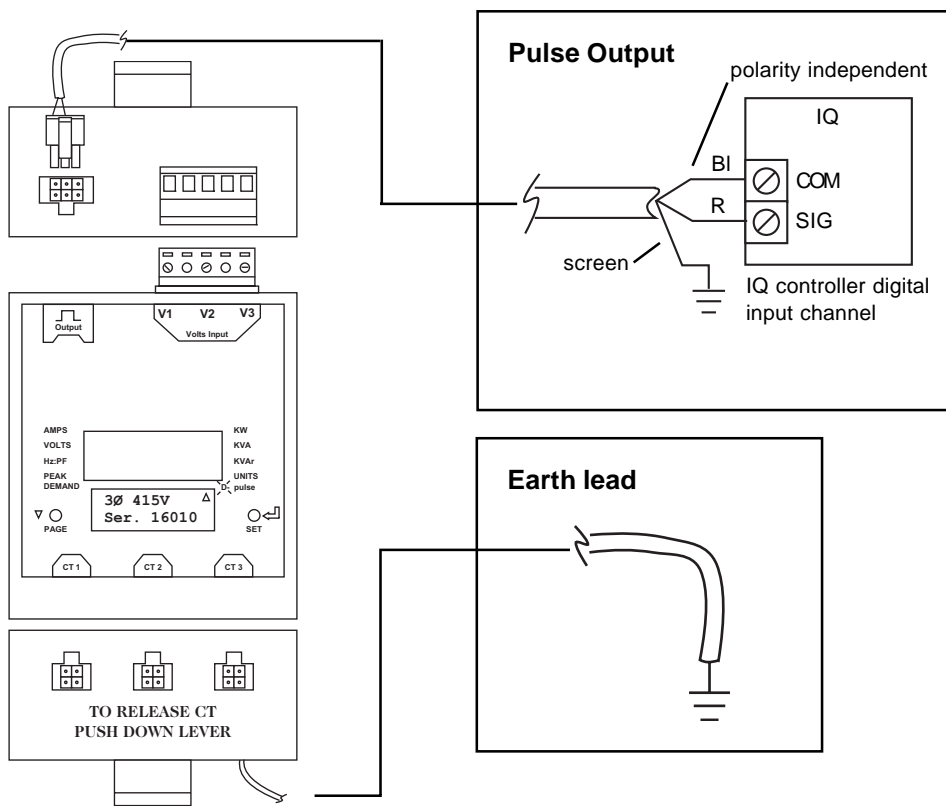
- clip meter on DIN rail
- connect meter earth lead to ground
- connect CT plugs to meter
- connect voltage terminals (via fuses or MCBs)
- clip CTs onto conductors and secure
- connect pulse output to IQ controller digital input
- switch on power
- set up meter (Ip if only 1 CT used, Integration period, peak demand kW or kVA)
- test system

Notes:

- Ensure VT and CT terminals are correctly paired (i.e. V3 with CT3 etc).*
- Ensure correct CT polarity (arrow and dark side of CT points to load).*
- Ensure CTs fully closed and secured.*
- If load is balanced, only 1 CT needs to be used; set meter Ip value 3 x actual value.*

The installation procedure is fully covered in the EM/RX2 Installation Instructions TG200133.

### CONNECTIONS



## ORDER CODE

**EM/RX2/[CT rating]** Multi-functional electricity meter for 3 phase balanced or unbalanced (3 wire or 4 wire) loads including insulated air core CT rings and connecting cables.

e.g. EM/RX2/500

CT rating
200 = 200A
500 = 500A
1000 = 1000A

## SPECIFICATIONS

Current	:Via CTs (200 A, 500 A, or 1000 A).	Connections	
Voltage	:3 phase line to line 380 to 450 V, 50 Hz	Voltage	:2 part connector, wireable
Accuracy	:±1 % reading (class 1) - meter calibrated with CTs	Cable to CTs	:2 m to wired plugs
Fusing	:2 A HRC (voltage connections)	Cable to pulse output	:2 m wired plug to stripped ends (2 wire screened)
Insulation	:2.5 kV for 1 min (including CTs)	Weight	
Isolation (CTs)	:630 Vrms maximum (for insulated conductors)	Meter	:100 grams
Consumption	:0.5 VA maximum (including CTs)	3 CTs	:300 grams (approximately)
Pulse output	:Optically isolated volt free relay contact (NO)	Current Transducers (3 sizes)	
Pulse rating	:24 Vdc or 24 Vac, 100 mA max	Current rating (Ip)	200 A    500 A    1000 A
Pulse width	:120 ms ±10 %	Current rating (overload)	400 A    1000 A    2000 A
Pulse rate	:2/s maximum		(The meter and CTs will measure correctly up to Ip + 20%; above this, up to the overload rating they will not be damaged, but will not show readings.)
Pulse value		Cable diameter (max)	16 mm    32 mm    47 mm
/200	:0.1 kWh	Meter calibration	:IEC1036
/500	:0.1 kWh	Safety	:IEC61010-1
/1000	:1.0 kWh	EMC	:EN55022:1994
Pulse isolation	:4 kV minimum		:EN50082 PL1 1992
Pulse o/p cable	:7/0.22 max, 100 m screened, max		
Display	:High contrast LCD, 7 digits, 8 x 4 mm		
Page Change	:By PAGE button or auto scroll every 5 secs		
Pages	:3 line currents , voltage, Hz:PF, peak demand, kW, kVA, kVar, kWh, kVAh, kVArh		
Setup	:Secure access; Primary Amps, Integration period, peak demand kW or kVA, reset all registers, separate peak demand reset		
non volatility	:EEPROM, auto restart on power up		
Material			
Meter	:HDPS, VL94V2		
CTs	:HIPS UL 92V2 self extinguishing		
Temperature			
Meter	:-10 °C to +50 °C		
CTs	:-20 °C to +65 °C		
Humidity	:0 to 95 %RH non condensing (meter and CTs)		
Protection			
Meter	:IP20		
CTs	:IP30		
Dimensions	:76 x 85 x 34 mm		
	:76 x 97 x 46 mm (including DIN clip and voltage connector)		

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<b>TREND</b>	P.O. Box 34, Horsham, West Sussex, RH12 2YF United Kingdom		Website <a href="http://www.trend-controls.com">www.trend-controls.com</a>
	Telephone +44 (0)1403 211888	Fax (International) +44 (0)1403 210982	Fax (UK) +44 (0)1403 241608
E-mail <a href="mailto:trendinfo@novar.com">trendinfo@novar.com</a>	Registered office. Novar House 24 Queens Road Weybridge Surrey KT13 9UX Registered in England No 1664519		