RISHABH

Data Sheet

RISH Master 3480

Measure   Control   Record   Analyze

Application :

RISH Master 3480 measures important electrical parameters & replaces the multiple analog panel meters. It measures electrical parameters like AC current, Voltage, frequency, active energy import & active energy export, Current Demand, kW Demand, kVA Demand and Max Current Demand, Max kW Demand and Max kVA Demand. The instrument has optional output as one pulse output or two pulse output for energy measurement.

Product Features:

Touch screen graphics LCD:

Rish Master 3480 has touch sensible color graphics LCD display with resolution of 320x240.

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 by entering into Programming mode or remotely via MODBUS (RS485)

User selectable CT Secondary 5A/1A:

The secondary of external Current Transformer (CT) can be programmed on site to either 5A or 1A locally 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 site locally by entering into Programming mode or remotely via MODBUS (RS485)

User selectable 3 phase 3W or 4W unbalanced network:

User can program on site the network connection as either 3 Phase 3 Wire or 4 Wire locally by entering into Programming mode or remotely via MODBUS (RS485).

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 can be programmed locally by entering into Programming mode or remotely via MODBUS (RS485).

Phase reversal indication:

The instrument can detect wrong phase sequence or failure of one of the input voltages and displays "phase" error message.

Energy measurement (Import and Export):

Active energy (kWh), Reactive energy (kVArh), Apparent energy (kVAh) & Ampere Hour (kAh). Any of the parameters can be freely assigned to 2 optional pulse outputs.

True RMS measurement:

The instrument measures distorted waveform up to 15th Harmonic.

User selectable Low Current suppression (below 30 mA):

User can suppress the readings below 30 mA in the current measurement by onsite programming if required.

Min Max storage of parameters possible:

The instrument stores minimum and maximum values for System Voltage and System Current. Every 40 sec minimum and maximum readings are updated.

Number of parameters measured: more than 46:

The instrument measures more than 46 electrical parameters of 3 Phase network.

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.

Phasor Diagram:

Pictorial representation of all 3 Phases (Voltage & Current) in terms of vectors.

Custom color setting:

User can assign individual color for each Phase as per the application requirement through display .

WaveForm:

Pictorial representation of all 3 phases Current & voltage in terms of sinusoidal waveform.

Total Harmonic Distortion (THD):

The instrument can measures per phase (%) THD of voltage and (%) THD of current.

Energy Count storage:

In case of power failure, the instrument memorizes the last energy count.

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 14 digits depending on the energy format.

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.

Optional MODBUS (RS485) Output:

The optional ModBus output enables the instrument to transmit all the measured parameters over standard MODBUS (Rs485).

User Assignable Registers for MODBUS:

Customer can assign MODBUS register address as per his need for faster response time.

Optional Pulse Output (1 or 2 Relay output) / Limit switch:

The instrument can be programmed as Pulse output or Limit Switch.

Pulse Output: 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.

Limit switch: The instrument will trip the one or two relays if the programmed parameter exceeds the programmed High & Low Limits.

Configuration of the Instrument via MODBUS:

The instrument settings can be configured locally by entering into Programming mode or remotely via MODBUS (Rs485)

Optional Analog Outputs (1 or 2 Outputs):

1 or 2 Analog outputs can be programmed from a list of input parameters.

Ethernet Interface (Modbus TCP/IP Protocol)

The optional Ethernet Interface output transmit all the measured parameters on Modbus TCP/IP. Also user can configure their instrument via Ethernet Interface.

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

Measure   Control   Record   Analyze

Technical Specifications:

Input Voltage:

Nominal input voltage (AC RMS)	Phase –Neutral 57.7 - 346 V$_{L-N}$
	Line-Line 100 - 600 V$_{L-L}$
System PT primary values	100VLL to 692kVLL programmable on site.
Max continuous input voltage	120% of rated value

Input Current:

Nominal input current	1A/5A AC RMS.
System CT secondary values	1A & 5A programmable on site.
System CT primary values	From 1A up to 9999A (for 1 or 5 Amp)
Max continuous input current	120% of rated value

Auxiliary Supply:

ACDC Auxiliary Supply	60 – 300 VAC /DC OR 65 – 300 VAC /DC for Ethernet Option OR
	12V... 60 VAC DC
AC Auxiliary supply frequency range	45 to 66 Hz

VA Burden:

Nominal input voltage burden	< 0.35 VA approx. per phase
Nominal input current burden	< 0.3 VA approx. per phase
Auxillary Supply burden	< 6.5 VA approx.
	< 8 VA approx. for Analog / Ethernet option

Overload Withstand:

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

Operating Measuring Ranges

Voltage	10… 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 ±2%
Auxiliary supply voltage	Rated Value ±1%
Auxiliary supply frequency	Rated Value ±1%
Voltage Range	50... 100% of Nominal Value.
	60... 100% of Nominal Value for THD.
Current Range	10... 100% of Nominal Value.
	20... 100% of Nominal Value for THD.
Power	Cos phi / sin phi = 1 for Active / Reactive Power & Energy.
	10... 100% of Nominal Current &
	50... 100% of Nominal Voltage.
Power Factor / Phase Angle	40... 100% of Nominal Current &
	50... 100% of Nominal Voltage.

Measure   Control   Record   Analyze

Technical Specifications:

Accuracy:

	Class 1.0 (Standard)	Class 0.5 (on request)	Class 0.2 (on request)
Voltage	± 0.5% of Nominal value	± 0.5% of Nominal value	± 0.2% of Nominal value
Current	± 0.5% of Nominal value	± 0.5% of Nominal value	± 0.2% of Nominal value
Frequency	± 0.15% of mid frequency	± 0.15% of mid frequency	± 0.15% of mid frequency
Active Power	± 0.5% of Nominal value	± 0.5% of Nominal value	± 0.2% of Nominal value
Re-Active Power	± 0.5% of Nominal value	± 0.5% of Nominal value	± 0.4% of Nominal value
Apparent Power	± 0.5% of Nominal value	± 0.5% of Nominal value	± 0.2% of Nominal value
Active energy (kWh)	± 1.0% of Nominal value	± 0.5% of Nominal value	± 0.2% of Nominal value
Re Active energy (kVArh)	± 1.0% of Nominal value	± 0.5% of Nominal value	± 0.5% of Nominal value
Apparent energy (kVAh)	± 1.0% of Nominal value	± 0.5% of Nominal value	± 0.2% of Nominal value
Accuracy of Analog Output	1 % of Output end value	1 % of Output end value	1 % of Output end value
Power Factor	±1% of Unity	±1% of Unity	±1.0% of Unity
Angle	±1% of range	±1% of range	±1% of range
Total Harmonic Distortion	±1%	±1%	±1%

Note:- 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

Influence of Variations:

Temperature coefficient :   0.025%/°C for Voltage (50... 120% of rated value) and
(for rated value range of use (0…50°C))   0.05%/°C for Current (10... 120% of rated value)

Display update rate:

Response time to step input   1 sec approx.

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	III
High Voltage Test	2.2 kV AC, 50Hz for 1 minute between all electrical circuits

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

Energy (can be programmed for different energy parameters simultaneously):

Relay contact	1 NO + 1 NC
Switching Voltage & Current for Relay	240 VDC ,5 A

Other Pulse rate divisors (applicable only when Energy on MODBUS (RS485) is in W)

10	1 per 10 Wh (up to 3600W),	1 per 10kWh (up to 3600kW),	1 per 10MWh (above 3600 kW)
100	1 per 100Wh (up to 3600W),	1 per 100kWh (up to 3600kW),	1 per 100MWh (above 3600 kW)
1000	1 per 1000Wh (up to 3600W),	1 per 1000kWh (up to 3600kW),	1 per 1000MWh (above 3600 kW)

Pulse duration   60 ms, 100 ms or 200 ms

Above options are also applicable to Apparent & reactive Energy.

Measure   Control   Record   Analyze

Ampere Hour:

| Default pulse rate divisor | CT secondary = 1A Max pulse rate 3600 pulses/Ah * |
| | CT secondary = 5A Max pulse rate 720 pulses/Ah |

Other Pulse rate
Divisors (applicable only when Energy on MODBUS (RS485) is in W)

10	CT secondary = 1A Max pulse rate 3600 pulses/10Ah *
	CT secondary = 5A Max pulse rate 720 pulses/10Ah
100	CT secondary = 1A Max pulse rate 3600 pulses/100Ah *
	CT secondary = 5A Max pulse rate 720 pulses/100Ah
1000	CT secondary = 1A Max pulse rate 3600 pulses/1000Ah *
	CT secondary = 5A Max pulse rate 720 pulses/1000Ah
Pulse duration	60 ms, 100 ms or 200 ms

*No. of Pulses = $\dfrac{\text{Maximum Pulses}}{\text{CT Ratio}}$

Where, CT Ratio = (CT primary/ CT Secondary)

Limit Output Option:

Limit can be assigned to different measured parameters. It can be configured in one of the four modes given below.

1) Hi alarm & Energized Relay
2) Hi alarm & De-energized Relay
3) Lo alarm & Energized Relay
4) Lo alarm & De-energized Relay

With user selectable Trip point, Hysteresis, Energizing delay and De-energizing delay.

Parameter Measurement and Display:

Sr No	Displayed Parameters	3Phase 4Wire	3Phase 3Wire
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	✓	✓

Measure   Control   Record   Analyze

Parameter Measurement and Display:

| Sr No	Displayed Parameters	3 Phase 4Wire	3Phase 3Wire
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.	Phase Angle L1	✓	✗
31.	Phase Angle L2	✓	✗
32.	Phase Angle L3	✓	✗
33.	Import kWh (8 digit resolution)	✓	✓
34.	Export kWh (8 digit resolution)	✓	✓
35.	Import kVArh (8 digit resolution)	✓	✓
36.	Export kVArh (8 digit resolution)	✓	✓
37.	kVAh (8 digit resolution)	✓	✓
38.	KAh (8 digit resolution)	✓	✓
39.	Current Demand	✓	✓
40.	KVA Demand	✓	✓
41.	KW Import Demand	✓	✓
42.	KW Export Demand	✓	✓
43.	Max Current Demand	✓	✓
44.	Max KVA Demand	✓	✓
45.	Max KW Import Demand	✓	✓
46.	Max KW Export Demand	✓	✓
47.	Run Hour	✓	✓
48.	On Hour	✓	✓
49.	Number of Interruptions	✓	✓
50.	Phase Reversal Indication	✓	✗
51.	Phaser Diagram (Pictorial Representation)	✓	✗
52.	VA waveform (Pictorial Representation)	✓	✗
53.	THD Volts L1-N	✓	✗
54.	THD Volts L2-N	✓	✗
55.	THD Volts L3-N	✓	✗
56.	THD Volts L1-L2	✗	✓
57.	THD Volts L2-L3	✗	✓
58.	THD Volts L3-L1	✗	✓
59.	THD Current L1	✓	✓
60.	THD Current L2	✓	✓
61.	THD Current L3	✓	✓
62.	THD Voltage Mean	✓	✓
63.	THD Current Mean	✓	✓

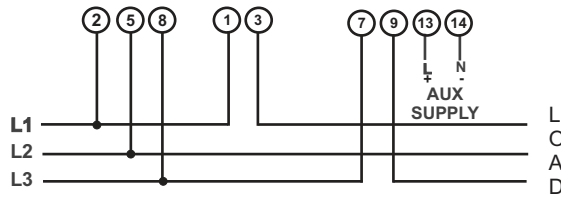Measure Control Record Analyze

Electrical Connections:

**For 3 Phase 4 Wire Unbalanced Load**
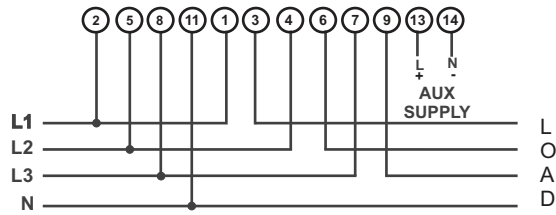
For 3 Phase 3 Wire Unbalanced Load

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: <= 4.0 mm^2 single wire or 2 × 2.5 mm^2 fine wire.

Dimensions

96 mm

Display Area

96 mm

80 mm

92mm+0.8

92mm+0.8

Panel Cutout
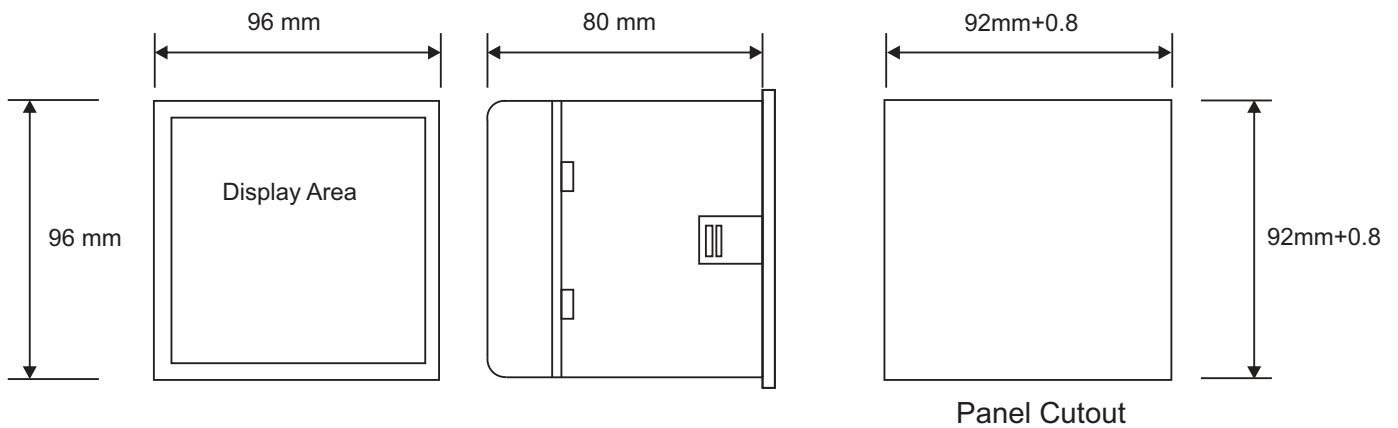
Measure   Control   Record   Analyze

Order Code:

Ordering information	Ordering Code *RISH Master* 3480
Accuracy Class	
Accuracy 1.0% **(Standard)**	1.0
Accuracy 0.5% **(on request)**	0.5
Accuracy 0.2% **(on request)**	0.2
Auxiliary Voltage	
60-300V AC DC	H
12-60V AC DC	L
Optional:	
RS 485 + 2 Pulse output	1
RS 485 + 1 Pulse output + 2 Analog output	2
Ethernet	3
Option not used	Z

Order Code Example:

RISH Master **3480 0.2 – H – 1**

RISH Master **3480** , Accuracy 0.2**%** ,60 - 300V AC DC Auxiliary supply, with MODBUS (RS485),with 2 pulse output .

Measure   Control   Record   Analyze

RISHABH