

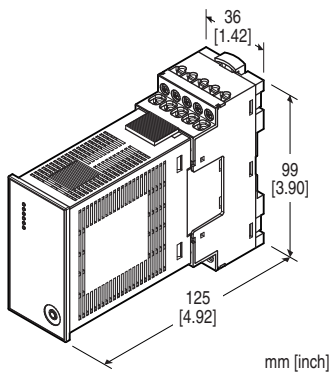
Plug-in Remote I/O R10 Series

MODBUS I/O MODULE

(4 points, RMS sensing, clamp-on current sensor input)

Functions & Features

- Plug-in construction
- Modbus-RTU protocol communication
- Easy-to-install clamp-on type current sensor without needing a current transformer
- Wide input range from 5 A up to 600 A
- High-density mounting



Note: The figure shows the combination of the unit and the base.

MODEL: R10M-CT4E-R[1]

ORDERING INFORMATION

- Code number: R10M-CT4E-R[1]
- Specify a code from below for [1].
(e.g. R10M-CT4E-R/Q)
- Specify the specification for option code /Q
(e.g. /C01)

I/O TYPE

CT4E: Clamp-on current sensor CLSE use 4 points

POWER INPUT

DC Power

R: 24 V DC

(Operational voltage range 24 V \pm 10 %, ripple 10 %p-p max.)

[1] OPTIONS

blank: none

/Q: With options (specify the specification)

SPECIFICATIONS OF OPTION: Q (multiple selections)

COATING (For the detail, refer to M-System's web site.)

/C01: Silicone coating

/C02: Polyurethane coating

/C03: Rubber coating

RELATED PRODUCTS

- Installation base (model: R10-BS)

- PC configurator software (model: R10CFG)

The configurator software is downloadable at M-System's web site.

A dedicated cable is required to connect the module to the PC. Please refer to the internet software download site or the users manual for the PC configurator for applicable cable types.

- Clamp-on current sensor (model: CLSE)

The clamp-on current sensors, not included in this product package, must be ordered separately. Required number depends upon the system configuration.

PACKAGE INCLUDES...

- Terminating resistor 110 Ω (0.25W)

GENERAL SPECIFICATIONS

Construction: Plug-in

Connection

- Connected to base with connector
- Base

M2.6 screw terminals (torque: 0.5 N·m)

Applicable solderless terminal size (M3)

Screw terminal: Nickel-plated steel

Housing material: Flame-resistant resin (black)

Isolation: Input to Modbus to power input to FE1

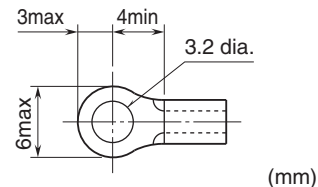
Input waveform

RMS sensing: Up to 15 % of 3rd harmonic content

Status indicators: Power, Run, Error

Configuration: Select sensors for 4 points (CT1, CT2, CT3, CT4) each with PC Configurator Software (model: R10CFG)

■ **Recommended solderless terminal size - M3 (unit: mm)**



MODBUS COMMUNICATION

RS-485

Standard: Conforms to TIA/EIA-485-A

Protocol: Modbus-RTU

Transmission distance: 500 meters max.

Transmission media: Shielded twisted-pair cable
(CPEV-S 0.9 dia.)

Status indicator LED: RD, SD

Transmission setting: PC configurator software

INPUT SPECIFICATIONS

Input setting: PC configurator software

Clamp-on current sensor (CT1, CT2)

Input (sensor & range)

CLSE-R5: 0 - 5 A

CLSE-05: 0 - 50 A

CLSE-10: 0 - 100 A

CLSE-20: 0 - 200 A

CLSE-40: 0 - 400 A

CLSE-60: 0 - 600 A

Frequency: 50 / 60 Hz (45 - 65 Hz)

Operational range: 0 - 105 % of rating

Overload capacity

CLSE-R5: 10 A continuous

CLSE-05: 60 A continuous

CLSE-10: 120 A continuous

CLSE-20: 240 A continuous

CLSE-40: 480 A continuous

CLSE-60: 720 A continuous

Be sure that the input voltage is of 480 V or less.

INSTALLATION

Current consumption: ≤ 90 mA

Operating temperature: -10 to +55°C (14 to 131°F)

Storage temperature: -10 to +55°C (14 to +131°F)

Operating humidity: 10 to 90 %RH (non-condensing)

Atmosphere: No corrosive gas or heavy dust

Mounting: Installation Base (model: R10BS)

Weight: 120 g (0.26 lb) except base

PERFORMANCE

Conversion accuracy: ± 1 % except the sensor accuracy

Conversion rate: 14 ms

Data range

CLSE-R5: Integer that engineering unit value (A) multiplied by 1000

CLSE-05, CLSE-10, CLSE-20: Integer that engineering unit value (A) multiplied by 100

CLSE-40, CLSE-60: Integer that engineering unit value (A) multiplied by 10

(Scaling of converted data is configurable with the

configurator software)

Temp. coefficient: ± 0.03 %/°C (± 0.02 %/°F)

Response time: ≤ 2 sec. (0 - 90 %)

Insulation resistance: ≥ 100 M Ω with 500 V DC

Dielectric strength: 1500 V AC @ 1 minute (input to Modbus to power input to FE1)

STANDARDS & APPROVALS

EU conformity:

EMC Directive

EMI EN 61000-6-4

EMS EN 61000-6-2

RoHS Directive

CONFIGURATOR SOFTWARE SETTING

The following parameters can be set with using PC Configurator Software (model: R10CFG)
 Refer to the users manual for the R30CFG for detailed operation of the software program.

■ INPUT SETTING

Each channel can be set independently.

| ITEM | SETTING RANGE | DEFAULT SETTING |
|-------------------------|---|-----------------|
| Clamp-on Current Sensor | CLSE-R5 / CLSE-05 / CLSE-10 / CLSE-20 / CLSE-40 / CLSE-60 | CLSE-R5 |
| Zero Input | CLSE-R5: 0.000 - 5.000 (\leq full input) | 0.000 |
| | CLSE-05: 0.00 - 50.00 (\leq full input) | |
| | CLSE-10: 0.00 - 100.00 (\leq full input) | |
| | CLSE-20: 0.00 - 200.00 (\leq full input) | |
| | CLSE-40: 0.00 - 400.00 (\leq full input) | |
| | CLSE-60: 0.00 - 600.00 (\leq full input) | |
| Full Input | CLSE-R5: 0.000 - 5.000 (\geq zero input) | 0.000 |
| | CLSE-05: 0.00 - 50.00 (\geq zero input) | |
| | CLSE-10: 0.00 - 100.00 (\geq zero input) | |
| | CLSE-20: 0.00 - 200.00 (\geq zero input) | |
| | CLSE-40: 0.00 - 400.00 (\geq zero input) | |
| | CLSE-60: 0.00 - 600.00 (\geq zero input) | |
| Zero Fine Adjust | -320.00 - 320.00 | 0.00 (%) |
| Gain Zero Adjust | -3.2000 - 3.2000 | 1.0000 |
| Zero Scaling | -32000 - 32000 | 0 |
| Full Scaling | -32000 - 32000 | 10000 |
| Cutout | 0.0 - 5.0 (%) | 1.0 (%) |

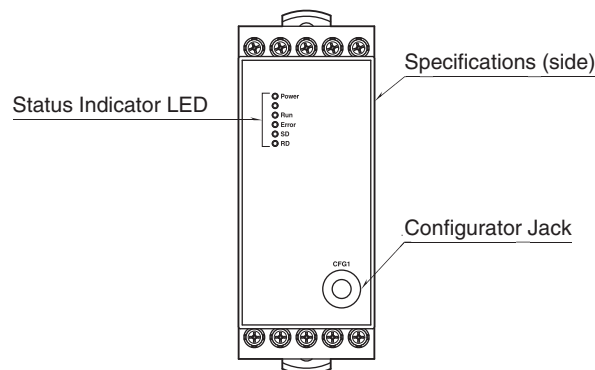
■ MODBUS SETTING

| ITEM | SETTING RANGE | DEFAULT SETTING |
|--------------------------------|---------------------------------|-----------------|
| Data Mode | Modbus-RTU / Modbus-ASCII | Modbus-RTU |
| Address | 1 - 247 | 1 |
| Baud Rate | 38400 / 19200 / 9600 / 4800 bps | 38400 bps |
| Parity | None / Odd / Even | None |
| Communication timeout duration | 0.1 - 3200.0 (sec.) | 3.0 sec. |

Depending on data mode and parity bit setting, data bit and stop bit are as following.

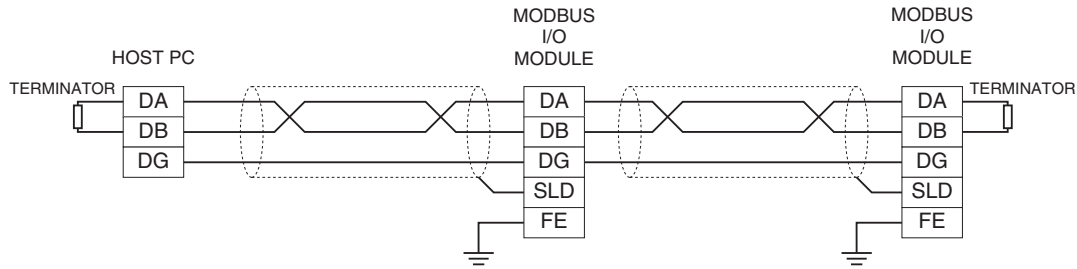
| DATA MODE | PARITY BIT | DATA BIT | STOP BIT |
|--------------|-------------|----------|----------|
| Modbus-RTU | None | 8 | 2 |
| | Odd or Even | 8 | 1 |
| Modbus-ASCII | None | 7 | 2 |
| | Odd or Even | 7 | 1 |

EXTERNAL VIEW



MODBUS WIRING CONNECTION

■ WIRING COMMUNICATION WITH HOST PC



Note: The terminator must be connected across "DA" and "DB" at both ends of communication line.

TERMINAL ASSIGNMENTS

■ BASE

| | | | | |
|-----------|----------|----------|-----------|-----------|
| 1 K1 | 2 K2 | 3 K3 | 4 K4 | 5 NC |
| 6 L1 | 7 L2 | 8 L3 | 9 L4 | 10 NC |
| | | | | |
| 11 FE | 12 DB | 13 DA | 14 NC | 15 FE1 |
| 16 SLD | 17 DG | 18 NC | 19 24V | 20 0V |

| PIN NO. | ID | FUNCTION | PIN NO. | ID | FUNCTION |
|---------|----|-----------|---------|-----|---------------------|
| 1 | K1 | Input 1-K | 11 | FE | Modbus grounding |
| 2 | K2 | Input 2-K | 12 | DB | DB |
| 3 | K3 | Input 3-K | 13 | DA | DA |
| 4 | K4 | Input 4-K | 14 | NC | Unused |
| 5 | NC | Unused | 15 | FE1 | Power grounding |
| 6 | L1 | Input 1-L | 16 | SLD | Shield |
| 7 | L2 | Input 2-L | 17 | DG | DG |
| 8 | L3 | Input 3-L | 18 | NC | Unused |
| 9 | L4 | Input 4-L | 19 | 24V | Power supply 24V DC |
| 10 | NC | Unused | 20 | 0V | Power supply 0V DC |

* Base does not come with the unit. Please order separately.

MODBUS FUNCTION CODES & SUPPORTED CODES

Modbus function codes are shown below

■ DATA AND CONTROL FUNCTIONS

| CODE | NAME | |
|------|----------------------|--|
| 02 | Read Input Status | Status of digital inputs to the slave (read only) |
| 04 | Read Input Registers | Collected data from the field by the slave (read only) |

■ EXCEPTION CODES

| CODE | NAME | |
|------|----------------------|--|
| 01 | Illegal Function | Function code is not allowable for the slave |
| 02 | Illegal Data Address | Address is not available within the slave |
| 03 | Illegal Data Value | Data is not valid for the function |

MODBUS I/O ASSIGNMENT

| | ADDRESS | DATA TYPE | DATA |
|---------------------|---------|-----------|--|
| Input (0X) | 1 | | Analog input 1 error (input range error) |
| | 2 | | Analog input 2 error (input range error) |
| | 3 | | Analog input 3 error (input range error) |
| | 4 | | Analog input 4 error (input range error) |
| Input Register (3X) | 1 | I | Analog Input (analog input 1) |
| | 2 | I | Analog Input (analog input 2) |
| | 3 | I | Analog Input (analog input 3) |
| | 4 | I | Analog Input (analog input 4) |

Note: DO NOT access addresses other than the ones mentioned above. Such access may cause problems such as malfunction.

■ DATA TYPE

I: Integer, 0 - 65535

■ STATUS

1 bit: indicates input status.

input range error ((Input range is out of the range)

0: Normal

1: Error

DATA CONVERSION

■ ENGINEERING UNIT CONVERSION

CLSE-R5 is multiplied by 1000, CLSE-10 and CLSE-20 is multiplied 100, CLSE-40 and CLSE-60 is multiplied by 10, expressed in 16 bits (0 - 65535).

■ SCALED ANALOG DATA (16-bit) CONVERSION



The data is 0 to 10000 for scaling 0 to 100% setting.

If the input range is 0 to +105% (0 to +10500) and that is out of range, the data is fixed to 0 or 10500.

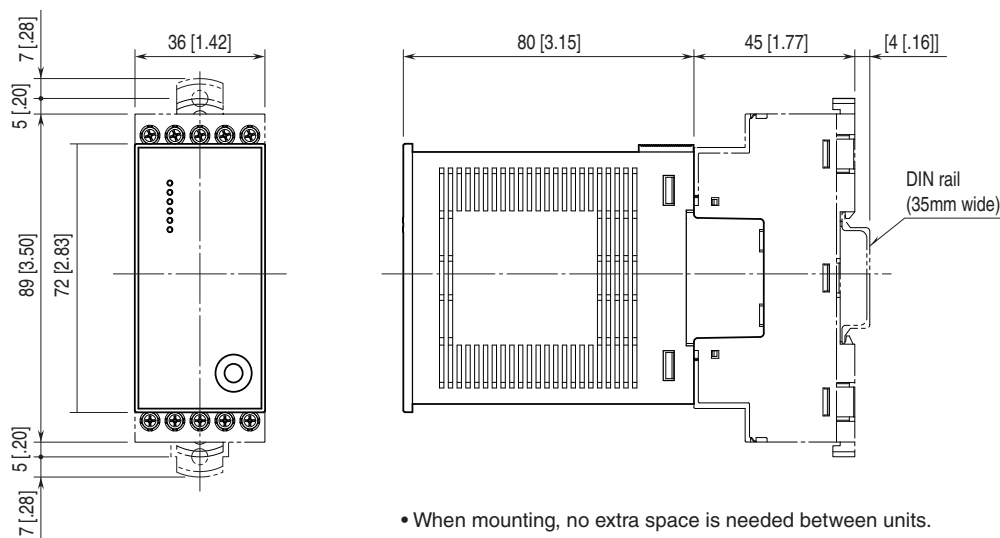
■ DATA ERROR STATUS

Data error status is indicated by 1 bit.

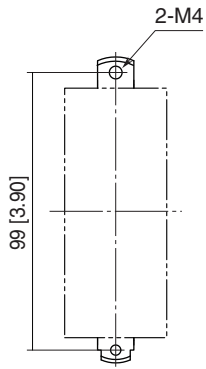
0: OFF

1: ON

EXTERNAL DIMENSIONS unit: mm [inch]



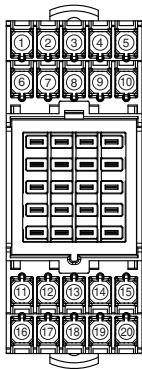
MOUNTING REQUIREMENTS unit: mm [inch]



* Mounting requirements for base.

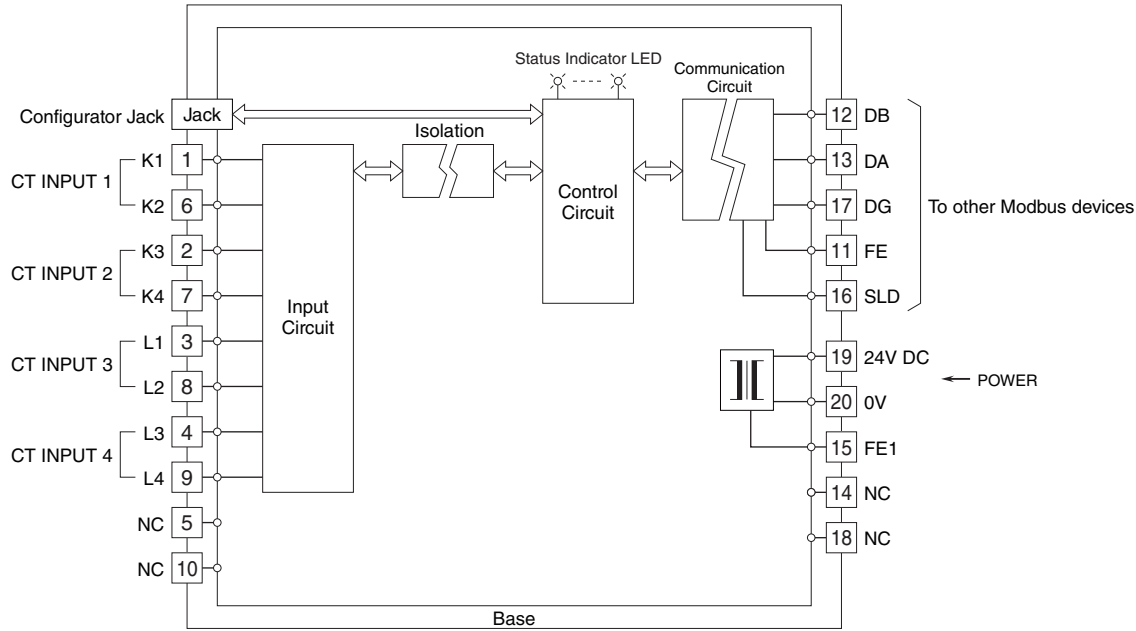
TERMINAL ASSIGNMENTS

■ BASE

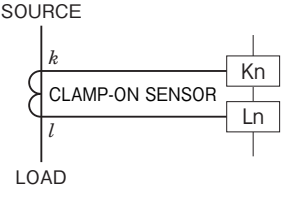



* Base does not come with the unit. Please order separately.

SCHEMATIC CIRCUITRY & CONNECTION DIAGRAM



■ INPUT CONNECTION



 Specifications are subject to change without notice.