



User Manual

DRS-45-1P-PLS DRS-45-1P-MOD

DIN Rail Energy Meter for Direct Connected Single Phase Electrical Systems up to 45 Amps

Warnings



Caution: Risk of
Electric Shock

- During normal operation, voltages hazardous to life may be present at some of the terminals of this unit.
- At voltages below that specified in the Range of Use the meter may shut down. However, voltages hazardous to life may still be present at some of the terminals of this unit.
- Installation and servicing should be performed only by qualified, properly trained personnel abiding by local regulations.
- Ensure all supplies are de-energised before attempting connection or other procedures.
- Terminals should not be user accessible after installation and external installation provisions must be sufficient to prevent hazards under fault conditions.
- This unit is not intended to function as part of a system providing the sole means of fault protection - good engineering practice dictates that any critical function be protected by at least two independent and diverse means.
- The unit does not have internal fuses therefore external fuses must be used for protection and safety under fault conditions.
- Never open-circuit the secondary winding of an energized current transformer.
- This product should only be operated with the CT secondary connections earthed.
- If this equipment is used in a manner not specified by the manufacturer, protection provided by the equipment may be impaired.

Warnings

Important Safety Information is contained in the Maintenance section. Familiarize yourself with this information before attempting installation or other procedures. Symbols used in this document:



Risk of Danger: These instructions contain important safety information. Read them before starting installation or servicing of the equipment.



Caution: Risk of Electric Shock

The Multifunction Energy Meter, DRS-45-1P, is a new generation DIN rail mounted meter, used not only in the electricity transmission and power distribution system but also in power consumption measurement and analysis in high voltage intelligent power grid.

This document provides operating, maintenance and installation instructions for the DRS-45-1P. The unit measures and displays the characteristics of single phase two wire supplies including voltage, frequency, current, power, active and reactive energy, imported or exported. Energy is measured in kWh and kVAh. Maximum demand power can be measured over preset periods of up to 60 minutes.

The DRS-45-1P features two built-in pulsed outputs and RS485 Modbus RTU comms. Configuration is modified through Modbus interrogation.

1.1 Unit Characteristics

The DRS-45-1P-MOD can measure and display:

- Voltage
- Current
- Frequency
- Active & Reactive Power, Power Factor
- Imported, Exported & Total Active Energy
- Imported, Exported & Total Reactive Energy

DRS-45-1P-PLS

Has a single pulsed output to indicate importing active energy (kWh) measurement. The screen is fixed to Import Active energy.

DRS-45-1P-MOD

Has two pulsed output to indicate real-time energy measurement and an RS485 output to allow remote monitoring from another display or a computer.

1.2 RS485 Serial – Modbus RTU

This uses an RS485 serial port with Modbus RTU protocol to provide a means of remotely monitoring and controlling the DRS-45-1P-MOD. Setup is possible using an USB to RS485 converter.

1.3 Pulse output

This unit has 2 built-in pulsed outputs that record measured active and reactive energy. The constant for (re)active energy is 1000imp/(kWh / kVAh). The pulse width for active energy can be set from the Set-up menu.

2 Start Up Screens



The first screen lights all display segments and can be used as a display check.



The second screen indicates the firmware installed in the unit and its build number.


Please note: The values may vary from the numbers shown here.

*After a short delay, the screen will display the total active energy measurement.

3 Buttons

The buttons operate as follows:

3.1 Measurements

Each successive press of the  button selects a new parameter:



Total active energy (Σ kWh).



Imported active energy (kWh). (Single screen on DRS-45-1P-PLS)



Exported active energy (kWh).



Voltage (V)



Current (A)



Instantaneous Active Power (W)




Frequency (Hz)




Power Factor (PF)

4 Set Up

To enter set-up mode, press the  button for 5 seconds, until the "set" screen appears.



To enable 'write' function through modbus, the meter must be on 'set' mode.

To exit the set-up menu, press & hold  for 5 seconds until the "set" screen disappears.



This is the button used to rotate through the different parameter options. This is also the button used to cycle through numbers when in selection mode. Holding this button down will enable the "Set" mode for writing to the meter via Modbus.

5 Specifications

The DRS-45-1P can monitor and display the following parameters of a single phase supply:

5.1.1 Voltage and Current

- Phase to neutral voltage 63.5V - 276V AC L-N
- Continuous Overload voltage 120%
- Phase current to 45A (direct connected)
- Continuous Overload current 120%
- Burden <10VA (nom 2VA)
- Self powered

5.1.2 Power factor and Frequency and Max. Demand

- Frequency in Hz
- Instantaneous Power 0 to 999MW
- Reactive Power 0 to 999MVAR
- Volt-amps 0 to 999 MVA
- Maximum demanded power since last Demand reset Power factor

5.1.3 Energy Measurements

- Imported active energy 0 to 99999.9 kWh
- Exported active energy 0 to 99999.9 kWh
- Imported reactive energy 0 to 99999.9 kVAh
- Exported reactive energy 0 to 99999.9 kVAh
- Total active energy 0 to 99999.9 kWh
- Total reactive energy 0 to 99999.9 kVAh

5.2 Accuracy

- Voltage 0-5% of range maximum
- Current 0-5% of nominal
- Frequency 0-2% of mid-frequency
- Power factor 1% of unity (0.01)
- Active power (W) ±1% of range maximum
- Reactive power (VAR) ±2% of range maximum
- Apparent power (VA) ±1% of range maximum
- Active energy (Wh) ±1% of range maximum
- Reactive energy (VAh) ±2% of range maximum
- Total harmonic distortion 1% up to 31st harmonic
- Temperature co-efficient 0.013%/°C typical
- Response time to step input 1s, typical, to >99% of final reading, at 50 Hz.

5.3 Interfaces for External Monitoring

Three interfaces are provided:

- RS485 communication channel that can be programmed for Modbus RTU protocol
- Relay output indicating real-time measured energy. (configurable)
- Pulse output 5000imp/kWh (not configurable)

The Modbus configuration (Baud rate etc.) and the pulse relay output assignments (kWh/kVAh, import/export etc.) are configured through the Set-up screens.

5.4.1 Pulse Relay Output

The pulse relay output can be set to generate pulses to represent kWh or kVAh.

Rate can be set to generate 1 pulse per:

- 1 = 1 kWh/kVAh
- 10 = 10 kWh/kVAh
- 100 = 100 kWh/kVAh
- 1000 = 1000 kWh/kVAh

Pulse width 200/100/60 ms. Relay Rating 240V ac 50mA

5.4.2 RS485 Output for Modbus RTU

For Modbus RTU, the following RS485 communication parameters can be configured from the set-up menu:

Baud rate 1200, 2400, 4800, 9600,
Parity none / odd / even
RS485 network address 3-digit number, 1 to 247
Modbus™ Word order Hi/Lo byte order is set automatically to normal as defined in IEEE 754. It cannot be configured from the set-up menu.

5.5 Reference Conditions of Influence Quantities

Influence Quantities are variables that affect measurement errors to a minor degree. Accuracy is verified under nominal value (within the specified tolerance) of these conditions.

- Ambient temperature 23°C ±1°C
- Input waveform 50 or 60Hz ±2%
- Input waveform Sinusoidal (distortion factor < 0.005)
- Magnetic field of external origin Terrestrial flux

5.6 Environment

- Operating temperature -25°C to +55°C*
- Storage temperature -40°C to +70°C*
- Relative humidity 0 to 90%, non-condensing
- Altitude Up to 2000m
- Warm up time 1 minute
- Vibration 10Hz to 50Hz, IEC 60068-2-6, 2g 30g in 3 planes
- Shock

*Maximum operating and storage temperatures are in the context of typical daily and seasonal variation.

5.7 Mechanics

- DIN rail dimensions 76 x 100 mm (WxH) per DIN 43880
- Mounting DIN rail (DIN 43880)
- Sealing IP51 indoor
- Material UL 94 V-0 Self-extinguishing

6 Installation and Maintenance

6.1 Installation notes

Units should be installed in a dry position, where the ambient temperature is reasonably stable and will not be outside the range -25 to +55°C. Vibration should be kept to a minimum. Preferably, mount the Integra so that the display contrast is not reduced by direct sunlight or other high intensity lighting.

6.2 Input Wiring and Fusing

Choose fuses of a type and with a breaking capacity appropriate to the supply and in accordance with local regulations.

A switch or circuit breaker allowing isolation of supplies to the unit must be provided where practical. In primary metering applications, ensure the supply is isolated before any maintenance on the product. Tampering with the product seals may contravene local laws.

6.3 Wire Size

Voltage and current terminal blocks will accept 2.5mm² to 4mm² stranded cable.

6.4 Maintenance

The front of the case should be wiped with a dry cloth only, using minimal pressure. If necessary wipe the rear case with a dry cloth.

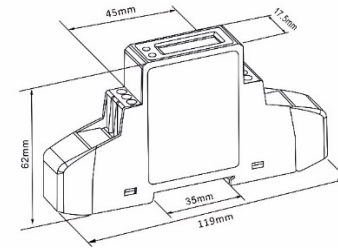
No user serviceable parts.

7 Declaration of Conformity

We, Tyco Electronics UK Ltd, declare under our sole responsibility as the manufacturer that the single phase multifunction electrical energy meter "DRS-45-1P", corresponds to the production model described in the EC-type examination certificate and to the requirements of the Directive 2004/22/EC EC type examination certificate number 0120/SGS0247. Identification number of the NB 0120.

8 Meter

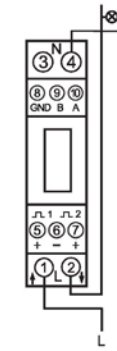
8.1 Dimensions



8.2 Appearance



8.3 Wiring Diagram (Both Models)



Explanation of Symbols



Refer to manual



Danger of electric shock



Do not discard

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Tyco Electronics UK Ltd

TE Energy
 Freebournes Road
 Witham, Essex CM8 3AH
 Phone: +44 (0)870 870 7500
 Fax: +44 (0)870 240 5289
 Email: Crompton.info@te.com
www.crompton-instruments.com

