

# *PowerRail 303*

RAIL MOUNTING kWh METER

## OPERATING INSTRUCTIONS

August 2000



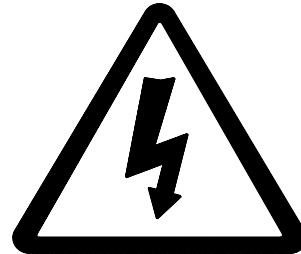
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# 1 Safety

This instruction sheet gives details of safe installation and operation of the **PowerRail 303** electricity meter. Safety may be impaired if the instructions are not followed. Labels on each meter give details of equipment ratings for safe operation. Take time to examine all labels before commencing installation. Safety symbols on the meter have specific meanings.



**CAUTION**  
REFER TO USER  
MANUAL



**WARNING**  
RISK OF  
ELECTRIC SHOCK

## 2 Cleaning

The front panel of the **PowerRail 303** may be cleaned by wiping lightly with a soft, clean cloth. No solvents or cleaning agents should be used.

## 3 Mounting the Unit

The **PowerRail 303** enclosure conforms to DIN 43880, 6 Modules wide. The unit is therefore compatible with a number of standard DIN distribution systems with 45mm cut-outs. The unit may be mounted by itself or alongside other standard units such as timers, circuit breakers etc. The **PowerRail 303** should be mounted on a 35mm, symmetric DIN rail of minimum length 106mm.

## 4 Current Inputs

Recommended external CTs should conform to Class 1 per IEC 60044-1. The secondary of the CT should be specified to suit the input rating defined on the meter label (5A as standard). Cables used for the current circuit should have a maximum conductor size of  $4.0\text{mm}^2$  and should be kept as short as possible to reduce cable losses loading the CT secondary.

### **WARNING**

**NEVER** allow the secondary of a current transformer to become open circuit while a primary current flows. Under these conditions dangerous voltages may be produced at the secondary terminals.

## 5 Voltage Inputs

Cables used for the voltage measurement circuit should have minimum ratings of 600V, 250mA AC. The maximum conductor size is 4.0mm<sup>2</sup>. External protection fuses are recommended for the voltage measurement inputs. These should be rated at 160mA max, Type F, with a voltage rating to suit the maximum inputs to the meter.

## 6 Auxiliary Mains Supply (L & N)

The **PowerRail 303** is supplied from an auxiliary mains input, isolated from the voltage measurement inputs. This may be connected separately or in parallel with the measurement inputs. Ensure the ratings detailed on the instrument label are not exceeded.

Separate connection of the auxiliary mains is advantageous when :

- Measurement voltages are expected to vary over a wide range
- Measurement voltages are unsuitable for meter supply
- Voltage inputs are taken from low power PT secondaries.


The auxiliary mains supply is internally fused at 250V, 100mA type T. External fusing is required if the auxiliary supply voltage exceeds 250V. The meter ratings are detailed on the instrument label.

## 7 Pulse Output (optional)

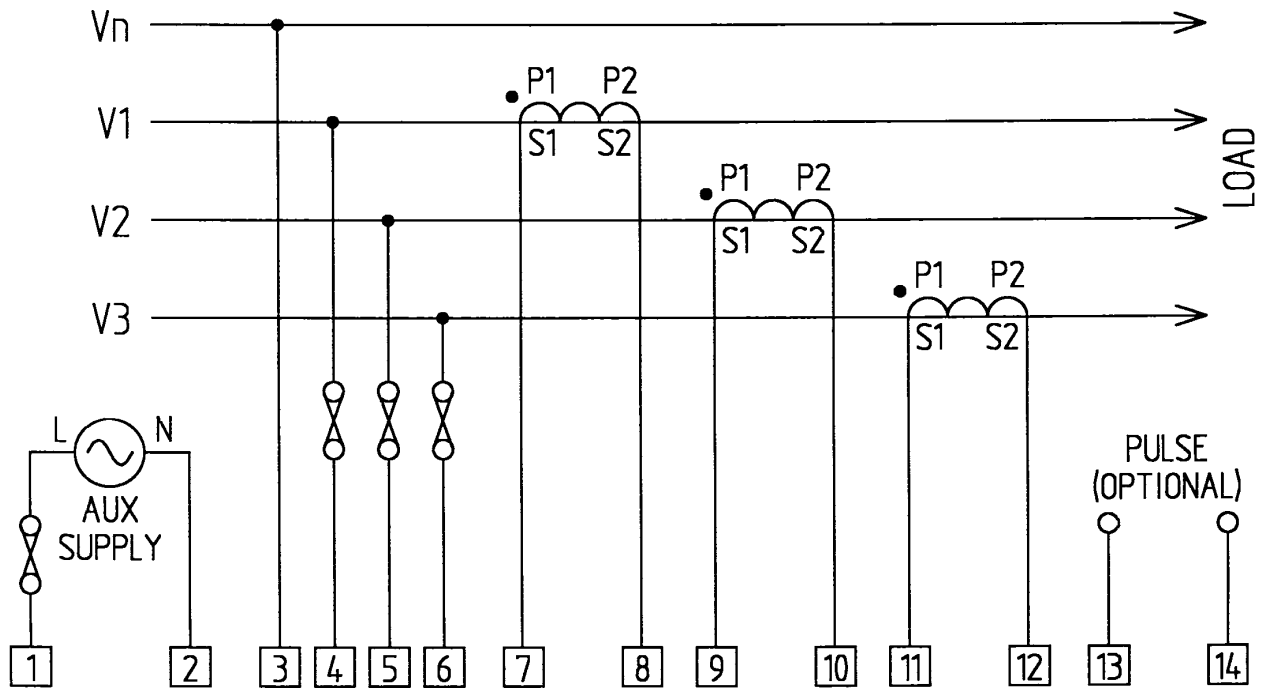
An isolated pulse output may optionally be provided on the **PowerRail 303**. The pulse output provides a volt free contact pair closure for a programmable number of increments (1, 10, 100 or 1000) of the energy display. (e.g. 1 pulse per 10 kWh). The signal provided is designed to interface to building management systems, data collectors, remote counters etc.

On completion of the programmed number of counts the Pulse Output terminals (Figure 1 to Figure 4 ) momentarily appear short circuit (100ms). At all other times the pins appear open circuit.

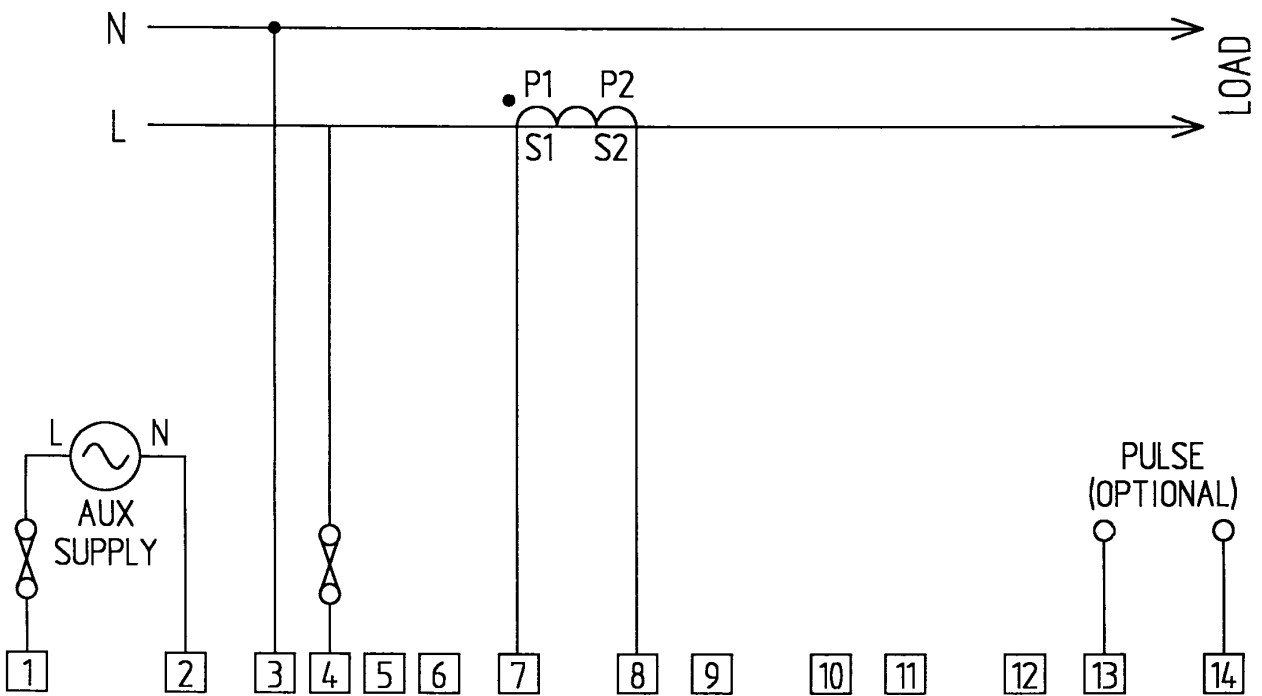
The Pulse Output terminals are isolated (@ 2.5kV) from all other parts of the instrument providing safe connection to external systems.

Each pulse output is indicated on the front panel of the **PowerRail 303** by a single flash of the  LED.





**Figure 3 3-Phase 4-Wire**



**Figure 4 Single Phase**

## 9 Commissioning

Three unlabelled keys hidden behind the front panel are used during commissioning to setup meter scaling and test the instantaneous measured load. The key functions are shown below.



**Figure 5 Front Panel Hidden Keys**

### 9.1 kW Display

A display of instantaneous primary kW is available by pressing the 'kW' key. This display remains visible for 1 minute before the unit reverts to normal kWh mode. The kWh key may be used to return to kWh mode before the minute has elapsed.

### 9.2 Programming Setup Parameters

**The PowerRail 303** may be programmed to suit the system in which it is to be installed. Before programming the meter, take a note of the CT Primary Current Rating in Amps, the PT Primary/Secondary Ratio (1.0 if not fitted) and the meter Nominal Voltage rating (meter label).

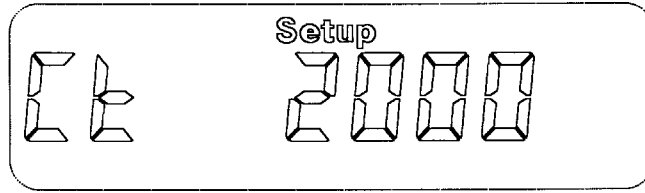
kWh readings are scaled using two multiplying factors CT and SCAL as :

$$\text{Nominal kW} = 3 \times V_{\text{nom}} \times \text{CT} \times \text{SCAL}$$

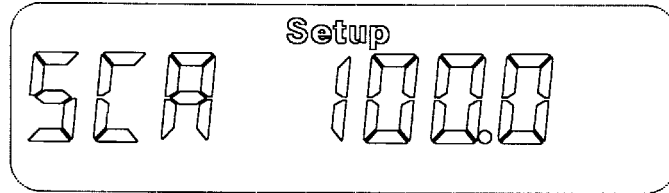
The display output is set automatically to provide optimum resolution depending on nominal kW programming.

Nominal kW	Resolution
< 1,44 kW	1 Wh
< 14,40 kW	0.01 kWh
< 144,00 kW	0.1 kWh
< 1,44 MW	1 kWh
< 14.4 MW	0.01 MWh
< 144 MW	0.1 MWh

To enter programming mode Press **PROG** and **hold** for 5 seconds. The unit shows the CT Primary Setup screen.



The CT primary rating may be adjusted in 10A steps by pressing the  $\Delta$  or  $\nabla$  keys until the desired current is displayed. Press **PROG** when the selection is complete.

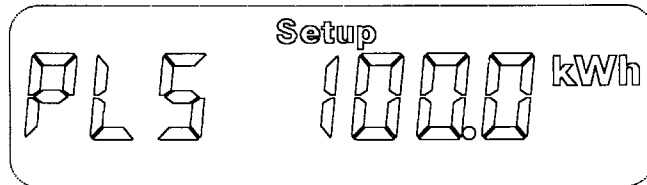


A Scaling factor (0.1, 1.0, 10.0, 100.0 or 1000.0) is provided which, multiplied by the CT setting, allows for external PTs and/or non-standard CTs.

**EXAMPLE :** If CTs are rated at 200A and 11000:110 PTs are used.  
CT=200 and SCAL=100.0

**EXAMPLE :** If CTs are rated at 25A and No PTs are used.  
CT=250 and SCAL=0.1

Press the  $\Delta$  or  $\nabla$  keys until the desired Scaling Factor is displayed. Press **PROG** when the selection is complete.



Pulse output is optional on the **PowerRail 303**. If no pulse output is fitted this setting has no effect on meter operation.

Pulse output rate may be set to provide 1 pulse after each 1, 10, 100 or 1000 increments of the LCD register. Press the  $\Delta$  or  $\nabla$  keys until the desired Pulse Rate is displayed. Press **PROG** when the selection is complete.

### 9.3 Reverse Connections

If the **PowerRail 303** detects negative power at it's input terminals the 'REV CT' message is displayed and the kWh register is frozen.

This condition is most commonly caused by wiring errors. The most common of these errors is incorrect orientation of CT primaries (P1/P2) or secondaries (S1/S2).

# 10 SPECIFICATION

<b>AUX MAINS</b>	Nominal 230V, $\pm 15\%$ , 45-65Hz Optional 110V Other voltages available to special order Burden 3W max
<b>VOLTAGE</b>	Nominal $U_n = 400V$ L-L, 230V L-N Optional $U_n = 110V$ L-L, 63.5V L-N Other voltages to special order AC 45-65Hz fundamental Range = $U_n \pm 20\%$ Burden 0.1W per phase Overload 2 x $U_n$ for 2 Seconds
<b>CURRENT</b>	Nominal $I_b = 5A$ rms Optional $I_b = 1A$ rms Range = 0.005 $I_b$ to 1.2 $I_b$ Burden 0.1VA per phase. Overload 40 x $I_b$ for 1 Sec
<b>DISPLAY</b>	Liquid Crystal (LCD). 8 x 9mm Digits + Legends Backlight green LED Memory 10 Years in the event of power fail.
<b>PULSE</b>	Normally Open Volt Free Contacts. Contact Rating 50V, 150mA, 5VA AC/DC. 100mS Closure per display increment. Switching Time ( $t_r$ , $t_f$ ) 2mS max Contact Bounce 0.5mS max.
<b>STANDARDS</b>	Accuracy EN 61036 Class 1 (kWh) Safety EN 61010-1 (Installation category 3) EMC EN 50081-1 (Commercial Emmissions) EN 50082-2 (Industrial Immunity)
<b>CASE</b>	DIN 43880, 6-Modules wide 106mm x 90mm x 58mm Cut-Out 45mm x 106mm NORYL. ULV94 V-O self extinguishing
<b>DIN RAIL</b>	DIN EN 50022 106mm (min) x 35mm
<b>TERMINALS</b>	Rising Cage 0.25mm <sup>2</sup> to 4mm <sup>2</sup>
<b>OPERATION</b>	-10°C to 55°C. <75% RH non condensing
<b>STORAGE</b>	-25°C to 70°C. < 85% RH non condensing