User's Manual

409-W Strain Gauge Indicator

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1. Introduction

1.1 Product Overview/Description

409-W is a powerful micro-controller based strain gauge indicator, designed to accept strain gauges, load cells, force transducers, pressure transducers or similar devices as an input and two programmable set points with individual relays. Model 409-W is easy to operate and configuration is user friendly.

1.2 Model and Suffix code

Check the model and suffix codes to confirm that the product received is the one which was ordered.

1.3 Accessory

The product is provided with the following accessory. (See the table 2 below).

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

Table 1.1

2. Safety/Warning Precaution

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.*

3. Front Panel Description

3.1 Keyboard and Operation

There are four keys for operation of the instruments. For understanding the operation first of all understand the functionality of keys as shown in Fig.1.

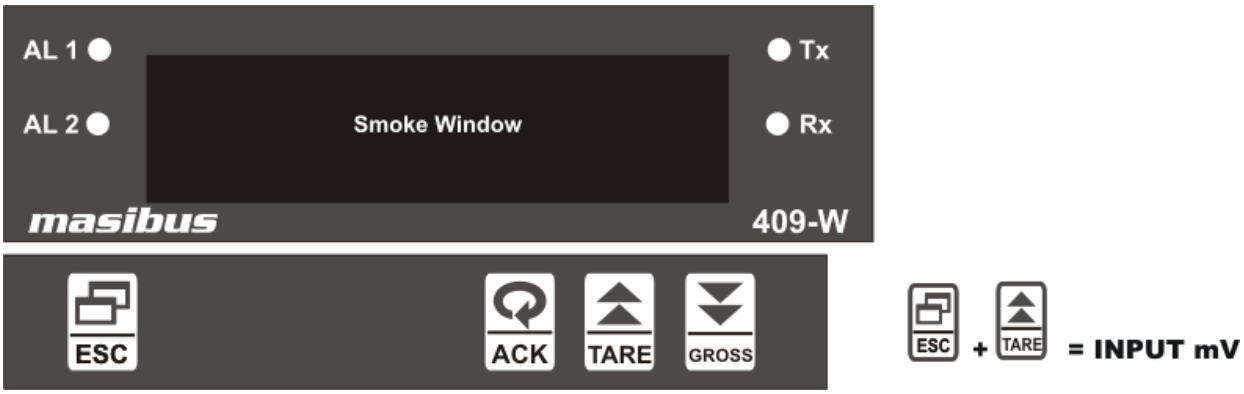


Fig 3.1. Front Panel 409-W

MENU key: It is used to come out from the main or sub menu.

Menu + UP key is used to see mV in run mode.

ENTER key: It is used to select the desired parameter in various operating Mode. After setting the data to proper value, by increment or decrement key, it is used to enter the value of the selected parameter in memory.

It is used for alarm acknowledgment in run mode.

UP key: It is used to increment the parameter for selection. Value of Parameter can be incremented by pressing this key. If the key is pressed continuously for more than 10 counts change, the rate of increment will be made faster. This facility is to allow faster data change for higher values.

Long press up to 7 sec will TARE the weight for SGI input.

DOWN key: It is used to decrement the parameter for selection. Value of parameter can be decremented by pressing this key. If the key is pressed continuously for more than 10 counts change, the rate of decrement will be made faster. This facility is to allow faster data change for higher values.

It is used to display Gross value in run mode for SGI input.

Communication Status lamps: Lamps will blink when communication is on.

Alarm status lamps: When alarm occurs respective alarm lamp will on.

4. Panel Cutout Dimension

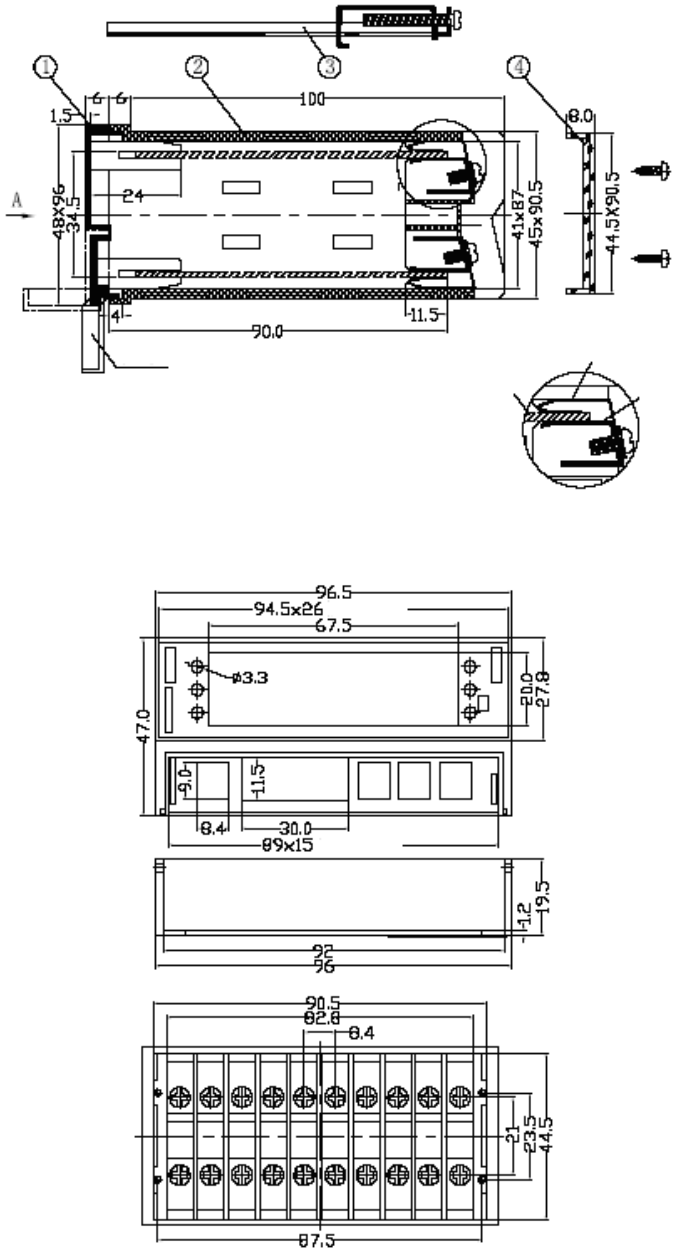


Fig 4.1.Panel cut out for 409-W

5. Sticker details

5.1 Terminal Arrangement Diagram

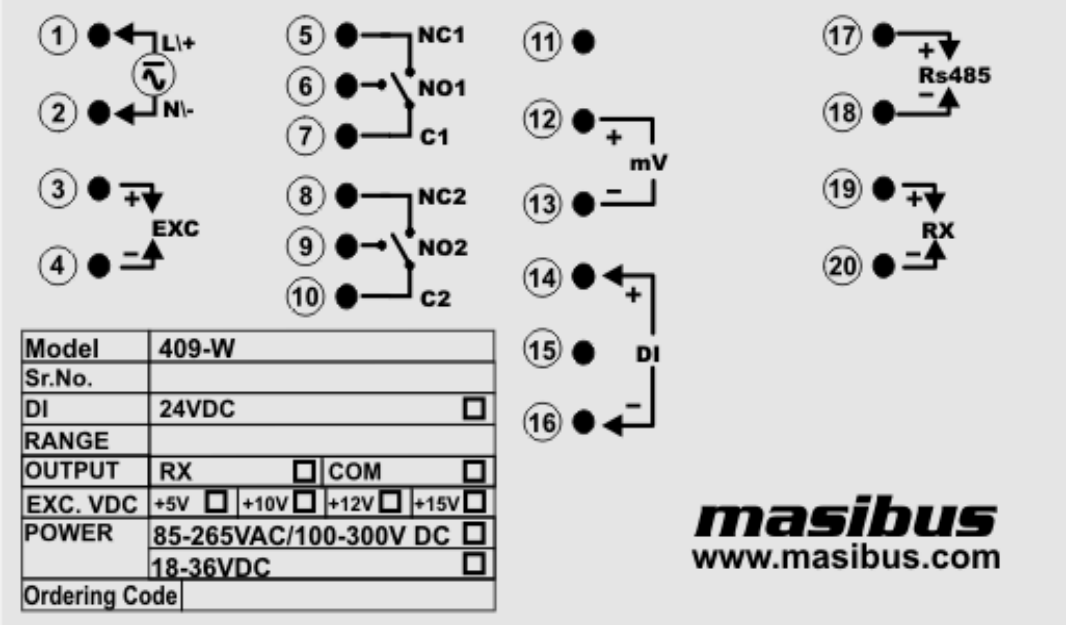


Fig 5.1. Terminal arrangement for 409-W

5.2 Connection diagram for SGI Input

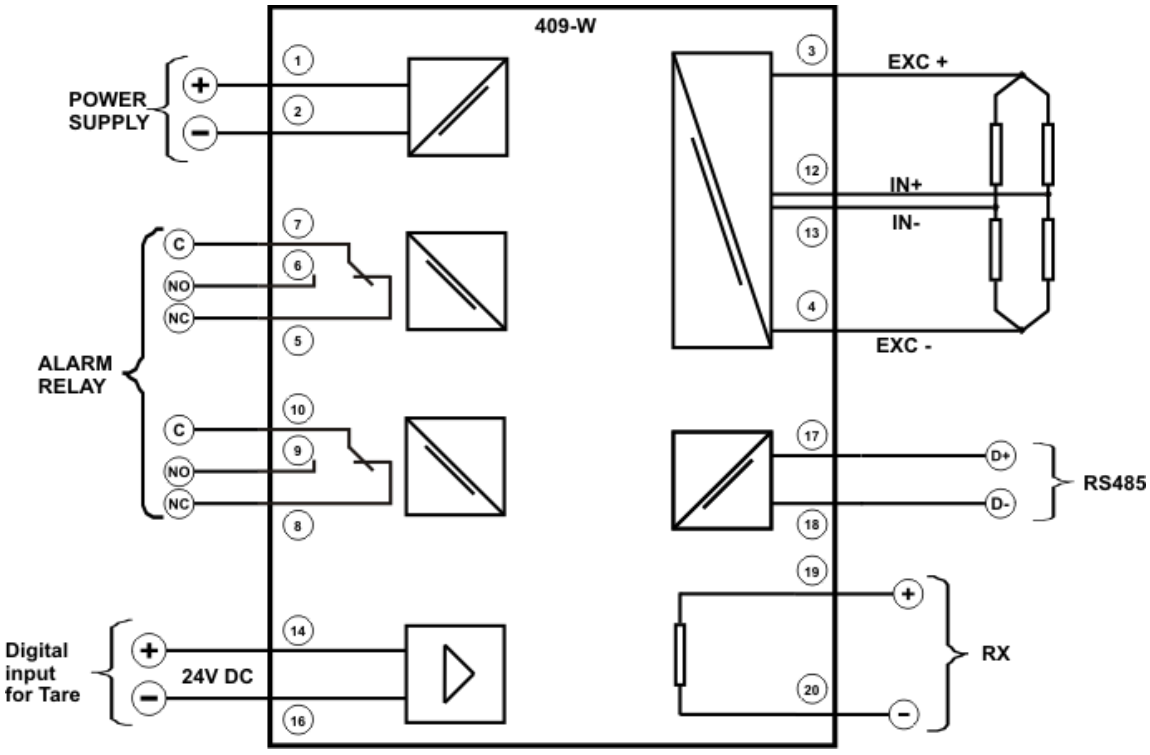


Fig 5.2. Connection diagram for 409-W

6. Configuration Guidelines

6.1 Menu Parameter List

Display	Name	Description	Default Value
RESO (rESO)	Resolution	Set position of Decimal Point on Display. 0 : 0 1 : .0 2 : .00 3 : .000 4 : .0000	.0
MAXMV* (mAIImu)	Maximum Mv range	Set mV range for resolution. 0: 15mu 1 : 30mu 2 : 75mu	30mu
OFST (OFSt)	Offset	Set offset value for weight -9999 to 9999	0 .0
KTARE (KtArE)	Keypad Tare option	Set value to enable or disable Key tare 0: d,Sb 1: En	En
ZTARE (ZtArE)	Zero Tare	set to clear Tare 0: nO 1: YES	nO
STEP (StEP)	Step value	Set steps for display increment 0: OFF 1: 2 2: 5 3: 10	OFF
Rtr	**Retransmission**		
RET V (rEtu)	Retransmission voltage	Retransmission Output Type This output is according to PV input. Zero & Span acts as Min & Max value of retransmission o/p scale respectively. 0 : 0- 10u 1 : 0-5u 2 : 1-5u Voltage or Current is Jumper Selectable from the Hardware.	0- 10

RETmA (rEtmA)	Retransmission current	Retransmission Output Type This output is according to PV input. Zero & Span acts as Min & Max value of retransmission o/p scale respectively. 0 : 4-20mA 1 : 0-20mA Voltage or Current is Jumper Selectable from the Hardware.	4-20mA
OPZ **(OP 2)**	Output Zero	Set output zero for retransmission scaling	0 .0
OP S **(OP S)**	Output Span	Set output span for retransmission scaling	200 .0
R MAPP **(r mAPP)**	RET map	Set value for retransmission mapping 0: nEt 1: Gross	0
Alarm	**Alarm Logic**		
ATYP (AtyP)	Alarm Type	Set which Set Point to shown in SV display in RUN mode while device is in Auto Mode 0 : HH 1 : HL 2 : LL	LL
SEL **(SEL)**		Selection for Alarm 1 & 2. 0: AL 1 1: AL2	-
Al1/AL2 **(AL 1/AL2)**	Alarm 1/Alarm 2	Set which Set Point to shown in SV display in RUN mode while device is in Auto Mode 0 : ALrm 1 : tr IP	ALrm
LACH (LACH)	Latch	Enable or Disable Latch 0 : YES 1 : NO	NO
HYST (HYSt)	Hysteresis	Hysteresis Value for Relay 0.000 to 0.255 1 to 255 — Resolution = 0 0 .1 to 25 .5 — Resolution = 0.0 0 .01 to 2 .55 — Resolution = 0.00	0 .1

		0.001 to 0.255 — Resolution = 0.000 0.0001 to 0.0255 — Resolution = 0.0000	
OPES (oPES)	OPEN Sensor Status	Set Control O/P & Retransmission state when Input OPEN condition. 0 : UP 1 : dOWN	UP
ST-1 **(St-1)**	Set Point 1	Range Depending on PV sensor type selected	10.0
ST-2 **(St-2)**	Set Point 2	Range Depending on PV sensor type selected	10.0
RDLY (rdLY)	Relay Delay (For Relay)	Relay Delay is amount of time (in sec), that Relay will wait before getting ON after the ON condition occurs. 0 to 9999 sec	0 SEc
CTRI (CtrL)	Control Relay	Select Control Relay Status 0 : ON 1 : OFF	OFF
COM	**Communication**		
SRNO (Srno)	Serial No	Unit ID for Modbus-RS485 Communication 1 to 247	1
BAUD (bAUd)	Baud Rate	Set Modbus RS485 Communication Baud Rate 0 : 4800 (4800 bps) 1 : 9600 (9600 bps) 2 : 19.2K (19200bps) 3 : 38.4K (38400bps)	9600
PRST **(PrSt)**	Parity/Stop bit	Set Parity and Stop bit 0 : PnS1 1 : PnS2 2 : POS1 3 : POS2 4 : PES1 5 : PES2	PnS1
FLTR (FLtr)	Filter	Filter is time (in sec), that PV will wait before getting to its value after filter set. 0-60 sec	0
BRHT	Brightness	Adjust Brightness of the 7-segment Display.	100

(brHt)		10 to 100	
F-CNT (F-CNt)	Filter count	IIR Filter is apply for sated count only. 0-500	20
ALPHA (ALPHA)	Alpha	Set alpha for IIR Filter. 0- 100	0
M-CNT (ñ-CNt)	Average Count	Moving Average Filter is apply for sated count only. 0-500	20
PASS (PASS)	Password	Set Device Password 0 to 9999	1
CAL**	**Calibration**		
CALIB (CAL Ib)	Calibration methods	Set calibration method. 0 : S-üGt (Sample weight calibration method) 1 : tH-ñu (theoretical mV calibration method)	S-üGt
RESO (rESO)	Resolution	Set position of Decimal Point on Display. 0 : 0 1 : .0 2 : .00 3 : .000 4 : .0000	.00
[1]ZERO (2Ero)	Zero	Can be set to any value within the Input Range & less the SPAN Value.	0 .00
SPAN (SPAn)	Span	Can be set to any value within the Input Range & greater the ZERO Value.	200 .00
[2]mV-FS (ñu-FS)	Full span mV	Can be set to any value within the input mV range.	20 .000
[2]CALZ (CAL2)	Calibrate zero theory mV	Set above calibration parameters as per requirement Press DOWN key to calibrate ZERO	ProcESS uALUE
[1]SMP-W (SñP-ü)	Sample weight calibration	Set above calibration parameters as per requirement, Press DOWN key to calibrate ZERO press UP key to calibrate SPAN	ProcESS uALUE

Table 6.1

[1]Display only if method is S-üGt .

[2]Display only if method is tH-ñu .

Note 1: For SGI input DI is used to Tare the weight. When 24V Signal is applied momentarily at the DI terminal, it will tare the weight.

Note 2: * maximum mV read from input, select

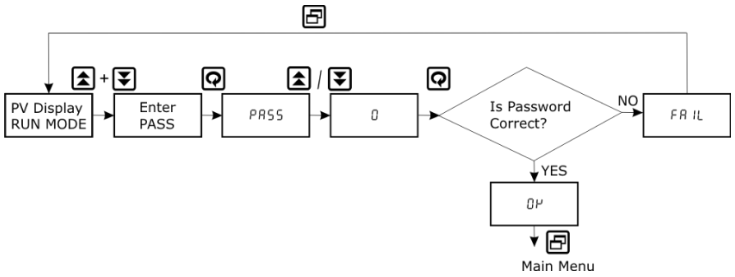
1. 15mV for 0-15mV
2. 30mV for 0-30mV
3. 75mV for 0-75mV

Note 3: ** initial settings

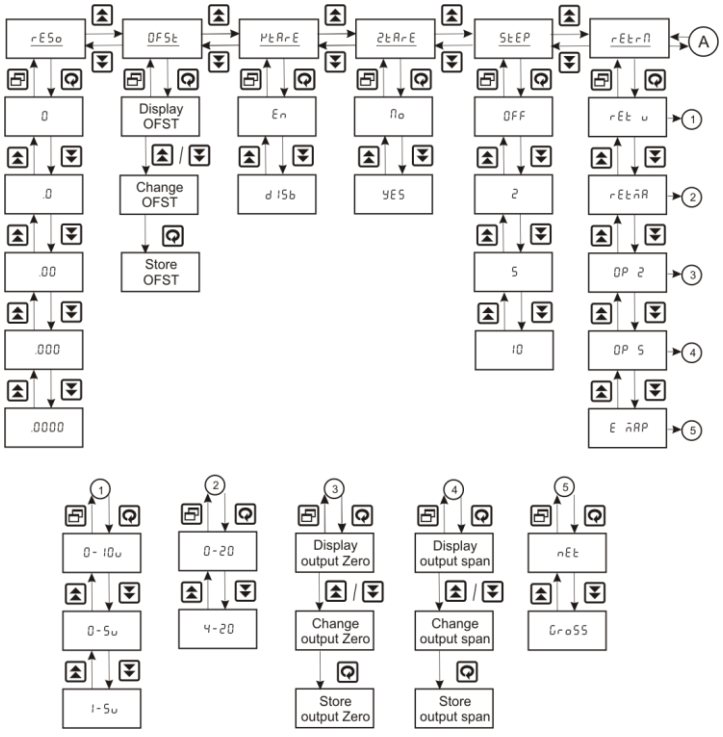
Parameters	Set value
Resolution	0.00
Scaling input zero mV	0.0mV
Scaling input Display Zero	0.00
Scaling input span mV	20.0000mV
Scaling input Display Span	200.00

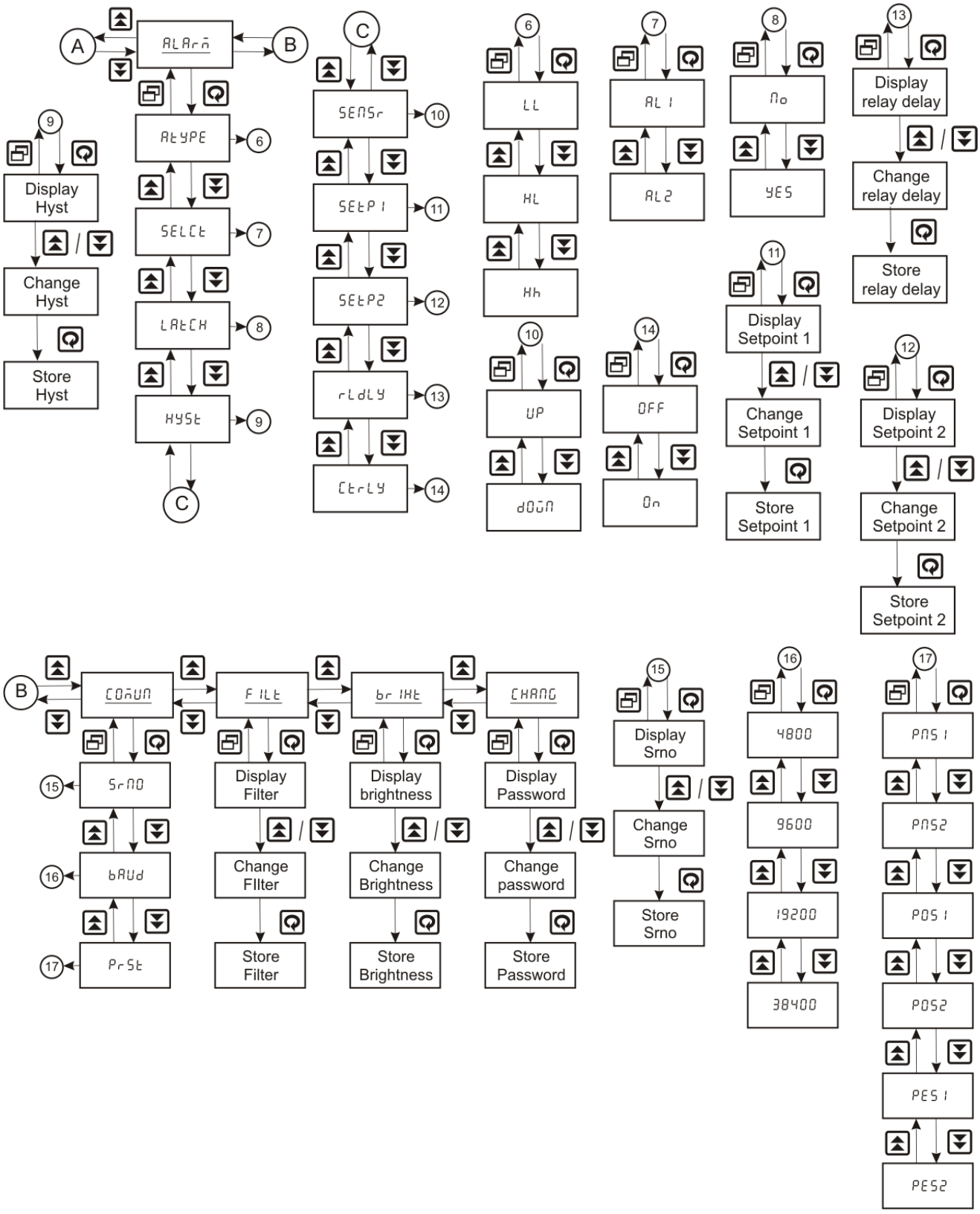
Table 6.2

6.2 Menu Layout for 409-W



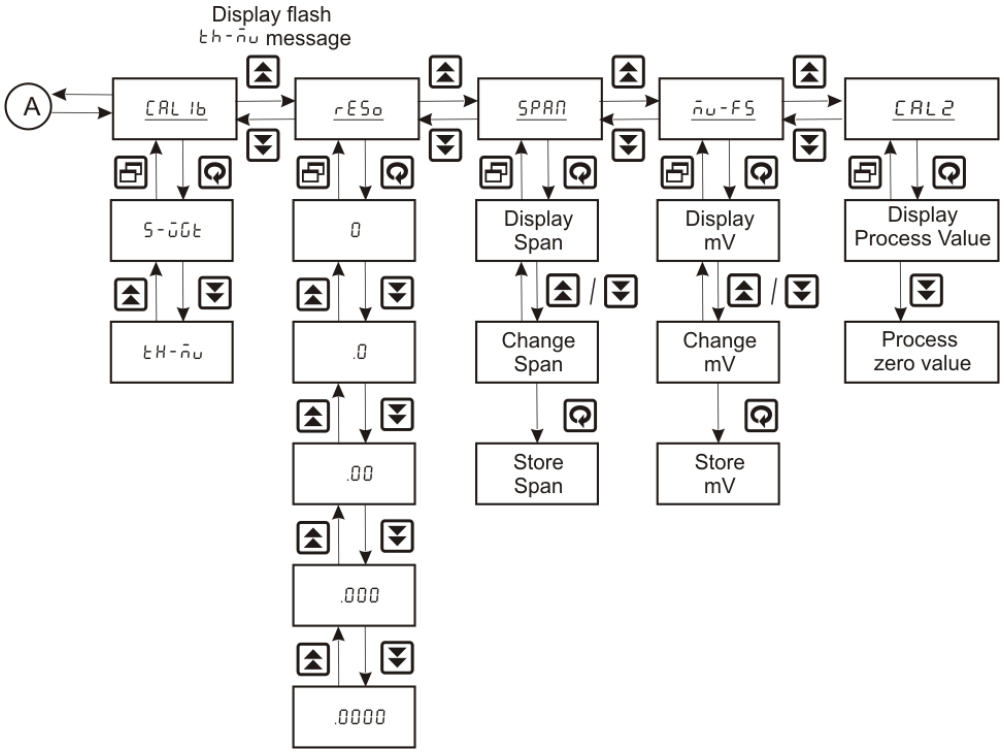
6.3 Main Menu for 409-W



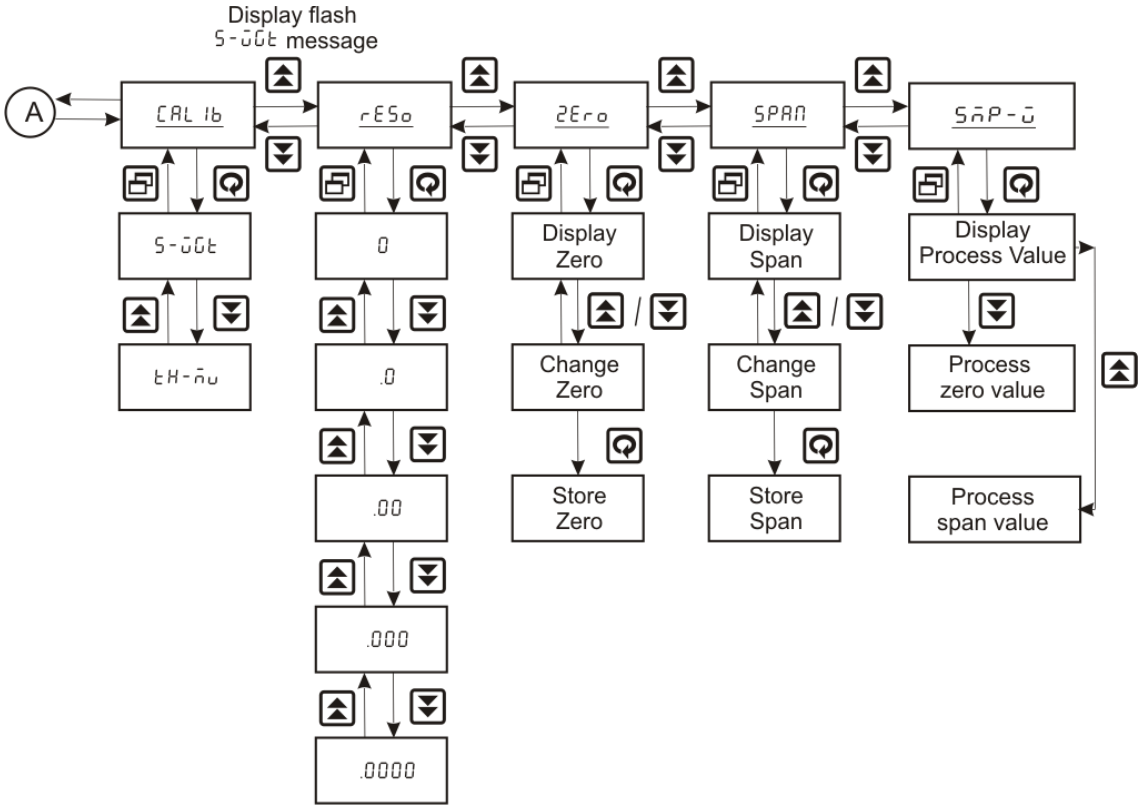

A
ALArn
B
C
9
Display Hyst
Change Hyst
Store Hyst
AtYPE
6
SELCt
7
LAtCH
8
HYSt
9
C
SENSr
10
SEtP1
11
SEtP2
12
rLdLY
13
CtrLY
14
6
LL
HL
Hh
10
UP
dOUn
7
AL1
AL2
14
OFF
On
8
no
YES
11
Display Setpoint 1
Change Setpoint 1
Store Setpoint 1
13
Display relay delay
Change relay delay
Store relay delay
12
Display Setpoint 2
Change Setpoint 2
Store Setpoint 2
B
CONUn
FILt
brIHt
CHANG
15
SrNO
16
bAUd
17
PrSt
Display Filter
Change FIlter
Store Filter
Display brightness
Change Brightness
Store Brightness
Display Password
Change password
Store Password
15
Display Srno
Change Srno
Store Srno
16
4800
9600
19200
38400
17
PNS1
PNS2
POS1
POS2
PES1
PES2

6.4 Calibration menu

- Theoretical mV calibration method



- Sample weight calibration method



7. Alarm Operation

7.1 Alarm type

HH-high, very high AL1-high, AL2-very high

HL-high, low AL1-low, AL2-high.

LL-very low, low AL1-very low, AL2-low.

This setting is common for all groups.

7.2 Status of ALARM/TRIP

It will toggle between ALARM and TRIP depending up on selection in menu. ALARM mode is further subdivided into Alarm with Latch and Alarm without Latch.

TRIP is useful when the relay is used for tripping the plant or device and it is not to be started once again. Open condition is treated as normal condition in TRIP type.

7.3 Latching of ALARM

This is used for latching of discrete LEDs and relay status when alarm limit is crossed. This option will keep discrete LEDs/Relay latched even after channel has come to normal status until ENTER (ACK) key is pressed. This option can be changed to YES or NO for enabling or disabling respectively. When configurations of Alarms are of TRIP type, these parameters will be skipped from display. Different conditions for the ALARM/TRIP have been mentioned in the following table 7.4, 7.5, 7.6, 7.7.

7.4 HH Logic

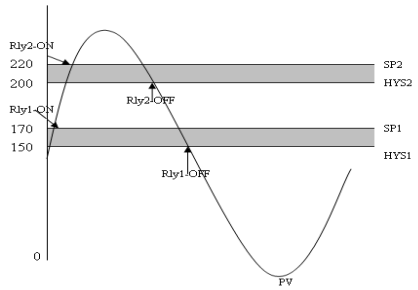


Fig 7.1

HH-high, very high. AL1-high, AL2-very high

AL1-High, AL2-Very High

SP2>SP1

If PV>SP1 but, less than SP2 => Relay 1- ON, Relay 2-OFF.

If PV<SP1-Hyst1 => Relay 1-OFF, Relay 2-OFF.

PV>SP2 => Relay1 and Relay2 both are ON.

If PV<SP2-Hyst2 but, >SP1 => Relay 1-ON, Relay 2-OFF.

Depending up on condition set i.e. Latch Yes/No, Acknowledge Yes/No or Trip refer table 7.4, 7.5, 7.6, 7.7.

7.5 HL Logic

HL-high,low AL1-low, AL2- high

Fig 7.2.

AL1-low, AL2- High

SP2>SP1

If PV>SP2 then Relay 2-ON.

If PV<SP2-Hyst2 => Relay 2-OFF.

PV<SP1 => Relay1 ON.

If PV>SP1+Hyst1 then. Relay 1-OFF.

Depending up on condition set i.e. Latch Yes/No, Acknowledge Yes/No or Trip refer tables 7.4, 7.5, 7.6, 7.7.

7.6 LL Logic

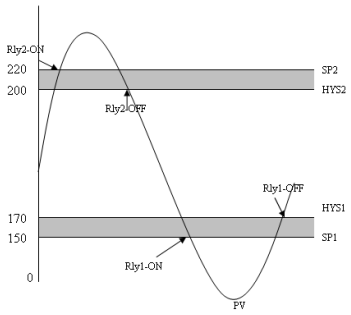
LL-low, low AL1- very low, AL2-low.

AL1- very Low, AL2-Low

SP2>SP1

If PV<SP1 then => Relay 1-ON, Relay 2-ON

Relay 1-ON till PV>SP1+HYS1 after that Relay 1-OFF.



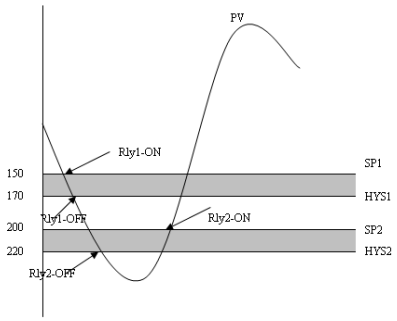
Relay 2-ON till PV>SP2+HYS2 after that Relay 2- OFF.

Fig 7.3.

Depending upon condition set i.e. Latch Yes/No, Acknowledge Yes/No or Trip refer tables 7.4, 7.5, 7.6, 7.7.

7.7 Open sensor UP scale/DOWN scale

This is used to define the state of the alarms in OPEN sensor condition. It can be configured as UP Scale or DOWN Scale by keys. This condition works if and only if OPEN sensor condition occurs. Suppose ,UP scale has been selected and “HH” logic is there then during OPEN sensor condition Relay 1 & 2 will be ON and Lamp will be FLASH as shown in tables 7.4, 7.5, 7.6, 7.7. If DOWN logic is selected then relays and Lamp will be OFF.



7.8 HH Logic

HH-high, very high. AL1-high, AL2-very high.

In this logic if “UP Scale” condition has been selected than in OPEN sensor condition ALARM 1 and ALARM 2 will be in the ABNORMAL condition and will work according to the following tables 7.4, 7.5, 7.6, 7.7.If “DOWN Scale” Condition has been selected for this logic than in OPEN sensor condition ALARM 1 and ALARM 2 will be in the NORMAL State of operation.

7.9 HL Logic

HL-high, low AL1-low, AL2-high.

In this logic if “UP Scale” condition has been selected than in OPEN sensor condition ALARM 2 will be in the ABNORMAL condition and ALARM 1 will be in the NORMAL condition will work according to the following tables 7.4, 7.5, 7.6, 7.7.If “DOWN Scale” Condition has been selected for this logic than in OPEN sensor condition ALARM 1 will be in the ABNORMAL condition and ALARM 2 will be in the NORMAL condition and will work according to the following tables.

7.10 LL Logic

LL-low, low AL1-very low, AL2-low.

In this logic if “UP Scale” condition has been selected than in OPEN sensor condition ALARM 1 and ALARM 2 will be in the NORMAL condition and will work according to the following tables 7.4, 7.5, 7.6, 7.7.If “DOWN Scale” Condition has been selected for this logic than in OPEN sensor condition ALARM 1 and ALARM 2 will be in the ABNORMAL State of operation.

7.11 Process value on Display

PV>105% OR PV< -5% OR PV open	-5%	0%	100%	105%	zero	span	mV group
OPEN	UNDER	-19999	99999	OVER	-19999	99999	15mV
OPEN	UNDER	-19999	99999	OVER	-19999	99999	30mV
OPEN	-250	0	5000	5250	0	5000	75mV
OPEN	-250	0	5000	5250	0	5000	30mV

Table 7.1.

Note: If maximum value of zero and span then process value will display OVER/UNDER message until value crosses 5% of selected group of mV(15mV or 30mV or 75mV). If value of zero and span is less than maximum value of zero and span then process value will display open message until value crosses 5% of selected group of mV (15mV or 30mV or 75mV). Process value greater than5% of selected group of mV (15mV or 30mV or 75mV) then display will show OPEN message. Retransmission o/p will follow 5% of display range and then it will give fixed o/p depending up on input OPEN sensor selection.

7.12 Retransmission output during OPEN sensor

I/P	0-20 mA O/P		4-20 mA O/P	
	UP Scale O/P	DW Scale O/P	UP Scale O/P	DW Scale O/P
SGI	21.00	0.0	20.8	3.2

Table 7.2.

I/P	0-10 V O/P		0-5 V O/P		1-5 V O/P	
	UP Scale O/P	DW Scale O/P	UP Scale O/P	DW Scale O/P	UP Scale O/P	DW Scale O/P
SGI	10.50	0.0	5.25	0.0	5.20	0.80

Table 7.3.

Above mention value in the table 7.2, 7.3 will come only after calibration for specific o/p type i.e. Voltage/Current.

7.13 Relay Delay

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.

7.14 Control Relay

Control relay “OFF” then relay will function according to the condition mention in the following tables. Control relay “ON” then functioning of relay will be just opposite to the condition mention in the table. Lamp functioning will be as mention in the table i.e. no change in the LED status.

Alarm AL1 (Momentary Alarm): when in abnormal condition ACK not pressed.

Condition			Normal	Abnormal	UP	DOWN	ACK**	Normal*	ACK***
High	Alarm Latch (Yes)	LAMP	OFF	FLASH	FLASH	OFF		FLASH	OFF
		RELAY	OFF	ON	ON	OFF		OFF	OFF
	Alarm Latch (No)	LAMP	OFF	FLASH	FLASH	OFF		OFF	OFF
		RELAY	OFF	ON	ON	OFF		OFF	OFF
	Trip	LAMP	OFF	FLASH	OFF	OFF		FLASH	OFF
		RELAY	OFF	ON	OFF	OFF		ON	OFF
Low	Alarm Latch (Yes)	LAMP	OFF	FLASH	OFF	FLASH		FLASH	OFF
		RELAY	OFF	ON	OFF	ON		OFF	OFF
	Alarm Latch (No)	LAMP	OFF	FLASH	OFF	FLASH		OFF	OFF
		RELAY	OFF	ON	OFF	ON		OFF	OFF
	Trip	LAMP	OFF	FLASH	OFF	OFF		FLASH	OFF
		RELAY	OFF	ON	OFF	OFF		ON	OFF
VLow	Alarm Latch(Yes)	LAMP	OFF	FLASH	OFF	FLASH		FLASH	OFF
		RELAY	OFF	ON	OFF	ON		OFF	OFF
	Alarm Latch(No)	LAMP	OFF	FLASH	OFF	FLASH		OFF	OFF
		RELAY	OFF	ON	OFF	ON		OFF	OFF

	Trip	LAMP	OFF	FLASH	OFF	OFF		FLASH	OFF
		RELAY	OFF	ON	OFF	OFF		ON	OFF

Table 7.4.

Alarm AL2 (Momentary Alarm): when in abnormal condition ACK not pressed.

Condition			**Normal**	**Abnormal**	**UP**	**DOWN**	**ACK****		**Normal***	**ACK*****
VHigh	Alarm Latch(Yes)	LAMP	OFF	FLASH	FLASH	OFF			FLASH	OFF
		RELAY	OFF	ON	ON	OFF			OFF	OFF
	Alarm Latch(No)	LAMP	OFF	FLASH	FLASH	OFF			OFF	OFF
		RELAY	OFF	ON	ON	OFF			OFF	OFF
	Trip	LAMP	OFF	FLASH	OFF	OFF			FLASH	OFF
		RELAY	OFF	ON	OFF	OFF			ON	OFF
High	Alarm Latch(Yes)	LAMP	OFF	FLASH	FLASH	OFF			FLASH	OFF
		RELAY	OFF	ON	ON	OFF			OFF	OFF
	Alarm Latch(No)	LAMP	OFF	FLASH	FLASH	OFF			OFF	OFF
		RELAY	OFF	ON	ON	OFF			OFF	OFF
	Trip	LAMP	OFF	FLASH	OFF	OFF			FLASH	OFF
		RELAY	OFF	ON	OFF	OFF			ON	OFF
LOW	Alarm Latch(Yes)	LAMP	OFF	FLASH	OFF	FLASH			FLASH	OFF
		RELAY	OFF	ON	OFF	ON			OFF	OFF
	Alarm Latch(No)	LAMP	OFF	FLASH	OFF	FLASH			OFF	OFF
		RELAY	OFF	ON	OFF	ON			OFF	OFF
	Trip	LAMP	OFF	FLASH	OFF	OFF			FLASH	OFF
		RELAY	OFF	ON	OFF	OFF			ON	OFF

Table 7.5.

Alarm AL1 (Maintained Alarm): when in abnormal condition ACK is pressed.

Condition			**Normal**	**Abnormal**	**UP**	**DOWN**	**ACK****	**Normal***	**ACK*****
	Alarm Latch(Yes)	LAMP	OFF	FLASH	FLASH	OFF	STEADY	STEADY	OFF
		RELAY	OFF	ON	ON	OFF	ON	OFF	OFF

High	Alarm Latch(No)	LAMP	OFF	FLASH	FLASH	OFF	STEADY	OFF	OFF
		RELAY	OFF	ON	ON	OFF	OFF	OFF	OFF
	Trip	LAMP	OFF	FLASH	OFF	OFF	STEADY	STEADY	OFF
		RELAY	OFF	ON	OFF	OFF	ON	ON	OFF
Low	Alarm Latch(Yes)	LAMP	OFF	FLASH	OFF	FLASH	STEADY	STEADY	OFF
		RELAY	OFF	ON	OFF	ON	ON	OFF	OFF
	Alarm Latch(No)	LAMP	OFF	FLASH	OFF	FLASH	STEADY	OFF	OFF
		RELAY	OFF	ON	OFF	ON	OFF	OFF	OFF
	Trip	LAMP	OFF	FLASH	OFF	OFF	STEADY	STEADY	OFF
		RELAY	OFF	ON	OFF	OFF	ON	ON	OFF
VLOW	Alarm Latch(Yes)	LAMP	OFF	FLASH	OFF	FLASH	STEADY	STEADY	OFF
		RELAY	OFF	ON	OFF	ON	ON	OFF	OFF
	Alarm Latch(No)	LAMP	OFF	FLASH	OFF	FLASH	STEADY	OFF	OFF
		RELAY	OFF	ON	OFF	ON	OFF	OFF	OFF
	Trip	LAMP	OFF	FLASH	OFF	OFF	STEADY	STEADY	OFF
		RELAY	OFF	ON	OFF	OFF	ON	ON	OFF

Table 7.6

Alarm AL2 (Maintained Alarm): when in abnormal condition ACK is pressed.

Condition			**Normal**	**Abnormal**	**UP**	**DOWN**	**ACK****	**Normal***	**ACK*****
VHigh	Alarm Latch(Yes)	LAMP	OFF	FLASH	FLASH	OFF	STEADY	STEADY	OFF
		RELAY	OFF	ON	ON	OFF	ON	OFF	OFF
	Alarm Latch(No)	LAMP	OFF	FLASH	FLASH	OFF	STEADY	OFF	OFF
		RELAY	OFF	ON	ON	OFF	OFF	OFF	OFF
	Trip	LAMP	OFF	FLASH	OFF	OFF	STEADY	STEADY	OFF
		RELAY	OFF	ON	OFF	OFF	ON	ON	OFF
High	Alarm Latch(Yes)	LAMP	OFF	FLASH	FLASH	OFF	STEADY	STEADY	OFF
		RELAY	OFF	ON	ON	OFF	ON	OFF	OFF
	Alarm	LAMP	OFF	FLASH	FLASH	OFF	STEADY	OFF	OFF

	Latch(No)	RELAY	OFF	ON	ON	OFF	OFF	OFF	OFF
	Trip	LAMP	OFF	FLASH	OFF	OFF	STEADY	STEADY	OFF
		RELAY	OFF	ON	OFF	OFF	ON	ON	OFF
LOW	Alarm Latch(Yes)	LAMP	OFF	FLASH	OFF	FLASH	STEADY	STEADY	OFF
		RELAY	OFF	ON	OFF	ON	ON	OFF	OFF
	Alarm Latch(No)	LAMP	OFF	FLASH	OFF	FLASH	STEADY	OFF	OFF
		RELAY	OFF	ON	OFF	ON	OFF	OFF	OFF
	Trip	LAMP	OFF	FLASH	OFF	OFF	STEADY	STEADY	OFF
		RELAY	OFF	ON	OFF	OFF	ON	ON	OFF

Table 7.7.

Notes: *means normal condition after abnormal has occurred.

**means ACK pressed in abnormal condition.

***means ACK pressed in normal condition after abnormal has occurred.

8. Calibration Procedure

8.1 Calibration

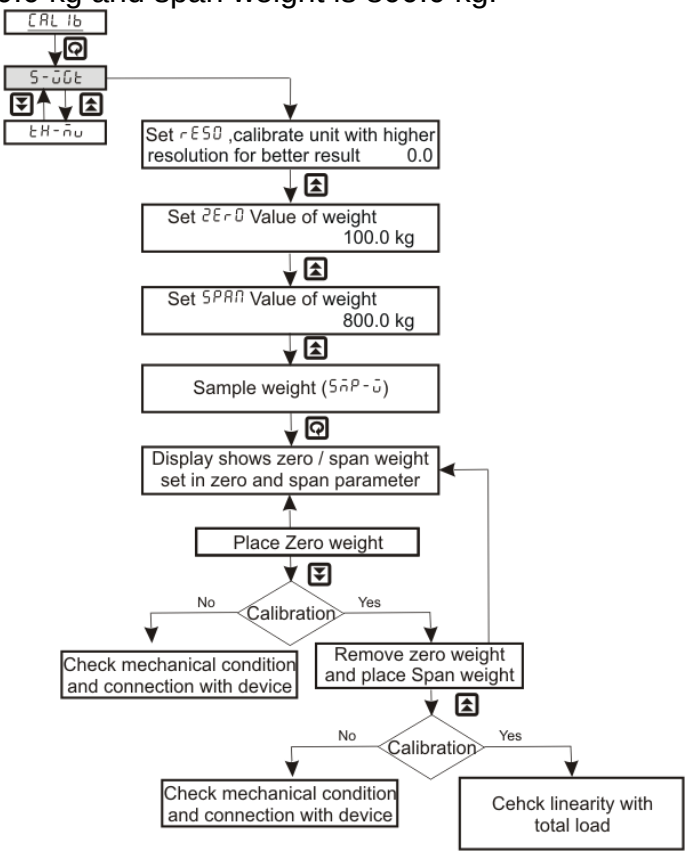
The calibration in the instrument is using front panel keys as well as with Modbus communication. Instrument can be calibrated even during installed condition.

Calibration is carried out using following steps.

1. First of all enter in to calibration mode using password "75" with front panel keys. Display shows Calibration menu.
2. Select calibration method:
   - **Sample weight calibration(S-UGt)**

   a. Set resolution, enter zero point of weight and span point of weight.
   b. Now display indicates Process value for zero and span in "SAP-U" index, last digit decimal point of display blinking indicates calibration mode.
   c. Feed input zero weight for zero calibration, Press GROSS key to calibrate ZERO.
   d. Feed input span weight for Span calibration, Press TARE key to calibrate SPAN.

Example:
For a system of maximum capacity 2000 kg with .1 decimal point resolution,
Zero weight is 100.0 kg and span weight is 800.0 kg.



Calibration using keys:
Enter into CAL 1b mode with front panel keys,

Zero Calibration: feed zero weight and Press GROSS key

Span calibration: feed span weight and press TARE key

Calibration using Modbus: Modbus address 40099
Zero Calibration: feed zero weight and write "1"
Span calibration: feed span weight and write "2"

Modbus addresses for calibration are given in table 8.1.

Sr.No	Parameter	Absolute address	Type	Minimum value	Maximum Value	Access Type
1	Process value	40091	Swapped Long	-19999	99999	R
2	*Resolution	40093	Swapped Long	0	4	R/W
3	Zero display	40095	Swapped Long	-19999	99999	R/W
4	Span display	40097	Swapped Long	-19999	99999	R/W
5	Calibration index	40099	Swapped Long	1	2	R/W

Table 8.1.

- **Theoretical mV calibration(tH-nu)**

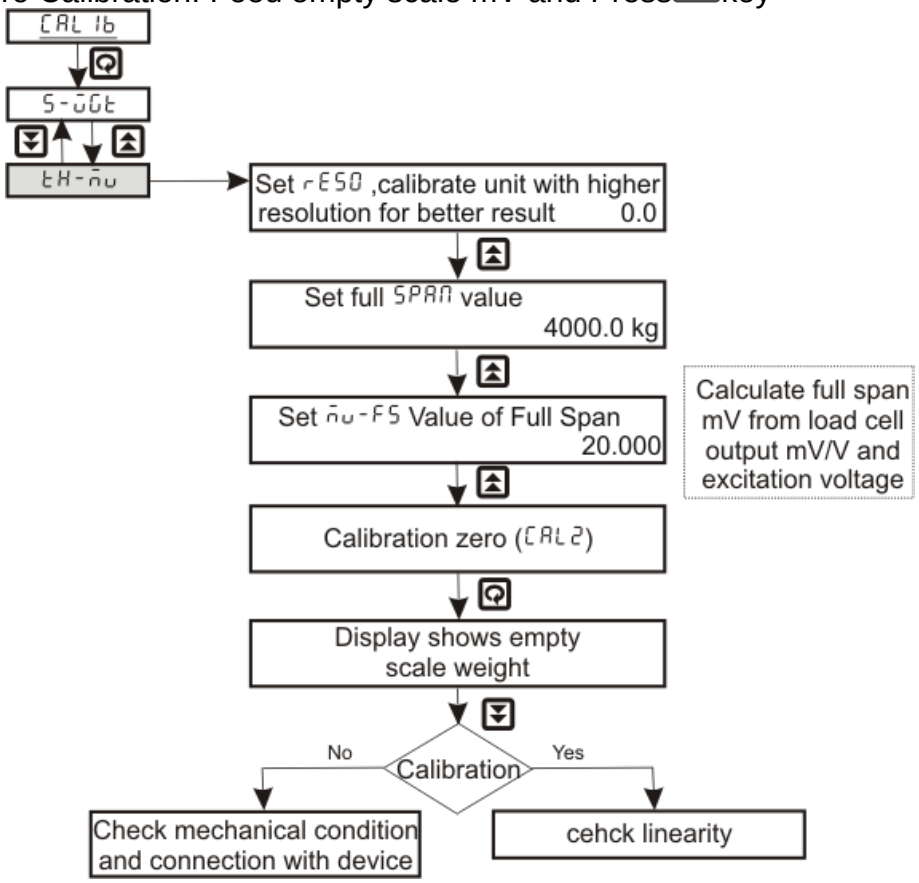
a. Set resolution, enter span point of weight.
b. Set "nu-FS" mV derived from measured excitation voltage and load cell output in mV/V.
c. Now display indicates Process value for zero in "CAL2" index, last digit decimal point of display blinking indicates calibration mode.
d. Process value for zero calibration is set simply by emptying the scale, Press GROSS key to calibrate displayed value to 0.00.

Example:
For a system of maximum capacity 4000.0 kg with .1 decimal point resolution,
Weighing load cell has the following data:
• Excitation voltage: 10 V

• Sensitivity: 2mV/V
• Maximum load: 4000.0kg
Set calibration parameters as shown below:
SPAN = 4000.0 kg
MV-FS = 20.000 mV
Zero weight is empty scale weight.

Enter into CAL2 mode with front panel keys,

Zero Calibration: Feed empty scale mV and Press GROSS key



3. If it does not happen please check mechanical conditions and connection with Indicator.

Note: calibrate unit with higher resolution for better result.

For Ex.

With Resolution 4 (9.9999 kg), Resolution 3 (99.999 kg), Resolution 2 (999.99 kg), Resolution 1 (9999.9 kg), Resolution 0 (99999 kg).

9. Communication Parameter

9.1 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 PV, Control, RSP output etc.
04	Read input registers	Use to read programmable registers
05	Force single coil	Use to ON /OFF single coil.
16	Preset Multiple register	Use to write programmable register

Table 9.1.

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.

9.2 Parameter Address Details

Sr.No	Parameter	Absolute address	Type	Minimum value	Maximum Value	Access Type
1.	*Relay status1	1	Bit	0	1	R/W
2.	*Relay status2	2	Bit	0	1	R
3.	*Alarm status1	10001	Bit	0	1	R
4.	*Alarm status2	10002	Bit	0	1	R
5.	*Digital Input	10003	Bit	0	1	R
6.	*Alarm 1 Blinking	10004	Bit	0	1	R
7.	*Alarm 2 Blinking	10005	Bit	0	1	R
8.	Process value	30001	Integer	-19999	19999	R
9.	Gross value	30002	Integer	-19999	19999	R

10.	Process value	30051	Swapped Long	-19999	99999	R
11.	Gross value	30053	Swapped Long	-19999	99999	R
12.	mV	30055	Swapped Long	-	-	R
13.	Reserved for future	40001	Integer	-	-	R/W
14.	Reserved for future	40002	Integer	-	-	R/W
15.	Set point 1	40003	Integer	-19999	19999	R/W
16.	Set point 2	40004	Integer	-19999	19999	R/W
17.	Relay delay	40005	Integer	0	9999	R/W
18.	Brightness	40006	Unsigned char	1	100	R/W
19.	*Input type selected	40007	Unsigned char	26	26	R
20.	*resolution	40008	Unsigned char	0	4	R/W
21.	Hysteresis	40009	Unsigned char	0	255	R/W
22.	Serial number	40010	Unsigned Char	1	247	R/W
23.	*Baud rate	40011	Unsigned char	0	4	R/W
24.	*Alarm logic type	40012	Unsigned char	0	2	R/W
25.	*Alarm 1	40013	Unsigned char	0	1	R/W
26.	*Alarm 2	40014	Unsigned char	0	1	R/W
27.	*Alarm Latch	40015	Unsigned char	0	1	R/W
28.	* Alarm sensor	40016	Unsigned char	0	1	R/W
29.	*Relay control	40017	Unsigned char	0	1	R/W
30.	Password	40018	Unsigned integer	1	9999	R/W
31.	Filter	40034	Unsigned char	0	60	R/W
32.	Tare for Modbus	40042	Unsigned char	0	0	R/W
33.	Offset	40043	Integer	-9999	9999	R/W
34.	Output Zero	40044	Integer	-19999	19999	R/W
35.	Output Span	40045	Integer	-19999	19999	R/W
36.	*Retransmission Mapping	40046	Unsigned char	0	1	R/W

37.	*Parity and stop bit	40047	Unsigned char	0	5	R/W
38.	*Step value	40048	Integer	0	3	R/W
39.	Process value	40051	Swapped Long	-19999	99999	R
40.	Set point 1	40053	Swapped Long	-19999	99999	R/W
41.	Set point 2	40055	Swapped Long	-19999	99999	R/W
42.	Offset	40057	Swapped Long	-9999	9999	-
43.	Output Zero	40059	Swapped Long	-19999	99999	R/W
44.	Output Span	40061	Swapped Long	-19999	99999	R/W

Table 9.2.

Absolute addresses 40019 to 40031, 40037 to 40041 are reserved for future use

- *Relay status1, *Relay status2: it gives status of LED.
- *Digital Input: 1 = OFF, 0= ON.
- Alarm 1 Blinking, Alarm 2 Blinking : 1= Blinking On, 0 = Blinking Off
- Acknowledge using function code-5
- *Alarm status1, *Alarm status2 gives status of abnormal condition only. Address 1003- 1016 for future use only
- *Input type: 26=SGI
- *Baud rate: 0 = 4800, 1 = 9600, 2 = 19200, 3 = 38400
- *Alarm Latch: 0 = YES, 1 = NO
- Alarm sensor: 0 =UP, 1=DOWN
- *Relay control: 0 = ON, 1=OFF
- *Alarm logic type: 0 = HH, 1 = HL, 2 = LL.
- *Alarm 1: 0 = Alarm, 1 = Trip
- *Alarm 2: 0 = Alarm, 1 = Trip.
- PV long Values when OPEN: 100001, UNDER: 100002, OVER: 100003.
- PV integer Values when OPEN: 32767, UNDER: 32765, OVER: 32766.
- *resolution: 0=0, 1= .0, 2=.00, 3=.000, 4=.0000
- *Filter: 0 = No Filter, 1-60 = Filter used.
- *Retransmission mapping: 0 = net value, 1 = gross value.
- *Parity and stop bit: 0 = PNS1, 1= PNS2, 2= POS1, 3= POS2, 4= PES1, 5=PES2.
- *step value: 0 = OFF, 1 = 2, 2 = 5, 3 = 10.

9.3 Exceptional Response

CODE	MEANING
01	Function code Invalid. It must be 01, 03, 04, 05 or 16.The function code received in the query is not allowable action for the slave.
02	Illegal address value. The data address received in the query is not an allowable address for the salve.

03	Illegal data value. A value contained in the query data field is not an allowable value for the salve.
06	When Master device write some parameters to Slave device, If slave device busy then it will send 06 code to indicate slave device is busy.

Table 9.3.

10. Technical Specifications

10.1 Input Specification

INPUT TYPES Table:			
INPUT	**Input Signal**	**Range**	**Accuracy**
Strain gauge indicator(SGI)	± 75mV	-19999 to 99999	0.1 % of Full span ± 1 digit

Table 14.

Digital Input	1-Channel (Isolated) Non- voltage contact input, Maximum reverse voltage 6V,Maximum Forward voltage 50V, Capacity 24V DC, 10mA
SPECIFICATIONS:	
Sampling Period	4 Sample/Sec
Burn out current	0.5 uA
Noise Rejection Ratio ,Common Mode **Normal Mode**	>100 dB (50Hz) >40 dB (50Hz)
Response time	< 1000mS
Resolution	17-bit
Repeatability	0.05% of FS
Step value, Display Increments	x1, x 2, x 5, x 10

10.2 Output Specifications

RETRANSMISSION OUTPUT	
DC Current	0 to 20 mA DC, 4 to 20 mA
DC Voltage	0 to 10 V DC, 0 to 5V DC, 1 to 5V DC.

Accuracy	±0.25% of full Span (one at a time factory settable).
Load Resistance for current O/P	<=600 Ω
Load Resistance for Voltage O/P	>=2 KΩ
ALARM	
Alarm AL1	-Momentary Alarm Condition – high/low/vlow Lamp – on/flash/latch Relay – on/off
Alarm AL2	- Momentary Alarm Condition – vhigh/high/low Lamp – on/flash/latch Relay – on/off

10.3 General Specifications

DISPLAY	PV: Red LED 5-digit, character size 0.56".LED for status indication (Alarm and Tx/Rx)
Operation keys	Escape, Enter, Increment, Decrement
Ambient	0 to 55 ºC.
Humidity	20 to 95% RH (Non-condensing).
Case Material	ABS Plastic
Case Color	Black
Mounting method	Panel mounting
Dimension	96mm(W)*48mm(H)*112mm(D)
Panel Cutout	92mm(W)*46mm(H)
Weight	260 grams (Approx.)
TEMPCO	< 100 ppm for input to display <150 ppm for retransmission output

10.4 Power Supply

Power Supply	85 to 265VAC @50HZ / 100-300VDC, 18 to 36VDC(One at a time factory settable)
Power Consumption	Max. 10VA
Load excitation voltage	5 V,10 V,12V,15V DC(±1%) @100mA(±1 % accuracy)

10.5 Isolation

Between primary terminals* and secondary terminals**	At least 1500 V AC for 1 minute
Between primary terminals* and grounding terminal	At least 1500 V AC for 1 minute
Between grounding terminal 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

* Primary terminals indicate power terminals and relay output terminals.

** Secondary terminals indicate analog I/O signal and Communication O/P.

10.6 Communication Specifications

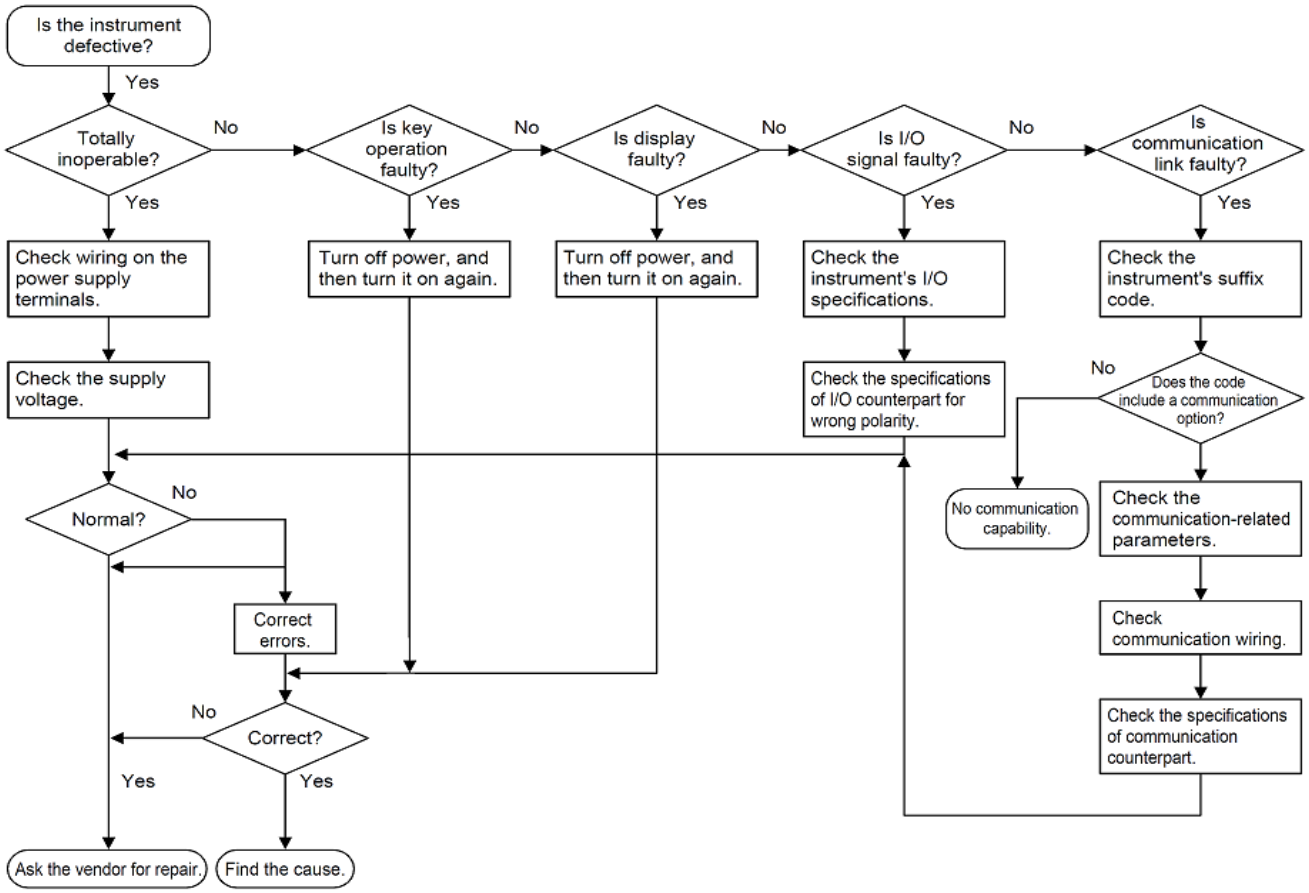
Communication Interface	Based on EIA RS-485
Communication method	Half-duplex communication start stop synchronous
Communication Speed	4800/9600/19200/38400bps selectable by key
Parity	None,Odd,Even(Selectable)
Stop bit	1, 2(Selectable)
Communication Protocol	Modbus RTU
Connectable number of unit	Max.32 unit per host computer
Communication error detection	CRC check

10.7 10.7Special Feature

Digital Filter	60 Sec.
Scalability	Input and output Scalability for SGI input
Rx output mapping	According to Net and Gross value
On demand display value	Gross,mV
Digital Input	For Tare
Decimal Point	User Programmable
Step value for display increments	Display increments with x1, x2, x5, and x10.
Key tare	Tare enable disable for front panel key
Zero tare	Clear tare value

11. Appendix

11.1 Troubleshooting



11.2 Jumper Location for Retransmission Output

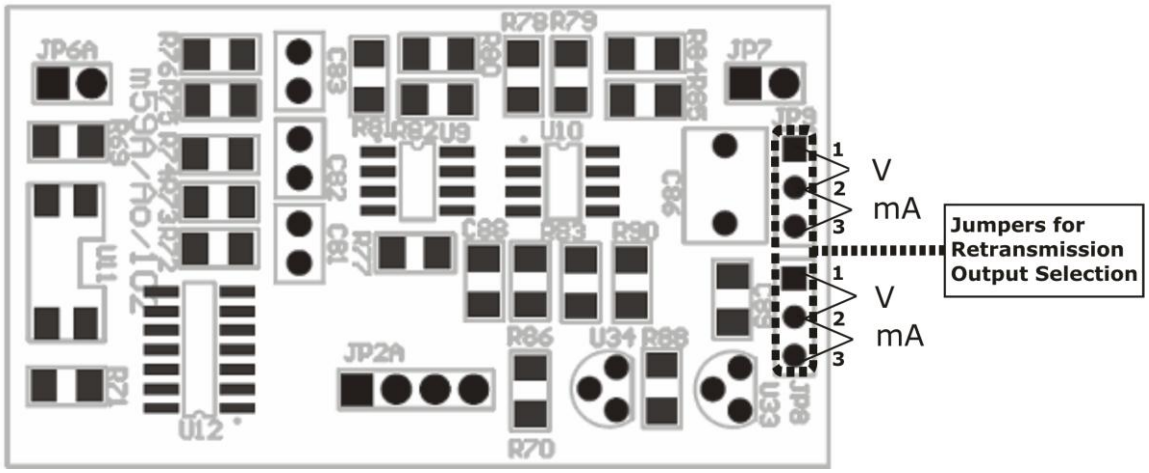
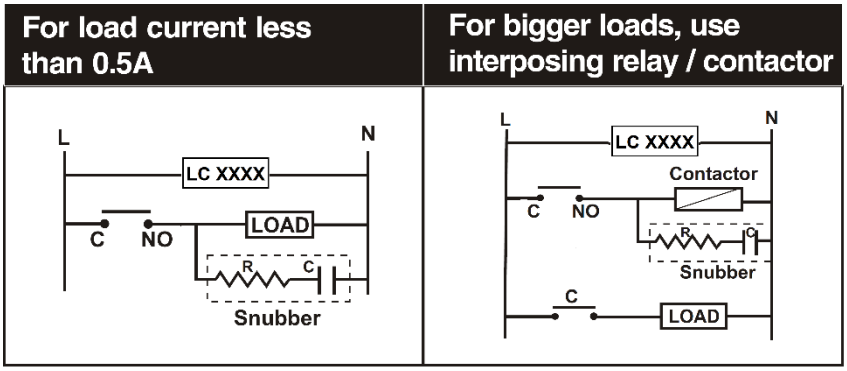


Fig 7. Jumper Location for Retransmission output

- For V retransmission output short the 1 and 2 pins of jumpers JP8 and JP9 of AO card as shown in figure 7.
- For mA retransmission output short the 2 and 3 pins of jumpers JP8 and JP9 of AO card as shown in figure 7.

11.3 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.

11.4 What is gross value?

Gross Value = I/P Feed mV * ((I/P Span – I/P Zero) / (InHI – InLO))

Net Value = Gross Value- Tare Value

Example: If Input Range is 0-20mV, selected 30mV group. If Scaled Display Range is 0.00-40.00Kg., then I/P Zero will be 0.00 and I/P Span will be 40.00 with resolution 0.00.

If you feed input of 15mV then the Gross Value is as below:

Gross Value = 15.00* ((40.00-0.00)/ (20.00-0.00))

Gross Value = 15.00*2.00

Gross Value = 30.00

11.5 What is tare weight?

It is the weight of an empty object. With an empty weighing device setting a zero point. For the whole system is possible via the input Parameterised as tare under "Trigger Input". The characteristic of the weighing cell is retained and only the origin is Adjusted.

11.6 What is step value?

The step for the right most digit of display change is set with step value parameter in menu mode.

<table>
<tr><td rowspan="4">Right most digit of Process value change accordingly</td><td>Step: off</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td></tr>
<tr><td>Step: 2</td><td colspan="2">0</td><td colspan="2">2</td><td colspan="2">4</td><td colspan="2">6</td><td colspan="2">8</td><td>10</td></tr>
<tr><td>Step : 5</td><td colspan="3">0</td><td colspan="4">5</td><td colspan="4">10</td></tr>
<tr><td>Step : 10</td><td colspan="6">5</td><td colspan="6">10</td></tr>
</table>