

# Interface Definition

## DIN Rail Single Channel DC Energy Meter DC2111 Mod



# DIGITAL MULTIFUNCTION INSTRUMENT

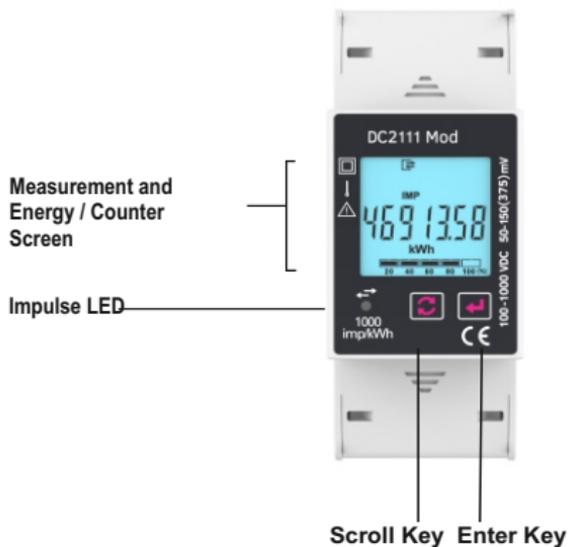
## Programmable Multi-function DC Energy Meter

### Installation & Operating Instructions

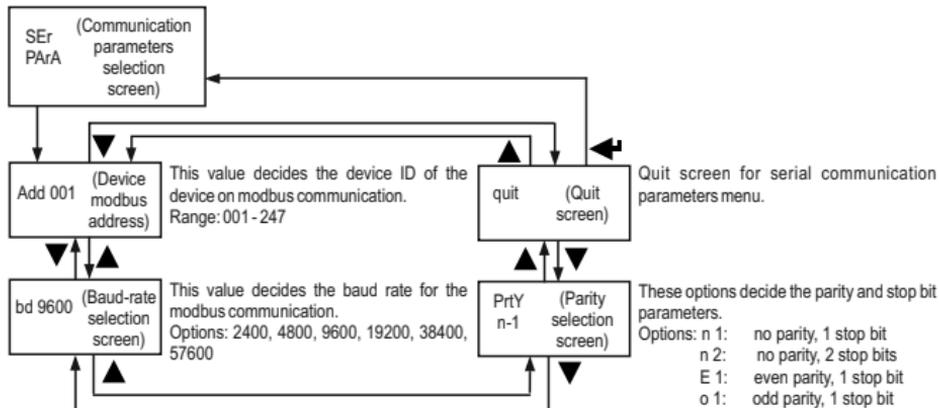
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## 1. Introduction

DC2111 is a DIN Rail mounted modern Single channel DC Energy Meter with bidirectional measurement, designed for EV charging station, telecommunications base stations, solar photovoltaic, and other applications of DC Energy Metering. It also accurately measures important electrical parameters like Voltage, Current, Power, Energy, Amper hours. The meter is engineered using advanced micro controller technology and is suitable for electrical parameter measurement and monitoring. It supports the input voltage range from 5-1000V and measures about 2000A maximum current through external shunt register of output 50-150mv. It displays parameters on bright intuitive LCD and also has Pulse Outputs and Impulse LED for energy monitoring. It has an inbuilt industry standard MODBUS RTU for remote monitoring.



## 2. Communication Parameter Selection Screen



The parameter values set here are only applicable for modbus communication.

### Parameter Editing Guide

Use these points to change any value in setup screens.

- 1) Use key to enter editing mode. A blinking decimal point will be displayed as cursor.
- 2) Use key to change the digit values.
- 3) Use key to go to the next cursor position.
- 4) Use key to confirm the value and finish editing.
- 5) Pressing key enter the "Quit" serial parameter screen.
- 6) If user inputs values out of the limits specified, they are brought to the limit values automatically by the meter and showed at value confirmation.

### 3. RS 485 ( ModBus ) Output :

The Multifunction DC 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. The screens should also be connected to the "Gnd" terminal. To avoid the possibility of loop currents, an Earth connection should be made at one point on the network. 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. The maximum latency time of an Meter is 200ms i.e. this is the amount of time that can pass before the first response character is output.

After sending any query through software (of the Master), it must allow 200ms of time to elapse before assuming that the Meter is not going to respond. If slave does not respond within 200 ms, Master can ignore the previous query and can issue fresh query to the slave.

The 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
<b>Format of Data Bytes</b>	4 bytes (32 bits) per parameter. Floating point format ( to IEEE 754) Most significant byte first (Alternative least significant byte first)
<b>Error Checking Bytes</b>	2 byte Cyclical Redundancy Check (CRC)
<b>Byte format</b>	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

Baud Rate is user selectable from the front panel between 4800, 9600, 19200, 38400 & 57600 bps.

**Function code :**

03	Read Holding Registers	Read content of read / write location ( 4X )
04	Read input Registers	Read content of read only location ( 3X )
16	Presets Multiple 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

### 3.1 Accessing 3X and 4X register for reading measured values:

Two consecutive 16 bit registers represent one parameter. Refer **TABLE 1** 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 04 and 03 are used to access all parameters in 3X and 4X registers respectively.

**Example :**

To read parameter,

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

Power from 4X: Start address= 10 04 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)	02(Hex)	00 (Hex)	02(Hex)	30 (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

**3X Response: Current Ch2 (219.254 A)**

01 (Hex)	04 (Hex)	04 (Hex)	43 (Hex)	5B (Hex)	41 (Hex)	21 (Hex)	6F (Hex)	9B (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)	10 (Hex)	04(Hex)	00 (Hex)	02(Hex)	E0 (Hex)	C9 (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: Power Ch1 (2000 W)**

01 (Hex)	03 (Hex)	04 (Hex)	44 (Hex)	FA (Hex)	00 (Hex)	00 (Hex)	CE (Hex)	F2 (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

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 1 : 3X and 4X register addresses for measured parameters**

Address (3X)	Address (4X)	Parameter Number	Parameter	Hex Address		Hex Address	
				High Byte	Low Byte	High Byte	Low Byte
30001	44097	0	Voltage	00	00	10	00
30003	44099	1	Current	00	02	10	02
30005	44101	2	Power	00	04	10	04
30007	44103	3	Import Energy	00	06	10	06
30009	44105	4	Import Energy OF	00	08	10	08
30011	44107	5	Export Energy	00	0A	10	0A
30013	44109	6	Export Energy OF	00	0C	10	0C
30015	44111	7	Import Ampere Hour	00	0E	10	0E
30017	44113	8	Import Ampere Hour OF	00	10	10	10
30019	44115	9	Export Ampere Hour	00	12	10	12
30021	44117	10	Export Ampere Hour OF	00	14	10	14
30023	44119	11	Import Power Demand	00	16	10	16
30025	44121	12	Export Power Demand	00	18	10	18
30027	44123	13	Import Current Demand	00	1A	10	1A
30029	44125	14	Export Current Demand	00	1C	10	1C
30031	44127	15	Max Voltage	00	1E	10	1E
30033	44129	16	Min Voltage	00	20	10	20
30035	44131	17	Max Current	00	22	10	22
30037	44133	18	Min Current	00	24	10	24
30039	44135	19	Max Import Power Demand	00	26	10	26
30041	44137	20	Max Export Power Demand	00	28	10	28
30043	44139	21	Max Import Current Demand	00	2A	10	2A
30045	44141	22	Max Export Current Demand	00	2C	10	2C
30047	44143	23	Import Energy on update rate	00	2E	10	2E
30049	44145	24	Import Energy on update rate OF	00	30	10	30
30051	44147	25	Export Energy on update rate	00	32	10	32
30053	44149	26	Export Energy on update rate OF	00	34	10	34
30055	44151	27	On Hour	00	36	10	36
30057	44153	28	Run Hour	00	38	10	38
30059	44155	29	No. of Interruptions	00	3A	10	3A

30061	44157	30	Partial Import Energy	00	3C	10	3C
30063	44159	31	Partial Import Energy OF	00	3E	10	3E
30065	44161	32	Partial Export Energy	00	40	10	40
30067	44163	33	Partial Export Energy OF	00	42	10	42
30069	44165	34	Partial Import Ampere Hour	00	44	10	44
30071	44167	35	Partial Import Ampere Hour OF	00	46	10	46
30073	44169	36	Partial Export Ampere Hour	00	48	10	48
30075	44171	37	Partial Export Ampere Hour OF	00	4A	10	4A
30077	44173	38	Max Power	00	4C	10	4C
30079	44175	39	Min Power	00	4E	10	4E
30081	44177	40	Total energy	00	50	10	50
30083	44179	41	Total energy OF	00	52	10	52
30085	44181	42	-	00	54	10	54
30087	44183	43	-	00	56	10	56
30089	44185	44	Total Ampere Hour	00	58	10	58
30091	44187	45	Total Ampere Hour OF	00	5A	10	5A
30093	44189	46	-	00	5C	10	5C
30095	44191	47	-	00	5E	10	5E
30097	44193	48	Partial Total energy	00	60	10	60
30099	44195	49	Partial Total energy OF	00	62	10	62
30101	44197	50	-	00	64	10	64
30103	44199	51	-	00	66	10	66
30105	44201	52	Partial Total Ampere Hour	00	68	10	68
30107	44203	53	Partial Total Ampere Hour OF	00	6A	10	6A

**TABLE 2 : 3X and 4X register addresses for 32-bit Integer Energy**

Address (3X)	Address (4X)	Parameter number	Parameter	Hex Address		Hex Address	
				High Byte	Low Byte	High Byte	Low Byte
30769	44865	0	Import Energy	03	00	13	00
30771	44867	1	Import Energy OF	03	02	13	02
30773	44869	2	Export Energy	03	04	13	04
30775	44871	3	Export Energy OF	03	06	13	06
30777	44873	4	Import Energy on update rate*	03	08	13	08
30779	44875	5	Import Energy on update rate OF*	03	0A	13	0A
30781	44877	6	Export Energy on update rate*	03	0C	13	0C
30783	44879	7	Export Energy on update rate OF*	03	0E	13	0E
30785	44881	8	Import Ampere Hour	03	10	13	10
30787	44883	9	Import Ampere Hour OF	03	12	13	12
30789	44885	10	Export Ampere Hour	03	14	13	14
30791	44887	11	Export Ampere Hour OF	03	16	13	16
30793	44889	12	-	03	18	13	18
30795	44891	13	-	03	1A	13	1A
30797	44893	14	Partial Import Energy	03	1C	13	1C
30799	44895	15	Partial Import Energy OF	03	1E	13	1E
30801	44897	16	Partial Export Energy	03	20	13	20
30803	44899	17	Partial Export Energy OF	03	22	13	22
30805	44901	18	Partial Import Ampere Hour	03	24	13	24
30807	44903	19	Partial Import Ampere Hour OF	03	26	13	26
30809	44905	20	Partial Export Ampere Hour	03	28	13	28
30811	44907	21	Partial Export Ampere Hour OF	03	2A	13	2A
30813	44909	22	Total Energy	03	2C	13	2C
30815	44911	23	Total Energy OF	03	2E	13	2E
30817	44913	24	Total Ampere Hour	03	30	13	30
30819	44915	25	Total Ampere Hour OF	03	32	13	32
30821	44917	26	Partial Total Energy	03	34	13	34
30823	44919	27	Partial Total Energy OF	03	36	13	36
30825	44921	28	Partial Total Ampere Hour	03	38	13	38
30827	44923	29	Partial Total Ampere Hour OF	03	3A	13	3A

### 3.2 Accessing 4 X register for Reading & Writing Settings:

Each setting is held in the 4X registers. ModBus code 03 is used to read the current setting & code 16 is used to write/change the setting. Refer **TABLE 3** for 4X Register addresses.

#### Example: Reading Nominal Voltage

**Nominal Voltage:** Start address = 1A (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	00 (Hex)
Start Address Low	1A (Hex)
Number of Registers High	00 (Hex)
Number of Registers Low	02 (Hex)
CRC Low	E5 (Hex)
CRC High	CC (Hex)

#### Response (Nominal voltage 24V):

Device Address	01 (Hex)
Function Code	03 (Hex)
Byte Count	04 (Hex)
Data Register1 High Byte	41 (Hex)
Data Register1 Low Byte	C0 (Hex)
Data Register2 High Byte	00 (Hex)
Data Register2 Low Byte	00(Hex)
CRC Low	44 (Hex)
CRC High	C6 (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.

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 Nominal Voltage

Nominal Voltage: Start address = 1A (Hex)      Number of registers = 02

### Query:(Change Nominal Voltage to 48 V )

Device Address	01 (Hex)
Function Code	10 (Hex)
Starting Address Hi	00 (Hex)
Starting Address Lo	1A(Hex)
Number of Registers Hi	00 (Hex)
Number of Registers Lo	02(Hex)
Byte Count	04 (Hex)
Data Register-1High Byte	42 (Hex)
Data Register-1 Low Byte	40(Hex)
Data Register-2 High Byte	00(Hex)
Data Register-2 Low Byte	00(Hex)
CRC Low	67 (Hex)
CRC High	70 (Hex)

### Response:

Device Address	01 (Hex)
Function Code	10 (Hex)
Start Address High	00 (Hex)
Start Address Low	1A(Hex)
Number of Registers Hi	00 (Hex)
Number of Registers Lo	02(Hex)
CRC Low	60 (Hex)
CRC High	0F (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.

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

StartAddress 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.

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

**TABLE 3 : 4X register addresses**

Address (Register)	Parameter No.	Parameter	Read/ Write	Modbus Start Addr. Hex		Default Value
				High Byte	Low Byte	
40003	1	Demand Period	R/Wp	00	02	1
40005	2	Reset parameters	R/Wp	00	04	0
40007	3	RS485 Setup Code	R/Wp	00	06	4
40009	4	Modbus address	R/Wp	00	08	1
40027	5	Nominal Voltage	R/Wp	00	16	1000
40029	6	-	R/Wp	00	18	0
40033	7	Current - Full Scale	R/Wp	00	1C	5
40041	8	Current - Shunt	R/Wp	00	24	75
40051	9	Backlit	R/Wp	00	2E	0
40053	10	Energy update rate	R/Wp	00	30	2
40061	11	Energy Output	R/Wp	00	38	1
40069	12	Noise Current Cutoff	R/Wp	00	40	0
40073	13	-	R/Wp	00	44	0
40075	14	Auto Scroll	R/Wp	00	46	0
40077	15	Reverse Lock	R/Wp	00	48	0
40085	16	-	R/Wp	00	50	8
40093	17	Factory Reset	R/Wp	00	58	0
40095	18	Password	R/Wp	00	5A	0
40097	19	Serial Number	R/Wp	00	5C	-
40099	20	Model Number	R/Wp	00	5E	6000
40101	21	Version Number	R/Wp	00	60	-
40103	22	-	R/Wp	00	62	0
40125	23	Pulse Constant	R/Wp	00	64	1
40133	24	Pulse Width	R/Wp	00	66	100
40221	25	Pulse parameters	R/Wp	00	68	1

**TABLE 4: Explanation for 4X register:**

Note: Writing any invalid values (non-applicable values) to any of the following locations will result in modbus error.

Address	Parameter	Description
40003	Demand Integration Time	Demand integration time represents demand time in minutes. The applicable values are as follows : 5,10,15,30 & 60 minutes.
40005	Reset parameters	This address is used to reset different parameters. Write specific value to this register to reset the corresponding parameter. Refer Table 5.
40007	RS485 Setup Code	This address is used to set the baud rate, Parity, Number of stop bits. Refer Table 6.
40009	Modbus address	This value is used to read and write device address of the device. Valid values are 1-247.
40027	Nominal Voltage	This address is used to read and write nominal voltage of the system. Valid values range is 100-1000 V
40029	-	-
40033	Current - Full Scale	This address is used to read and write full scale current values in ampere. Valid value range is 5-2000 A.
40041	Current - Shunt	This address is used to read and write the shunt voltage drop for full scale current in millivolts. Valid value range is 50-150 mV
40051	Backlit	This address used to read and write the backlit On/ Off. Write one of the following values to the address. 1 : ON    2 : OFF    3 : Act
40053	Energy update rate	This address is used to specify update rate of energy in corresponding 3X registers. The valid values for update rate are from 1 to 60 min.
40061	Energy Output	This address is used to set energy output in Wh, kWh & MWh. Write one of the following value to this address. 1: Energy in Wh (only valid when nominal power is less than 60kW) 2: Energy in KWh 3: Energy in MWh

Address	Parameter	Description
40069	Noise Current Cutoff	This address is used to activate or de-activate the noise current elimination. Noise current is in percentage of nominal current. Valid values 0-30. 0: deactivate 1-30: noise current is cut off below this percent of nominal current.
40073	-	
40075	Auto Scroll	This address is used to activate or de-activate the auto scrolling. 0: No, 10, 20, 30 seconds.
40077	Reverse Lock	This address is used to read and write the reverse locking parameter. Reverse locking is when the current or power is in the opposite direction of the desired direction, the energy and ampere-hour accumulation is stopped. Valid values are: 0: No reverse locking 1: Positive/ Import locking 2: Negative/ Export locking
40085	-	-
40093	Factory Reset	This address allows the user to reset the instrument to factory settings. Refer the Default Values in Table 3 for factory settings. Write 100 at this address to reset the instrument.
40095	Password	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 absent & if this location is read it will return one. 3) If password lock is present & to disable this lock first send valid password to this location then write "0000" to this location. 4) If password lock is present & to modify 4X parameter first send valid password to this location so that 4X parameter will be accessible for modification. 5) If in any of the above case invalid password is sent then meter will return exceptional error 2.
40097	Serial Number	This address is read only and displays the serial number of the meter.

Address	Parameter	Description
40099	Model Number	This address is read only and displays the Model number of the meter.
40101	Firmware Version Number	This address is read only and displays the firmware version of the meter.
40125	Pulse Constant	This address is used to set pulse constant of the pulse output.
40133	Pulse Width for pulse output	This address is used to set pulse width of the Pulse output. Write one of the following values to this address: 60 : 60 ms 100 : 100 ms 200 : 200 ms
40221	Pulse Parameter	This address is used to set parameters of the SO output. The following parameters will be write on this address: IMP KWH - Import Energy EXP KWH - Export Energy TOT KWH - Total energy

**TABLE 5: Reset Parameters**

Para No / Code	Parameter
0	None
1	All
2	Run Hour & On Hour
3	No of Interrupts
4	High V & A
5	Low V & A
6	Energy
7	Demand
8	AH

**TABLE 6: Communication Parameters**

Baud Rate	Parity	Stop bit	Decimal Value
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
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
57600	NONE	1	20
57600	NONE	2	21
57600	EVEN	1	22
57600	ODD	1	23

**TABLE 8: For energy output in Wh**

Pulse Rate		
Divisor	Pulse	Channel Power
1	1per Whr	Up to 3600W
	1per kWhr	Up to 60kW
10	1per 10Whr	Up to 3600W
	1per 10kWhr	Up to 60kW
100	1per 100Whr	Up to 3600W
	1per 100kWhr	Up to 60kW
1000	1per 1000Whr	Up to 3600W
	1per 1000kWhr	Up to 60kW

**For energy output in kWh**

Pulse Rate		
Divisor	Pulse	Channel Power
1	1per kWhr	Up to 3600kW
	1per MWhr	above 3600kW

**For energy output in MWh**

Pulse Rate	
Divisor	Pulse
1	1per MWhr

**TABLE 10: Parameter for Pulse Output**

Code	Configuration
0	Import Energy
1	Export Energy
2	Total Energy

**TABLE 15 : Measurement Screens**

Screen No.	Screen Name
1	Total Energy
2	Total energy OF
3	Import Energy
4	Import Energy OF
5	Export Energy
6	Export Energy OF
7	Partial Total Energy
8	Partial Total Energy OF
9	Partial Import Energy
10	Partial Import Energy OF
11	Partial Export Energy
12	Partial Export Energy OF
13	Voltage
14	Current
15	Power
16	Total Ampere Hour
17	Total Ampere Hour OF
18	Import Ampere Hour
19	Import Ampere Hour OF
20	Export Ampere Hour
21	Export Ampere Hour OF
22	Partial Total Ampere Hour
23	Partial Total Ampere Hour OF
24	Partial Import Amp Hour
25	Partial Import Amp Hour OF
26	Partial Export Amp Hour
27	Partial Export Amp Hour OF
28	Import Power Demand
29	Export Power Demand
30	Import Max Power Demand

Screen No.	Screen Name
31	Export Max Power Demand
32	Import Max Current Demand
33	Export Max Current Demand
34	Import Current Demand
35	Export Current Demand
36	Max Current
37	Min Current
38	Max Voltage
39	Min Voltage
40	On - hrs
41	Run - hrs
42	No of interruptions

### 3.3 User Assignable Modbus Registers:

The Multifunction Energy Meter contains 20 user assignable registers in the address range of 0x200 (30513) to 0x226 (30551) for 3X registers (see TABLE 16) and address range of 0x1E00 (47681) to 0x1E26 (47719) for 4X registers (see TABLE 17).

Any of the parameter addresses (3X register addresses and 4X register addresses TABLE 1) accessible in the instrument can be mapped to these 20 user assignable registers.

Parameters (3X and 4X registers addresses) that reside in different locations may be accessed by the single request by re-mapping them to adjacent address in the user assignable registers area.

The actual address of the parameters (3X and 4X registers addresses) which are to be accessed via address 0x200 to 0x226 (or 0x1E00 to 0x1E26) are specified in 4X Register 0x200 to 0x213. (see TABLE 18)

**TABLE 16 : User Assignable 3X Data Registers**

Address (Register)	Assignable Register	Modbus Start Address (Hex)	
		High Byte	Low Byte
30513	Assignable Reg 1	02	00
30515	Assignable Reg 2	02	02
30517	Assignable Reg 3	02	04
30519	Assignable Reg 4	02	06
30521	Assignable Reg 5	02	08
30523	Assignable Reg 6	02	0A
30525	Assignable Reg 7	02	0C
30527	Assignable Reg 8	02	0E
30529	Assignable Reg 9	02	10
30531	Assignable Reg 10	02	12
30533	Assignable Reg 11	02	14
30535	Assignable Reg 12	02	16
30537	Assignable Reg 13	02	18
30539	Assignable Reg 14	02	1A

**TABLE 16 : Continued...**

30541	Assignable Reg 15	02	1C
30543	Assignable Reg 16	02	1E
30545	Assignable Reg 17	02	20
30547	Assignable Reg 18	02	22
30549	Assignable Reg 19	02	24
30551	Assignable Reg 20	02	26

**TABLE 17 : User Assignable 4X Data Registers**

Address (Register)	Assignable Register	Modbus Start Address (Hex)	
		High Byte	Low Byte
47681	Assignable Reg 1	1E	00
47683	Assignable Reg 2	1E	02
47685	Assignable Reg 3	1E	04
47687	Assignable Reg 4	1E	06
47689	Assignable Reg 5	1E	08
47691	Assignable Reg 6	1E	0A
47693	Assignable Reg 7	1E	0C
47695	Assignable Reg 8	1E	0E
47697	Assignable Reg 9	1E	10
47699	Assignable Reg 10	1E	12
47701	Assignable Reg 11	1E	14
47703	Assignable Reg 12	1E	16
47705	Assignable Reg 13	1E	18
47707	Assignable Reg 14	1E	1A
47709	Assignable Reg 15	1E	1C
47711	Assignable Reg 16	1E	1E
47713	Assignable Reg 17	1E	20

**TABLE 17 : Continued...**

Address (Register)	Assignable Register	Modbus Start Address (Hex)	
		High Byte	Low Byte
47715	Assignable Reg 18	1E	22
47717	Assignable Reg 19	1E	24
47719	Assignable Reg 20	1E	26

**TABLE 18 : User Assignable mapping register ( 4X registers)**

Address (Register)	Mapping Register	Modbus Start Address (Hex)	
		High Byte	Low Byte
40513	Mapped Add for register #0x0200	02	00
40514	Mapped Add for register #0x0202	02	01
40515	Mapped Add for register #0x0204	02	02
40516	Mapped Add for register #0x0206	02	03
40517	Mapped Add for register #0x0208	02	04
40518	Mapped Add for register #0x020A	02	05
40519	Mapped Add for register #0x020C	02	06
40520	Mapped Add for register #0x020E	02	07
40521	Mapped Add for register #0x0210	02	08
40522	Mapped Add for register #0x0212	02	09
40523	Mapped Add for register #0x0214	02	0A
40524	Mapped Add for register #0x0216	02	0B
40525	Mapped Add for register #0x0218	02	0C
40526	Mapped Add for register #0x021A	02	0D
40527	Mapped Add for register #0x021C	02	0E
40528	Mapped Add for register #0x021E	02	0F
40529	Mapped Add for register #0x0220	02	10
40530	Mapped Add for register #0x0222	02	11
40531	Mapped Add for register #0x0224	02	12
40532	Mapped Add for register #0x0226	02	13

## Assigning parameter to User Assignable Registers

To access the Current (3X address 0x0002) and Power (3X address 0x0004) through user assignable register assign these addresses to 4x register (TABLE 18) 0x0200 and 0x0201 respectively.

### Assigning Query:

Device Address	01 (Hex)	
Function Code	10 (Hex)	
Starting Address Hi	02 (Hex)	
Starting Address Lo	00 (Hex)	
Number of Registers Hi	00 (Hex)*	
Number of Registers Lo	02(Hex)*	
Byte Count	04 (Hex)	
Data Register-1High Byte	00 (Hex)	} Current (3X Address 0x0002)
Data Register-1 Low Byte	02 (Hex)	
Data Register-2 High Byte	00 (Hex)	} Power (3X Address 0x0004)
Data Register-2 Low Byte	04 (Hex)	
CRC Low	CA (Hex)	
CRC High	CB (Hex)	

\* Note : Parameters should be assigned in Multiple of two i.e. 2,4,6,8.....20.

### Response :

Device Address	01 (Hex)
Function Code	10 (Hex)
Start Address High	02 (Hex)
Start Address Low	00 (Hex)
Number of Registers Hi	00 (Hex)
Number of Registers Lo	02 (Hex)
CRC Low	40 (Hex)
CRC High	70 (Hex)

## Reading Parameter data through User

### Assignable Registers:

In assigning query Current & Power parameters were assigned to 0x200 & 0x201 (TABLE 18) which will point to user assignable 3x registers 0x200 and 0x202 (TABLE 16). So to read Current and Power data reading query should be as below.

### Query:

Device Address	01 (Hex)
Function Code	04 (Hex)
Start Address High	02 (Hex)
Start Address Low	00 (Hex)
Number of Registers Hi	00 (Hex)
Number of Registers Lo	04 (Hex)**
CRC Low	F0 (Hex)
CRC High	71 (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.

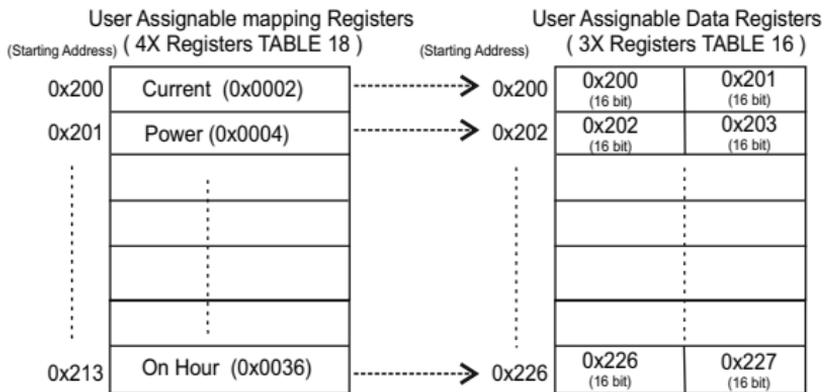
Number of register Hi : Most significant 8 bits of Number of registers requested.

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 : (Current = 1.2A / Power = 1.0 W)

Device Address	01 (Hex)	
Function Code	04 (Hex)	
Byte count	08 (Hex)	
Data Register-1 High Byte	3F (Hex)	} Current
Data Register-1 Low Byte	99 (Hex)	
Data Register-2 High Byte	99 (Hex)	
Data Register-2 Low Byte	9A (Hex)	
Data Register-3 High Byte	3F (Hex)	} Power
Data Register-3 Low Byte	80 (Hex)	
Data Register-4 High Byte	00 (Hex)	
Data Register-4 Low Byte	00 (Hex)	
CRC Low	79 (Hex)	
CRC High	3F (Hex)	



**To get the data through User Assignable Register go through the following steps:**

- 1) Assign starting addresses(TABLE 1) of parameters of interest to "User assignable mapping registers" in a sequence in which they are to be accessed (see section "**Assigning Parameter to User Assignable Registers**").
- 2) Once the parameters are mapped, data can be acquired by using "User assignable data register" Starting address i.e. to access data of Current, Power & On Hour send query with starting address 0x200 with number of register 8 or individually parameters can be accessed.  
(See section **Reading Parameter data through User Assignable Registers**).

## NOTE

The Information contained in these installation instructions is for use only by installers trained to make electrical power installations and is intended to describe the correct method of installation for this product. However, 'manufacturer' has no control over the field conditions which influence product installation.

It is the user's responsibility to determine the suitability of the installation method in the user's field conditions. 'manufacturer' only obligations are responsibility to determine the suitability of the installation method in the user's field conditions. 'manufacturer' only obligations are those in 'manufacturer' standard Conditions of Sale for this product and in no case will 'manufacturer' be liable for any other incidental, indirect or consequential damages arising from the use or misuse of the products.



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