

## EM 3490 DS

EM 3490 DS Dual Source Energy Meter

### Application :

**EM 3490 DS** measures important electrical parameters of Utility (in normal mode) & Generators (in Power back up) in three phase and single phase Network & replaces the multiple analog pane I meters. It measures electrical parameters like AC current, Voltage, frequency, Active energy import. The instrument has optional pulse output as one for Utility and another for Generator.

### Product Features:

#### Dual Source Energy Measurements :

EM 3490 DS features two energy integrator Utility & Generator. In normal operation meter accumulates energy counts in utility register & when utility shutdowns and control input signal of (10 to 60V DC/ 20 to 300V AC) is present on generator sensor energy starts accumulating in Generator register.

#### On site programmable PT/CT ratios:

It is possible to program primary of external potential Transformer (PT), primary of external Current Transformer (CT) on site locally via front panel keys by entering into Programming mode or remotely via MODBUS (RS485)

#### User selectable PT Secondary

The secondary of external potential Transformer (PT) can be programmed on locally via front panel keys by entering into Programming mode or remotely via MODBUS (Rs485)

#### User selectable 3 phase 3W or 4W

User can program on site the network connection as either 3 Phase 3 Wire or 4 Wire locally via front panel keys by entering into Programming mode or remotely via MODBUS (RS485). For single phase applications, single phase version is available.

#### Low back depth:

The instrument has very low back depth (behind the panel) of less than 80 mm in spite of optional features like pulse output Onsite

#### selection of Auto scroll / Fixed Screen

User can set the display in auto scrolling mode or fixed screen mode locally via front panel keys by entering into Programming mode or remotely via MODBUS (RS485).

#### True RMS measurement

The instrument measures distorted waveform up to 15th Harmonic.

#### High brightness 2 line 7 digits LED display:

Simultaneous displays Utility and Generator parameters.

#### Parameter Screen recall:

In case of power failure, the instrument memorizes the last displayed screen. The displayed screen will get memorized only if user keeps this screen for minimum 40 sec duration before power failure for fixed screen mode.

**User Assignable Registers for MODBUS:** Customer can assign MODBUS register address as per his need for faster response time.

#### Hour Run, ON Hour, Number of Interruptions:

Hour run records the number of hours load is connected. ON Hour is the period for which the auxiliary supply is ON. Number of Interruptions indicates the number of times the Auxiliary Supply was interrupted. All these parameters are displayed in both utility & generator mode.



#### Energy Count storage:

In case of power failure, the instrument memorizes the last energy count. Every 40 sec, the instrument updates the energy counter in the non-volatile memory.

#### Programmable Energy format & Energy rollover count:

Customer can assign the format for energy display on MODBUS (RS485) in terms of W, kW or MW. Additional to this, customer can also set a rollover count from 7 to 13 digits depending on the energy format, after which the energy will roll back to zero.

#### Old Register

This register holds the value before the last reset . The old value will be available when scrolled through screen.

#### Optional MODBUS (RS485) Output

The optional ModBus output enables the instrument to transmit all the measured parameters over standard MODBUS (RS485).

#### Optional Pulse Output

The instrument has optional pulse output one for Utility and another for Generator. The optional pulse output is a potential free, very fast acting relay contact which can be used to drive an external mechanical counter for energy measurement.

**Configuration of the Instrument via MODBUS:** The instrument settings can be configured locally via front panel keys by entering into Programming mode or remotely via MODBUS (RS485).

Note: The MODBUS

communication parameters can only be set locally via front panel keys in the Programming mode.

#### Enclosure Protection for dust and water:

conforms to IP 54 (front face) as per IEC60529

#### Compliance to International Safety standards

Compliance to International Safety standard IEC 61010-1- 2001

#### EMC Compatibility

Compliance to International standard IEC 61326.

## Technical Specifications:

### Input Voltage:

Nominal input voltage (AC RMS)	Phase –Neutral	57.7 - 277V L-N
	Line-Line	100 - 480V L-L
Max continuous input voltage		120% of rated value

### Input Current:

Nominal input current	1 and 5A AC RMS (to be specified while ordering)
System CT primary values	Std. values up to 4kA (1 or 5 Amp )
Max continuous input current	120% of rated value
Starting current	0.4 % of In (In = Nominal Current)

### Auxiliary Supply:

ACDC Auxiliary Supply	100V... 250 VAC DC
DC Auxiliary Supply	12....48 VDC
AC Auxiliary supply frequency range	45 to 66 Hz

### VA Burden:

Nominal input voltage burden	< 0.2 VA approx. per phase
Nominal input current burden	< 0.6 VA approx. per phase
AC Supply burden	4 VA

### Overload Withstand:

Voltage	2 x rated value for 1 second, repeated 10 times at 10 second intervals
Current	20x for 1 second, repeated 5 times at 5 min

### Operating Measuring Ranges

Voltage	5... 120% of rated value
Current	5 ... 120% of rated value
Frequency	40...70 Hz
Power Factor	0.5 Lag ... 1... 0.8 Lead

### Reference conditions for Accuracy:

Reference temperature	23 C +/- 2 C
Input waveform	Sinusoidal (distortion factor 0.005)
Input frequency	50 or 60 Hz $\pm$ 2%
Auxiliary supply voltage	Rated Value $\pm$ 1%
Auxiliary supply frequency	Rated Value $\pm$ 1%
Power Factor	0.5 lag....1....0.8 lead

### Accuracy:

Voltage	$\pm$ 0.5% of range (50... 100% of rated value)
Current	$\pm$ 0.5% of range (10... 100% of rated value)
Frequency	0.15% of mid frequency
Active Power	$\pm$ 0.5% of range (10... 100% of rated Current value & 50... 100% of rated Voltage value)
Reactive Power	$\pm$ 0.5% of range (10... 100% of rated Current value & 50... 100% of rated Voltage value)
Apparent Power	$\pm$ 0.5% of range (10... 100% of rated Current value & 50... 100% of rated Voltage value)
Active energy (kWh)	1 % (IEC 62053-21) Active PF 0.5 lag... 1...0.8 lead
Power Factor	1 % of Unity
Phase angle	1 % of range

Measurement error is normally much less than the error specified above.

Variation due to influence quantity is less than twice the error allowed for reference condition

**Generator Sensor:** 10 to 60 VDC / 20 to 300 VAC (For monitoring generator ON or OFF).

### Applicable Standards:

EMC	IEC 61326
Immunity	IEC 61000-4-3. 10V/m min – Level 3 industrial low level
Safety	IEC 61010-1-2001 , Permanently connected use
IP for water & dust	IEC60529
Pollution degree:	2
Installation category:	CAT III 300V ac rms
High Voltage Test	2.2 kV AC, 50Hz for 1 minute between all electrical circuits

## Technical Specifications:

### Environmental

Operating temperature	-10 to +55 C
Storage temperature	-20 to +65 C
Relative humidity	0... 90% non condensing
Warm up time	Minimum 3 minute
Shock	15g in 3 planes
Vibration	10... 55 Hz, 0.15mm amplitude
Enclosure	Ip54 (front face only)

### Enclosure style:

Enclosure style	96 X 96 DIN Quadratic)
Enclosure material	Polycarbonate (Self extinguish & non dripping as per UL 94 V-0)
Terminals	M4 Screw Type
Fixing	4 side clamps

## Pulsed Output Option:

Two optional pulse outputs are provided one for Utility pulse out and another for Generator pulse out  
 Relay Contact One Normally open

Divisor	Pulse Rate	
	Pulse	System power*
1	1 per Whr	Up to 3600W
	1 per kWhr	Up to 3600kW
	1 per MWhr	Above 3600kW
10	1 per 10 Whr	Up to 3600W
	1 per 10 kWhr	Up to 3600kW
	1 per 10 MWhr	Above 3600kW
100	1 per 100 Whr	Up to 3600W
	1 per 100 kWhr	Up to 3600kW
	1 per 100 MWhr	Above 3600kW
1000	1 per 1000 Whr	Up to 3600W
	1 per 1000 kWhr	Up to 3600kW
	1 per 1000 MWhr	Above 3600kW

Note: Divisor 10,100,1000 is applicable only when Energy Display on RS485 is selected in terms of Watts

- \*System Power =  $CT(\text{Primary}) \times PT(\text{Primary})$  for single Phase
- \*System Power =  $3 \times CT(\text{Primary}) \times PT(\text{Primary})L-N$  for Three Phase four wire
- \*System Power =  $\text{Root}3 \times CT(\text{Primary}) \times PT(\text{Primary})L-L$  for Three Phase three wire

Pulse Width = 60mS, 100mS, 200mS

### PT Secondary Ranges for Various Input Voltage:

Input Voltage	PT Secondary Settable Range
110V L-L (63.5V L-N)	100V – 120V L-L (57V – 69V L-N)
230V L-L (133V L-N)	121V – 239V L-L (70V – 139V L-N)
415V L-L (239.6V L-N)	240V – 480V L-L (140V – 277V L-N)

**Displayed Parameters:**

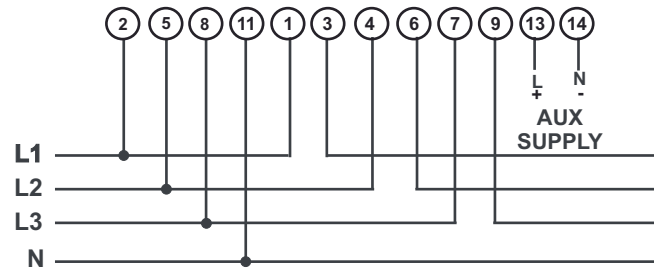
Sr No	Parameters	3 Phase 4 Wire	3 Phase 3 Wire	1 Phase 2 Wire
1.	System Current	✓	✓	✓
2.	Current L1	✓	✓	✗
3.	Current L2	✓	✓	✗
4.	Current L3	✓	✓	✗
5.	System Active Power (kW)	✓	✓	✓
6.	Active Power L1 (kW)	✓	✗	✗
7.	Active Power L2 (kW)	✓	✗	✗
8.	Active Power L3 (kW)	✓	✗	✗
9.	Utility Import kWh	✓	✓	✓
10.	Utility Run Hour	✓	✓	✓
11.	Utility On Hour	✓	✓	✓
12.	Utility Number of Interruptions	✓	✓	✓
13.	Generator Import kWh	✓	✓	✓
14.	Generator Run Hour	✓	✓	✓
15.	Generator On Hour	✓	✓	✓
16.	Generator Number of Interruptions	✓	✓	✓
17.	Total Run Hour	✓	✓	✓
18.	Total On Hour	✓	✓	✓
19.	Total Number of Interruptions	✓	✓	✓
20.	Old Utility Import kWh	✓	✓	✓
21.	Old Utility Run Hour	✓	✓	✓
22.	Old Utility On Hour	✓	✓	✓
23.	Old Utility Number of Interruptions	✓	✓	✓
24.	Old Generator Import kWh	✓	✓	✓
25.	Old Generator Run Hour	✓	✓	✓
26.	Old Generator On Hour	✓	✓	✓
27.	Old Generator Number of Interruptions	✓	✓	✓
28.	Old Total Run Hour	✓	✓	✓
29.	Old Total On Hour	✓	✓	✓
30.	Phase Reversal Indication	✓	✓	✗

## Parameters Through MODBUS:

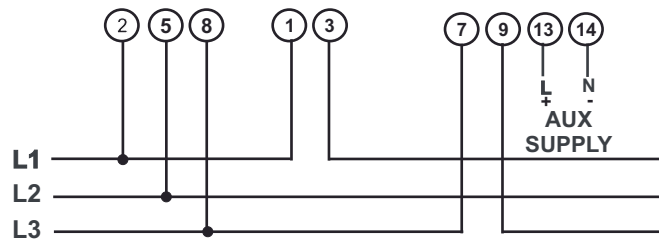
Sr No	Parameters	3 Phase 4 Wire	3 Phase 3 Wire	1 Phase 2 Wire
1.	System Volts	✓	✓	✓
2.	System Current	✓	✓	✓
3.	Volts L1 – N	✓	✗	✗
4.	Volts L2 – N	✓	✗	✗
5.	Volts L3 – N	✓	✗	✗
6.	Volts L1 – L2	✓	✓	✗
7.	Volts L2 – L3	✓	✓	✗
8.	Volts L3 – L1	✓	✓	✗
9.	Current L1	✓	✓	✗
10.	Current L2	✓	✓	✗
11.	Current L3	✓	✓	✗
12.	Neutral Current	✓	✗	✗
13.	Frequency	✓	✓	✓
14.	System Active Power (kW)	✓	✓	✓
15.	Active Power L1 (kW)	✓	✗	✗
16.	Active Power L2 (kW)	✓	✗	✗
17.	Active Power L3 (kW)	✓	✗	✗
18.	System Re-active Power (kVAr)	✓	✓	✓
19.	Re-active Power L1 (kVAr)	✓	✗	✗
20.	Re-active Power L2 (kVAr)	✓	✗	✗
21.	Re-active Power L3 (kVAr)	✓	✗	✗
22.	System Apparent Power (kVA)	✓	✓	✓
23.	Apparent Power L1 (kVA)	✓	✗	✗
24.	Apparent Power L2 (kVA)	✓	✗	✗
25.	Apparent Power L3 (kVA)	✓	✗	✗
26.	System Power Factor	✓	✓	✓
27.	Power Factor L1	✓	✗	✗
28.	Power Factor L2	✓	✗	✗
29.	Power Factor L3	✓	✗	✗
30.	System Phase Angle	✓	✓	✓
31.	Phase Angle L1	✓	✗	✓
32.	Phase Angle L2	✓	✗	✗
33.	Phase Angle L3	✓	✗	✗
34.	Import kWh (Utility /Generator)	✓	✓	✓
35.	kVAh (Utility /Generator)	✓	✓	✓
36.	Run Hour (Utility /Generator / Total)	✓	✓	✓
37.	On Hour (Utility /Generator / Total)	✓	✓	✓
38.	Number of Interruptions (Utility /Generator)	✓	✓	✓
39.	Old Import kWh (Utility /Generator)	✓	✓	✓
40.	Old Run Hour (Utility /Generator / Total)	✓	✓	✓
41.	Old On Hour (Utility /Generator / Total)	✓	✓	✓
42.	Old Number of Interruptions (Utility /Generator)	✓	✓	✓

## Electrical Connections:

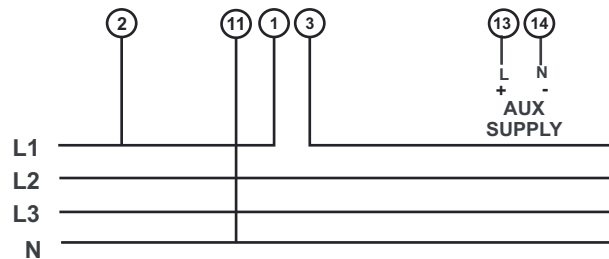
For 3 Phase 4 Wire Unbalanced Load



For 3 Phase 3 Wire Unbalanced Load



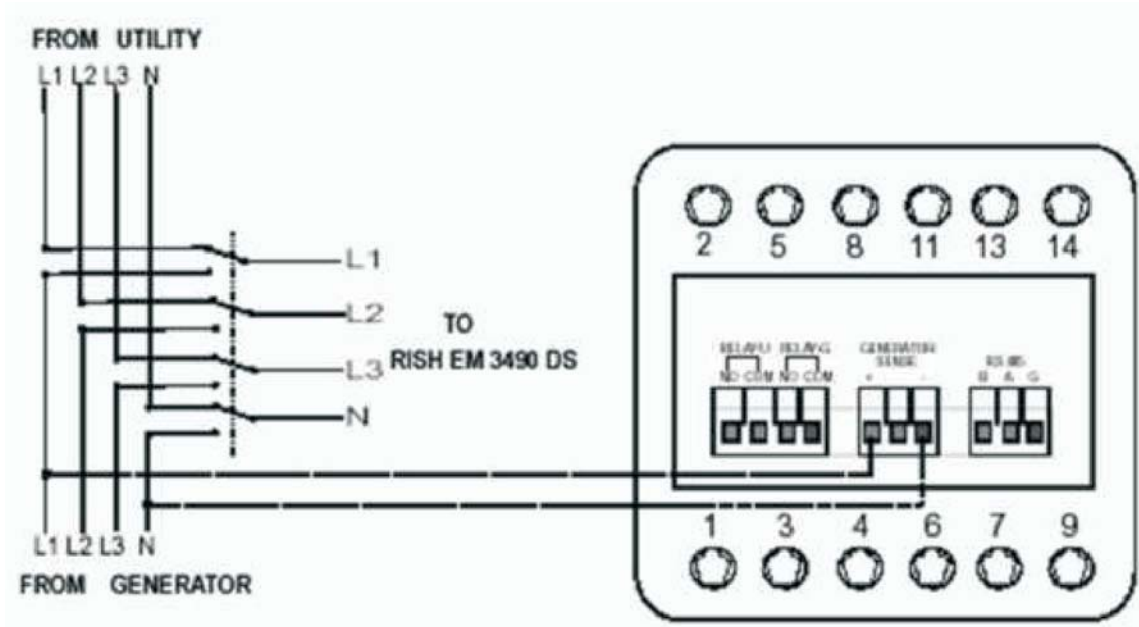
For Single Phase



It is recommended that the wires used for connections to the instrument should have lugs soldered at the end. That is, the connections should be made with Lugged wires for secure connections. The Maximum diameter of the lug should be 7.0 mm and maximum thickness 3.5 mm.

Permissible cross section of the connection wires:  $\leq 4.0 \text{ mm}^2$  single wire or 2  $2.5 \text{ mm}^2$  fine wire.

## Generator Sense Connection diagram.

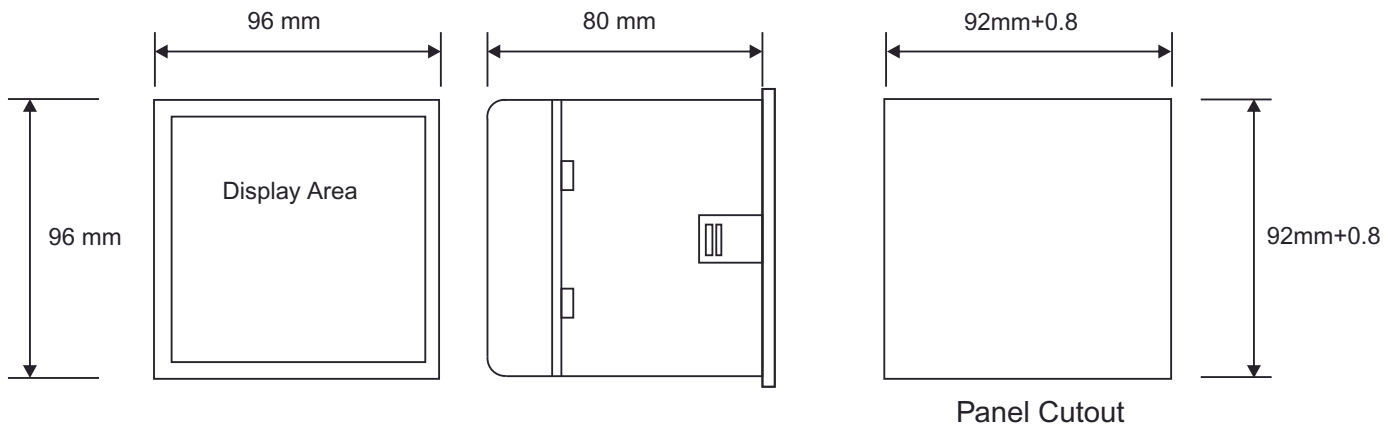


### Generator Sense Voltages

AC Voltage : 20VAC to 300VAC

DC Voltage : 10VDC to 60VDC

## Dimensions



## Parameter Measurement and Display:

Ordering information	Ordering Code EM 3490 DS
<b>System Type (Connection network)</b>	
3 Phase (programmable as 4 Wire or 3 Wire on site)	3
1 Phase	1
<b>Input Voltage</b>	
110V L-L (63.5V L-N)	110
230V L-L (133V L-N)	230
415V L-L (239.6V L-N)	415
440V L-L (254V L-N)	440
<b>Input Current</b>	
5 Amps	5
1 Amps	1
<b>AC Auxiliary Voltage</b>	
100V... 250 V AC DC -10% / +10 %	AD
12V... 48V V DC -10% / +10 %	D
<b>Optional:</b>	
MODBUS (RS485) output	R
MODBUS Option not used	Z
<b>Optional: Pulse Output for energy measurement</b>	
Pulse output (Utility / Generator)	UG
Pulse Output option not used	Z

## Order Code Example:

Master 3490DS – 3– 415-AD-R-UG

Master 3490DS, EM 3490 DS, 3 phase( programmable onsite as 4 wire or 3 Wire), 415L-L nominal voltage, 5Amps nominal input current, 100 – 250V AC DC Auxiliary supply, with MODBUS (RS485),with pulse output.

Types	100...250VACDC Aux	12...48 VDC Aux
3490 DS	✓	✓
3490 DS + 2 pulse	✓	✓
3490 DS + Rs485	✓	✓
3490 DS + 2 pulse + Rs485	✓	✓

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