

RISH Master 3450

Digital Multifunction Instrument

Class 0.5

Application:

Rish Master 3450, Din quadratic size 96 x 96 measures important electrical parameters in 3 phase system & replaces the multiple analog panel meters. It measures electrical parameters like AC Voltage, current and frequency, Power, Power Factor, Active Energy (Import/Export), Reactive Energy (Import /Export) and Apparent Energy.

Product Features:

True RMS measurement:

The instrument measures distorted waveform up to 15th Harmonic.

Number of parameters measured: up to 37

The instrument measures 37 electrical parameters of 3 Phase system.

Display:

Alphanumeric LCD display for viewing all being monitored and for configuring at site CT/PT ratio reset and Modbus communication settings (Address, baud, parity).

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).

Programmable PT/CT ratios:

It is possible to program primary of external potential Transformer (PT), primary of external Current Transformer (CT) on site via modbus (RS485) 4x registers with the help of PC or via front panel keys by entering into programming mode.

Energy measurement (Import and Export):

Active energy (kWhr), Reactive energy (kVAhr) and Apparent energy (kVAhr).

Compliance to International Safety standards

Compliance to International Safety standard IEC 414 / IEC 61010-1.

Programming mode for setting of PT/CT ratios & Modbus communication :

Rish Master can be programmed by entering into the programming mode which is password protected. Programming mode can be used for configuring CT / PT ratio, reset and Modbus communication settings (Address, baud, parity) at site.

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.

User Assignable Registers for MODBUS: Customer can assign MODBUS register address as per his need for faster response time. The parameter to be acquired from Rish Master is selectable.



User selectable Low Current Suppression

(below 30mA): User can suppress the reading below 30mA in the current measurement by onsite programming if required.

User selectable CT secondary 5A/1A:

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

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 14 digits depending on the energy format, after which the energy will roll back to zero.

Configurable energy timing:

Values of Active energy (import/export), Reactive energy (import/export) are configurable 15 minutes / 1 hour.

MODBUS (RS485) Output:

The ModBus output enables the instrument to transmit all the measured parameters over standard MODBUS protocol. Baud rate setting can be done from 2.4 K, 4.8 K, 9.6 K, 19.2 K Bps & parity selectable Even/Odd with one stop bit or without parity with one/two stop bits. Modbus address settable from 1 to 247.

Configuration of the Instrument via MODBUS: The instrument settings can be configured remotely via MODBUS (RS485) through PC.

EMC Compatibility: Compliance to International standard IEC 60688 / IEC 801-3 / IEC 61326 / IEC61000-4-3.

Mounting of Instrument: DIN Rail mounting.

Enclosure :

Body : Polycarbonate Housing, self extinguish & non dripping as per UL 94 V-0. Terminals : Shrouded screw type terminals.



Preliminary Datasheet subject to change without notice

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Input Voltage:

Nominal input voltage (AC RMS)	Phase –Neutral	63.5 / 133 / 239.6 / 254V L-N
	Line-Line	110 / 230 / 415 / 440V L-L
Temporary overload protection Connections	120% of the rated voltage (that is range maximum*) as per IEC60688 standard. Permissible cross section of the connection wires: $\leq 4.0 \text{ mm}^2$ single wire or $2 \times 2.5 \text{ mm}^2$ fine wire.	

Input Current:

Nominal input current	1 A or 5A Programmable On site	
System CT primary values	Standard values up to 9999A.	
Temporary overload protection Connections	120% of rated value as per IEC 60688 standard. Permissible cross section of the connection wires: $\leq 4.0 \text{ mm}^2$ single wire or $2 \times 2.5 \text{ mm}^2$ fine wire.	

Auxiliary Supply:

DC Auxiliary Supply	48 / 24 VDC $\pm 10\%$
ACDC Auxiliary Supply	100V... 250 VAC DC $\pm 10\%$

VA Burden:

Nominal input voltage burden	$< 0.20 \text{ VA}$ approx. per phase
Nominal input current burden	$< 0.60 \text{ VA}$ approx. per phase
Auxiliary supply burden	$< 4\text{VA}$ approx

High Voltage Test

2.2 kV AC, 50Hz for 1 minute between all electrical circuits

Weight

Approx 460 gms

Permanent overload protection:

Voltage	2 x rated value for 1 second, repeated 10 times at 10 second intervals as per IEC 60688 standard.
Current	20x for 1 second, repeated 5 times at 300 sec interval as per IEC 60688 standard.

Instrument operating Ranges

Voltage	10... 120% of rated Voltage value
Current	5 ... 120% of rated Current value
Frequency	40...70 Hz
Active Power	5... 120% of rated value
Re-Active Power	5... 120% of rated value
Apparent Power	5... 120% of rated value
Apparent energy (kVAh)	5... 120% of rated value
Active energy (kWh)	5... 120% of rated value
Re Active energy (kVArh)	5... 120% of rated value
Angle	0- 360 degree
Power Factor	0.6 Lag ... 1... 0.6 Lead

Reference conditions for Accuracy as per IEC 60688:

Reference temperature	23°C $\pm 2^\circ\text{C}$
Input waveform	Sinusoidal
Input frequency	50 or 60 Hz $\pm 2\%$
Input voltage	Rated value
Power Factor	0.8 Lag... 1... 0.8 Lead

Accuracy:

Voltage	$\pm 0.5\%$ of range
Current	$\pm 0.5\%$ of range
Frequency	$\pm 0.15\%$
Active Power	$\pm 0.5\%$ of range
Re-Active Power	$\pm 0.5\%$ of range
Apparent Power	$\pm 0.5\%$ of range
Apparent energy (kVAh)	$\pm 0.5\%$ of range
Active energy (kWh)	$\pm 0.5\%$ of range
Re Active energy (kVArh)	$\pm 0.5\%$ of range
Power Factor	$\pm 0.5\%$ of unity
Angle	$\pm 0.5\%$ of range(0- 360 degree)

Measurement error is normally much less than errors specified in the above. Variation due to influence quantity is less than twice the error allowed for reference condition.

Applicable Standards:

Electromagnetic Compatibility	IEC60688, IEC 801-3(Level 1) / IEC61000-4-3 and IEC 61326
Terms, definitions & Test method	IEC 60688
High frequency disturbance / Immunity	As per IEC 60688 / IEC 61000-4-3.



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Measure, Control & Record with a Difference

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Safety	IEC 414 / 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
Impulse Withstand voltage	IEC 60688

Environmental conditions:	
Operating temperature	-5°C to +60°C
Storage temperature	-20°C to +65°C
Temperature coefficient variation:(for rated value range of use (0...50°C))	0.025%/°C for Voltage (10... 120% of rated value) and 0.05%/°C for Current (5... 120% of rated value)
Relative humidity	0... 90% non condensing
Warm up time	Minimum 3 minute
Shock	50A as per IEC 60068-2-27
Vibration	55/05 as per IEC 60068-2-6
Temperature rise	As per IEC 60688 standard.

Modbus :	RTU mode
Format of data bytes	4bytes (32 bits) per parameter Floating point format as per IEEE 754
Error Checking bytes	2 byte Cyclical Redundancy Check (CRC).
Byte format	1 Start bit 8 data bit, least significant bit sent first. 1 bit for even/odd parity 1 stop bit if parity is used, 1 or 2 stop bits if no parity.

Electrical Parameters

Sr.No.	Measured Parameters	3 PH 4W	3 PH 3W
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	✓	✓
15.	Active Power L1 (kW)	✓	✗
16.	Active Power L2 (kW)	✓	✗
17.	Active Power L3 (kW)	✓	✗
18.	System Re-active Power	✓	✓
19.	Re-active Power L1 (kVAr)	✓	✗
20.	Re-active Power L2 (kVAr)	✓	✗
21.	Re-active Power L3 (kVAr)	✓	✗
22.	System Apparent Power	✓	✓
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 kVAh (8 digit resolution)	✓	✓
36.	Export kVAh (8 digit resolution)	✓	✓
37.	kVAh (8 digit resolution)	✓	✓



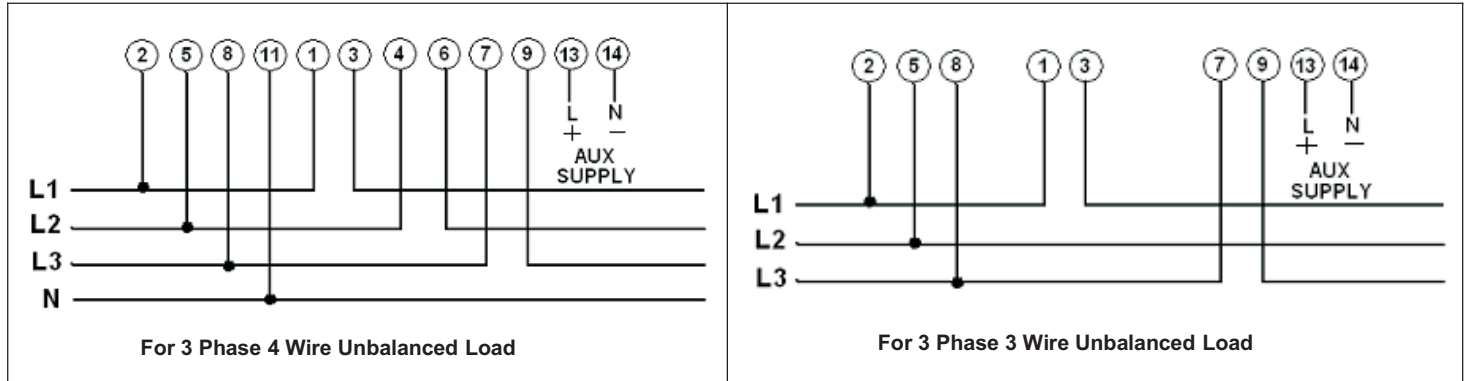
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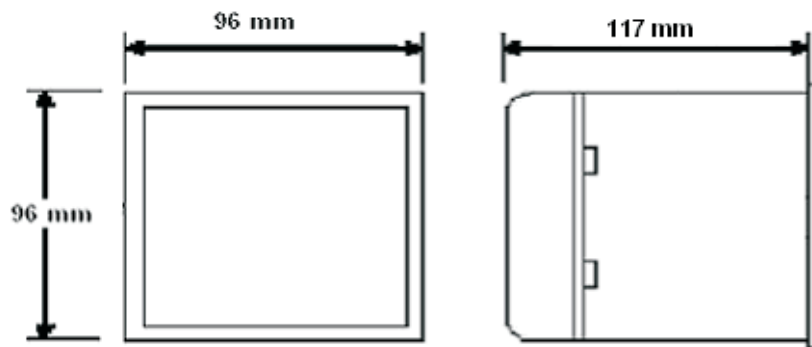
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Electrical Connections:



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

Case Dimensions & Panel Cutout:



Ordering information	Ordering Code
Product Type:	Rish Master 3450
System Type (Connection network)	
3 Phase 4wire / 3Phase 3Wire	3
Input Voltage	
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
AC/DC Auxiliary Supply Voltage	
100 – 250V AC/DC +/- 10%	AD
12V... 48V V DC +/- 10 %	D
MODBUS (RS485) output	R

Order Code Example: Rish Master 3450 – 3 – 110 – AD - R

Rish Master 3450, 3 phase, 110 L-L nominal voltage, 100 – 250 VAC/DC Aux, with ModBus (RS485).

Input current Onsite programmable 1Amps OR 5 Amps.



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