# QI-POWER-485 | QI-POWER-485-100 | QI-POWER-485-300



**Ⓓ).E.M.**
ELECTRONIC PERFORMANCE

**QE∃D**
QUALITY ELECTRONIC DESIGN

**QWizard**

## Visit the product page for news, updates and downloads

QI-POWER-485          QI-POWER-485-100          QI-POWER-485-300

## CONTENTS

PAGE
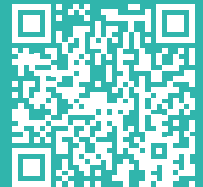**2** of **16**

**QI-POWER-485 | QI-POWER-485-100 | QI-POWER-485-300**
PRODUCT MANUAL

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## SAFETY WARNINGS AND CAUTIONS

The following warnings and cautions must be observed to ensure personal safety and prevent damage.

**Death** or **serious injury** may result from failure to heed this warning.

**Material damage** or **serious personal injury** may result from failure to heed this warning.

The manufacturer **declines all responsibility** for electrical safety in the event of improper use of the equipment.

It is essential to read the entire contents of this manual before carrying out any work.

Installation and commissioning must be carried out by qualified personnel only.

Before commissioning, make sure that:

- the maximum values for all connections are not exceeded; refer to the product data sheet;
- the connection cables are not damaged or live during wiring;
- the direction of current flow and phase rotation are correct.

During installation, ensure that a switch or circuit-breaker is near the product and easily accessible.

The unit must be uninstalled if safe operation can no longer be guaranteed (e.g. visible damage). Disconnect all connections in this case. The unit should be returned to the manufacturer or to an authorised service centre for repair.

**WARNING:** High-intensity magnetic fields may alter the values measured by the transformer. Avoid installation near: permanent magnets, electromagnets, or iron masses. If irregularities are detected, reposition or move the unit to a more suitable location.

Failure to observe the warnings may result in damage to the equipment or failure to operate as intended.

Please note that the information on the nameplate must be observed.

It is necessary to comply with national regulations when installing and picking materials for power lines.

Repairs and modifications must be carried out only by the manufacturer. It is forbidden to open the case and make any changes to the device. Tampering with the device will invalidate the warranty.

The product described in this document may only be used for the specified application. The maximum performance data and environmental conditions specified in the product data sheet must be observed. Proper transport and storage, as well as professional assembly, installation, handling and maintenance are required for the correct and safe operation of the device.

Use under ambient conditions other than those specified, application of signals or voltages other than those specified, may cause significant deviations from the specified measurement tolerances, which may be irreversible.

Although the contents of this document have been checked for accuracy, it may contain errors or inconsistencies and we cannot guarantee its completeness or accuracy.

This document is subject to periodic revision and updating. QEED reserves the right to make changes to the product and/or its technical documentation at any time in the interests of continuous quality improvement. Always consult the latest version of the documentation available on the website:

**www.qeed.it**

If you find any errors or missing information in this document, please notify us by e-mail to:

**technical@qeed.it**

Disposal of waste electrical and electronic equipment (applicable in the European Union and other countries with separate collection). The symbol on the product or its packaging indicates that the product should not be treated as household waste. Instead, it will be handed over to an authorised collection point for the recycling of electrical and electronic waste. Ensuring that the product is disposed of properly will prevent potential negative effects on the environment and human health, which could otherwise be caused by inappropriate waste management of the product. Recycling materials helps to conserve natural resources. For further information, please contact your local authority, waste disposal service or the retailer from whom you purchased the product.

## PRODUCT OVERVIEW

The QI-POWER-485-(xxx) (in its three versions 50A, 100A and 300A) is a single-phase power meter capable of measuring current and AC/DC T$_{RMS}$ voltage without the need for external current transformers. The accuracy class is 0.5% of F.S.

The unit provides instantaneous values of I$_{rms}$, V$_{rms}$, Power (active, reactive and apparent), V$_{pk}$, I$_{pk}$, Frequency, Cos$\varphi$, THD and cumulative values of total, absorbed and produced energy.

The product is powered by an external 12V$_{DC}$ or 24V$_{DC}$ power supply.

The input voltage isolation is 4kV.

The safety category is Cat III up to 600V (bare conductor) and Cat II up to 1000V (insulated conductor).

RS485 serial interface for communication with Modbus RTU protocol, either from the **Q-WIZARD configuration tool (download at link)**, or with third party Modbus masters by acting on register map registers.

Mounting accessories supplied as standard for DIN rail mounting.
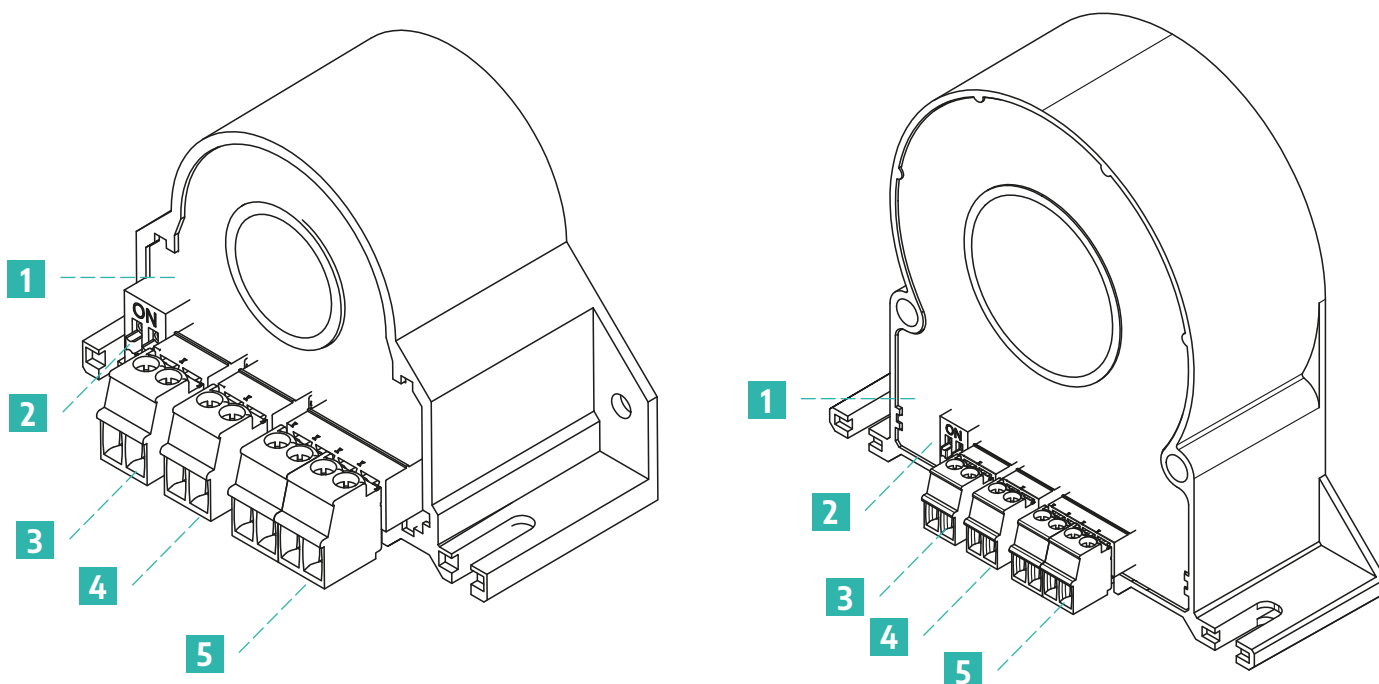


**1** Status LED:

    Off: product not powered

    Steady yellow: product powered

    Flashing yellow: communication in progress

**2** DIP switch for Modbus RTU baud rate setting

**3** Screw terminals for voltage input V- (N)

**4** Screw terminals for voltage input V+ (L)

**5** Screw terminals for power supply and serial communication

## TECHNICAL SPECIFICATIONS

### Electrical characteristics

|  | QI-POWER-485 | QI-POWER-485-100 | QI-POWER-485-300 |
|---|---|---|---|
| Power supply | 9÷30V$_{DC}$ with reverse polarity and overtemperature protection | | |
| Current consumption | 1,3 W | | |
| Measurable AC/DC current range | 0÷50 A | 0÷100 A | 0÷300 A |
| Max. measuring voltage | 800V$_{AC}$, 1000V$_{DC}$ | | |
| Measurement type | TRMS(AC)/DC | | |
| Measurement frequency | DC or 1÷400Hz | | |
| Accuracy class @25°C up 200Hz | Voltage, Current, Active Power: <0,5% F.S. Frequency: ±0,1 Hz Energy: ±1% on reading V$_{peak}$, I$_{peak}$: ± 5% F.S. | | |
| Crest factor | 1.8 (on current measurement) | | |
| Sampling rate | 11 ksample/s | | |
| Input impedance | 1 MΩ | | |
| Overvoltage category | Cat III up to 600V Cat II up to 1000V | | |
| Isolation | 3kV on bare cable for current measurement 4kV for voltage measurement (reinforced insulation to power supply and RS485 serial interface) | | |
| THD | Available for measured currents greater than 15% of F.S. | | |
| Communication interface | RS485 Modbus RTU | | |
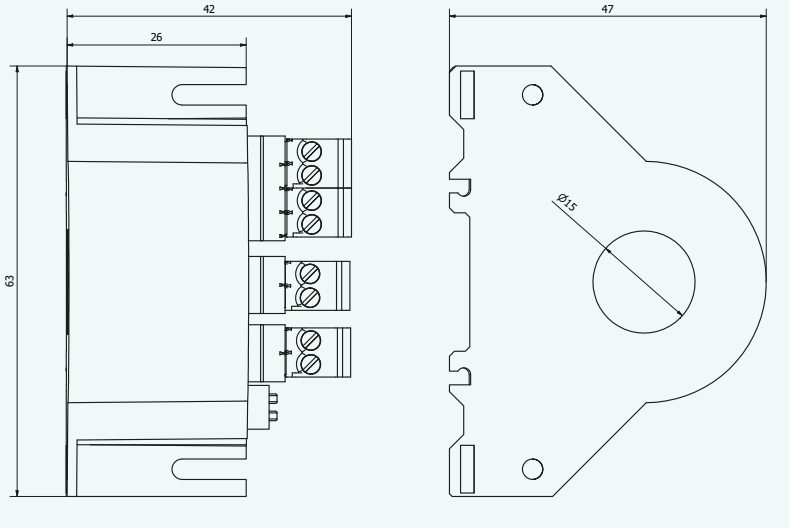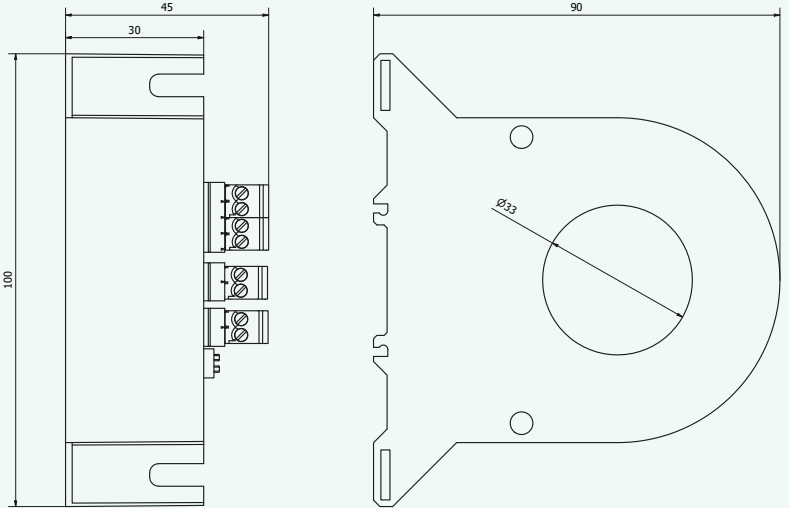
### Communication characteristics

| Protocol | Modbus RTU |
|---|---|
| Baudrate | 1200÷115200 bps (default 9600) |
| Addresses | 1÷247 (default 1) |
| Data format | 1 start bit, 8-bit data, NO/ODD/EVEN parity (default NO parity) |
| Response delay | 1÷1000ms |
| Connection | Via removable 4-pin terminal |

### General data

| Working temperature | -15÷60° C |
|---|---|
| Storage temperature | -40÷85° C |
| Relative humidity | 10÷90% not condensing |
| Elevation | Up to 2000 a.s.l. |
| Temperature coefficient | < 200ppm/°C |
| Protection degree | IP20 |

| Measurements | QI-POWER-485 | QI-POWER-485-100 42x63x47 mm |
|---|---|
| |  |
| | QI-POWER-485-300 45x100x90 mm |
| |  |
| Weight | QI-POWER-485-50 | QI-POWER-485-100 80 g | QI-POWER-485-300 350 g |
| Terminal cable cross-section | 0.05÷1.5 mm² (30÷14 AWG) |
| Energy values storage | Flash, min 100k writings |
| Approvals and certifications | IEC 61010-1: 2010 - IEC 61010-2-030: 2010 - EN IEC 61326-1: 2021 |
| | EN IEC 61000-6-2: 2019 - EN IEC 61000-6-4: 2019 - CEI EN IEC 63000: 2021 |
| | CE UKCA c UL US |
| Installation | Inside electrical panels and mounted on a DIN rail with attachment clips provided |

## Order codes

| 50A version | QI-POWER-485-50 |
|---|---|
| 100A version | QI-POWER-485-100 |
| 300A version | QI-POWER-485-300 |
| Attachment clips (50-100A) | 90000009 |
| Attachment clips (300A) | 900000012 |

PAGE
**6** of **16**

**QI-POWER-485 | QI-POWER-485-100 | QI-POWER-485-300**
PRODUCT MANUAL

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## CONNECTION AND INSTALLATION

The instrument is designed to be installed inside electrical panels and mounted in four different ways (DIN rail or panel mounting, vertical or horizontal).

All connection terminals are shown on the pad print on the product and correspond to the figure below:
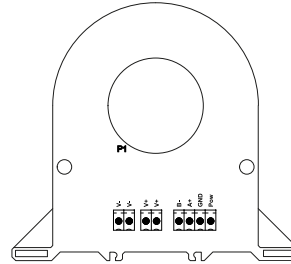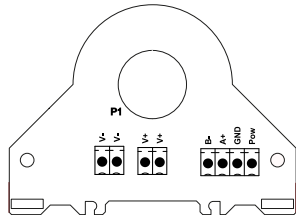


The system installation is as in the following image:
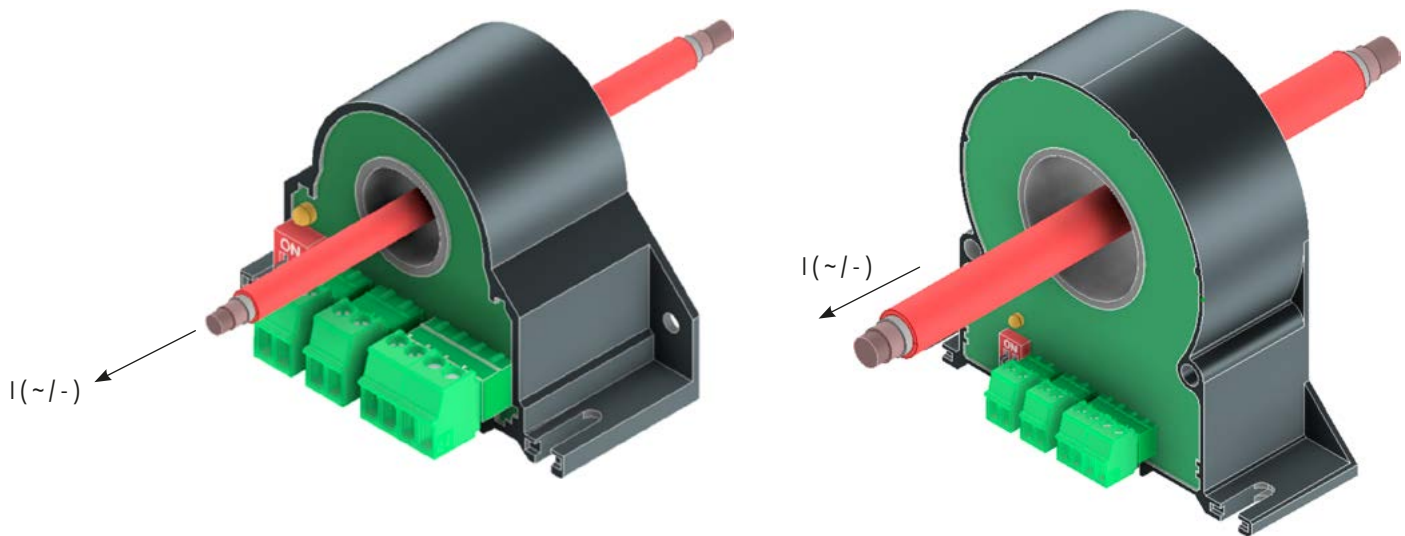


The conductor must be positioned as close to the product centre as possible to ensure correct current measurement.

The incoming direction of the current is represented by the nomenclature P1 pad-printed on the product.

**PLEASE NOTE**: If you wish to measure currents with intensities close to the lower measuring limit of the instrument, wind the conductor on the instrument so that it has a greater number of turns; in this case, change the transformation ratio in the 40011 register for correct current measurement.



Normal installation - 1 turn
(1 conductor's crossing through core)

2 turns
(2 conductor's crossing through core)

4 turns
(4 conductor's crossing through core)
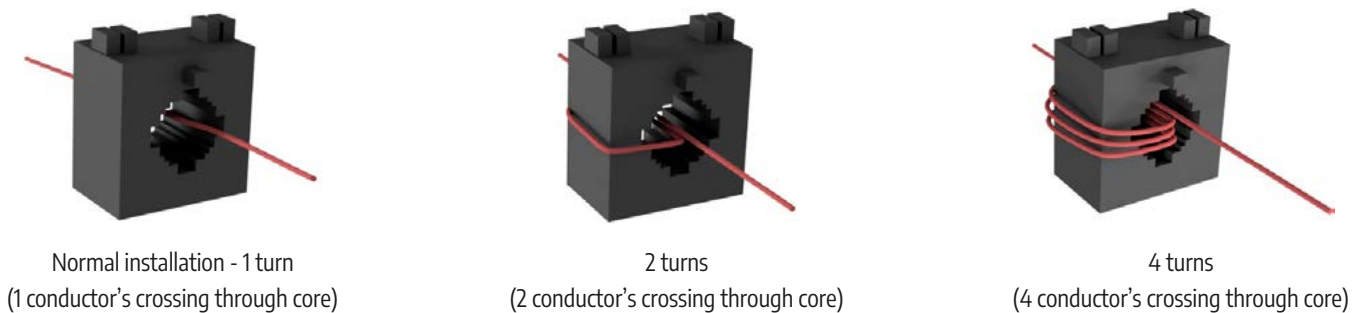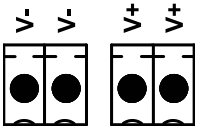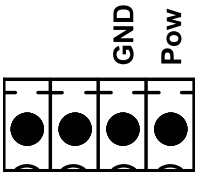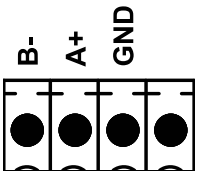
**Figure 1:** turns examples

**WARNING**: strong magnetic fields can alter the values measured by the instrument. Avoid installation near permanent magnets, electromagnets or ferrous masses that can significantly alter the magnetic field. In the event of anomalies, we recommend reorienting the instrument or moving it to a more suitable location.

The connection of the terminals is described below:

| | |
|---|---|
| V- V- V+ V+ | Screw terminals for voltage input V- (N)<br>Screw terminals for voltage input V+ (L) |
| GND Pow | Device power supply.<br>**Please note:** Wiring must be protected against short circuits and/or accidental faults |
| B- A+ GND | RS485 Modbus RTU connection: terminals 3 (A+), 4 (B-), 1 (GND) |

## AVAILABLE MEASUREMENT

The unit provides power readings in all 4 quadrants. The sign conventions used in the product are summarized in the following figure:

Reactive Power

Quadrant 2

W (-)
VAR (+)
PF (-)

Active power
Exported/produced

Quadrant 1

W (+)
VAR (+)
PF (+)

Active power
Imported/consumed

Real Power

Active power
Exported/produced

Active power
Imported/consumed

W (-)
VAR (-)
PF (-)

Quadrant 3

W (+)
VAR (-)
PF (+)

Quadrant 4
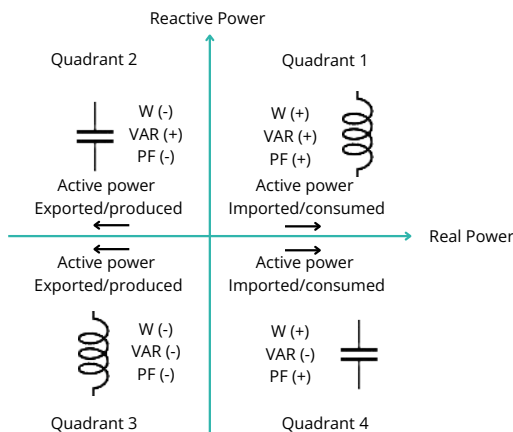
## PRODUCT FEATURES

Using the configuration software or acting on the dedicated registers, the following functions can be configured:

### Modbus

Address, baud rate, parity and response delay can be set.

### Input/Output

- Measurement method [Reg. 40008]
- Enable energy flash storage [Reg. 40008]
- Frequency calculation channel [Reg. 40008]
- Ratio of transformations for voltage and current [Reg. 40009 - 40011]
- Measurement filtering [Reg. 40007]
- Current and power display threshold [Reg. 40013]

## DEVICE CONFIGURATION

### Baudrate setting via DIP switch

The baud rate can be set via DIP switches, before connecting and switching on the product. The possible combinations are shown below:

| DIP 1 | DIP 2 | ADDRESS | BAUDRATE |
|:-----:|:-----:|:--------------------------:|:--------:|
| 0 | X | RS485 settings from EEPROM | |
| 1 | 0 | 1 | 9600 |
| 1 | 1 | 1 | 38400 |

Addresses other than 1 (default value) and baud rates other than those selected by the DIP switches can be configured using the **Q-WIZARD configuration software** or with the Modbus RTU functions below, by acting on the dedicated registers- see page 12.

**PLEASE NOTE:** to make active all changes via DIP-switch, it is necessary to remove and restore power to the device.

### Functionality configuration

Through an RS485 serial device such as our Q-USB485, it is possible to connect to the product using the Modbus RTU input terminals.
Configuration of the module can be done with our **Q-WIZARD configuration software** or with any third-party Modbus master by acting on the registers in the map - see page 12.

### Q-WIZARD

Using the **Q-WIZARD interface tool that can be downloaded from the link** it is possible to configure all device parameters by following the simple, self-explanatory steps.
In addition to the configuration of various parameters, inputs and outputs, the **Q-WIZARD** also allows real-time monitoring of device variables.

### Third-party Modbus Master

Alternatively, the product can communicate directly with a third-party Modbus RTU Master using the communication settings according to the DIP switch configuration (when using microUSB the DIP switch settings are irrelevant).
The communication protocol supported is Modbus RTU Slave:

- • Modbus RTU connections: A+ and B- according to Modbus RTU standards
- Supported Modbus RTU functions: 03 hexadecimal (read multiple registers, max 100), 06 hexadecimal (write single), 10 hexadecimal (write multiple registers)
- Modbus RTU address numbering is by convention '1 BASED' (standard), but the physical register is base 0; the logical address, e.g. 40010, corresponds to the physical address #9, as required by Modbus RTU standards

**PLEASE NOTE:** All setting changes of calibration and configuration parameters must be followed by the flash save command 0xC1C0 = Flash settings save command in register 40252; changes of device communication parameters in addition must also be followed by the command 0xC1A0 = Reboot command in register 40252.

In this case, all device configurations are performed by accessing the Modbus RTU register map available in the last chapter of this document using the functions:

- Read holding registers (function 03 hexadecimal)
- Write single holding register (function 06 hexadecimal)
- Write multiple registers (function 10 hexadecimal)

## Function 03 Hexadecimal (Read Holding Registers)

This function is used to read the contents of a contiguous block of holding registers (words). The request frame specifies the source register address and the number of registers to read. A maximum of 120 registers (words) can be read with a single request, unless otherwise specified. The register data in the response message is packaged as two bytes per register (word), with the binary contents right-justified within each byte. For each register, the first byte contains the most significant bits (MSB) and the second byte contains the least significant bits (LSB).

| Request Frame | | | |
|---|---|---|---|
| **Description** | **Lenght** | **Value** | **Comments** |
| Physical address | 1 byte | 1 to F7 HEX (1 to 247) | |
| Function code | 1 byte | 03 HEX | |
| Starting address | 2 bytes | 0000 to FFFF HEX | Bytes order: MSB, LSB |
| Number of registers (N word) | 2 bytes | 1 to 10 HEX (1 to 16) | Bytes order: MSB, LSB |
| CRC | 2 bytes | | |

| Response frame (right action) | | | |
|---|---|---|---|
| **Description** | **Lenght** | **Value** | **Comments** |
| Physical address | 1 byte | 1 to F7 HEX (1 to 247) | |
| Function code | 1 byte | 03 HEX | |
| Required Number of bytes | 1 byte | N word * 2 | |
| Register value | N*2 bytes | | Bytes order: MSB, LSB |
| CRC | 2 bytes | | |

| Response frame (wrong action) | | | |
|---|---|---|---|
| **Description** | **Lenght** | **Value** | **Comments** |
| Physical address | 1 byte | 1 to F7 HEX (1 to 247) | Possible exception: |
| Function code | 1 byte | 83 HEX | 01: illegal function |
| Exception code | 1 byte | 01, 02, 03, 04 (see note) | 02: illegal data address |
| CRC | 2 bytes | | 03: Illegal data value |
| | | | 04: Slave device failure |

## Function 06 Hexadecimal (Write Single Holding Register)

This function is used to write a single holding register. The request frame specifies the address of the register (word) to be written and its contents.
The correct response is an echo of the request, returned after the contents of the register have been written.

| Request frame | | | |
|---|---|---|---|
| **Description** | **Lenght** | **Value** | **Comments** |
| Physical address | 1 byte | 1 to F7 HEX (1 to 247) | |
| Function code | 1 byte | 06 HEX | |
| Starting address | 2 bytes | 0000h to FFFF HEX | Bytes order: MSB, LSB |
| Register value | 2 bytes | 0000h to FFFF HEX | Bytes order: MSB, LSB |
| CRC | 2 bytes | | |

| Response frame (right action) | | | |
|---|---|---|---|
| **Description** | **Lenght** | **Value** | **Comments** |
| Physical address | 1 byte | 1 to F7 HEX (1 to 247) | |
| Function code | 1 byte | 06 HEX | |
| Starting address | 2 bytes | 0000h to FFFF HEX | Bytes order: MSB, LSB |
| Register value | 2 bytes | 0000h to FFFF HEX | Bytes order: MSB, LSB |
| CRC | 2 bytes | | |

| Response frame (wrong action) | | | |
|---|---|---|---|
| Description | Lenght | Value | Comments |
| Physical address | 1 byte | 1 to F7 HEX (1 to 247) | Possible exception: |
| Function code | 1 byte | 86 HEX | 01: illegal function |
| Exception code | 1 byte | 01, 02, 03, 04 (see note) | 02: illegal data address |
| CRC | 2 bytes | | 03: Illegal data value |
| | | | 04: Slave device failure |

## Function 10 Hexadecimal (Write Multiple Registers)

This function is used to write a block of contiguous registers (maximum of 2). The required values to be written are specified in the data field of the request. The data is packed as two bytes per register.

A correct response returns the function code, the starting address and the number of registers written.

| Request frame | | | |
|---|---|---|---|
| **Description** | **Lenght** | **Value** | **Comments** |
| Physical address | 1 byte | 1 to F7 HEX (1 to 247) | |
| Function code | 1 byte | 10 HEX | |
| Starting address | 2 bytes | 0000 to FFFF HEX | Bytes order: MSB, LSB |
| Number of registers (N word) | 2 bytes | 0001 to 0078 HEX | Bytes order: MSB, LSB |
| Byte counting | 1 byte | N word * 2 | |
| Register value | N * 2 bytes | value | Bytes order: MSB, LSB |
| CRC | 2 bytes | | |

| Response frame (right action) | | | |
|---|---|---|---|
| **Description** | **Lenght** | **Value** | **Comments** |
| Physical address | 1 byte | 1 to F7 HEX (1 to 247) | |
| Function code | 1 byte | 10 HEX | |
| Starting address | 2 bytes | 0000 to FFFF HEX | Bytes order: MSB, LSB |
| Number of registers (N word) | 2 bytes | 0001 to 0078 HEX | Bytes order: MSB, LSB |
| CRC | 2 bytes | | |

| Response frame (wrong action) | | | |
|---|---|---|---|
| **Description** | **Lenght** | **Value** | **Comments** |
| Physical address | 1 byte | 1 to F7 HEX (1 to 247) | Possible exception: |
| Function code | 1 byte | 90 HEX | 01: illegal function |
| Exception code | 1 byte | 01, 02, 03, 04 (see note) | 02: illegal data address |
| CRC | 2 bytes | | 03: Illegal data value |
| | | | 04: Slave device failure |

PAGE
**12** of **16**

QI-POWER-485 | QI-POWER-485-100 | QI-POWER-485-300
PRODUCT MANUAL

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## REGISTER MAP

Default values are in **bold**.

| Address Modbus | Description | Register Type | R/W | Default | Range |
|---|---|---|---|---|---|
| 40001 | Machine ID:<br>7 = QI-POWER-485<br>18 = QI-POWER-485-300<br>48 = QI-POWER-485-100 | UShort [16b] | R | | |
| 40002 | Firmware version | UShort [16b] | R | | |
| 40003 | Modbus address | UShort [16b] | R/W | 1 | 1...247 |
| 40004 | Machine answer delay (in characters) | UShort [16b] | R/W | 1 | 1...1000 |
| 40005 | Baudrate Value:<br>0 = 1200<br>1 = 2400<br>2 = 4800<br>**3 = 9600**<br>4 = 19200<br>5 = 38400<br>6 = 57600<br>7 = 115200 | UShort [16b] | R/W | 3 | 0...7 |
| 40006 | Parity:<br>**0 = NONE**<br>1 = ODD<br>2 = EVEN | UShort [16b] | R/W | 0 | 0...2 |
| 40007 | Update interval for RMS calculation. Valid for DC systems. [tenths of a second]. | UShort [16b] | R/W | 10 | 1...65535 |
| 40008 | Measurement settings:<br>bit[0] = Measurement type<br>    **0 → TRMS value (without sign)**<br>    1 → DC_measurement (with sign)<br>bit[1] = Energy logging in flash<br>    0 → disable<br>    **1 → enabled**<br>bit[2] = Frequency detection<br>    **0 → on voltage channel**<br>    1 → on current channel | UShort [16b] | R/W | 2 | |
| 40009 | Voltage transformer ratio | Float [32b-LSW] | R/W | 1.0 | |
| 40011 | Current trasformer ratio<br>If turns are placed around the instrument, CT ratio = 1 / (number of turns - if any) [see figure 1] | Float [32b-LSW] | R/W | 1.0 | |
| 40013 | Current and power cutoff threshold - minimum level for measurements<br>(below trimmed to 0) [1]<br>    LSB: Current cutoff<br>    MSB: Power cutoff | UShort [16b] | R/W | See Note [1] | |
| 40014 | Number of line zero-crossing for RMS calculation. Valid for AC systems.<br>(example: 50 → if frequency is 50Hz, updated every 1s) | UShort [16b] | R/W | 50 | 1...65535 |
| 40041 | Partial serial number | UShort [16b] | R | | |
| 40050 | Partial serial number | UShort [16b] | R | | |
| 40057 | Partial serial number | UShort [16b] | R | | |
| 40072 | Status:<br>bit[0] = flash settings error<br>bit[1] = flash calibration error<br>bit[2] = Voltage Over Range<br>bit[3] = Voltage Under Range<br>bit[4:5] = don't care<br>bit[6] = Zero crossing detecting<br>bit[7:9] = don't care<br>bit[10]=Energy storing error<br>bit[11]= Energy initialization error<br>bit[12]= don't care<br>bit[13]= Current Over Range<br>bit[14]=Current Under Range<br>bit[15]= don't care | UShort [16b] | R | | |
| 40073 | Voltage RMS Measurement (V) | Float [32b-LSW] | R | | |
| 40075 | Current RMS Measurement (mA) | Float [32b-LSW] | R | | |
| 40077 | Active Power Measurement (W) | Float [32b-LSW] | R | | |
| 40079 | Reactive Power Measurement (VAR) | Float [32b-LSW] | R | | |
| 40081 | Apparent Power Measurement (VA) | Float [32b-LSW] | R | | |
| 40083 | Cosφ Measurement | Float [32b-LSW] | R | | |
| 40085 | Frequency Measurement (Hz) | Float [32b-LSW] | R | | |
| 40087 | THD Measurement | Float [32b-LSW] | R | | |
| 40089 | Total Energy Measurement (kWh) | Float [32b-LSW] | R/W | | |
| 40091 | Positive Energy Measurement (kWh) | Float [32b-LSW] | R/W | | |

| Address Modbus | Description | Register Type | R/W | Default | Range |
|---|---|---|---|---|---|
| 40093 | Negative Energy Measurement (kWh) | Float [32b-LSW] | R/W | | |
| 40095 | Voltage Peak (V) | Float [32b-LSW] | R | | |
| 40097 | Current Peak (mA) | Float [32b-LSW] | R | | |
| 40099 | Max RMS Voltage (V) | Float [32b-LSW] | R/W | | |
| 40101 | Min RMS Voltage (V) | Float [32b-LSW] | R/W | | |
| 40103 | Max RMS Current (mA) | Float [32b-LSW] | R/W | | |
| 40105 | Min RMS Current (mA) | Float [32b-LSW] | R/W | | |
| 40107 | Max RMS Power (W) | Float [32b-LSW] | R/W | | |
| 40109 | Min RMS Power (W) | Float [32b-LSW] | R/W | | |
| 40111 | Max Reactive Power (VAR) | Float [32b-LSW] | R/W | | |
| 40113 | Min Reactive Power (VAR) | Float [32b-LSW] | R/W | | |
| 40115 | Max Apparent Power (VA) | Float [32b-LSW] | R/W | | |
| 40117 | Min Apparent Power (VA) | Float [32b-LSW] | R/W | | |
| 40119 | Max Cos$\varphi$ | Float [32b-LSW] | R/W | | |
| 40121 | Min Cos$\varphi$ | Float [32b-LSW] | R/W | | |
| 40123 | Max Frequency (Hz) | Float [32b-LSW] | R/W | | |
| 40125 | Min Frequency (Hz) | Float [32b-LSW] | R/W | | |
| 40127 | Max THD | Float [32b-LSW] | R/W | | |
| 40129 | Min THD | Float [32b-LSW] | R/W | | |
| 40132 | Status swapped:<br>bit[0] = flash settings error<br>bit[1] = flash calibration error<br>bit[2] = Voltage Over Range<br>bit[3] = Voltage Under Range<br>bit[4:5] = don't carebit<br>bit[6] = Zero crossing detecting<br>bit[7:9] = don't care<br>bit[10]= Energy storing error<br>bit[11]= Energy initialization error<br>bit[12]= don't care<br>bit[13]= Current Over Range<br>bit[14]= Current Under Range<br>bit[15]= don't care | UShort [16b] | R | | |
| 40133 | Voltage RMS measurement (V) swapped | Float [32b-MSW] | R | | |
| 40135 | Current RMS measurement (mA) swapped | Float [32b-MSW] | R | | |
| 40137 | Power measurement (W) swapped | Float [32b-MSW] | R | | |
| 40139 | Reactive Power measurement Q (VAR) swapped | Float [32b-MSW] | R | | |
| 40141 | Apparent Power measurement S (VA) swapped | Float [32b-MSW] | R | | |
| 40143 | Cos$\varphi$ measurement swapped | Float [32b-MSW] | R | | |
| 40145 | Frequency measurement (Hz) swapped | Float [32b-MSW] | R | | |
| 40147 | THD swapped | Float [32b-MSW] | R | | |
| 40149 | Total Energy measurement (kWh) swapped | Float [32b-MSW] | R/W | | |
| 40151 | Only positive Energy Measurement (kWh) swapped | Float [32b-MSW] | R/W | | |
| 40153 | Only negative Energy Measurement (kWh) swapped | Float [32b-MSW] | R/W | | |
| 40155 | Voltage Peak (V) swapped | Float [32b-MSW] | R | | |
| 40157 | Current Peak (mA) swapped | Float [32b-MSW] | R | | |
| 40159 | Max RMS Voltage (V) swapped | Float [32b-MSW] | R/W | | |
| 40161 | Min RMS Voltage (V) swapped | Float [32b-MSW] | R/W | | |
| 40163 | Max RMS Current (mA) swapped | Float [32b-MSW] | R/W | | |
| 40165 | Min RMS Current (mA) swapped | Float [32b-MSW] | R/W | | |
| 40167 | Max RMS Power (W) swapped | Float [32b-MSW] | R/W | | |
| 40169 | Min RMS Power (W) swapped | Float [32b-MSW] | R/W | | |
| 40171 | Max Reactive Power (VAR) swapped | Float [32b-MSW] | R/W | | |
| 40173 | Min Reactive Power (VAR) swapped | Float [32b-MSW] | R/W | | |
| 40175 | Max Apparent Power (VA) swapped | Float [32b-MSW] | R/W | | |
| 40177 | Min Apparent Power (VA) swapped | Float [32b-MSW] | R/W | | |
| 40179 | Max Cos$\varphi$ swapped | Float [32b-MSW] | R/W | | |
| 40181 | Min Cos$\varphi$ swapped | Float [32b-MSW] | R/W | | |
| 40183 | Max Frequency (Hz) swapped | Float [32b-MSW] | R/W | | |
| 40185 | Min Frequency (Hz) swapped | Float [32b-MSW] | R/W | | |
| 40187 | Max THD swapped | Float [32b-MSW] | R/W | | |
| 40189 | Min THD swapped | Float [32b-MSW] | R/W | | |

PAGE
**14** of **16**

**QI-POWER-485 | QI-POWER-485-100 | QI-POWER-485-300**
PRODUCT MANUAL

QEED
QUALITY ELECTRONIC DESIGN

| Address Modbus | Description | Register Type | R/W | Default | Range |
|---|---|---|---|---|---|
| 40192 | Status for measurements in hundredths:<br>  bit[0] = flash settings error<br>  bit[1] = flash calibration error<br>  bit[2] = Voltage Over Range<br>  bit[3] = Voltage Under Range<br>  bit[4:5] = don't care<br>  bit[6] = Zero crossing detecting<br>  bit[7:9] = don't care<br>  bit[10]=Energy storing error<br>  bit[11]= Energy initialization error<br>  bit[12]= don't care<br>  bit[13]= Current Over Range<br>  bit[14]=Current Under Range<br>  bit[15]= don't care | UShort [16b] | R | | |
| 40193 | Voltage RMS measurement [V/100] (in hundredths) | Long [32b-LSW] | R | | |
| 40195 | Current RMS measurement [mA/100] (in hundredths) | Long [32b-LSW] | R | | |
| 40197 | Power measurement [W/100] (in hundredths) | Long [32b-LSW] | R | | |
| 40199 | Reactive Power measurement Q [VAR/100] (in hundredths) | Long [32b-LSW] | R | | |
| 40201 | Apparent Power measurement S [VA/100] (in hundredths) | Long [32b-LSW] | R | | |
| 40203 | Cosφ measurement (in hundredths) | Long [32b-LSW] | R | | |
| 40205 | Frequency measurement [Hz/100] (in hundredths) | Long [32b-LSW] | R | | |
| 40207 | THD (in hundredths) | Long [32b-LSW] | R | | |
| 40209 | Total Energy measurement [KWh/100] (in hundredths) | Long [32b-MSW] | R/W | | |
| 40211 | Only positive Energy Measurement [kWh/100] (in hundredths) | Long [32b-LSW] | R/W | | |
| 40213 | Only negative Energy Measurement [kWh/100] (in hundredths) | Long [32b-LSW] | R/W | | |
| 40215 | Voltage Peak [V/100] (in hundredths) | Long [32b-LSW] | R | | |
| 40217 | Current Peak [mA/100] (in hundredths) | Long [32b-LSW] | R | | |
| 40219 | Max RMS Voltage [V/100] (in hundredths) | Long [32b-LSW] | R/W | | |
| 40221 | Min RMS Voltage [V/100] (in hundredths) | Long [32b-LSW] | R/W | | |
| 40223 | Max RMS Current [mA/100] (in hundredths) | Long [32b-LSW] | R/W | | |
| 40225 | Min RMS Current [mA/100] (in hundredths) | Long [32b-LSW] | R/W | | |
| 40227 | Max RMS Power [W/100] (in hundredths) | Long [32b-LSW] | R/W | | |
| 40229 | Min RMS Power [W/100] (in hundredths) | Long [32b-LSW] | R/W | | |
| 40231 | Max Reactive Power [VAR/100] (in hundredths) | Long [32b-LSW] | R/W | | |
| 40233 | Min Reactive Power [VAR/100] (in hundredths) | Long [32b-LSW] | R/W | | |
| 40235 | Max Apparent Power [VA/100] (in hundredths) | Long [32b-LSW] | R/W | | |
| 40237 | Min Apparent Power [VA/100] (in hundredths) | Long [32b-LSW] | R/W | | |
| 40239 | Max Cosφ swapped (in hundredths) | Long [32b-MSW] | R/W | | |
| 40241 | Min Cosφ swapped (in hundredths) | Long [32b-MSW] | R/W | | |
| 40243 | Max Frequency [Hz/100] (in hundredths) | Long [32b-LSW] | R/W | | |
| 40245 | Min Frequency [Hz/100] (in hundredths) | Long [32b-LSW] | R/W | | |
| 40247 | Max THD swapped (in hundredths) | Long [32b-MSW] | R/W | | |
| 40249 | Min THD swapped (in hundredths) | Long [32b-MSW] | R/W | | |
| 40252 | Command:<br>  0xC1C0 = Flash settings save command<br>  0xC1A0 = Reboot command<br>  0xBABA = Set Energy command (energy to be stored must be written in reg.40253)<br>  0xBABB = Set Positive Energy command (positive energy to be stored must be written in reg.40253)<br>  0xBABC = Set Negative Energy command (negative energy to be stored must be written in reg.40253) | UShort [16b] | R/W | 0 | |
| 40253 | Auxiliary Register for Energy Command (see register 40252) | Float [32b-LSW] | R/W | 0 | |

**Note:**
  [1] The LSB and MSB values written in register 40013 are the cutoff values (minimum accepted value) for currents and powers (default values in brackets).

For each model, the cutoff values are:

| | FW rev. < 37 | FW rev. ≥ 37 |
|---|---|---|
| QI-POWER-485 | 1x mA the value written into the register (default 0xFA=250mA)<br>1x W the value written into the register (default 0x01=1W) | 4x mA the value written into the register (default 0x7D=500mA)<br>4x W the value written into the register (default 0x01=4W) |
| QI-POWER-485-300, QI-POWER-485-100 | 10x mA the value written into the register (default 0x96=1500mA)<br>10x W the value written into the register (default 0x01=10W) | 40x mA the value written into the register (default 0x4B=3000mA)<br>40x W the value written into the register (default 0x01=40W) |

**LEGEND:**

Short [16b] = Signed Short (16 bit)
UShort [16b] = Unsigned Short (16 bit)

Long [32b-MSW] = Signed Long (32 bit - MSW First Register)
Long [32b-LWS] = Signed Long (32 bit - LSW First Register)
ULong [32b-LSW] = Unsigned Long (32 bit - LSW First Register)
ULong [32b] = Unsigned Long (32 bit)

Float [32b-MSW] = Float (32 bit - MSW First Register)
Float [32b-LSW] = Float (32 bit - LSW First Register)

UInt [16b] = Unsigned Integer (16 bit)
UInt [32b-MSW] = Unsigned Integer (32 bit - MSW First Register)
Int [64b-LSW] = Signed Long Long (64 bit - LSW First Register)

PAGE
**16** of **16**

QI-POWER-485 | QI-POWER-485-100 | QI-POWER-485-300
PRODUCT MANUAL

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As standards, specifications, and design change from time to time, please ask for confirmation of the information given in this publication.