OPERATING MANUAL
FOR
PROCESS INDICATOR CONTROLLER

MODEL : 301P

Manufactured By:

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1. <u>INTRODUCTION</u>

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:** 230VAC/115VAC is field selectable from back panel.

• **Output Options:**
   ☐ Transmitter Power Supply: +24V DC +/- 5%, 50mA
   ☐ Relay Transmitter Power Supply: +24V DC +/- 5%, 50mA
   ☐ Retransmitted 4 to 20mA / 50mA
   ☐ Modbus serial (RS 232/485)

• **Indication:** Counter: Four Digit Seven Segment Red LED.

• **Key board:** Four keys membrane like.

• **Accuracy:** 0.2% + +/- 1 digit.

• **Warm up time:** 15 minutes.

• Configuration Data & Integrated total are stored in serial NVRAM.

• **Mechanical data:**

   Mounting: Panel mounting
   Cutout size: 92mm x 92 mm
   Outer dimension: 96mm x 96mm x 90mm (Depth)

2. <u>SYSTEM DESCRIPTION</u>

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 and KB/Display card.

The CPU card has necessary hardware for:

  ➢ Driving Four digit multiplexed Display
  ➢ Four key keypad interface.
  ➢ Watch dog circuit
  ➢ DC regulated supply: +5V, +24V,
  ➢ The transformer is fitted on this PCB on two mounting screws thro' a clamp.

• The connectors are accessible from back panel cutout.
• Mating female connectors are supplied along with the instrument.

• The card is soldered with KB/Display card and it slides in frame of the enclosure. No mounting screws are required. The KB/Display card is fixed with front bezel.

• Mains selection for 110V/220V is to be done from back panel. There are total three terminals for mains connection. One of them is for Earthing. Necessary connection for configuration of 230V/115V mains is indicated on the sticker on the back panel.

ENCLOSURE:

This is general purpose Powder coated metallic enclosure suitable for panel mounting. Panel mounting is to be done using side brackets.

KB/DISPLAY CARD AND FRONT PANEL:

A display/KB card has a Four-digit display for Process indication

Four keys are also mounted on this card. The card is soldered with CPU card. The card is fitted with the bezel. An overlay is provided on the front side.

INSTALLATION GUIDE:

- Unpack the instrument from the packing box carefully.
- Mount the instrument in the panel cut-out of 92mm * 92mm.
- 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.
- Earth the instrument properly.

Applying Input:

- The instrument takes input form back panel
- Transmitter supply is available in printed in back plate

3. <u>OPERATING DETAILS</u>

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/counter.

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 also can be used as Stop key.
Digit Select (→)	Select next digit and it is also used as Start key.
Increment (↑)	Increment selected digit value and al- so used as Reset key

Normal Mode of Operation:

Whenever a main is switched on to the unit, It counts and displays no. of pulse received and set scale factor (SF discussed below).

     Display count = No of pulse received / Scale Factor

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 di- git 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 / 0101
Calibration Zero	CALZ	
Calibration Span	CALS	
Out Zero	OUTZ	0 to 9999
Out Span	OUTS	0 to 9999
Zero	Zero	0 to 9999
Full Scale	FS	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	HI-HI, LO-HI, LO-LO
HYSTERISIS	HYST	0 to 9999
BUDRATE	baud	9600, 19200, 4800

- Following the above process, one can select any of the above listed parameters.

- 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 digits 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. In case of the left most digit it scrolls between 0, 1, 2 and 3.

- 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 25 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 then 25 seconds, the unit will terminate 'Edit' mode automatically and start indicating Process value. To enter into 'Edit' mode, one has to enter Password again.

INDICATION:

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

4. <u>Calibration Procedure</u>

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 through 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 (10 & 11) 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.
- Actual row counts 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.
- 'CALS' for Span calibration will be displayed.
- Row counts of VFC will be displayed.
- Allow the reading to settle and 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.

RELAYS FUNCTION: (Optional)

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

RELAY OPERATION :(for lwo-high)

Two relays are provided. I.e. Relay 1(LOW) & Relay 2(HIGH). Relay will operate on basis of Flow value. Example if relay1 values is 30 and relay 2 values is 50. Then relay1 will remain ON till Flow value is will equal to less then relay1 value (30). Relay 2 will ON when Flow value will equal to more than relay2 value (50).

RELAY OPERATION :(for hi-hihi)

Two relays are provided. I.e. Relay 1(HI) & Relay 2(HIHI). Relay will operate on basis of Flow value. Example if relay1 values is 30 and relay 2 values is 50. Then relay1 will remain ON till Flow value is will equal to more then relay1 value (30). Relay 2 will ON when Flow value will equal to more than relay2 value (50).

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).

Retransmission Output: (Optional)

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

5. <u>MODEL: SMIT-301P MODBUS PROTOCOL</u>

Register NO	Parameter	Function
40001	Zero	Read/Write the Zero Value
40002	Full-scale	Read/Write the Full scale Value
40003	Decimal point	Read/Write the DP Value
40004	UINT NUMBER	Read/Write the unite no
40005	RELAY 1	Read/Write the Low alarm value
40006	RELAY 2	Read/Write the Hi alarm value
40007	ALRL	Read/Write the alarm value
40008	HYSTERISIS	Read/Write the hyst value
40009	BAUDRATE	Read/Write the baudrate value
40010	Process variable	Read Flow value

NOTE: PERAMETER	FUNCTION
BAUDRATE	0 – 4800
	1 - 9600
	2 - 19200
ALRL	0 - LO-HI
	1 - LO-LO
	2 - HI-HI

FRONT LAYOUT:

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PROCESS VARIABLE

INDEX   →   ↑   ↵
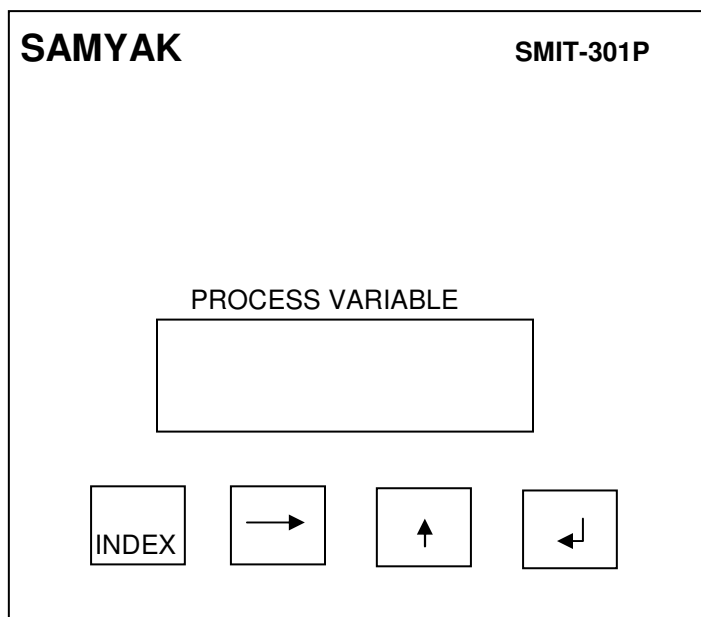
6. <u>BACK PANEL DETAILS</u>

PIN NO.	DETAILS	
1	LINE	**MAINS 90-255 VAC**
2	NEUTRAL	
3	EARTH	
9	------	
10	I/P +VE	**ANALOG INPUT**
11	I/P –VE	
12	+24V/50MA	**TPS**
15	RX O/P +VE	**ANALOG OUTPUT**
16	RX O/P -VE	
17	D-	**RS-485 MODBUS SERIAL**
18	D+	
19	NC	**ALARM RELAY 1**
20	C	
21	NO	
22	NC	**ALARM RELAY 2**
23	C	
24	NO	