

Operating Manual

DRR-45-1P / DRR-CT-1P / DRR-RJ-1P DIN RAIL MOUNTED SINGLE PHASE ENERGY METER



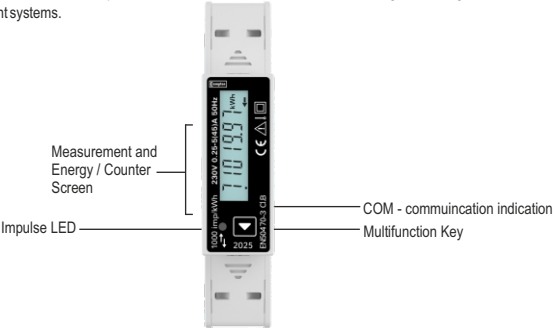
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1. INTRODUCTION

TE Connectivity's Crompton Instruments Single Phase Digital Energy Meter is a DIN rail-mounted device designed for bidirectional measurement of Active, Reactive, and Apparent Energy in industrial, commercial, and residential electrical energy metering applications. Utilizing advanced microcontroller technology, the meter supports single-phase, two-wire networks and provides accurate measurement of key electrical parameters including True RMS (TRMS) Voltage, TRMS Current, Frequency, Active Power, Reactive Power, Apparent Power, and Power Factor. The meter accommodates both direct connection (up to 45 A) and external CT connection with 1 A / 5 A or 100 mA nominal current inputs, offering flexibility for various installation requirements. It features a bright, intuitive LCD display, pulse outputs, and an impulse LED for real-time energy monitoring. Tariff counters are selectable via tariff input, MODBUS, or MBUS communication, depending on the model. Built-in support for MODBUS RTU and MBUS protocols enables seamless remote monitoring and integration into energy management systems.



2. LCD Display

2.1. Introduction

The meter displays over 40 measurement parameters, including Total Energy, Tariff, Partial Energy, and other key electrical parameters such as Maximum Demand, Voltage, Current, Frequency, Active Power, Reactive Power, Apparent Power, and Power Factor—each shown on individual screens. Users can easily scroll through the parameters by pressing the key. To view Tariff and Demand parameters, press and hold the key for 5 seconds while on Screen 2. To return to the main parameter screen, press and hold the key for 5 seconds while on Screen 1. To access the Setup Menu, press and hold the key while viewing any measurement parameter screen. Refer to Table 1 and Table 2 for a complete list of measurement parameters available on the display, as well as via MODBUS and MBUS communication.

2.2. LCD Display Symbols and Indications

The LCD features bold seven-segment digits with a bright white backlight, ensuring clear visibility of measurement parameters. Special symbols and units are included to enhance readability and support easy on-site configuration. The display provides visual indicators for current reversal, communication status, and active tariff, making system status easy to monitor. Users can choose between automatic scrolling or manual scrolling of measurement screens, depending on their preference.

2.2.1 Communication Indication

The meter supports remote data acquisition and configuration via MODBUS and MBUS communication protocols. When the meter is successfully communicating with the host system, this is indicated by a dedicated symbol on the display, as shown below:



The dot symbol on LCD indicates that the meter is communicating.

2.2.2 Tariff Energies Indication

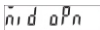


This instrument supports two tariff modes, selectable via tariff input, MODBUS, or MBUS communication. In the image shown, the meter is currently displaying the selected energy parameter (Import Active Energy) for Tariff 1. Tariff energy values and demand parameters are accessible on Screen 2. To open Screen 2, press and hold the key for 5 seconds while on the Display 2 option.

Tariff Indication : Meter has tariff function and indicated by symbol **T**, The digit after this symbol indicates tariff number either 1 or 2.

Other Labels: **Σ** - Indicates Total parameter, **←** - indicates Import parameter, **→** - indicates export parameter.

2.2.3 MID Setup Indication

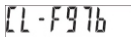


This screen indicates that the MID setup is open. To lock the setup, the user must configure the CT Primary and CT Secondary values. These parameters must be programmed on-site within the first 15 minutes after entering the CT Primary or CT Secondary edit mode. Once configured, the values are locked in accordance with MID standards, ensuring compliance and preventing unauthorized changes.

2.2.4 Start-up Screens



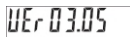
Display check screen



CRC Lower Byte screen



CRC Higher Byte screen



Software version screen

NOTE : CRC will be calculated after 3 minutes of power ON the meter.

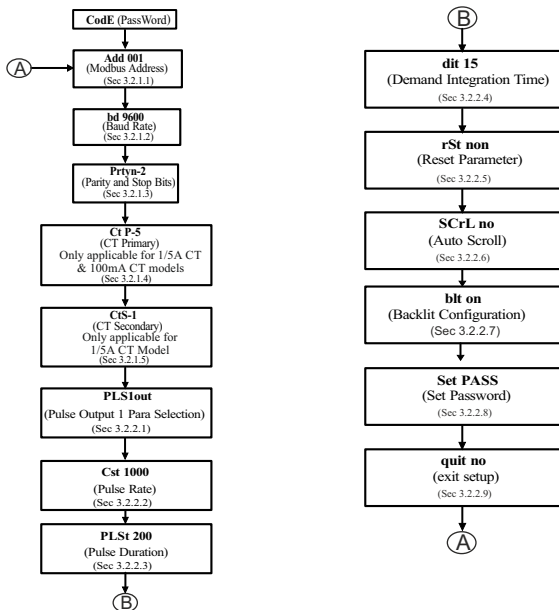
TABLE 1 : Measurement Parameters:
Screen 1

Parameter No.	Parameters	On Display	On Modbus
1	Total Active Energy	✓	✓
2	Import Active Energy	✓	✓
3	Export Active Energy	✓	✓
4	Import Reactive Energy	✓	✓
5	Export Reactive Energy	✓	✓
6	Total Reactive Energy	✓	✓
7	Total Apparent Energy	✓	✓
8	Partial Import Active Energy	✓	✓
9	Partial Export Active Energy	✓	✓
10	Partial Total Active Energy	✓	✓
11	Partial Import Reactive Energy	✓	✓
12	Partial Export Reactive Energy	✓	✓
13	Partial Total Reactive Energy	✓	✓
14	Partial Total Apparent Energy	✓	✓
15	Voltage	✓	✓
16	Current	✓	✓
17	Active Power	✓	✓
18	Reactive Power	✓	✓
19	Apparent Power	✓	✓
20	Power Factor	✓	✓
21	Frequency	✓	✓
22	Cst - xxxx	✓	✓
23	Add - xxx	✓	✓
24	bd - xxxx	✓	✓
25	Pd - Pd count of meter	✓	✓
26	Active tariff status	✓	✓
27	Serial Number	✓	✓
28	Display Test	✓	--

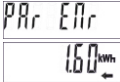
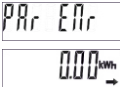
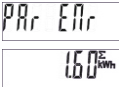
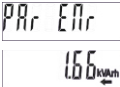
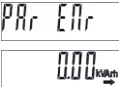
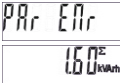
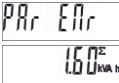
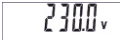
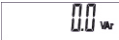
TABLE 1 : Measurement Parameters (contd.):
Screen 2

Parameter No.	Parameters	On Display	On Modbus
29	CRC of meter	✓	✓
30	T1 Import Active Energy	✓	✓
31	T1 Export Active Energy	✓	✓
32	T1 Total Active Energy	✓	✓
33	T1 Import Reactive Energy	✓	✓
34	T1 Export Reactive Energy	✓	✓
35	T1 Total Reactive Energy	✓	✓
36	T1 Total Apparent Energy	✓	✓
37	T2 Import Active Energy	✓	✓
38	T2 Export Active Energy	✓	✓
39	T2 Total Active Energy	✓	✓
40	T2 Import Reactive Energy	✓	✓
41	T2 Export Reactive Energy	✓	✓
42	T2 Total Reactive Energy	✓	✓
43	T2 Total Apparent Energy	✓	✓
44	Import W Max Demand	✓	✓
45	Export W Max Demand	✓	✓
46	Import VAr Max Demand	✓	✓
47	Export VAr Max Demand	✓	✓
48	Import VA Max Demand	✓	✓
49	Export VA Max Demand	✓	✓
50	Current Max Demand	✓	✓

2.3 Setup Parameters Screens Navigation Map



2.4 Measurement Parameters Screens

			
Total Active Energy	Import Active Energy	Export Active Energy	Import Reactive Energy
			
Export Reactive Energy	Total Reactive Energy	Total Apparent Energy	Partial Import Active Energy
			
Partial Export Active Energy	Partial Total Active Energy	Partial Import Reactive Energy	Partial Export Reactive Energy
			
Partial Total Reactive Energy	Partial Total Apparent Energy	Voltage	Current
			
Active Power	Reactive Power	Apparent Power	Power Factor

50.00 Hz

Frequency

151 1000

Pulse Constant

Addr 001

Modbus Device Address

bdr 9600

Baud Rate

Pd- 13

Power Drop

Err-1P
Err-111

Tariff Status-Input
Based & Error Indication

Err-nd

Tariff Status-
Modbus Based

Sr-2312
000001

Serial Number

0.00000000 Hz
1.00000000 kW
1.00000000 kWh

Display Check

Err-nd
150 kW

Import Active Power
Max Demand

Err-nd
150 kW

Export Active Power
Max Demand

Err-nd
150 kWh

Import Reactive Power
Max Demand

Err-nd
150 kWh

Export Reactive Power
Max Demand

Err-nd
150 kVA

Import Apparent Power
Max Demand

Err-nd
150 kVA

Export Apparent Power
Max Demand

Err-nd
450 A

Current
Max Demand

3. PROGRAMMING

The following sections comprise step by step procedures for configuring the Energy Meter according to individual user requirements. To access the set-up screens press and hold key for 5 seconds on any measurement parameter screen. This will take the User into the Password Protection Entry Stage (Section 3.1).

3.1 Password Protection

Password protection can be enabled to prevent unauthorized access to set-up screens, when default password protection is not enabled. Password protection is enabled by selecting a four digit number other than 0000, setting a password of 0000 disables the password protection.



Enter Password, prompt for first digit. Press the key to scroll the value of first digit from 0 through to 9, Press & Hold key to advance to next digit.



Enter Password, first digit entered, prompt for second digit.
Press the key to scroll the value of first digit from 0 through to 9
Press & Hold the key to advance to next digit.



Enter Password, second digit entered, prompt for third digit.
Press the key to scroll the value of first digit from 0 through to 9.
Press & Hold the key to advance to next digit.



Enter Password, third digit entered, prompt for fourth digit. .
Press the key to scroll the value of first digit from 0 through to 9.
Press & Hold the key to advance to verification of the password.



password confirmed and Pressing key advances to the "Setup Menu" entry stage. (See Section 3.2).

Password Incorrect.



When this screen appears and the first digit is blinking, it indicates that the meter has not accepted the entered password. The user is given one additional attempt to enter the correct password. If the second attempt also fails, the meter will exit the setup menu

3.2 Setup Menu selection

3.2.1 Communication Parameter Selection

3.2.1.1 Address Setting

This screen allows the user to set the communication address for the meter. The valid address range is 1 to 247 for MODBUS and 1 to 250 for MBUS.

To set the address:

Press and hold the key to enter the address setup mode. After setting the address, press the key to advance to the Baud Rate setup screen. To edit the address, press and hold the key to enter edit mode. The first digit will begin blinking. Use the key to scroll through values for the first digit. Press and hold the key to move to the next digit. Repeat the process for the second and third digits. After entering the third digit, press and hold the key to confirm the selection. The meter will display a "Done" screen. The default address setting is '001'.

3.2.1.2 Baud Rate

This screen allows the user to set the Baud Rate, displayed in bits per second.

Press the key to accept the current value and proceed to the Parity and Stop Bit Selection screen (see Section 3.2.2.3). Press and hold the key to enter Baud Rate Edit mode. In edit mode, use the scroll key to cycle through the available baud rates: For MODBUS: 2400, 4800, 9600, 19200, and 38400. For MBUS: 300, 600, 1200, 2400, 4800, and 9600.

Once the desired value is selected, press and hold the key to confirm the setting. The meter will return to the Baud Rate screen (see Section 3.2.1.2). Note: The default baud rate is 9600.

3.2.1.3 Parity and Stop Bit

This screen allows the user to set Parity & number of stop bits. Pressing the key accepts the present value and advances to "CT Primary Parameters" screen (see section 3.2.1.4).

Pressing and holding the key enters the Parity & Stop Bit Edit mode. In this mode, use the scroll key to cycle through the available options:

- nonE1: No parity with one stop bit
- nonE2: No parity with two stop bits
- EVEn: Even parity with one stop bit
- odd: Odd parity with one stop bit(For MBUS only):
- EVEn1 – Even parity

Once the desired setting is selected, press and hold the key to confirm the value. The meter will then advance to the CT Primary setup screen (see Section 3.2.1.4).

Note: The default setting for MODBUS is 'nonE1'.

3.2.1.4 CT Primary (only applicable for 1/5A CT & 100mA CT Models)



This screen allows the user to set the CT Primary value for the meter.

For 1 A / 5 A CTs, the valid range is 1 to 1000. For 100 mA CTs, the valid range is 5 to 1000. To set the value: Press the key to accept the current value and proceed to the CT Secondary setup screen. Press and hold the key to enter edit mode. The first digit will begin blinking. Use the key to scroll through values for the first digit. Press and hold the key to move to the next digit. Repeat the process for the second and third digits. After entering the final digit, press the key to confirm the selection. The meter will display a "Done" screen.

Note: The default CT Primary value is '5'. This parameter must be configured within the first 15 minutes of entering the CT Primary or CT Secondary edit mode. Once set, it is permanently locked in accordance with MID standards.

3.2.1.5 CT Secondary (only applicable for 1/5A CT Model)



This screen allows the user to set the CT Secondary value for the meter. The option values of CT secondary are 1 Ampere or 5 Ampere.

Press key to set the CT Secondary value.

Press and hold key to enter into edit mode. Pressing key again scrolls the value through 1A or 5A. confirms the selection by pressing key, then shows 'Done' screen.

Pressing key sets the value and advances to 'output parameter selection' screen (see section 3.2.2.) The default is 5.

Note: 1) The parameter can be set in the first 15 minutes after entering the CT Primary or CT Secondary edit mode and get locked for lifetime

2) When CT secondary value set to 1 then the operation current range of meter will be 10mA-1A(6A)

3) When CT secondary value set to 5 then the operating current range of meter will be 50mA-5(6A)

3.2.2 Output Parameter Selection

3.2.2.1. Pulse Output



This screen is used to configure the Pulse Output 1 (SO1) parameter. Press the key to accept the current value and proceed to the Pulse Rate Selection menu. Press and hold the key to enter Pulse Output 1 Parameter Edit mode. In edit mode, use the key to scroll through the available output options: IMP kWh – Import Active Energy EXP kWh – Export Active Energy IMP kVarh – Import Reactive Energy EXP kVarh – Export Reactive Energy IND kVarh – Inductive Reactive Energy CAP kVarh – Capacitive Reactive Energy TOTAL kWh – Total Active Energy TOTAL kVarh – Total Reactive Energy (Refer to Table 3 on page 18 for details.) Once the desired option is selected, press and hold the key to confirm the setting. The meter will then advance to the Pulse Rate Selection screen. Note: The default setting is IMP kWh (Import Active Energy).

3.2.2.2. Pulse Rate



This screen applies to the Pulse Output option only. The screen allows user to set the following pulse rates: 1 pulse per 1 (1kWh) / 10 (1kWh) / 100 (1kWh) / 1000 (1kWh). Pressing key accepts the present selection and takes to the "Pulse Duration Selection" menu (See section 3.2.2.3).

Pressing & Holding the key advances to "Pulse Rate Edit" mode & pressing the key will scrolls the value through the values *1, 10, 100 and 1000*.

Pressing & Holding the key set the value and advances to "Pulse Duration" screen (see Section 3.2.2.3).

The default setting is '1000'.

NOTE: For 1/5A CT SO pulse are always based on CT ratio 5/5 A and for 100mA models pulse are always based on CT Secondary 100mA.

3.2.2.3 Pulse Duration



This screen is used to configure the Pulse Output Duration, which defines the pulse energization time in milliseconds.

Press the key to accept the current value and proceed to the Demand Integration Time screen (see Section 3.2.2.4). Press and hold the key to enter Pulse Duration Edit mode. In edit mode, use the key to scroll through the available values: 60 ms, 100 ms, and 200 ms. Press and hold the key to confirm the selection and advance to the Demand Integration Time menu (see Section 3.2.2.4).

Note: The default setting is 200 ms. For 1 A / 5 A CT models, SO pulse output is always based on a CT ratio of 5/5 A. For 100 mA models, pulse output is always based on a CT secondary value of 100 mA.

3.2.2.4 Demand Integration Time

The image shows a small rectangular LCD screen with a black background and white text. The text on the screen is 'dlt 15'.

This screen allows the user to define the time interval over which current and power measurements are integrated. The displayed unit is in minutes. Pressing the key confirms the current value and proceeds to the "Reset Parameter" screen. Pressing and holding the key enters the "Demand Integration Time Edit" mode. In this mode, pressing the key cycles through the available time intervals: 5, 10, 15, and 30 minutes. Pressing and holding the key again selects the desired value and advances to the "Reset Parameter" menu (refer to Section 3.2.2.5 for details). The default integration time is set to 15 minutes.

3.2.2.5 Reset Parameter Selection

The image shows a small rectangular LCD screen with a black background and white text. The text on the screen is 'rst non'.

This screen is used to configure the reset options for various parameters

Pressing the key confirms the current selection and proceeds to the "Auto Scroll" screen. Pressing and holding the key enters the "Reset Parameter Edit" mode. In this mode, pressing the key cycles through the available reset options: None, Partial Energy, Demand, Power Down Counter, and All. Pressing the Enter key confirms the selected option and advances to the "Auto Scroll" menu (refer to Section 3.2.2.6 for further details).

3.2.2.6 Auto Scrolling

The image shows a small rectangular LCD screen with a black background and white text. The text on the screen is 'scr no'.

This screen allows the user to enable or disable automatic screen scrolling.

Pressing the key confirms the current setting and proceeds to the "Backlit Configuration" screen (refer to Section 3.2.2.7). Pressing and holding the key enters the "Auto Scroll Edit" mode. In this mode, pressing the key cycles through the available options: No – Auto scroll is disabled. 10, 20, 30 seconds – Auto scroll is enabled, with the selected value representing the time interval between screen transitions. Pressing and holding the key again confirms the selected value and advances to the "Backlit Configuration" menu (see Section 3.2.2.7).

3.2.2.7 Backlight Configuration

The image shows a small rectangular LCD screen with a black background and white text. The text on the screen is 'blt on'.

This screen allows the user to configure the backlight settings.

Pressing the key confirms the current setting and proceeds to the "Change Password" screen (refer to Section 3.2.2.8). Pressing and holding the key enters the "Backlit Configuration Edit" mode. In this mode, pressing the key cycles through the following options: On – The backlight remains continuously on. Off – The backlight remains continuously off. Act – The backlight turns on for 10 seconds when a key is pressed. Pressing and holding the key again confirms the selected option and advances to the "Change Password" menu (see Section 3.2.2.8).

3.2.2.8 New / Change Password



This screen allows user to set password screen scrolling.
Pressing & Holding the key accepts the present status and advance to the "quit screen" screen (see Section 3.2.2.9).



Pressing & Holding the key advances to "Set password Edit" mode and pressing the key scroll the value of first digit from 0 through to 9.



Pressing & Holding the key selects the value and advances to set second digit. pressing the key scroll the value of second digit from 0 through to 9.



Pressing & Holding the key selects the value and advances to set third digit. pressing the key scroll the value of third digit from 0 through to 9.



Pressing & Holding the key selects the value and advances to set forth digit. pressing the key scroll the value of fourth digit from 0 through to 9.



Pressing & Holding the key selects the value and advances to Password conformation.

3.2.2.9 Quit Setup Menu



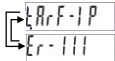
This screen allows user to Exit from Setup Menu.
Pressing & Holding the key advances to "quit setup" edit mode
pressing the key scroll the options yes or no.

Pressing & Holding the key will conforms the selection.

if YES selected then meter will quit from setup, selecting the NO option it will advanced to address setup screen (see Section 3.2.1.1).

4. Troubleshooting

4.1 Error Screen



The Error Screen is designed to display error codes in the format "Er-XXX". Each digit in the error code represents a specific type of error. The first digit indicates a program flash CRC mismatch error, the second digit signifies an EEPROM full or error, and the third digit represents a calibration error. If any of these errors occur, the corresponding digit changes from 0 to 1. For instance, if a program flash CRC mismatch error occurs, the error code displayed will be "Er-100" or if a program EEPROM gets full or malfunction, the error code displayed will be "Er-010". Conversely, if no errors are detected, the screen will display "Er-000". This clear and concise error indication system ensures efficient troubleshooting and maintenance of the energy meter. This screen is multiplexed with Tariff Input Screen and will toggle back and forth.

NOTE: If any of the above errors occurs, please contact technical support

5. Tariff Selection :

The meter is provided Tariff Selection Via Tariff Inputs or Modbus or MBus for selection of active tariff respectively for energy meter

5.1 Tariff Selection:

Relationship between Tariff Input and ActiveTariff

Tariff Input 1	Tariff number
LOW	Tariff 1
HIGH	Tariff 2

6. SO Output :

The Meter is provided with one opto-isolated pulse outputs that can be configured for any one of the Active, Reactive and Apparent Energy parameters. Refer TABLE 3 for parameters for pulse output. The pulse width and rate of pulse out is onsite programmable .

6.1 Pulse Output :

Pulse Output is opto-coupler based SO which can be used to drive an external mechanical counter for energy measurement. The Pulse Output can be configured to the parameters mentioned in TABLE 3 through setup parameter screen.

TABLE 3 : Parameters for Pulse Output

Parameter Number	Parameter	1P 2W
1	Import Active Energy	✓
2	Export Active Energy	✓
3	Import Reactive Energy	✓
4	Export Reactive Energy	✓
5	Inductive Reactive Energy	✓
6	Capacitive Reactive Energy	✓
7	Total active energy	✓
8	Total kvarh energy	✓

7. RS 485 (ModBus) Output :

The Energy Meter supports MODBUS (RS485) RTU protocol (2-wire) .

Connection should be made using twisted pair shielded cable. All "A" and "B" connections are daisy chained together. Loop (ring) topology does not require any termination load. Line topology may or may not require terminating loads depending on the type and length of cable used. The impedance of the termination load should match the impedance of the cable and be at both ends of the line. The cable should be terminated at each end with a 120 ohm (1/4 Watt min.) resistor.

RS 485 network supports maximum length of 1.2km. Including the Master, a maximum of 32 instruments can be connected in RS485 network. The permissible address range for The Meter is between 1 and 247 for 32 instruments. Broadcast Mode (address 0) is not allowed.

Each byte in RTU mode has following format:

	8-bit binary, hexadecimal 0-9, A-F 2 hexadecimal characters contained in each 8-bit field of the message
Format of Data Bytes	4 bytes (32 bits) per parameter. Floating point format (to IEEE 754) Most significant byte first (Alternative least significant byte first)
Error Checking Bytes	2 byte Cyclical Redundancy Check (CRC)
Byte format	1 start bit, 8 data bits, least significant bit sent first 1 bit for even/odd parity 1 stop bit if parity is used; 1 or 2 bits if no parity

Communication Baud Rate is user selectable from the front panel between 2400,4800,9600,19200,38400 bps.

Function code :

03 (HEX)	Read Holding Registers	Read content of read /write location (4X)
04 (HEX)	Read input Registers	Read content of read only location (3X)
10 (HEX)	Presets Registers	Set the content of read / write locations (4X)

Exception Cases : An exception code will be generated when Meter receives ModBus query with valid parity & error check but which contains some other error (e.g. Attempt to set floating point variable to an invalid value) The response generated will be "Function Code" ORed with HEX (80H) . The exception codes are listed below

01	Illegal function	The function code is not supported by Meter
02	Illegal Data Address	Attempt to access an invalid address or an attempt to read or write part of a floating point value
03	Illegal DataValue	Attempt to set a floating point variable to an invalid value

7.1 Accessing 3X and 4X register for reading measured values:

Two consecutive 16 bit registers represent one parameter. Refer **TABLE 4** for the addresses of 3X and 4X registers used for parameters measured by the instrument. Each parameter is held in the 3X as well as 4X registers. Modbus Code 03 and 04 are used to access all parameters in 3X and 4X registers respectively.

Example :

To read parameter,

Voltage from 3X: Start address= 00 00 Number of registers = 02

Current from 4X: Start address= 00 06 Number of registers = 02

Note : Number of registers = Number of parameters x 2

Each query for reading the data must be restricted to 40 parameters or less. Exceeding the 40 parameter limit will cause a ModBus exception code to be returned.

Query for 3X read:

01 (Hex)	04 (Hex)	00 (Hex)	00(Hex)	00 (Hex)	02(Hex)	71 (Hex)	CB (Hex)
Device Address	Function Code	Start Address High	Start Address Low	Number of Registers Hi	Number of Registers Lo	CRC Low	CRC High

3X Response: Voltage (230V)

01 (Hex)	04 (Hex)	04 (Hex)	43 (Hex)	66 (Hex)	00 (Hex)	00 (Hex)	0E (Hex)	1F (Hex)
Device Address	Function Code	Byte Count	Data Register1 High Byte	Data Register1 Low Byte	Data Register2 High Byte	Data Register2 Low Byte	CRC Low	CRC High

Byte Count : Total number of data bytes received.

Query for 4X read:

01 (Hex)	03 (Hex)	00 (Hex)	06(Hex)	00 (Hex)	02(Hex)	24 (Hex)	0A (Hex)
Device Address	Function Code	Start Address High	Start Address Low	Number of Registers Hi	Number of Registers Lo	CRC Low	CRC High

4X Response: Current (5 A)

01 (Hex)	03 (Hex)	04 (Hex)	40 (Hex)	A0 (Hex)	00 (Hex)	00 (Hex)	EF (Hex)	D1 (Hex)
Device Address	Function Code	Byte Count	Data Register1 High Byte	Data Register1 Low Byte	Data Register2 High Byte	Data Register2 Low Byte	CRC Low	CRC High

Byte count : No. of Bytes Demanded by user in query.

Start Address High : Most significant 8 bits of starting address of the parameter requested.

Start Address low : Least significant 8 bits of starting address of the parameter requested.

Number of register Hi : Most significant 8 bits of Number of registers requested.

Number of register Lo : Least significant 8 bits of Number of registers requested.

Data register 1 High Byte : Most significant 8 bits of Data register 1 of the parameter requested.

Data register 1 Low Byte : Least significant 8 bits of Data register 1 of the parameter requested.

Data register 2 High Byte : Most significant 8 bits of Data register 2 of the parameter requested.

Data register 2 Low Byte : Least significant 8 bits of Data register 2 of the parameter requested.

(Note : Two consecutive 16 bit register represent one parameter.)

TABLE 4 : 3 X and 4 X register addresses for measured parameters

Address (3X)	Address (4X)	Parameter Number	Parameter	Units	Hex Address	
					High Byte	Low Byte
30001	40001	0	Voltage	Volts	00	00
30003	40003	1	-	-	00	02
30005	40005	2	-	-	00	04
30007	40007	3	Current	Amp	00	06
30009	40009	4	-	-	00	08
30011	40011	5	-	-	00	0A
30013	40013	6	Active Power	W	00	0C
30015	40015	7	-	-	00	0E
30017	40017	8	-	-	00	10
30019	40019	9	Apparent Power	VA	00	12
30021	40021	10	-	-	00	14
30023	40023	11	-	-	00	16
30025	40025	12	Reactive Power	VA _r	00	18
30027	40027	13	-	-	00	1A

TABLE 4 : Continued

Address (3X)	Address (4X)	Parameter Number	Parameter	Units	Hex Address	
					High Byte	Low Byte
30029	40029	14	-	-	00	1C
30031	40031	15	Power Factor	-	00	1E
30033	40033	16	-	-	00	20
30035	40035	17	-	-	00	22
30037	40037	18	-	-	00	24
30071	40071	35	Frequency	Hz	00	46
30073	40073	36	W Import Demand	W	00	48
30075	40075	37	W Import Max Demand	W	00	4A
30077	40077	38	W Export Demand	W	00	4C
30079	40079	39	W Exp. Max Demand	W	00	4E
30081	40081	40	var Imp.\ Ind Demand	VAr	00	50
30083	40083	41	var Imp.\ Ind Max Demand	VAr	00	52
30085	40085	42	var Exp. \ Cap Max Demand	VAr	00	54
30087	40087	43	var Exp. \ Cap Max Demand	VAr	00	56
30089	40089	44	va Imp. Demand	VA	00	58
30091	40091	45	va Imp. Max Demand	VA	00	5A
30093	40093	46	va Exp. Demand	VA	00	5C
30095	40095	47	va Exp. Max Demand	VA	00	5E
30097	40097	48	Current Imp. Demand	Amp	00	60
30099	40099	49	Current Imp Max. Demand	Amp	00	62
30101	40101	50	-	-	00	64
30103	40103	51	-	-	00	66
30105	40105	52	-	-	00	68
30107	40107	53	Active Import Energy Overflow Count	-	00	6A
30109	40109	54	Active Import Energy	kWh	00	6C
30111	40111	55	Active Export Energy Overflow Count	-	00	6E
30113	40113	56	Active Export Energy	kWh	00	70
30115	40115	57	Reactive Import Energy Overflow Count	-	00	72
30117	40117	58	Reactive Import Energy	kVArh	00	74
30119	40119	59	Reactive Export Energy Overflow Count	-	00	76
30121	40121	60	Reactive Export Energy	kVArh	00	78
30123	40123	61	Total Apparent Energy Overflow Count	-	00	7A
30125	40125	62	Total Apparent Energy	kVAh	00	7C
30127	40127	63	-	-	00	7E
30129	40129	64	-	-	00	80

TABLE 4 : Continued

Address (3X)	Address (4X)	Parameter Number	Parameter	Units	Hex Address	
					High Byte	Low Byte
30131	40131	65	Total Active Energy Overflow Count	-	00	82
30133	40133	66	Total Active Energy	kWh	00	84
30135	40135	67	Total Reactive Energy Overflow Count	-	00	86
30137	40137	68	Total Reactive Energy	kVArh	00	88
30139	40139	69	Total Apparent Energy Overflow Count	-	00	8A
30141	40141	70	Total Apparent Energy	kVAh	00	8C
30143	40143	71	T1 Active Import Energy Overflow Count	-	00	8E
30145	40145	72	T1 Active Import Energy	kWh	00	90
30147	40147	73	T1 Active Export Energy Overflow Count	-	00	92
30149	40149	74	T1 Active Export Energy	kWh	00	94
30151	40151	75	T1 Reactive Import Energy Overflow Count	-	00	96
30153	40153	76	T1 Reactive Import Energy	kVArh	00	98
30155	40155	77	T1 Reactive Export Energy Overflow Count	-	00	9A
30157	40157	78	T1 Reactive Export Energy	kVArh	00	9C
30159	40159	79	T1 Total Apparent Energy Overflow Count	-	00	9E
30161	40161	80	T1 Total Apparent Energy	kVAh	00	A0
30163	40163	81	-	-	00	A2
30165	40165	82	-	-	00	A4
30167	40167	83	T1 Total Active Energy Overflow Count	-	00	A6
30169	40169	84	T1 Total Active Energy	kWh	00	A8
30171	40171	85	T1 Total Reactive Energy Overflow Count	-	00	AA
30173	40173	86	T1 Total Reactive Energy	kVArh	00	AC
30175	40175	87	T1 Total Apparent Energy Overflow Count	-	00	AE
30177	40177	88	T1 Total Apparent Energy	kVAh	00	B0
30179	40179	89	T2 Active Import Energy Overflow Count	-	00	B2
30181	40181	90	T2 Active Import Energy	kWh	00	B4
30183	40183	91	T2 Active Export Energy Overflow Count	-	00	B6
30185	40185	92	T2 Active Export Energy	kWh	00	B8
30187	40187	93	T2 Reactive Import Energy Overflow Count	-	00	BA
30189	40189	94	T2 Reactive Import Energy	kVArh	00	BC
30191	40191	95	T2 Reactive Export Energy Overflow Count	-	00	BE
30193	40193	96	T2 Reactive Export Energy	kVArh	00	C0
30195	40195	97	T2 Total Apparent Energy Overflow Count	-	00	C2
30197	40197	98	T2 Total Apparent Energy	kVAh	00	C4
30199	40199	99	-	-	00	C6

TABLE 4 : Continued

Address (3X)	Address (4X)	Parameter Number	Parameter	Units	Hex Address	
					High Byte	Low Byte
30201	40201	100	-	-	00	C8
30203	40203	101	T2 Total Active Energy Overflow Count	-	00	CA
30205	40205	102	T2 Total Active Energy	kWh	00	CC
30207	40207	103	T2 Total Reactive Energy Overflow Count	-	00	CE
30209	40209	104	T2 Total Reactive Energy	kVArh	00	D0
30211	40211	105	T2 Total Apparent Energy Overflow Count	-	00	D2
30213	40213	106	T2 Total Apparent Energy	kVAh	00	D4
30215	40215	107	Partial Active Import Energy Overflow Count	-	00	D6
30217	40217	108	Partial Active Import Energy	Wh	00	D8
30219	40219	109	Partial Active Export Energy Overflow Count	-	00	DA
30221	40221	110	Partial Active Export Energy	kWh	00	DC
30223	40223	111	Partial Reactive Import Energy Overflow Count	-	00	DE
30225	40225	112	Partial Reactive Import Energy	kVArh	00	E0
30227	40227	113	partial Reactive Export Energy Overflow Count	-	00	E2
30229	40229	114	Partial Reactive Export Energy	kVArh	00	E4
30231	40231	115	Partial Total Apparent Energy Overflow Count	-	00	E6
30233	40233	116	Partial Total Apparent Energy	kVAh	00	E8
30235	40235	117	-	-	00	EA
30237	40237	118	-	-	00	EC
30239	40239	119	Partial Total Active Energy Overflow Count	-	00	EE
30241	40241	120	Partial Total Active Energy	kWh	00	F0
30243	40243	121	Partial Total Reactive Energy Overflow Count	-	00	F2
30245	40245	122	Partial Total Reactive Energy	kArh	00	F4
30247	40247	123	Partial Total Apparent Energy Overflow Count	-	00	F6
30249	40249	124	Partial Total Apparent Energy	kVAh	00	F8
30251	40251	125	-	-	00	FA
30253	40253	126	-	-	00	FC
30255	40255	127	No of Interrupts	-	00	FE
30257	40257	128	Impulse Rate	-	01	00
30259	40259	129	-	-	01	02
30261	40261	130	Tariff Status		01	04
30263	40263	131	Current Direction	Amp	01	06

Note: In Current Direction address if 0 is shown then current is in right direction i.e. in and out at current are matching with the terminals marked. if this address shows 1 then current is in reversed direction.

TABLE 5 : 3 X long register addresses for measured parameters

Address (3X)	Parameter Number	Parameter	Units	Hex Address	
				High Byte	Low Byte
30513	1	Wh Import Overflow Count	-	02	00
30515	2	Wh Import	kWh	02	02
30517	3	Wh Export Overflow Count	-	02	04
30519	4	Wh Export	kWh	02	06
30521	5	Varh Import Overflow Count	-	02	08
30523	6	Varh Import	kVArh	02	0A
30525	7	Varh Export Overflow Count	-	02	0C
30527	8	Varh Export	kVArh	02	0E
30529	9	Vah Import Overflow Count	-	02	10
30531	10	Vah Import	kVAh	02	12
30533	11	Vah Export Overflow Count	-	02	14
30535	12	Vah Export	kVAh	02	16
30537	13	Total Active Energy Overflow Count	-	02	18
30539	14	Total Active Energy	kWh	02	1A
30541	15	Total Reactive Energy Overflow Count	-	02	1C
30543	16	Total Reactive Energy	kVArh	02	1E
30545	17	Total Apparent Energy Overflow Count	-	02	20
30547	18	Total Apparent Energy	kVAh	02	22
30549	19	T1 Wh Import Overflow Count	-	02	24
30551	20	T1 Wh Import	kWh	02	26
30553	21	T1 Wh Export Overflow Count	-	02	28
30555	22	T1 Wh Export	kWh	02	2A
30557	23	T1 Varh Import Overflow Count	-	02	2C
30559	24	T1 Varh Import	kVArh	02	2E
30561	25	T1 Varh Export Overflow Count	-	02	30
30563	26	T1 Varh Export	kVArh	02	32
30565	27	T1 Vah Import Overflow Count	-	02	34
30567	28	T1 Vah Import	kVAh	02	36
30569	29	T1 Vah Export Overflow Count	-	02	38
30571	30	T1 Vah Export	kVAh	02	3A
30573	31	T1 Total Active Energy Overflow Count	-	02	3C
30575	32	T1 Total Active Energy	kWh	02	3E
30577	33	T1 Total Reactive Energy Overflow Count	-	02	40
30579	34	T1 Total Reactive Energy	kVArh	02	42
30581	35	T1 Total Apparent Energy Overflow Count	-	02	44
30583	36	T1 Total Apparent Energy	kVAh	02	46

TABLE 5 : Continued

Address (3X)	Parameter Number	Parameter	Units	Hex Address	
				High Byte	Low Byte
30585	37	T2 Wh Import Overflow Count	-	02	48
30587	38	T2 Wh Import	kWh	02	4A
30589	39	T2 Wh Export Overflow Count	-	02	4C
30591	40	T2 Wh Export	kWh	02	4E
30593	41	T2 Varh Import Overflow Count	-	02	50
30595	42	T2 Varh Import	kVArh	02	52
30597	43	T2 Varh Export Overflow Count	-	02	54
30599	44	T2 Varh Export	kVArh	02	56
30601	45	T2 Vah Import Overflow Count	-	02	58
30603	46	T2 Vah Import	kVAh	02	5A
30605	47	T2 Vah Export Overflow Count	-	02	5C
30607	48	T2 Vah Export	kVAh	02	5E
30609	49	T2 Total Active Energy Overflow Count	-	02	60
30611	50	T2 Total Active Energy	kWh	02	62
30613	51	T2 Total Reactive Energy Overflow Count	-	02	64
30615	52	T2 Total Reactive Energy	kVArh	02	66
30617	53	T2 Total Apparent Energy Overflow Count	-	02	68
30619	54	T2 Total Apparent Energy	kVAh	02	6A
30621	55	Par Wh Import Overflow Count	-	02	6C
30623	56	Par Wh Import	kWh	02	6E
30625	57	Par Wh Export Overflow Count	-	02	70
30627	58	Par Wh Export	kWh	02	72
30629	59	Par Varh Import Overflow Count	-	02	74
30631	60	Par Varh Import	kVArh	02	76
30633	61	Par Varh Export Overflow Count	-	02	78
30635	62	Par Varh Export	kVArh	02	7A
30637	63	Par Vah Import Overflow Count	-	02	7C
30639	64	Par Vah Import	kVAh	02	7E
30641	65	Par Vah Export Overflow Count	-	02	80
30643	66	Par Vah Export	kVAh	02	82
30645	67	Par Total Active Energy Overflow Count	-	02	84
30647	68	Par Total Active Energy	kWh	02	86
30649	69	Par Total Reactive Energy Overflow Count	-	02	88
30651	70	Par Total Reactive Energy	kVArh	02	8A
30653	71	Par Total Apparent Energy Overflow Count	-	02	8C
30655	72	Par Total Apparent Energy	kVAh	02	8E

NOTE: Energy Overflow count Increments when energy count exceeds 99999.999.

Overflow	Display Energy
< 1	99999.99
< 10	999999.9
> =10	9999999

7.2 Accessing 3 X register for Long Energy Reading :

For Reading Energy start count in long energy format following query format should be used

Query: (Query for Reading Active Energy Import Overflow)

Device Address	01 (Hex)
Function Code	04 (Hex)
Starting Address High	02 (Hex)
Starting Address Low	00 (Hex)
Number of Registers High	00 (Hex)
Number of Registers Low	02 (Hex)
Byte Count	04 (Hex)
Data Register- 1 High Byte	40 (Hex)
Data Register- 1 Low Byte	80 (Hex)
Data Register- 2 High Byte	00 (Hex)
Data Register- 2 Low Byte	00 (Hex)
CRC Low	BE (Hex)
CRC High	A7 (Hex)

Byte Count : Total number of data bytes transmitted.

Data register 1 High Byte : Most significant 8 bits of Data register 1 of the parameter requested.

Data register 1 Low Byte : Least significant 8 bits of Data register 1 of the parameter requested.

Data register 2 High Byte : Most significant 8 bits of Data register 2 of the parameter requested.

Data register 2 Low Byte : Least significant 8 bits of Data register 2 of the parameter requested.

(Note : Two consecutive 16 bit register represent one parameter.)

Response:

Device Address	01 (Hex)
Function Code	04 (Hex)
Start Address High	02 (Hex)
Start Address Low	00 (Hex)
Number of Registers High	00 (Hex)
Number of Registers Low	02 (Hex)
CRC Low	70 (Hex)
CRC High	73 (Hex)

Start Address High : Most significant 8 bits of starting address of the parameter requested.

Start Address Low : Least significant 8 bits of starting address of the parameter requested.

Number of register High : Most significant 8 bits of Number of registers requested.

Number of register Low : Least significant 8 bits of Number of registers requested.

7.3 Accessing 4 X register for Reading & Writing Settings:

Each setting is held in the 4X registers. ModBus code 04 is used to read the parameters. Refer **TABLE 6** for 4X Register addresses.

Example: Reading Total Energy Counter Formula

Start address = 1776 (Hex)

Number of registers = 02

Note: Number of registers = Number of Parameters x 2

Query :

Device Address	01 (Hex)
Function Code	03 (Hex)
Start Address High	17 (Hex)
Start Address Low	76 (Hex)
Number of Registers High	00 (Hex)
Number of Registers Low	02 (Hex)
CRC Low	20 (Hex)
CRC High	65 (Hex)

Start Address High : Most significant 8 bits of starting address of the parameter requested.

Start Address Low : Least significant 8 bits of starting address of the parameter requested.

Number of register High : Most significant 8 bits of Number of registers requested.

Number of register Low : Least significant 8 bits of Number of registers requested.

(Note : Two consecutive 16 bit register represent one parameter.)

Response: Total Energy Counter Formula 1

Device Address	01 (Hex)
Function Code	03 (Hex)
Byte Count	04 (Hex)
Data Register- 1 High Byte	3F(Hex)
Data Register- 1 Low Byte	80 (Hex)
Data Register- 2 High Byte	00 (Hex)
Data Register- 2 Low Byte	00 (Hex)
CRC Low	F7 (Hex)
CRC High	CF (Hex)

Byte Count : Total number of data bytes received.

Data register 1 High Byte : Most significant 8 bits of Data register 1 of the parameter requested.

Data register 1 Low Byte : Least significant 8 bits of Data register 1 of the parameter requested.

Data register 2 High Byte : Most significant 8 bits of Data register 2 of the parameter requested.

Data register 2 Low Byte : Least significant 8 bits of Data register 2 of the parameter requested.

(Note : Two consecutive 16 bit register represent one parameter.)

Example : Writing Measurement Mode Watt

Measurement mode : 2 Start address = 1776 (Hex)

Number of registers = 02

Note: Number of registers = Number of Parameters x 2

Query:

Device Address	01 (Hex)
Function Code	10 (Hex)
Starting Address High	17 (Hex)
Starting Address Low	76 (Hex)
Number of Registers High	00 (Hex)
Number of Registers Low	02 (Hex)
Byte Count	04 (Hex)
Data Register- 1 High Byte	40 (Hex)
Data Register- 1 Low Byte	00 (Hex)
Data Register- 2 High Byte	00 (Hex)
Data Register- 2 Low Byte	00 (Hex)
CRC Low	8A (Hex)
CRC High	91 (Hex)

Byte Count : Total number of data bytes received.

Data register 1 High Byte : Most significant 8 bits of Data register 1 of the parameter requested.

Data register 1 Low Byte : Least significant 8 bits of Data register 1 of the parameter requested.

Data register 2 High Byte : Most significant 8 bits of Data register 2 of the parameter requested.

Data register 2 Low Byte : Least significant 8 bits of Data register 2 of the parameter requested.

(Note : Two consecutive 16 bit register represent one parameter)

Response:

Device Address	01 (Hex)
Function Code	10 (Hex)
Start Address High	17 (Hex)
Start Address Low	76 (Hex)
Number of Registers High	00 (Hex)
Number of Registers Low	02 (Hex)
CRC Low	A5 (Hex)
CRC High	A6 (Hex)

Start Address High : Most significant 8 bits of starting address of the parameter requested.

Start Address Low : Least significant 8 bits of starting address of the parameter requested.

Number of register High : Most significant 8 bits of Number of registers requested.

Number of register Low : Least significant 8 bits of Number of registers requested.

(Note : Two consecutive 16 bit register represent one parameter)

TABLE 6 : 4 X register addresses

Parameter No.	Address Register	Parameters	Default Values
1	46001	-	-
2	46003	Demand Integration Time	15
3	46005	-	-
4	46007	Total Energy Counter Formula	3
5	46009	Import/Export Reactive Energy Counter Formula	1
6	46011	Nominal voltage	230
7	46013	Nominal Current	Rated Current
8	46015	Nominal Frequency	50
9	46017	Reset Parameters	0
10	46019	Setup change Count	0
11	46021	Lock Setup Change Count (for EC11XX & ER11XX)	50
12	46023	Tariff Configuration	1
13	46025	Modbus Address	1
14	46027	Comsetup Address	9
15	46029	-	-
16	46031	Autoscroll	0
17	46033	Backlit Configuration	1
18	46035	Password	0000
19	46037	So1 Pulse Constant	1000
20	46039	So1 Pulse Parameters	1
21	46041	So1 Pulse Width	200
22	46043	-	-
23	46045	-	-
24	46047	-	-

4 X register addresses for Direct Connection models

Parameter No.	Address Register	Parameters	Default Values
25	46049	-	-
26	46051	-	-
27	46053	Version Number	XX.XX
28	46055	Serial Number Year Date	YYMM
29	46057	Serial Number Data	-
30	46059	CRC Flash	-
31	46061	Error bit Address	-
32	46063		-

4 X register addresses for 1/5A CT & 100mA CT models

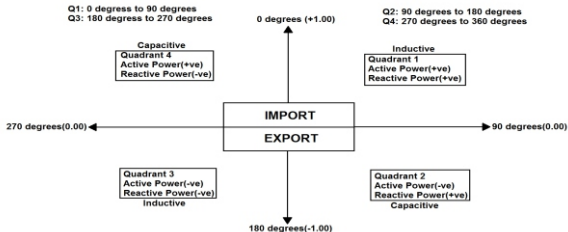
Parameter No.	Address Register	Parameters	Default Values
25	46049	CT Primary	5
26	46051	CT Secondary	5
27	46053	-	-
28	46055	-	-
29	46057	-	-
30	46059	-	-
31	46061	-	-
32	46063	-	-
33	46065	Version Number	XX.XX
34	46067	Serial Number Year Date	YYMM
35	46069	Serial Number Data	-
36	46071	CRC Flash	-
37	46073	Error bit Address	-
38	46075	-	-

TABLE 7 : 4 X register addresses Description

Parameter No.	Address Register	Parameters	Description
1	46001	-	-
2	46003	Demand Integration Time (Read\Write)	Demand Period represents demand time in minutes The Applicable values are 5, 10, 15, 30.
3	46005	-	-
4	46007	Total Energy counter formula (for Active & Reactive energy) (Read\Write)	This address allow to setup total energy measurement modes. Valid values are: 1:Total Energy = Import only, 2:Total Energy = Export only, 3.Total Energy = Imp+Export (for Import/Export Reactive energy refer 46009 setting)
5	46009	Import/Export Reactive Energy / Demand counter formula (Read\Write)	This address allow to setup reactive energy measurement Modes. Valid values are: 1: Import/Export i.e. Import KVARh = Import energy of Q1+Q2 and Export KVARh = Export energy of Q3+Q4, 2: Inductive/Capacitive i.e. Import KVARh = Import energy of Q1+Q3 and Export KVARh = Export energy of Q2+Q4 (refer to figure 1 page no. 34 for more detail).
6	46011	Nominal voltage (Read)	In this address nominal Voltage is set 230V by default.
7	46013	Nominal Current (Read)	In this address Rated Current will be Shown.
8	46015	Nominal Frequency (Read)	In this address nominal Frequency is set 50Hz by default.
9	46017	Reset Parameters (Read\Write)	This address allows the user to reset Parameter the valid values are 0: None, 1: Partial Energy, 2: Demand, 3: Power Drop, 4: all.
10	46019	Setup Change Count (Read)	Setup change count is increases only if below parameters are changed 1.Demand Integration Time 2.Total Energy Counter Formula 3.Import/Export Reactive Energy / Demand Counter Formula 4.Tariff Configuration 5.AutoScroll 6.Backlite Configuration 7.Password 8.Pulse Constant 9.Pulse Parameters 10.Pulse Width 11.CT Primary 12.CT Secondary.
11	46021	Lock Setup Change Count (Read)	This address shows time upto 50 minutes initially after changing the CT primary and CT secondary values time will be of 15 minutes once it gets 0 setup will be locked .
12	46023	Tariff Configuration (Read\Write)	This address allows user to configure the tariff input whether if it is setup from modbus or tariff inputs.The Valid Values are 1: Tariff Input Based 2: Tariff 3: Tariff 2.

TABLE 7 : Continued

Parameter No.	Address Register	Parameters	Description
13	46025	Modbus Address (Read\Write)	This register address is used to set device address between 1 to 247.
14	46027	Comsetup Address (Read\Write)	This register address is used to setup Rs485 communication parameters like baud rate , parity stop bit. the valid values are in between 0 to 19 (refer table no. for details of baud rate and parity stop bit.
15	46029	-	-
16	46031	Autoscroll (Read\Write)	This address is used to setup autoscroll feature the valid values are 0 for No and 10, 20, 30 seconds.
17	46033	Backlit (Read\Write)	This address is used to setup backlit configuration. Valid values are 0: backlit set to continuous off, 1: backlit set to continuous on and 2: backlit on when key is pressed
18	46035	Password (Read\Write)	This Address is used to set & Reset the Password Valid Range of Password can be set is 0000-9999. 1)if password lock is present & if this location is read it will return zero 2)if password lock is present & to disable this lock first send valid password to this location then write "0000" to this location 3)if password lock is present & to modify 4X parameter first send valid password to this to this location so that 4X parameter will be accessible for modification. 4) if for in any of the above case invalid password is send then meter will return exception error 2
19	46037	So1 Pulse Constant (Read\Write)	This address is used to set desired pulse rate for 1 Kwh of SO1 output. The valid Values are 1,10,100,1000.
20	46039	So1 Pulse Parameters (Read\Write)	This address is used to select parameter for S01 output the valid values in between 1 to 8. refer table 3 for parameters
21	46041	So1 Pulse Width (Read\Write)	This address allows the user to set the pulse duration of S01 output the valid values are 60, 100, 200 in ms.
22	46043	-	-
23	46045	-	-
24	46047	-	-



NOTE : If import export energy formula is selected (ie.46009=1) then for reactive demand and energy import term is representing import values (Q1+Q2) and export term represents export values (Q3+Q4)

If inductive capacitive energy formula is selected (ie.46009=2) then for reactive demand and energy import term is representing inductive values (Q1+Q3) and export term represents capacitive values (Q2+Q4)

Figure 1: Power Quadrant Diagram

4 X register addresses Description for ED11XX models

Parameter No.	Address Register	Parameters	Description
25	46049	-	-
26	46051	-	-
27	46053	Version Number (Read)	This address reads only firmware version of meter.
28	46055	Serial Number Year Date (Read)	This address shows the serial number of meter in Year and Month format
29	46057	Serial Number Data (Read)	-
30	46059	CRC Flash (Read)	-
31	46061	Error bit Address (Read)	This address shows the error bit
32	46063	Show/Hide leading zeros (Read/Write)	This address allow to show/hide leading zeros. Valid values are 0: hide leading zeros of energy counter and 1: show leading zeros of energy counter.

4 X register addresses Description for 1/5A CT & 100mA CT models

Parameter No.	Address Register	Parameters	Description
25	46049	CT Primary (Read)	This address shows the CT Primary value of meter
26	46051	CT Secondary (Read)	This address shows the CT Secondary value of meter
27	46053	-	-
28	46055	-	-
29	46057	-	-
30	46059	-	-
31	46061	-	-
32	46063	-	-
33	46065	Version Number (Read)	This address reads only firmware version of meter
34	46067	Serial Number Year Date (Read)	This address shows the serial number of meter in Year and Month format
35	46069	Serial Number Data (Read)	-
36	46071	CRC Flash (Read)	-
37	46073	Error bit Address (Read)	This address shows the error bit
38	46075	Show/Hide leading zeros (Read)	This address allow to show/hide leading zeros. Valid values are 0: hide leading zeros of energy counter and 1: show leading zeros of energy counter.

TABLE 8 : RS 485 Setup Codes

Baud Rate	Parity	Stop Bit	Parameter No
2400	NONE	1	0
2400	NONE	2	1
2400	EVEN	1	2
2400	ODD	1	3
4800	NONE	1	4
4800	NONE	2	5
4800	EVEN	1	6
4800	ODD	1	7
9600	NONE	1	8
9600	NONE	2	9
9600	EVEN	1	10

TABLE 8 : Continued

Baud Rate	Parity	Stop Bit	Parameter No
9600	ODD	1	11
19200	NONE	1	12
19200	NONE	2	13
19200	EVEN	1	14
19200	ODD	1	15
38400	NONE	1	16
38400	NONE	2	17
38400	EVEN	1	18
38400	ODD	1	19

7.4 User Assignable Modbus Registers

The Multifunction Meter contains the 14 user assignable registers in the address range of (31025) to (31051) (See Table 9).

Any of the parameter addresses (3X register addresses Table 4) accessible in the instrument can be mapped to these 14 user assignable registers.

Parameters (3X registers addresses) that resides in different locations may be accessed by the single request by re-mapping them to adjacent address in the user assignable registers area.

Table 9 : User Assignable 3X & 4X Data Registers

Address (3X)	Address (4X)	Assignable Register	Modbus Start Address (Hex)	
			High Byte	Low Byte
31025	41025	Assignable Register 1	04	00
31027	41027	Assignable Register 2	04	02
31029	41029	Assignable Register 3	04	04
31031	41031	Assignable Register 4	04	06
31033	41033	Assignable Register 5	04	08
31035	41035	Assignable Register 6	04	0A
31037	41037	Assignable Register 7	04	0C
31039	41039	Assignable Register 8	04	0E
31041	41041	Assignable Register 9	04	10
31043	41043	Assignable Register 10	04	12
31045	41045	Assignable Register 11	04	14
31047	41047	Assignable Register 12	04	16
31049	41049	Assignable Register 13	04	18
31051	41051	Assignable Register 14	04	1A

Table 10 : User Assignable mapping register (4X registers)

Address (4X)	Assignable Register	Modbus Start Address (Hex)	
		High Byte	Low Byte
49501	Map Address for Assignable Register 1	25	1C
49502	Map Address for Assignable Register 2	25	1D
49503	Map Address for Assignable Register 3	25	1E
49504	Map Address for Assignable Register 4	25	1F
49505	Map Address for Assignable Register 5	25	20
49506	Map Address for Assignable Register 6	25	21
49507	Map Address for Assignable Register 7	25	22
49508	Map Address for Assignable Register 8	25	23
49509	Map Address for Assignable Register 9	25	24
49510	Map Address for Assignable Register 10	25	25
49511	Map Address for Assignable Register 11	25	26
49512	Map Address for Assignable Register 12	25	27
49513	Map Address for Assignable Register 13	25	28
49514	Map Address for Assignable Register 14	25	29

Example : Assigning parameter to user assignable registers

To access the voltage (3X address (30001) & Current (3X address (30007) through user assignable register assign these addresses to 4x register (Table 10) 251C (49501) & 251D (49502) Respectively.

Assigning Query:

Device Address	01 (Hex)
Function Code	10 (Hex)
Starting Address Hi	25 (Hex)
Starting Address Lo	1C (Hex)
Number of Registers Hi	00 (Hex)*
Number of Registers Lo	02 (Hex)*
Byte Count	04 (Hex)

Data Register-1 High Byte	00 (Hex)
Data Register-1 Low Byte	00 (Hex)
Data Register-2 High Byte	00 (Hex)
Data Register-2 Low Byte	06 (Hex)
CRC Low	D4 (Hex)
CRC High	65 (Hex)

Voltage
(3X Address
30001)
Current
(3X Address
30007)

* Note : Parameters should be assigned in Multiple of two i.e. 2,4,6,8.....14.

Response :

Device Address	01 (Hex)
Function Code	10 (Hex)
Start Address High	25 (Hex)
Start Address Low	1C (Hex)
Number of Registers Hi	00 (Hex)
Number of Registers Lo	02 (Hex)
CRC Low	8B (Hex)
CRC High	02 (Hex)

Reading parameter data through user assignable registers:

In assigning query voltage & Current parameters were assigned to 0000 & 0006 which will point to user assignable 3xregisters 0400 and 0402 (table9). So to read voltage and Current data reading query should be as below.

Query:

Device Address	01 (Hex)
Function Code	04 (Hex)
Start Address High	04 (Hex)
Start Address Low	00 (Hex)
Number of Registers Hi	00 (Hex)
Number of Registers Lo	04 (Hex)
CRC Low	F0 (Hex)
CRC High	F9 (Hex)

Start address high : Most significant 8 bits of starting address of user assignable register.

Start address low :Least significant 8 bits of starting address of user assignable register.

Number of register Hi : Most significant 8 bits of number of registers requested.

Number of register Lo : Least significant 8 bits of number of registers requested.

****Note : Two consecutive 16 bit register represent one parameter.
Since two parameters are requested four registers are required**

Response : (Volt = 230 / Current = 5)

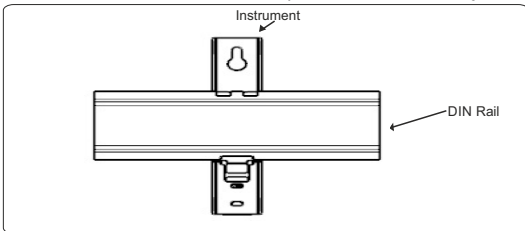
Device Address	01 (Hex)		Voltage Data
Function Code	04 (Hex)		
Byte count	08 (Hex)		
Data Register-1 High Byte	43 (Hex)		
Data Register-1 Low Byte	66 (Hex)	}	Current Data
Data Register-2 High Byte	00 (Hex)		
Data Register-2 Low Byte	00 (Hex)		
Data Register-3 High Byte	40 (Hex)		
Data Register-3 Low Byte	A0 (Hex)		
Data Register-4 High Byte	00 (Hex)		
Data Register-4 Low Byte	00 (Hex)		
CRC Low	73 (Hex)		
CRC High	CC (Hex)		

8. MBUS

For detailed information on the M-Bus communication Protocol, please refer to the M-Bus manual.

9. Installation

The Instrument should be mounted in a reasonably stable ambient temperature and where the operating temperature is within the range defined by the technical specification. Vibration should be kept to a minimum and the product should not be mounted where it will be subjected to excessive direct sunlight.



Caution

1. In the interest of safety and functionality this product must be installed by a qualified engineer, abiding by any local regulations.
2. Voltages dangerous to human life are present at some of the terminal connections of this unit. Ensure that all supplies are de-energised before attempting any connection or disconnection.
3. These products do not have internal fuses therefore external fuses must be used to ensure safety under fault conditions.
4. The installer is responsible for selecting appropriate supply side protection overcurrent device so, it is must to ensure that the maximum current rating and characteristics of that device.

Warning

1. Qualified personnel familiar with applicable codes and regulations must perform the installation.
2. Utilize insulated tools for device installation.
3. Install a fuse, thermal cut-off, or single-pole circuit breaker on the supply line, not on the neutral line.

9.1 EMC Installation Requirements

This product has been designed to meet the certification of the EU directives when installed to a good code of practice for EMC in industrial environments, e.g.

1. Screened output and low signal input leads or have provision for fitting RF suppression components, such as ferrite absorbers, line filters etc., in the event that RF fields cause problems.

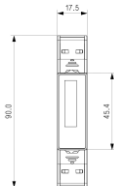
Note : It is good practice to install sensitive electronic instruments that are performing critical functions, in EMC enclosures that protect against electrical interference which could cause a disturbance in function.

2. Avoid routing leads alongside cables and products that are, or could be, a source of interference.

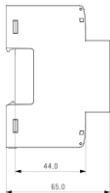
3. To protect the product against permanent damage, surge transients must be limited to 2KV pk. It is good EMC practice to suppress differential surges to 2KV at the source. Theunit has been designed to automatically recover in the event of a high level of transients. In extreme circumstances it may be necessary to temporarily disconnect the auxiliary supply for a period of greater than 5 seconds to restore correct operation.

4. ESD precautions must be taken at all times when handling this product.

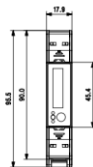
9.2 Case Dimensions



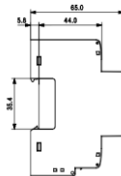
FRONT



SIDE



FRONT



SIDE

For Direct Connection & 1/5A CT Models

For 100mA CT Model

9.3 Name Plate



9.4 Wiring

Input connections are made directly to screw-type terminals with indirect wire pressure. Numbering is clearly marked at the connector location. Choice of cable should meet local regulations.

Note : It is recommended to use **wire with** insulated pin type lug for **connection with meter**.

Wire: It is suggested to use wire with a temperature rating of at least 83 Deg. C

Guidelines:

1. To prevent the risk of electric shock, power supply to the equipment must be Kept OFF while doing the wiring Arrangement.
2. Wiring shall be done strictly according to the terminal layout. Confirm that all connections are correct.
3. Use lugged terminals.
4. To reduce electromagnetic interference use of wires with adequate ratings and twists of the same in equal size shall be made with shortest connections.
5. Layout of connecting cables shall be away from any internal EMI source.
6. Cable used for connection to power source, must have across section of 10 mm²
These wires shall have current carrying capacity of 45A.
7. Copper cable should be used (Stranded or Single core cable).
8. Before attempting work on device, ensure absence of voltages using appropriate voltage detection device.

	ISO 7000-0434B(2004-01)	CAUTION
	ISO 7000-1641	Operating Instructions

For Direct Connected(ED11XX) Model :

Connections	Cable Size	Torque
L-In, L-Out, N	2.5-10 mm ² use insulated pin types lugs	0.5 - 1.2 Nm
B, A, G, M+, M-, SO1+, SO1-, SO2+.	1 - 2.5 mm ² use insulated pin types lugs	0.4 Nm

For CT Connected meters (1/5A CT) Model :

Connections	Cable Size (mm ²)	Torque Nm
L, N, I-In, I-out	1- 2.5 mm ² use insulated pin types lugs	0.4 Nm
B, A, G, M+, M-, SO1+, SO1-, SO2+, SO2-, TARIFF INPUTS.	1 - 2.5 mm ² Stranded with pin types lugs.	0.4 Nm

For RJ-12 CT Meters (100mA CT) Model :

Connections	Cable Size (mm ²)	Torque (Nm)
L,N	1- 2.5 mm ² use insulated pin types lugs	0.4 Nm
B, A, G / M+,M-,SO1+, SO1-, SO2+, SO2-, TARIFF INPUTS.	1 - 2.5 mm ² Standard with pin types lugs.	0.4 Nm

For current use standard RJ12 connector



PIN NUMBER	1, 3, 5	2, 4, 6
CT SIDE	S1	S2

***Note:**

1. Pin number 1, 3, 5 are shorted.
2. Pin number 2, 4, 6 are shorted.

9.5 Auxiliary Supply

The meter is directly connected and therefore does not require an external power source for operation. It derives its power from the signal source

9.6 Fusing

It is recommended to choose fuse of a type and with breaking capacity appropriate to the supply and in accordance with local regulations.

9.7 Sealing

As per the MID standard It is mandatory to seal the meter after complete connections of the meter to avoid tampering.

In the Packing box 2 utility seals for DRR-45-1P & DRR-CT-1P & 3 utility seals for DRR-RJ-1P are provided.

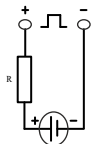
Follow the below procedure for sealing the meter :-

- 1) After all the connections close the upper terminal cover
- 2) In order to lock the terminal cover, press at the center of the terminal cover.
- 3) Now, insert the seal cord through the terminal sealing hole of housing & terminal cover.
- 4) Then insert the cord into the security seal hole and rotate the seal cap 2 to 3 times to lock the cord.
- 5) After sealing the meter brake the seal cap.
- 6) Repeat these steps for the lower terminal cover.
- 7) If the meter is ER11XX another sealing required for RJ12 Connector cover.
- 8) After inserting / connection of the RJ12 CT connector into the meter, push the transparent RJ12 Connector cover cap toward down
- 9) Now, insert the seal cord through both side of the housing hole & transparent RJ12 Connector cover cap.
- 10) Then insert the cord into the security seal hole and rotate the seal cap 2 to 3 times to lock the cord.
- 11) After sealing the meter brake the seal cap.

10. Connection Diagrams

Connection Terminals Detail:

- 1 :Neutral In For Direct Connection & Line For 1/5A CT & 100mA CT model
- 2 :Neutral out For Direct Connection & Neutral for 1/5ACT & 100mA CT model
- 3 :Line In for Direct Connection & Current in for 1/5A
- 4 :Line out for Direct Connection & Current out for 1/5A
- 5,6 :Pulse Output Terminal
- 7,8 :Tariff input Terminal (in Tariff input Model)
- 7,8 :RS485 Terminal (in Modbus Model)
- 7,8 :Mbus Terminal (in MBUS Model)



Supply

SO Connections



Connection Diagram
for Direct Connection model



Connection Diagram
for 1/5A CT model



Connection Diagram
for 100mA CT model

11. Safety Instructions :

Warning :



This indicates potential danger that can lead to death, serious injury, or significant material damage if not followed. Ignoring these instructions can cause death, serious injury, or major material damage.

Caution :



This indicates electric shock risk, which can also result in death, serious injury, or significant material damage. Risk of electric shock. Not taking precautions can result in death, serious injury, or major material damage.

Qualified Personnel:

- Only qualified individuals should install and operate this device.
- Qualified personnel are those with authorization and knowledge of labeling and grounding electrical equipment according to local safety regulations.

Intended Use:

- Use the device only as specified in the catalog and user manual.
- Use only with devices and components.

Proper Handling:

- Ensure proper transport, storage, installation, connection, operation, and maintenance for reliable operation.
- Be aware that parts of the meter may carry dangerous voltages during use.

Safety Precautions:

1. Use insulated tools suitable for the meter's voltages.
2. Do not connect the meter while the circuit is powered.
3. Install the meter in a dry environment within a suitable IP-rated enclosure.
4. Follow local installation codes and regulations.
5. Avoid installing in explosive areas or places with dust, mildew, or insects.
6. Use wires suitable for the meter's maximum current and ensure correct AC wire connections before powering the meter.
7. Do not touch the meter's connection clamps with bare hands or conductive materials to avoid electric shock.
8. Replace protection covers after installation.
9. Maintenance and repairs should only be performed by qualified personnel.
10. Do not break any seals on the meter as it may affect functionality, accuracy, and void the warranty.
11. Handle the meter carefully to avoid damaging internal components.
12. Ensure all clamps are properly tightened and wires fit securely to avoid bad contact and potential sparks.
13. If required clean the device with a microfiber cloth, keeping liquids away from the components.

12. Specification

Input :

Connections:	1 Phase 2 Wire
Nominal Voltage	230 VLN
Operating Voltage Range :	193 - 253 VLN
Power consumption in Voltage Circuit :	< 2 W (10 VA)
Power consumption in Current Circuit	< 1 VA
Nominal Frequency	50 Hz
Operating Frequency Range	49 Hz To 51 Hz

Direct Current (DRR-45-1P) Model :

Starting Current ($I_{st} = 0.04 \cdot I_{tr}$)	20 mA
Minimum Current (I_{min}) ($0.5 \cdot I_{tr}$)	250 mA
Transitional Current (I_{tr})	0.5 A
Nominal Current (I_n) ($10 \cdot I_{tr}$)	5 A
Maximum Current (I_{max}) = ($90 \cdot I_{tr}$)	45A
Operating Current Range	0.25-5(45) A
Short time Over-current	30 $\cdot I_{max}$ for one half-cycle at 50 Hz

1A/5A(DRR-CT-1P) Model :

Starting Current ($I_{st} = 0.04 \cdot I_{tr}$)	2 mA for 1 A / 10 mA for 5 A
Minimum Current (I_{min}) ($0.2 \cdot I_{tr}$)	10 mA for 1A / 50 mA for 5 A
Transitional Current (I_{tr})	50 mA for 1 A / 250 mA for 5 A
Nominal Current (I_n) ($20 \cdot I_{tr}$)	1 A / 5 A
Maximum Current for 1A ($I_{max} = 120 \cdot I_{tr}$)	6 A
for 5A ($I_{max} = 24 \cdot I_{tr}$)	6 A
Operating Current Range	10 mA - 1 A (1.2 A) / 50 mA - 5 A (6 A)
Short time Over-current	20 $\cdot I_{max}$ for 0.5 seconds

RJ12(DRR-RJ-1P) Model :

Starting Current ($I_{st} = 0.04 \cdot I_{tr}$)	0.2 mA
Minimum Current (I_{min}) ($0.2 \cdot I_{tr}$)	1 mA
Transitional Current (I_{tr})	5 mA
Nominal Current (I_n) ($20 \cdot I_{tr}$)	100 mA
Maximum Current (I_{max}) = ($24 \cdot I_{tr}$)	120 mA
Operating Current Range	1 mA - 100 mA (120 mA)
Short time Over-current	20 $\cdot I_{max}$ for 0.5 seconds

Accuracy :

Active Energy (Import/Export)
Reactive Energy (Import/Export)
Apparent Energy
Voltage
Current
Frequency
Active Power
Reactive Power
Apparent Power
Power Factor

Class B as per EN50470-3 : 2022 , Class 1 as per IEC 62053-21
 $\pm 2.0 \%$
 $\pm 1.0 \%$
 $\pm 0.5\%$ of of range max
 $\pm 0.5\%$ of Nominal value
 $\pm 0.2\%$ of Mid frequency
 $\pm 1\%$ of range max
 $\pm 1\%$ of range max
 $\pm 1\%$ of range max
 $\pm 1\%$

Pulse Outputs :

SO1
Contact Ranges
Pulse Duration
Pulse Rate
Impulse Rate

Passive Opto-isolated
5 - 27V DC, 27 mA DC (max)
60 / 100 / 200 millisecond
1 / 10 / 100 / 1000 pulse per kWh
1000 pulse per kWh

Communication Interface :**MODBUS :**

Protocol
Baudrate
Data Width
Parity
Device Address
Response Time

RS485 MODBUS RTU
2.4 / 4.8 / 9.6 / 19.2/38.4 kbps
8
Stop Bits None -1 / None -2/ Even -1 / Odd -1
1- 247
250 millisecond at 9.6 kbps Baudrate

MBUS :

Protocol
Baudrate
Data Width
Parity - Stop Bits
Address

EN13757-3 MBUS
0.3/ 0.6/ 1.2/ 2.4/ 4.8/ 9.6 kbps
8
Even -1
1....250

Display Ranges :

Active Energy
Reactive Energy
Apparent Energy

0.01-99999.99 kWh and Autoranging further
0.01-99999.99 kVARh
0.01-99999.99 kWh

Active Power	0-99999 W
Reactive Power	0-99999 VAR
Apparent Power	0-99999 VA
Tariff Input:	
Low / High	0V / 230V
Installation :	Indoor
Enclosure	IP 51 (Front Side) and IP 20 (Terminals Side) (IEC 60529: 2001) (The device should only be mounted within an external enclosure, such as a meter or switch cabinet. This enclosure must offer a minimum of IP 51 protection and should be situated indoors. Only under these conditions protection against dust and water penetration assured in compliance with the IEC 62052-11.)
Housing	2 Module DIN 43880
Dimensions	17.5 mm X 90 mm X 65 mm (for DRR-45-1P and DRR-CT-1P models), 17.9 mm X 95.5 mm X 65 mm (for DRR-RJ-1P models)
Weight	150 gm
Mounting	35 mm DIN Rail
Safety :	
Safety Standard	According to 62052-31:2015
Installation Category	III
Protective Class	II
High Voltage Test	4 kV AC, 50Hz for 1 minute between all electrical circuits
Impulse Voltage Withstand	6.0 kV (1.2 microsecond waveform)
Pollution Degree	2
Housing Flame Resistance	Flammability Class V-0 acc. to UL 94, Self Extinguishing, Non Dripping, free of Halogen
Environmental Conditions :	
Mechanical Environment	M1
Electromagnetic Environment	E2
Operating Temperature	-25°C to +55°C
Storage/Transport Temperature	-40°C to +70°C
Relative Humidity	0... 95% (Non Condensing)
Shock	Half sine wave, peak acceleration 30g _n (300 m/s ²), pulse duration 18msec
Vibration	10...150Hz f<8 Hz 0.075mm constant amplitude, f>60Hz 1g _n constant acceleration, 10 sweep cycles per axis <2000 m max
Altitude	



Refer to manual



Danger of electric shock



Do not discard

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