



Resource
Data Management

Single Phase Energy Meter

Commissioning/User Guide
Revision 1.0b



PR0671-1PH-XX

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Introduction

The RDM Single Phase Energy Meter is a slim (17.5mm) DIN rail mounted device which measures energy consumption of a single phase supply by means of a direct voltage connection to the supply and a split core CT (current transformer) fitted around the incoming cable.

The measured voltage can be in the range of 176–276 VAC, the measured current is dependent on the CT being used. Each meter is supplied with a CT which can be specified in 5 different ranges depending on application, these being; 5 Amp, 10 Amp, 20 Amp, 50 Amp or 75 Amp. Being a split core CT means that it can be fitted around the existing supply cable without the need to physically disconnect it from the supply.

The meter provides bi-directional energy monitoring so is ideal in applications such as solar or wind energy where import and export energy measurements may be desirable.

Two volt free pulse outputs are available to provide signalling to an external device by emitting a pulse after a certain amount of energy has been used, 1000 kWhr for example.

A Modbus RS485 port is also provided to enable network communication with a suitably equipped front end or monitoring system.

Part Numbers

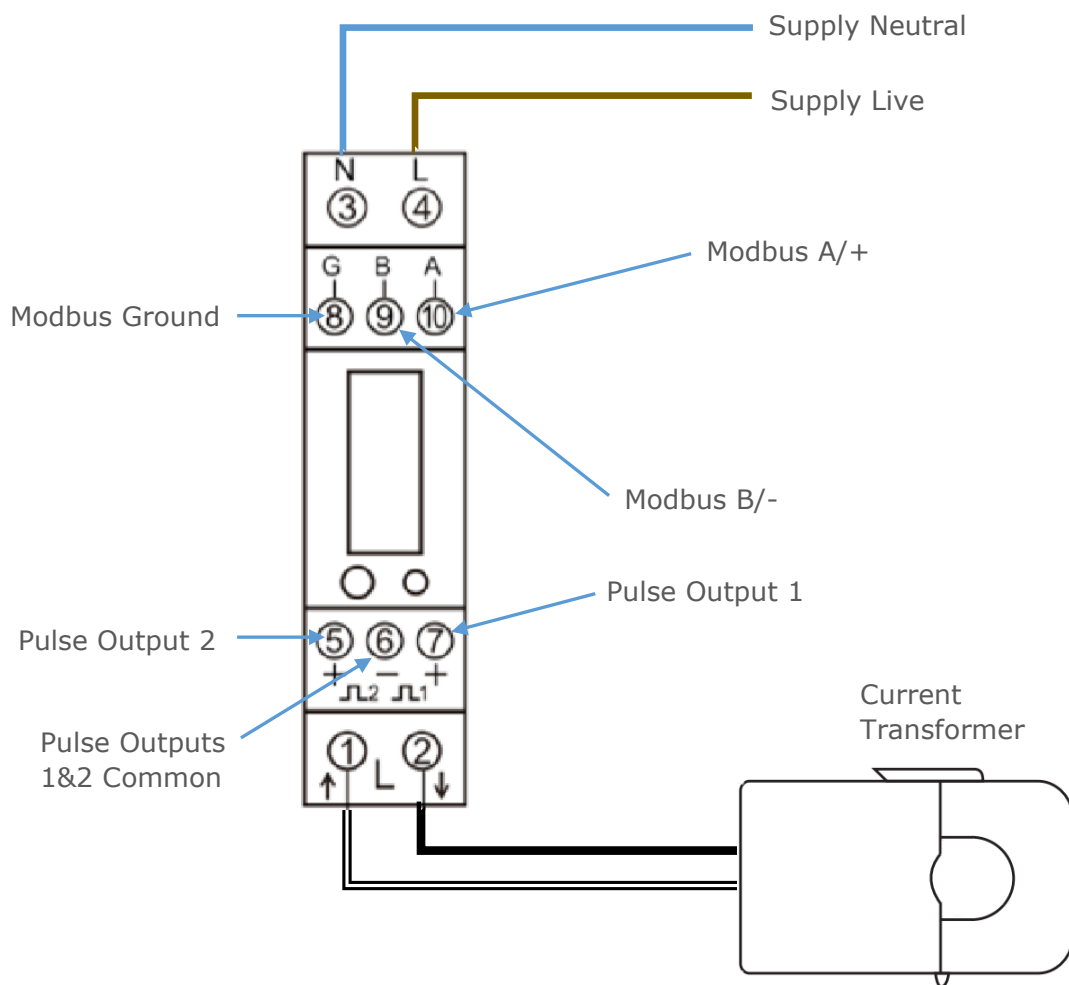
The following part numbers can be used when ordering.

Description	Part Number
1PH DIN Rail mountable Power Meter with RS485 Modbus and 1x 5A CT	PR0671-1PH-5A
1PH DIN Rail mountable Power Meter with RS485 Modbus and 1x 10A CT	PR0671-1PH-10A
1PH DIN Rail mountable Power Meter with RS485 Modbus and 1x 20A CT	PR0671-1PH-20A
1PH DIN Rail mountable Power Meter with RS485 Modbus and 1x 50A CT	PR0671-1PH-50A
1PH DIN Rail mountable Power Meter with RS485 Modbus and 1x 75A CT	PR0671-1PH-75A



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Connection Diagram



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Start Up Screens



On power up, the meter will initialize and perform some self-checking procedures. The start-up screen will show for around 3 seconds.



The next screen indicates the firmware version installed in the unit.



After 3 seconds the screen will display total active energy in kWh.

Viewing Measured Values



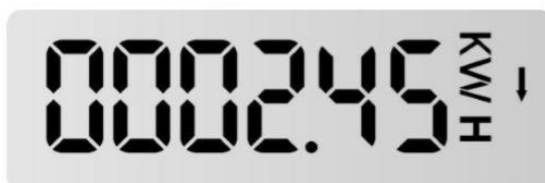
Display Button

There is a single pushbutton on the front of the display, each press will scroll through the various measurement and settings screens as follows:



Total Active Energy (kWh).

Display format:
0000.00 » 9999.99 then 10000.0 » 99999.9



Import Active Energy (kWh).

Display format:
0000.00 » 9999.99 then 10000.0 » 99999.9



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0002.32 kWh ↑

Export Active Energy (kWh).

Display format:

0000.00 » 9999.99 then 10000.0 » 99999.9
(Note change in arrow direction)219.8 V

Voltage (VAC)

20.18 A

Current (A)

2210.2 W

Active Power (W)

F 50.00

Frequency (Hz)

PF 100

Power Factor (PF)

Id 001

Modbus Address (ID)

Default 001

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Baud Rate

Default 9600 bps

Parity

None/Even/Odd

Default None

CT1, Current Transformer Primary Size.

Note: Secondary voltage input is fixed at 0.1v and is not configurable.

Set Up Mode

The meter is provided pre-programmed to match the Current Transducer (CT) being used (see table of [part numbers](#)).

The Modbus parameters (such as baud rate and stop bits) are preconfigured to;

Baud Rate:	9600
Parity:	None
Modbus address:	001

These parameters cannot be altered using the pushbutton on the display, to alter these parameters the meter must be put into "Set" mode and parameters changed using a Modbus master device (e.g. DMTouch V3.1.0 and above with Modbus activated).

To put the meter into Set mode, press and hold the pushbutton for 3 seconds, the display will show "-SET-"



DMTouch version V3.1.0 and above can be used to program the device. The meter must first be logged on to the DMTouch using its default communication settings, either with the USB Modbus adapter (PR0623) or the TCP/IP Modbus Gateway (PR0020-MOD) then the parameters can be adjusted accordingly.



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For more information logging a Modbus device on, please see DMTouch User Guide.

Alternatively the Single Phase Energy Meter's Modbus registers are listed in the [Modbus Registers](#) section below. These can be used to configure the unit using a 3rd party Modbus programming tool.

Specification

Pulse Outputs

The meter has two pulse outputs available, output 1 is configurable but output 2 is not	
Output 1	Can be set to generate a pulse every 0.001, 0.01, 0.1, 1, 10, 100 or 1000 kWh or kVarh, default is 0.001. The pulse width can be set to 200, 100 or 60ms.
Output 2	Fixed at one pulse per 1000 kWh

Modbus RS485 Output

The meter uses Modbus RTU protocol with the following settings:	
Baud Rate	1200, 2400, 4800, 9600 (9600 used with RDM interface)
Parity	None, Even or Odd (None used with RDM interface)
Stop Bits	1 or 2 (1 used with RDM interface)
Modbus Address	001 to 247 (Default 001)

Power Supply

Voltage Supply	230 VAC
Voltage Range	176-276 AC
Base Current	0.1 VAC
Power Consumption	<2W/10VA
Supply Frequency	50/60 Hz ($\pm 10\%$)
Maximum AC Voltage Tolerance	4kV for 1 minute
Maximum Impulse Voltage Tolerance	6kV with 1.2us waveform
Maximum Overcurrent	30A for 0.01s
Display	Backlit LCD, maximum reading 99999.9 kWh

Accuracy

Voltage	0.5% of range maximum
Current	0.5% of nominal
Frequency	0.2% of mid-frequency
Power Factor	1% of unity
Active Power	1% of maximum range
Reactive Power	1% of maximum range
Apparent Power	1% of maximum range
Active Energy	Class 1 IEC62053-21 Class B EN50470-3
Reactive Energy	1% of maximum range



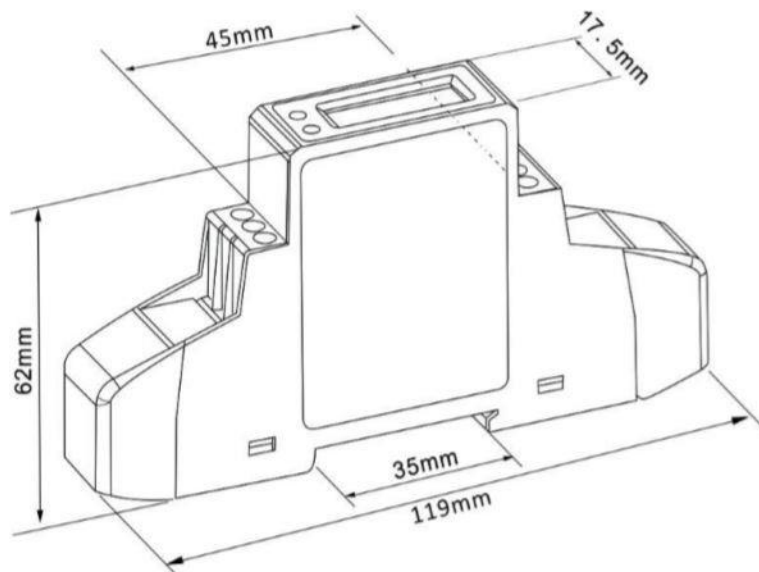
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Environment

Operating temperature	-25°C to +55°C
Storage and transportation temperature	-40°C to +70°C
Reference temperature	23°C±2°C
Relative humidity	0 to 95%, non-condensing
Altitude	Up to 2500m
Warm up time	10s
Installation category	CAT II
Mechanical Environment	M1
Electromagnetic environment	E2
Degree of pollution	2

Mechanical

Dimensions	17.5x119x62 (WxHxD) DIN 43880
Mounting	DIN rail 35mm
IP Rating	IP51 (indoor)
Material	Self-extinguishing UL94V-0

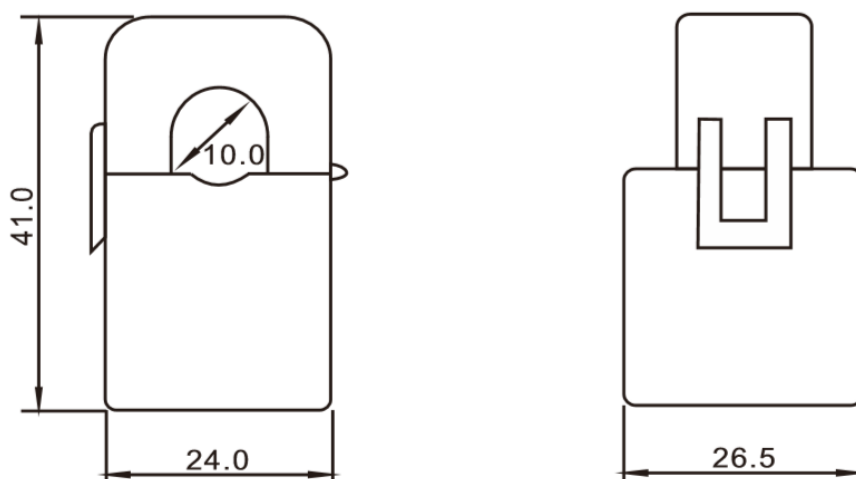


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Current Transformer

Specifications

Rated Current	5A to 75A
Rated Output	100mV AC
Frequency	50/60 Hz
Accuracy	+/- 1% from 20% to 120% of rated current
Phase Angle	Less than 2 degrees at 50% of rated current
Insulation Voltage	600V ac
Maximum Primary Voltage	5000V ac (Insulated Conductor)
Dielectric Strength	2.5 kV / 1 mA / 1 min
Operatic Temperature	-15°C to +60°C
Operating Humidity	<85%
Case Material	PC/UL94-V0
Bobbin	PBT
Core	Permalloy
Internal Structure	Epoxy
Leads	UL 1015, Twisted Pair, 22AWG, 1m length



Dimensions in mm



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Modbus Registers

Register	Name	Min	Max	Unit	Scaling	Item Type (Read Type = 4 - Read Input)		
Inputs								
0	Voltage	0	9999999.99	V	÷ 100	Ieee754	Invert	
6	Current	0	9999999.99	A	÷ 100	Ieee754	Invert	
12	Active Power	-99999999.9	99999999.9	W	÷ 10	Ieee754	Invert	
18	Apparent Power	-99999999.9	99999999.9	VA	÷ 10	Ieee754	Invert	
24	Reactive Power	-99999999.9	99999999.9	Var	÷ 10	Ieee754	Invert	
30	Power Factor	-1	1		÷ 100	Ieee754	Invert	
70	Frequency	0	100	Hz	÷ 10	Ieee754	Invert	
72	Import Active Energy	-9999999.99	9999999.99	kWh	÷ 100	Ieee754	Invert	
74	Export Active Energy	-9999999.99	9999999.99	kWh	÷ 100	Ieee754	Invert	
76	Import Reactive Energy	-99999999.9	99999999.9	KVArh	÷ 10	Ieee754	Invert	
78	Export Reactive Energy	-99999999.9	99999999.9	KVArh	÷ 10	Ieee754	Invert	
84	Total Power Demand	-99999999.9	99999999.9	W	÷ 10	Ieee754	Invert	
86	Max Total Power Demand	-99999999.9	99999999.9	W	÷ 10	Ieee754	Invert	
88	Import Power Demand	-99999999.9	99999999.9	W	÷ 10	Ieee754	Invert	
90	Max Import Power Demand	-99999999.9	99999999.9	W	÷ 10	Ieee754	Invert	
92	Export Power Demand	-99999999.9	99999999.9	W	÷ 10	Ieee754	Invert	
94	Max Export Power Demand	-99999999.9	99999999.9	W	÷ 10	Ieee754	Invert	
258	Current Demand	-99999999.9	99999999.9	A	÷ 10	Ieee754	Invert	
264	Max Current Demand	-99999999.9	99999999.9	A	÷ 10	Ieee754	Invert	
342	Total Active Energy	-9999999.99	9999999.99	kWh	÷ 100	Ieee754	Invert	
344	Total Reactive Energy	-9999999.99	9999999.99	KVArh	÷ 100	Ieee754	Invert	
Parameters								
Note: - The parameters are 'Read/Write' so in all cases the 'Read' type is 3 and the 'Write' type is 16								
12	P - Relay Pulse Width	0	200	ms	÷ 1	Ieee754	Invert	
18	P - Net Parity	0 - 1 Stop - N				Ieee754	Invert	
		1 - 1 Stop - E						
		2 - 1 Stop - O						
		3 - 1 Stop - N						
20	P - Modbus Address	1	247		÷ 1	Ieee754	Invert	
28	P - Baud Rate	0 - 2400				Ieee754	Invert	
		1 - 4800						
		2 - 9600						
		3 - 1200						
50	P - CT Primary Current	0	2000		÷ 1	Ieee754	Invert	
86	P - Pulse 1 Output Mode	0 - Not Used				Ieee754	Invert	
		1 - Exp Active						
		2 - Imp Exp Active						



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		3 - Not Used						
		4 - Exp Active						
		5 - Imp Reactive						
		6 - Imp Exp React						
		7 - Not Used						
		8 - Exp Reactive						
63744	P - Time of Scroll Display	0	30	secs	÷ 1	Word	Invert	
63760	P - Pulse 1 Output	0 - 0.001kWh imp				Ieee754	Invert	
		1 - 0.01kWh imp						
		2 - 0.1kWh imp						
		3 - 1kWh imp						
		4 - 10 kWh imp						
		5 - 100 kWh imp						
		6 - 1000 kWh imp						
63776	P - Measurement Total Mode	0 - Not Used				Ieee754	Invert	
		1 - Mode 1 Import						
		2 - Mode 2 Imp+Exp						
		3 - Mode 3 Imp-Exp						

Revision History

Revision	Date	Changes
1.0	21/02/2020	First Release.
1.0a	17/03/2020	Current Transformer Details Added
1.0b	22/03/2022	Current Transformer Cable Length Added



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