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User's Manual

RPM INDICATOR

1006S

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1. INTRODUCTION

Foreword

Thank you for purchasing RPM Indicator 1006S.
This manual describes the basic functions and operation methods. Please read through this user's manual carefully before using the product.

Notice

The contents of this manual are subject to change without notice as a result of continuous improvements to the instrument's performance and functions.
Every effort has been made to ensure accuracy in the preparation of this manual. Should any errors or omissions come to your attention, however, please inform MASIBUS Sales office or sales representative. Under no circumstances may the contents of this manual, in part or in whole, be transcribed or copied without our permission.

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Ordering Code

Model	**Auxiliary power supply**		**Retransmission Output**		**Communication Output**	
1006S	XX		X		X	
	U1	85-256 V AC	N	None	N	None
			Y	Yes	Y	RS485

Checking the Contents of the Package

Unpack the box and check the contents before using the product. If the product is different from which you have ordered, if any parts or accessories are missing, or if the product appears to be damaged, contact your sales representative.

List of Accessories

The product is provided with the following accessories according to the model and suffix codes (see the table below). Check that none of them are missing or damaged.

No	**Item name**	**Part number**	**Qty**	**Remarks**
1	Mounting Clamps	-	2	

Safety Precautions

The product and the instruction manual describe important information to prevent possible harm to users and damage to the property and to use the product safely. Understand the following description (signs and symbols), read the text and Observe Descriptions.

DESCRIPTION OF SIGNS

⚠ WARNING	***This indicates a danger that may result in death or serious injury if not avoided.***
⚠ CAUTION	***This indicates a danger that may result in minor or moderate injury or only a physical damage if not avoided.***

2. SPECIFICATIONS

2.1 Display	
Process Value	Red Led 4-Digit, Character Size 0.56”
Led	For Status Indication (Alarm And TX/Rx)
Operation Key	Menu/Enter, Up, Shift, Esc.

2.2 Input	
Input Frequency	0 – 166.6 Hertz Max
Display Rang	0-9999
Input Type	Proximity Sensor-Transducer/Photoelectric Sensors/ Limit Switches.
Number Of Channel	1
Pulse Per Rotation	1 To 255 (User Set)
Max Pulse Input	Rpm X Slots(Pulse/Rotation)<=600,000
Input Signal Level	0-24v Dc, Min On Pulse Width 100 usec
Input High	>1.0volt
Input Low	<0.2volt
Accuracy	±0.015% Rpm
Resolution	1 Rpm

2.3 Alarm	
Relays	2
Function	Alarm/Trip
Logic	Normal/Failsafe
Contacts	C,NO
Rating	5 A@250VAC/30VDC
Response Time	<1 Sec
Delay	0-9999 Sec
Alarm AL1	Momentary Alarm Condition High/Low – Latch YES / Latch NO/ Trip. Relay – On/Off
Alarm AL2	Momentary Alarm high/low – latch YES / latch NO/ Trip Relay – on/off

2.4 Re-transmission output	
DC current	4 to 20 mA @500 Ω Max
Accuracy	±0.025% Of Full Span

2.5 Supply Voltage	
Supply Voltage	85 To 265V Ac, 50/60hz
Optional	18 To 36 V Dc.
Power Consumption	<10VA

Isolation (Withstanding voltage)
Between primary terminals* and secondary terminals**: At least 1500 V AC for 1 minute
Between secondary terminals**: At least 500 V AC for 1 minute

Insulation resistance: Between Power supply terminal and ground terminal, 500V DC 50 MΩ

Note: primary terminals indicate power terminals and relay output terminals.
Secondary terminals indicate I/O terminals and Communication Port

2.6 Environment	
Operating Temperature	0 to 55°C
Storage Temperature	0 to 70°C
Humidity	30 to 90% RH (non-condensing)
Warm Up Time	>10min
Effect Of Ambient Temperature	For Voltage Input: ± 0.005% of FS/ °C or less, For Analog output: ± 0.010% of FS/ °C or less

2.7 Physical	
Material	ABS Plastic
Color	Black
Mounting Method	Panel Mounting
Size W X H X D	96mm(W) X 48mm(H) X 110mm(D)
Panel Cut-Out	92(W) mm X 44(H) mm
Weight	260 Grams (Approx.)

2.8 Communication	
Communication Interface	Based on EIA RS-485
Communication method	2 wire half duplex (RS 485) communication, start stop ,synchronous
Communication Speed (baud rate)	9600/19200/38400bps (selectable by key)
Parity	None
Communication protocol	Modbus RTU.
Connectable number of unit	Max.32 unit per host computer
Communication Error Detection	CRC Check

2.9 Transmitter Power Supply	
Transmitter Power Supply	24V DC ± 5% @ 50mA (±10 % accuracy)

2.10 Isolation Specifications
Retransmission Output Terminal - Isolated From Other Input/output Terminal And Internal Circuit Relay Contact Output Terminal/RS-485 Communication Terminal/Power Supply

3. TERMINAL CONNECTIONS

BACK TERMINAL DETAILS					
1	LINE	MAINS 85-265 VAC	9	PULSE -VE	
2	NEUTRAL		10	PULSE +VE	
3	EARTH		11	+24VDC(50mA)	
4	RELAY-1	RELAYS OUTPUT	12	GND	
5	RELAY-2		13	D +	RS-485 SERIAL
6	RELAY COM.		14	D -	
7	NC		15	OUT +	CURRENT O/P 4-20mA
8	NC		16	OUT -	
INPUT : ☐ 0-166.6Hz OUTPUT : ☐RELAY ☐485 SERIAL ☐4-20mA					
FOR PULSE I/P- PNP:SHORT 9-12 , NPN:SHORT 10&11					

Fig 3.1: Terminal Connection Detail

Terminal Details			
No.	Details	No.	Details
1	Line of AC Supply Voltage	9	Pulse –VE
2	Natural of AC Supply Voltage	10	Pulse +VE
3	Earth	11	+24VDC (50mA)
4	Realy-1	12	GND
5	Realy-2	13	D+ RS-485 SERIAL
6	Relay Common contact	14	D- RS-485 SERIAL
7	(NC) Not connected	15	OUT + current o/p 4-20mA
8	(NC) Not connected	16	OUT - current o/p 4-20mA

3.1 How to connect wires

Before carrying out wiring, turn off the power to the controller and check that the cables to be connected are not alive because there is a possibility of electric shock.

NOTE:

- ✓ All wiring must confirm to appropriate standards of good practice and local codes and regulations. Wiring must be suitable for Voltage, Current and temperature rating of the system.
- ✓ Provide power from a single-phase instrument power supply. If there is a lot of noise in the power line, insert an insulating transformer into the primary side of the line and use a line filter on the secondary side. Do not place the primary and secondary power cables close to each other.
- ✓ Use repeater after each set of 32 instruments connected in RS-485 Communication.
- ✓ Unused terminals should not be used as jumper points as they may be internally connected, which may cause damage to the unit.
- ✓ Unused control terminals should not be used as jumper points as they may be internally connected, which may cause damage to the unit.
- ✓ Use >250V-1Amp Cable for Power Supply.
- ✓ Supply voltage must be below maximum voltage rating specified on the label.

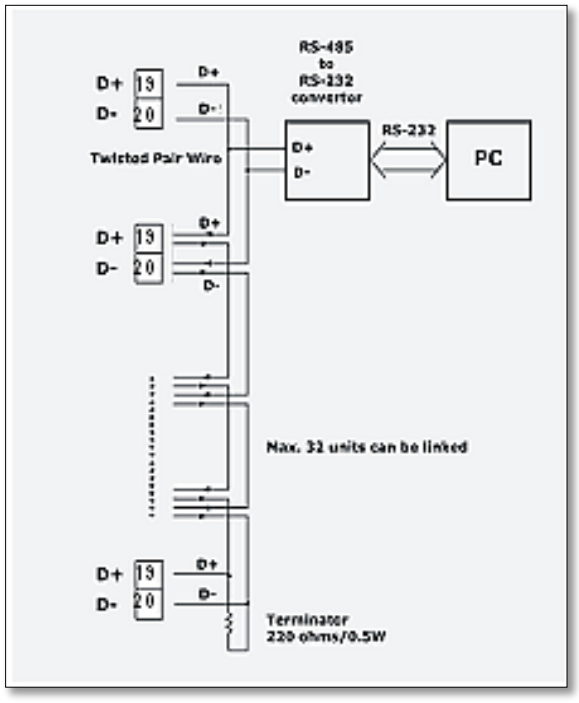


Fig 3.2:

4. FRONT PANEL DETAILS

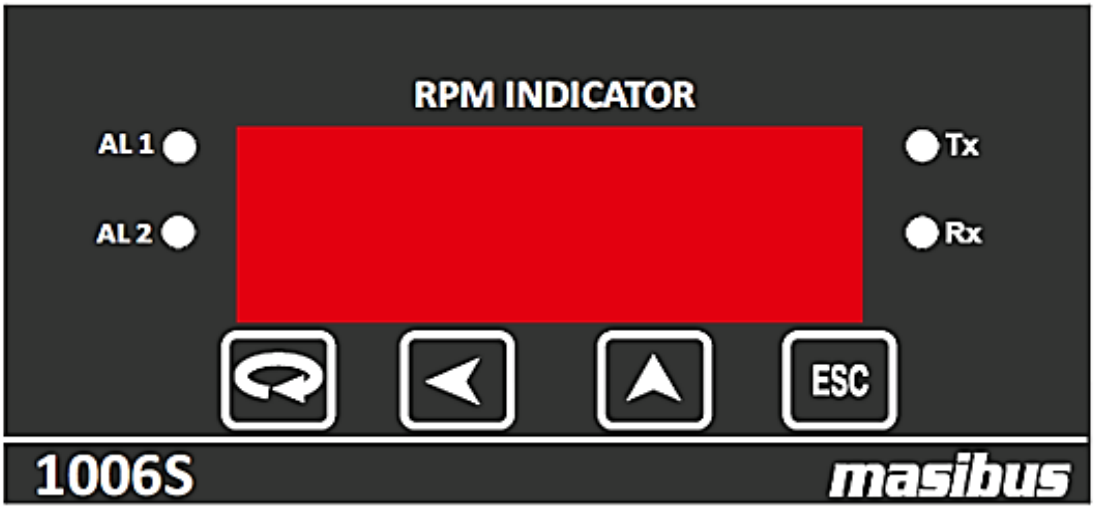


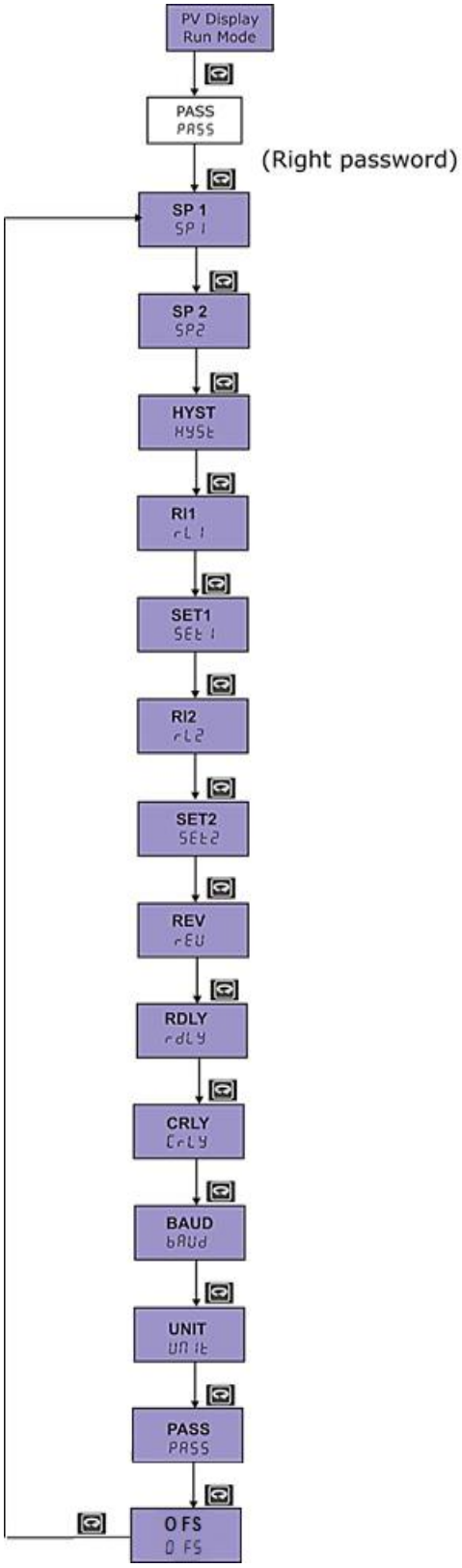
Fig 4.1:

4.1 Front Panel Description

Name of Part	Symbol	Function
Increase Key		• Increment the Value of any Parameter.
Escape key		• Shift Digit while changing value of any parameter.
Enter Key		• In RUN mode, used to enter in Password protected menu mode. • In Sub Menu it can be used to get to the next Parameter. • It is also used to save the parameters to nonvolatile memory, when user setting a proper data by Increment and shift key for parameter configuration.
Escape Key		• It works as escape key, if unit is not in RUN mode.
Alarm-1	AL1	• ON when Relay-1 is energized & OFF otherwise.
Alarm-2	AL2	• ON when Relay-2 is energized & OFF otherwise.
TX Indication	TX	• ON when device is transmitting some Data (RS-485).
RX Indication	Rx	• ON when device is receiving some Data (RS-485).

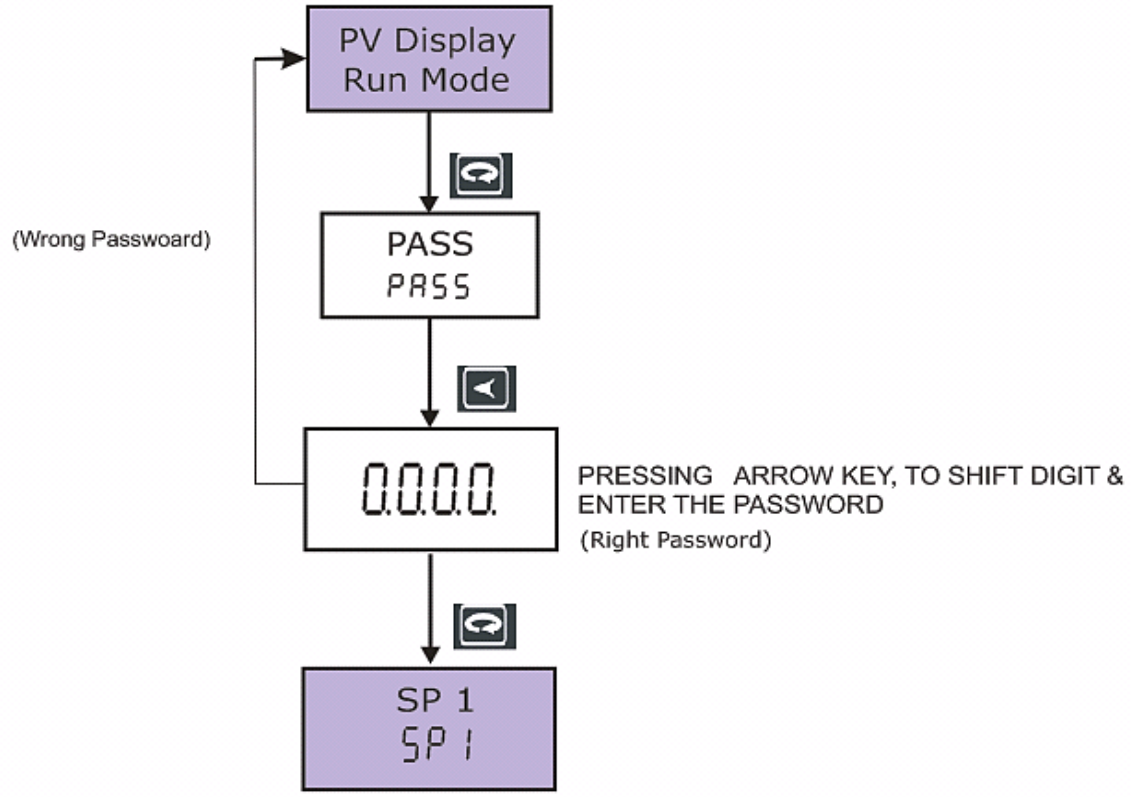
5. MENU LAYOUT

5.1 Menu Layout



5.2 EXAMPLE:

How to set password:-



(NOTE: For coming back to RUN mode from any where in the Menu Press ESC)

5.3 Display Parameter list

If Password is 0000 or as set by user

NAME	PARAMETER	VALUES
Set Point 1	SP 1	0000 - 9999
Set Point 2	SP 2	0000 - 9999
Hysteresis	HYST	0000 - 9999
Relay-1 Selection	RL1	HI , LO
Relay-1 setting	SET1	L YES , L NO , TRIP
Relay-2 Selection	RL2	HI , LO
Relay-2 setting	SET2	L YES ,L NO , TRIP
No Of revaluation	REV	1 - 255
Relay Delay	R DLY	0 - 9999
Control Relay	C RLY	ON /OFF
Baud rate	BUAD	9600 , 19200 , 38400
Unit Num	UNIT	1 - 255
Set Password	PASS	0000 - 9999
Out Full scale	O FS	0000 - 9999

Table.1

If Password is 1234

NAME	PARAMETER	VALUES
Out zero	OUT Z	0000 - 4000
Out span	OUT S	0000 - 4000
Default Out	D OUT	YES/NO

Table.2

5.4 Display Parameter Description

When display shows "PASS" press EDT/ENTER key to select Password selection If Password entered is 0000 or as set by user. The display parameter shows are as following:

SET POINT 1:
SET POINT 2:
When display shows "SP1" or "SP2" press EDIT/ENTER key to EDIT the value of set point. Display will show previously entered value of set point .Use UP key to increase the value and SHIFT key to shift the digit from next segment. Press ENTER key to store the value in memory and come out from the submenu of set point 1/set point2, display will be "SP1" or "SP2" depending up on selected set point .Maximum value of set points max 9999 and minimum value of set points be 0.

HYSTERESIS:
Hysteresis value is common for both alarms. When display shows "hyst" press EDIT/ENTER key to enter the value of hysteresis. Display will show previously entered value of hysteresis .Use UP key to increase the value and SHIFT key to shift the digit from next segment. Value of hysteresis can vary from 0(Min)-9999(Max), press EDIT/ENTER key to store the value in memory and to come out from the submenu of hysteresis, display will be "hyst".

RELAY-1 *SELECTION:*
RELAY-2 *SELECTION:*
When display shows "RL1" or "RL2" press EDIT/ENTER key to select Alarm Relay selection. Display will show previously selected Alarm. Use UP key to change the selection "HI" or "LO". Press ENTER key to store the selected item in memory and come out from the submenu of RELAY-1 SELECTION / RELAY-1 SELECTION, display will be "RL1" or "RL2" depending up on selected Alarm Relay.

HI:
When RPM is higher than high alarm set value SP1 and SP2, high alarm relay1 and relay2 will switch on. When RPM is lower than high alarm set value SP1 and SP2, high alarm relay 1 and relay 2 will switch off

LO:
When RPM is lower than low alarm set value SP1 and SP2, low alarm relay 1 and relay 2 will switch on. When RPM is higher than low alarm set value SP1 and SP2, low alarm relay 1 and relay 2 will switch off

RELAT-1 SETTING:
RELAT-2 SETTING:

When display shows either "SET1" or "SET2" and user presses ENTER key display message will be
Either Latch yes "L YES" or Latch no "L NO" or "TRIP" depending up on previously selected logic.
The submenus of either Latch yes "L YES" or Latch no "L NO" or "TRIP" are as shown in following tables.1 for HI Alarm or tables.2 for LO Alarm.

Condition			Normal	Abnormal	ACK
High	Alarm Latch (L Yes)	LED	OFF	FLASH	-
		Relay1	OFF	ON	-
	Alarm Latch (L No)	LED	OFF	ON	-
		Relay1	OFF	ON	-
	Trip	LED	OFF	FLASH	YES
		Relay1	OFF	ON	-

Table.1

Condition			Normal	Abnormal	ACK
Low	Alarm Latch(Yes)	LED	OFF	FLASH	-
		Relay1	OFF	ON	-
	Alarm Latch(No)	LED	OFF	ON	-
		Relay1	OFF	ON	-
	Trip	LED	OFF	FLASH	YES
		Relay1	OFF	ON	-

Table.2

LATCH YES (L YES):
LATCH NO (L NO):
TRIP:

Relay setting selection is "TRIP" and alarm condition is abnormal LED are flashing after Alarm relay is normal when ESC Button 3 sec continue pressed ACK occurred but Alarm relay is abnormal when ESC Button 3 sec continue pressed ACK not occurred .

NO OF REVALUATION:

When display shows "REV" press EDIT/ENTER key to EDIT the value of No Of revaluation. Display will show previously entered value of No Of revaluation. Use UP key to increase the value and SHIFT key to shift the digit from next segment. Press ENTER Key to store the value in memory and come out from the submenu of No Of revaluation .Maximum value of Relay Delay max 255 and minimum value of Relay Delay be 0.
This Parameters used for encoders determine rotary position by generating a specific number of pulses per revolution (PPR) and counting those pulses.

RPM = Frequency * 60;
SMIT-1006S Display shows value = (RPM/ REV);

BAUD RATE:

This is used to select baud rate for communication. When display shows "BAUD" and user presses ENTER key display can be either of "9600", "19200", or "38400" depending up on previously selected value. Press UP key to change the selection "9.6", "12.2" and "38.4" baud rate. Press ENTER key to store the selected item in memory and come out from the submenu of "BAUD".

UNIT NUM:

This value is for slave ID /Node address selection. When display shows "UNIT" press ENTER key to enter the value of serial number. Display will show previously entered value of Slave unit number. .Use UP key to increase the value and SHIFT key to shift the

digit from next segment. Press ENTER key to store the value in memory and come out from the submenu of Unit Number, Maximum value is 255 and minimum value is 1.

RELAY DELAY:

When display shows "R DLY" press EDIT/ENTER key to EDIT the value of Relay Delay. Display will show previously entered value of Relay Delay. Use UP key to increase the value and SHIFT key to shift the digit from next segment. Press ENTER key to store the value in memory and come out from the submenu of Relay Delay .Maximum value of Relay Delay max 9999 and minimum value of Relay Delay be 0.
Relay delay is the parameter used to set the delay (second) in the operation of relays (both 1&2).Minimum value of delay is 0(second) and maximum value 9999 (second) can be configured Using keyboard.

CONTROL RELAY:

When display shows "C rly" and user presses ENTER key display message will be either "on" or "Off" depending up on previously selected logic. If display shows "on" then by pressing UP key display changes to "off" and even after user presses UP key last display will be "on". Similarly, Press ENTER key to store the value in memory and come out from the submenu of Control Relay. Control relay "OFF" then relay will function according to the condition mention in the following Tables 1 and tables 2.Control relay "ON" then functioning of relay will be just opposite to the condition mention in the Tables 2 and tables 3.LED functioning will be as mention in the tables 2 and tables 3 i.e. no change in the LED status.

PASSWOARD:

When display shows "PASS" press EDIT/ENTER key to select Password selection But it will always show '0000'.User has to remember the password .If user needs to change password, then go in 'pass' parameter, enter the required password and press EDIT/ENTER key to store the value in memory and to come out from the submenu of Password.

For e.g.: If user enters '1234' in 'pass' parameter, then, to enter in EDIT mode, a password '1234'is to be entered.

Out Full-scale:

When display shows "O FS" press EDIT/ENTER key to select O FS selection. Use UP key to increase the value and SHIFT key to shift the digit from next segment. Press ENTER key to store the value in memory .Maximum Value is 9999 and minimum value is 0000.

If Password entered is 1234. The display parameter shows are as following:

Out Zero:
Out Span:

These two parameter are used for the calibration of re-transmission output. Users have to change the value of out zero and out span for the zero setting (for 4mA) and span setting (20 mA) respectively for re-transmission output.

DEFAULT OUT:

This parameter will used for default Output set. if default parameter select YES Outzero and Outspan default set 800 and 4000.

6. COMMUNICATION PROTOCOL–MODBUS RTU

6.1 Introduction

The unit can be connected in RS-485 communication data link either in multi drop or repeat mode. Each unit must have unique Serial Number. Entire range of addresses (1 to 247) may be used. Before starting any communication, choose a baud rate compatible to the host computer. The serial protocol used is MODBUS RTU.

Function Code for Modbus

CODE	NAME	Function
01	Read coil status	Use to read Relay and Digital output status
03	Read Holding registers	Use to read programmable registers
04	Read input registers	Use to read PV, Control op etc.
06	Preset Single register	Use to write programmable register

The error checking field contains a 16-bit value implemented as two eight-bit bytes. The error check value is the result of a Cyclical Redundancy Check (CRC) calculation performed on the message contents.

6.2 Parameter Address Details

Function Code (0x01)

Sr. No.	Parameters	Absolute Address	Type	Access Type
1	Relay Status-1	1	Int	R+W
2	Relay Status-1	2	Int	Read Only

Function Code (0x02)

Sr. No.	Parameters	Absolute Address	Type	Access Type
1	Alarm Status-1	1001	Int	Read Only
2	Alarm Staus-2	1002	Int	Read Only

Function Code (0x04)

Sr. No.	Parameters	Absolute Address	Type	Access Type
1	RPM value	30001	Int	Read Only
2	Pulse Count	30002	Int	Read Only

Function Code (0x03)

Sr. No.	Parameters	Absolute Address	Type	Access Type
1	Low Alarm	40000	Int	R + W
2	High Alarm	40001	Int	R + W
3	Hysteresis	40002	Int	R + W
4	Relay-1 Selection	40003	Int	R + W
5	Relay-1 Setting	40004	Int	R + W
6	Relay-2 Selection	40005	Int	R + W
7	Relay-2 Setting	40006	Int	R + W
8	Num Of Revaluation	40007	Int	R + W
9	Baud Rate	40008	Int	R + W
10	Unit Num	40009	Int	R + W
11	Relay Delay	40010	Int	R + W
12	Control Relay	40011	Int	R + W
13	Full-Scale	40012	Int	R + W
14	Out Zero	40013	Int	R + W
15	Out Span	40014	Int	R + W
16	Default Out	40015	Int	R + W

6.3 RPM equation:

$$Value = \frac{\text{Frequncey} * 60}{\text{Num of Revaluation}}$$

7. APPENDIX

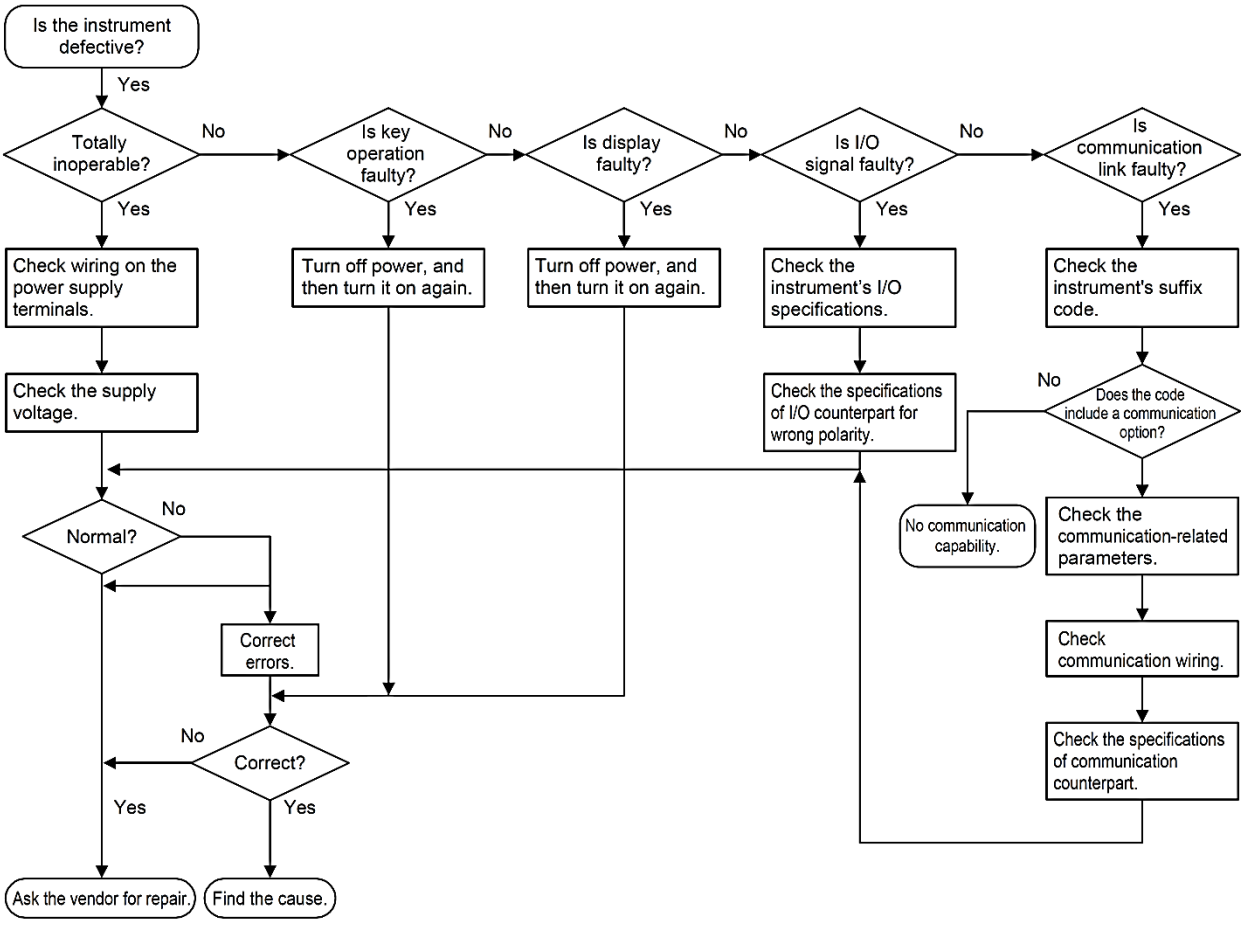
7.1 Troubleshooting

If the operating display does not appear after turning on the controller's power, follow the measures in the procedure below.

If a problem appears complicated, contact our sales representative.

IMPORTANT

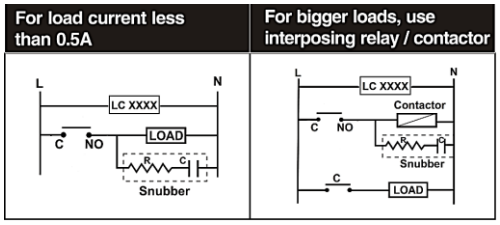
Take note of the parameter settings when asking the vendor for repair.



7.2 Retransmission Output Table for OPEN /OVER /UNDER Condition

RETRASMISSION	VARIABLE	SCALE	ACTION	OPEN	OVER	UNDER
4-20mA	PV	UP	DIR	20.8	20.8	3.2
	PV	DOWN	REV	3.2	3.2	20.8
	PV	UP	REV	20.8	3.2	20.8
	PV	DOWN	DIR	3.2	20.8	3.2
1-5V	PV	UP	DIR	5.2V	5.2V	0.8V
	PV	DOWN	REV	0.8V	0.8V	5.2V
	PV	UP	REV	5.2V	0.8V	5.2V
	PV	DOWN	DIR	0.8V	5.2V	0.8V

7.3 Load connection



Electrical precautions during use

Electrical noise generated by switching of inductive loads can create momentary disruption, erratic display, and latch up, data loss or permanent damage to the instrument. Use of snubber circuits across loads as shown above, is recommended.