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DUAL SOURCE METER

1. General Features

ICD Dual Source Meter EM 9024 is designed with latest state of art technolgy. It offers high accuracy, reliability and also real value for money. This next generation micro controller based instruments monitors over 25 vital parameters and does not require any external Transducers. This instrument is most suitable for measuring all electrical parameters in 3 phase industrial applications.

The measured informations are shown on a 2 row 16 character LCD display with backlit. Four keys are provided on the front panel of the meter to access these information easily and quickly. The front panel is provided with antiglare feature for improved readability.

The measurement parameters include Kw and kWh (EB & DG). All Power and energy readings are true R.M.S including harmonics. The power and energy measurement is done for the full four quadrants. The energy reading is provided with reverse lock, showing only the imported energy consumed by the consumer. The meter computes all the parameters and updates them in every 2 seconds.

The Dual Source Meter EM 9024 is also provided with a optional RS 485 optically isolated communication port supporting MOD BUS RTU protocol. The port is very useful in networking the meters in multidrop communication and to collect datas in a centralised control room using any standard SCADA Software package like cimplicity, intellution, wonderware & citech etc.

2. Installation

2.1. Mounting

The Dual Source Meter is housed in a compact ABS plastic enclosure of dimension 96(H)x96(W)x120(D)mm. The meter is suitable for panel mounting and has reliable mounting clamps to hold the meter to the panel.

The panel cut out for fixing the meter is a 92 x 92 mm. The depth behind the panel is 120 mm. Always provide extra space for the connectors and wiring. The panel cut out should be punched with probes tool and should be free from burrs. Instant the meter through panel cutout from front and fix the mounting clamps provided with the meter on each side. Tighten the fixing clamps with limit amount of force so as to hold the meter in position.

2.2. Wiring

2.2.1 Selection of PT & CT

The measurement of voltage and current is done using the PT voltage and CT current inputs. So the accuracy of measurement is determined by the accuracy and phase shift produced by the PT's and CT's so it is recommended to use PT's and CT's of instrument class 0.5 or better.

Also the PT's and CT's should have adequate VA rating to support the burden on the secondary side of them. The primary rating of the CT has to be selected such that the load variation lies between the dynamic range of the CT. (30% to 80% of the primary current).

2.2.2 Voltage signal connections

The EM 9024 directly accepts voltages upto 415VAC R.M.S line to line (240VAC R.M.S line to neutral) with 10% over load capacity in case of LT meters and 110VAC R.M.S line to line (63.5 VAC R.M.S line to Neutral) with 10% over load capacity in case of HT meters. The primary of the PT is field programmable upto 330 kV.

There are four voltage input terminals marked as R, Y, B & N. The three phase input voltage should be connected to those terminals. EM 9024R voltage input burden : 0.1VA per phase

2.2.3 Current signal connections

The EM 9024 current inputs can accept 5A AC R.M.S for connecting external CT's as standard. The EM 9024 can also be provided with 1A AC R.M.S current Inputs, in case the available CT in the field has 1A secondary. But it has to be specified while ordering. The CT Secondary value is not field programmable. In both the cases, the current inputs has over load capability of 120%.

There are three pairs of terminals marked as IR (M,L) IY (M,L) and IB (M,L) for the connection of external CT's. For proper measurements, the polarity of the CT's must be connected properly. The CT wiring must be properly done by deenergising the CT secondary by shorting it through a shorting block. The primary current of CT is field programmable upto 10000A.

EM 9024 Current input burden : 0.1VA per phase





3.4) Auxiliary power supply connections

The Indicator EM 9024 derives auxiliary power from the voltage input terminals as standard. If the burden of the PT is not sufficient in the case of HT meters auxiliary power supply of 110/240VAC can be provided seperately. But it has to be specified at the time of ordering.

In that case, seperate terminals will be provided for auxiliary supply. The auxiliary supply should be connected to proper specified voltage.

Burden on Auxiliary supply terminals : 4VA

3.5) Cross checking the wiring

The three phase voltage wiring and current wiring are to be properly done for correct measurements. Any wrong connections done either during installation or during rewiring can produce wrong measurement of electrical parameters. These incorrect wirings are difficult to detect since they produce wrong readings close to the expected readings.

4. Front Panel Features



The LCD Display is a 2 row 16 character Alpha numeric display with backlit. The LCD Display is used to display kW, kWh and program mode settings. The LCD backlit is switched off when no key is pressed for 3 minutes to save power and to enhance the life of LCD. The LCD backlit is switched ON, when any key is pressed.

The TxD and RxD LED's are provided to Indicate the activity in the communication port. The RxD LED flashes, whenever the data is received through communication port and the TxD LED flashes when data is transmitted from Dual Source Meter. These LED's are not provided in the meters without communication port. Calibration pulse output is provided through 3mm RED LED in front panel. Meter constant is 3200 impulse/kWh. The front panel is also provided with 4 keys. The key descriptions are given below. The keys are used to select the respective parameters in the normal operating mode and to configure various items in the program mode.

Keys	Program mode	Normal operating mode
# SCRL/HLD	Index key (To select Menus)	SCRL/HLD (To switch between Scroll/Hold mode)
	Shift Key (To move between characters & to select parameters)	To increment Display pages
	Increment Key (To increment the selected digit & to select parameters)	To decrement Display pages
	Enter Key (To store the modifications & datas)	More Key (To view further sub pages)

5. Programming Instructions

All meters are to be programmed properly to work in a particular Installation. The various items that are to be programmed are shown in the table below.

Configuration Item	Dual Source Meter
New pass word	All meters
Primary Voltage	In HT meters only
Primary Current	In All meters
Device Id	Meters with Communication Interface only
kWh & Run Hour reset	All meters

The Dual Source Meters are provided with password facility to prevent alteration of configuration items by unauthorised persons. The configuration Items of the meter may be changed by following the sequence given below.

With power applied to the meter hold in the shift and Incr keys together for 3 seconds. The display Indicates enter password

PROG PASS	W	0	R	D
<i>I</i>	1	1	1	

The valid password set in the configuration item, new password has to be entered by using Shift, Incr and enter keys (Refer changing the configuration items for using Shift, Incr and Enter keys). After valid password is entered the meter enters into program mode by showing it in display.

PROGRAM MODE

Special Note :

If the user enters the 'Enter pass word' for the first time, or if the user fails to remember the password entered in 'New pass word', the default password **0386** can be entered.



5.1 Changing the configuration Items

In program mode, after selecting the configuration item through Index key, It can be altered by using shift, Increment & Enter key.

The shift () key is used to select the digit one by one. The selected digit is shown by flashing that digit.

The Increment (\blacktriangle) key is used to increment the selected digit. The increment key Increments the digit from 0 to 9 and then wraps down to zero once again.

Once the required values are set in the configuration items press the Enter \dashv key to store it in memory. If the change is accepted the display Indicates 'E' otherwise an error message is displayed as 'Error'.

Once the configuration Items are programmed hold in the

& **A** keys together for 3 seconds to return back to normal operating mode.





Communication Port Details

The EM 9024 is provided with a optically Isolated RS 485 communication Port, which is an optional Feature and has to be specified Bat the time of ordering. The communication protocolused is MODBUS -RTU or MODBUS-ASCII (to be specified while ordering). Using the communication Port, the meters can be connected in multi drop network and data can be collected in a centralised control room using any standard SCADA Software.

The communication between the PC and the instrument would be in Master slave mode. P.C acts as a master and sends a command message (query) containing the slave Id, function code and address of the information required. The command is received by all the slaves. The slave whose address is matching with that of the command address would respond with the requested data.

MEASURED QUANTITIES:

Parameters shown

- 1. Total Kw,PF & Frequency
- 2. KWh EB & DG
- 3. Run hours of EB & DG
 - 4. Line voltage ,phase voltage & current

Instrument name	: Du	al source mete	r	
Starting address	 : 400001 : 24 : UNIT : MODBUS RTU : 9600 			
No.of elements				
Data Type				
Cummunication Type				
Baud Rate				
SL.NO. PARAMETERS	RES	ELEMENTS	ELMNT.NO.	
1 R-Voltage	0.01	1	1	
2 Y-Voltage	0.01	1	2	
3 B-Voltage		1	3	
4 KY-Voltage	U.UI	1	4	
5 YB-Voltage	0.01	1	5	
0 DK voltage 7 D Current	0.01	1	0	
 R-Current N Community 	0.1	1	/	
8 Y-Currrent	0.1	1	8	
9 B-Current	0.1	l	9	
10 No Data	0	0	10	
11 Total Kw	1	1	11	
12 No Data	0	0	12	
13Total PF	0.001	1	13	
14 Frequency	0.01	1	14	
15 EB Kwh	0.1	2	15,16	
16 Type(19),EB Runhr		2	17,18	
17 DG k wh	0.1	2	19,20	
18 DG Runhr		2	21,22	
19 Import/Export status	1	1	23	
20 CT Ratio	1	1	24	

7.1 Communication connection diagram

When connecting the meters in multidrop communication network, the following methods are to be adopted for trouble free communication.

1. Loop Topology



In this method, the communication continous to work even if there is a breakage in any one of the Loop. Termination registors are not required.

2. Straight line Topology Meter 2 Meter 3 Meter Meter Master 1 n D+ D-D+ D-D+ D-D+ D-D+ D-RT Meter 2 Meter 3 Meter Meter n D +D D + DD +D -D +D -RT

In this method termination resistor RT (60 -100 W) of value equal to characteristic Impedance of the cable used may be required to avoid reflection loses.

It is recommended to use proper & suitable communication cable for trouble free communication.

8. Technical specification (Standard)			
Туре	: ICD make DUAL SOURCE METER LT / HT Application		
Model	: EM 9024		
Voltage Input	: LT: 415 AC RMS (-20% to +10%)		
(Line to Line)	HT : 110V AC RMS (-20% to +10%)		
Current Input	: 5AAC R.M.S. (Standard)		
Measurement Method	: 3 Watt Meter (Standard)		
Working Load Range	: 0.5% to120% of load current		
Display	: 2 row 16 character LCD Display with Backlit		
Character Size	: 4.35(H) x 2.95(W) mm		
LCD Power Save	: Provided, LCD backlit goes OFF when there is		
	no key press for 3 minutes, to enhance the life of LCD. The backlit is switched ON, when any key is pressed.		
Accuracy	: class 1		
Frequency range	: 40.00to 60.00 HZ		
Programmable	: PT primary Voltage (HT meters), CT Primary		
Parameter	: Current, Device ID, LCD power save ,KWH & Runhr reset for (EB & DG)with password facility		
Parameter storage	: In non-volatile EERAM		
Phase Reverse Indication: Provided by showing minus sign in Instant kW			
Energy Registering during Reverse	: Not done		
Display page selection	: By set of keys provided in front panel.		
Calibration pulse O/P	: Provided thru' 3mm red LED in front panel		
Meter Constant	: 3200 imp/kWh (CT secondary based)		
Burden on Voltage I/P	: 0.1VA per phase		
Burden on Current I/P	: 0.1 V A per phase		
Burden on Auxiliary I/P	: 4 V A		

Auxiliary Supply	: self powered
PC Interface (Optional)	: An optically isolated RS 485 serial port is avail able with MODBUS-RTU Protocol.
Mains / DG selection	: Accepts potential free contact from field to differentiate the consumption through EB source or DG source.
Field Input Status	: When contact is closed, the energy comsumption taken thru' GN source and contact is open, the energy comsumption taken thru' EB
DG Indication	: 3mm RED LED Provided in the front panel
Registering Facility	: Seperate register will be provided in the display to view the EB consumption & DG consumption.
Operating Temperature	: Max 55°C
Box Dimension	: 96(W) x 96(H) x 80(D) mm (Cutout : 88x88mm)
Mounting	: Flush / Panel
Enclosure / Weight	: ABS Plastic case / 0.750Kg (Approximately)