OPERATING MANUAL
FOR
PROCESS VARIABLE

MODEL : 301H

Manufactured By:

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INTRODUCTION:

This is a microcontroller based universal Process Indicator controller/Pulse counter unit. It is highly versatile, accurate and different from the conventional indicators.

The set Parameters and integrated total are stored in serial NVRAM. No battery back up is required.

General Specifications of this unit are:

- This is a Microcontroller based unit.
- Power Supply: 230 V AC is from back panel.
- Output Options:
  - ☐ Transmitter Power Supply: +24V DC +/- 5%, 50mA.

- Indication: Four Digit Seven Segment Red LED.
- Key board: Four keys membrane like.
- Accuracy: 0.2% + +/- 1 digit.
- Warm up time: 15 minutes.
- Configuration Data are stored in serial NVRAM.
- Mechanical data:

  Mounting: Panel mounting
  Cut-out size: 90mm x 45 mm
  Outer dimension: 90mm x 45mm x 112mm (Depth).

SYSTEM DESCRIPTION:

The unit is based on an 8-bit Micro-controller. It counts and displays no. of pulse received.
With the help of the keypad and display, unit allows to set and modify various configuration parameters and calibration.

HARDWARE DESCRIPTION:

The unit consists of a CPU, KB & Display card.

The CPU and KB/Display card has necessary hardware for:
- Driving 4-digit multiplexed Display on CPU card.
- Watch dog circuit CPU card.
- RS232/RS485 circuit for serial on CPU card.(optional)
- Four key keypad interface on KB card.
- Two Flow Relays.
- Rx o/p (4 to 20 mA)

POWER SUPPLY CARD:
- The Power supply card is fitted on top on four mounting screws.
- DC regulated supply: +5V, +24V are available from Power supply card.

INSTALLATION GUIDE:

This is 230 V AC operated unit.

- Unpack the instrument from the packing box carefully.
- Mount the instrument in the panel cut-out of 90mm * 45mm.
- Fix the instrument with the panel using two side brackets.
- All the electrical connections to be done at the back panel on screw type terminals
- Refer the Appendix for back panel layout.
- Make sure that no wire is connected loosely to avoid generation of spark and RFI. Before connecting the mains, check the mains configuration on the back panel.

Applying Input:

- The instrument takes input form back panel
- Transmitter supply is available on back plate.

OPERATING DETAILS:

The following paragraphs give detailed description of how to operate the unit. Before using the instrument, make sure to study and understand this section.

DISPLAY & KEYBOARD:

- It displays Process variable/Flow.
- Unit has 4 key membrane keypad organized as 4 x 1 matrix.

List of keys and their functions:

Keys	Function
Index	Enter into data entry/verification mode Select parameter
Enter	Save new data and Terminate Edit mode.
Digit Select (→)	Select next digit
Increment (↑)	Increment selected digit value

Normal Mode of Operation:

When ever mains is switched on to the unit,

It indicates engineering value of process variable.

Process variable is linearly calculated based on set value of Zero & Span & calibration data.

$$= \frac{(\text{AdcData} - \text{Calzero\_value}) \times \text{Full scale}}{(\text{Calspan\_value} - \text{Calzero\_value})} + \text{Zero value}$$

EDIT MODE:

In this mode user can verify or modify various parameters. Entry into Edit mode is protected by Password.

Press 'Index' key to enter into edit mode. The display window will show 'PASS' for a moment and then it will start displaying '0000' with flashing Left most digit .The unit is prompting for Password. Password is a four digit no. There are two different passwords.

Operator's Password: 0101/ 1234

Enter any one of the above password using data entry keys. When 'Enter' key is pressed, the validity of Password is checked. If wrong password is entered the unit comes out of edit mode and displays engineering value.

Press 'Index' key again if you want to enter into edit mode.

If correct password is entered, then also the unit starts Indicating Engineering value of input. Now press 'Index' key, the display will show name of the parameter to be modified and its value after a moment.

Pressing the 'Index' key again will display next parameter. The various parameters that will appear on the display with successive depression of the 'Index' key are:

Parameter description	Display	Values
Password	PASS	1234-(ENG.- ONLY FOR CALIBRATION)
Calibration Zero	CALZ	0 to 9999
Calibration Span	CALS	0 to 9999
CHFS	CHFS	0 to 9999
Out Zero	OUTZ	0 to 9999
Out Span	OUTS	0 to 9999
Password	PASS	0101-(PASS ONLY FOR PARAMETER SET)
Zero	ZEro	0 to 9999
FS	FS	0 to 9999
CHFS	CHFS	0 to 9999
Decimal Point	dP	0, 0.1, 0.01
Unit No	U-no	1 to 31
RELAY 1	rL 1	0 to 9999
RELAY 2	rL 2	0 to 9999
Relay selection	ALrL	LOHI,LOLO,HIHI
HYST	HYSt	0 to 9999
AVAREGE	AvG	0 to 32
UPDATE	UPdT	0 to 9.9
BAUDRATE	bAUd	2400,9600,4800,19200

Following the above process, one can select any of the above listed parameters. First eleven parameters listed in the table (CALS & CALZ) after Password are displayed in engineer's Password mode only. We will discuss about the same in calibration Procedure.
When a parameter is selected, its name will be first displayed for a moment and then current value is displayed in the same field of display. The left most digit will start flashing.

Use Increment (Up arrow) key, if you want to modify the flashing digit.

Press increment key, flashing digit will increment up to 9 and rolls back to 0 when it reaches at 9.

Once desired digit is set, press digit select key, (Right arrow) to select next digit. The next selected digit will flash. Set it to desired value as per the above step.

Once all the four digits are set, press 'Enter' key. The parameter value will be modified as per new set value. Display will start indicating Input.
When in data entry/EDIT mode, if no key is pressed for 45 Seconds, the unit will terminate data entry mode automatically and start indicating Process value.

Press 'Index' key to go to next parameter. If 'Index' key is not pressed for more than 45 seconds, the unit will terminate 'Edit' mode automatically and start indicating Process value. To enter into 'Edit' mode, one has to enter Password again.

Note: For parameter **'CALZ' and 'CALS',** the unit will not terminate 'Edit 'mode automatically. To terminate the Edit Mode, press **ENTER** key.

INDICATION:

The indication of the unit under normal operating mode will be the counted pulses since last reset given to the unit.

RELAYS FUNCTION: (Optional)

Instrument has two relays. These relays are configured to operate as selected HI-HI, HI-LO, LO-LO, LO-HI alarm relay.

Low Alarm:
When process variable is lower than low alarm set value (RL1), low alarm relay (Relay 1) will switch on. When process variable is higher than low alarm set value (RL1), low alarm relay (Relay 1) will switch off.

High Alarm:
When process variable is higher than high alarm set value (RL2), high alarm relay (Relay 2) will switch on. When process variable is lower than high alarm set point (RL2), high alarm relay (Relay 2) will switch off.

Retransmission Output: (Optional)

4-20 mA current output is available from the instrument. This output is proportional to process variable (4.00 mA for Zero display) and 20.0 mA for Full scale display. Output calibration is can be done through software using keypad and standard DMM.

Serial Interface: (Optional)
Unit can interface with selected Application by RS232 or RS-485 interface.
Note: - Parameter selection for check serial interface modbus or smitsoft.

Hysteresis: It's the offset value to switch off the alarm value
For E.g. If the high alarm is set 50 then relay will be set ON at 50 and will be set OFF at (50 – hysteresis value).

Average: Flow will be displayed in multiple of average value set by the user.

Update: Flow will be displayed in every second selected value set by the user.

Calibration Procedure:

The Instrument is duly calibrated at the factory. For any reason, if re-calibration is required follow the procedure as defined below.

As explained earlier, One can do calibration thro' the keyboard itself, no trimming of potentiometer is required. The Zero and Full-scale values are stored in NVRAM. The calibration is allowed only in Engineer's Password mode.

1. Switch on the instrument and allow 15 minutes of warm up time before starting calibration.

2. Take a standard source. Set its output at desired Zero (CALZ) value. Apply output of the source to the input terminals (11 & 12) of the indicator.

3. Go to EDIT mode:

- Enter engineers; Password '1234'.
- Press INDEX key after entering this Password.
- The parameter 'CALZ ' for Zero will be displayed.
- Allow the reading to settle.
- Press 'Enter' Key.
- This count will be stored as Zero/Offset reading.

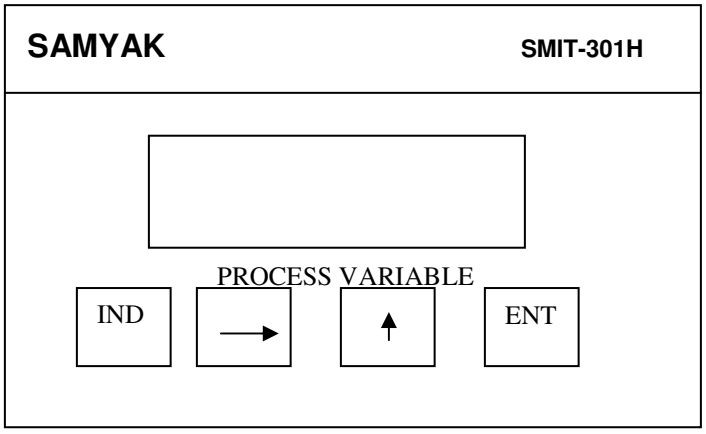
4. Now apply input equal to Full scale/Span (CALS):

- Press 'Index' key again.
- The parameter ‘CALS’ for Span calibration will be displayed.
- Allow the reading to settle.
- Press ' Enter' key.
- This reading will be stored as Span/Full scale.

Now the instrument is calibrated.

For again entering into calibration mode, you have to wait till the instruments go to normal mode. After that go to EDIT mode thro' Engineers' Password and perform calibration.

FRONT LAYOUT:



BACK PANEL DETAILS:

Pin No.	Signal	Pin No.	Signal
1	LINE	**9**	DIG INPUT 1
2	NEUTRAL	**10**	DIG INPUT 2
3	EARTH	**11**	INPUT +
4	OUT +Ve	**12**	INPUT -
5	OUT -Ve	**13**	RxD/RxTx+
6	RELAY 2	**14**	TxD/RxTx-
7	RELAY 1	**15**	GND
8	COMMON	**16**	+24VDC