

User's Manual

TPT-20

Tap Position Transmitter



Masibus Automation and Instrumentation Pvt. Ltd.

B/30, GIDC Electronics Estate,
Sector-25, Gandhinagar-382044, Gujarat, India
Phone : +91-79-23287275/77
Fax : +91-79-23287281
Email: support@masibus.com
Web: www.masibus.com

Contents

1.	Introduction.....	4
1.1	Ordering Code	4
2.	Installation	5
2.1	Environment:.....	5
2.2	Mounting:	5
2.3	Installation Dimensions:.....	5
2.4	Removal.....	5
3.	Front Panel.....	6
4.	Dimensions.....	7
5.	Terminal Position Detail:	7
6.	Menu Function List.....	8
7.	Parameter Description.....	9
8.	Menu Guideline	10
8.1	Program Menu	10
8.2	Configuration Menu.....	10
8.3	Calibration Menu.....	11
8.4	Software Version.....	11
9.	Menu Layout.....	12
10.	Modbus Detail:	14
10.1	Configuration parameter Read – write.....	14
10.2	Configuration parameter Read:.....	15
11.	Specifications	16
11.1	Input Specification:	16
11.2	Display & Keys:.....	16
11.3	Retransmission Output:	16
11.4	Relay Output (Optional)	17
11.5	Communication:	17
11.6	Power Supply.....	17
11.7	Isolation (Withstanding voltage):.....	17
11.8	Insulation resistance:	17
11.9	Physical:	17
11.10	Environmental:.....	17
11.11	Advance Option:	17
12.	Relay Logic:.....	18
13.	Appendix:	19
13.1	Internal Jumper Setting For Retransmission Output	19
13.2	Troubleshooting:	20
13.3	Load connection	20
13.4	Input Connection.....	21

SAFETY PRECAUTIONS

To ensure that the device can be operated safely and all functions can be used, please read these instructions carefully.



Caution: Never carry out work when the Power is turned on, this is dangerous.

Installation and startup must be carried out by qualified personnel only. The relevant country-specific regulations (e.g., VDE, DIN) must also be observed.

Before startup it is particularly important to ensure:

Terminal wiring:

Check that all cables are correctly connected according to the connection diagram

- The mains have been connected correctly and protection is provided against electric shock.
- The device can be switched off outside the power supply according to EN 60950 regulations (e.g., by the line protection on the primary side)
- All supply lines have sufficient fuse protection and are of correct size.
- All output cables are of correct size for the maximum device output current or have separate fuse protection.
- Sufficient convection is ensured.
- After installation the terminal area must be covered to provide sufficient protection against unauthorized access to live parts.

This is ensured by installing the device in the control cabinet or distributor box.

Warranty:

Warranty does not apply to defects resulting from action of the user such as misuse, improper wiring, operation outside of specification, improper maintenance or repair, or unauthorized modification.

Masibus is not liable for special, indirect or consequential damages or for loss of profit or for expenses sustained as a result of a device malfunction, incorrect application or adjustment.

Masibus total liability is limited to repair or replacement of the product. The warranty set forth above is inclusive and no other warranty, whether written or oral, is expressed or implied.

1. Introduction

This is a micro-controller based Tap Position Transmitter which retransmits Tap Position into the required Voltage or Current. This instrument provides isolation at 4 levels:

- a) Between Input and Power supply
- b) Between Output and Power supply.
- c) Between Input and Output.
- d) Output to Output

1.1 Ordering Code

Model TPT-20												
Model	Input Range		Power Supply		No of O/P	O/P type-1		O/P type-2		Relay O/P		Communication
TPT-20	X		XX		X		X		X		X	
	1	0 - 2.5KΩ	U1	85 -265VAC/ 100 -300VDC	1	One	1	4-20mA	0	None	N	None
	2	0 - 25KΩ	U2	18 -36VDC	2	Two	2	0-20mA	1	4-20mA	Y	Yes
					3	1-5VDC	2	0-20mA				
					4	0-5VDC	3	1-5VDC				
					5	0-10VDC	4	0-5VDC				
					S	Special	5	0-10VDC				
							S	Special				

2. Installation

2.1 Environment:



**Caution: Do not install the unit where it is subjected to continuous vibration.
Do not subject the unit to physical impact.**

2.2 Mounting:

The unit can be snapped onto all DIN rails according to EN 60715. The device must be mounted horizontally (input terminal blocks facing downwards)

2.3 Installation Dimensions:



To ensure sufficient convection, a minimum spacing of 3 cm is required.

- 1) Place the module with the DIN rail guide way on the bottom edge of the DIN rail and then snap it downwards.
- 2) The housing is mounted on the DIN rail by swiveling it into place.
- 3) As air vents are provided on the top and bottom part of the unit, the (horizontal) mounting arrangement allows good vertical air circulation.

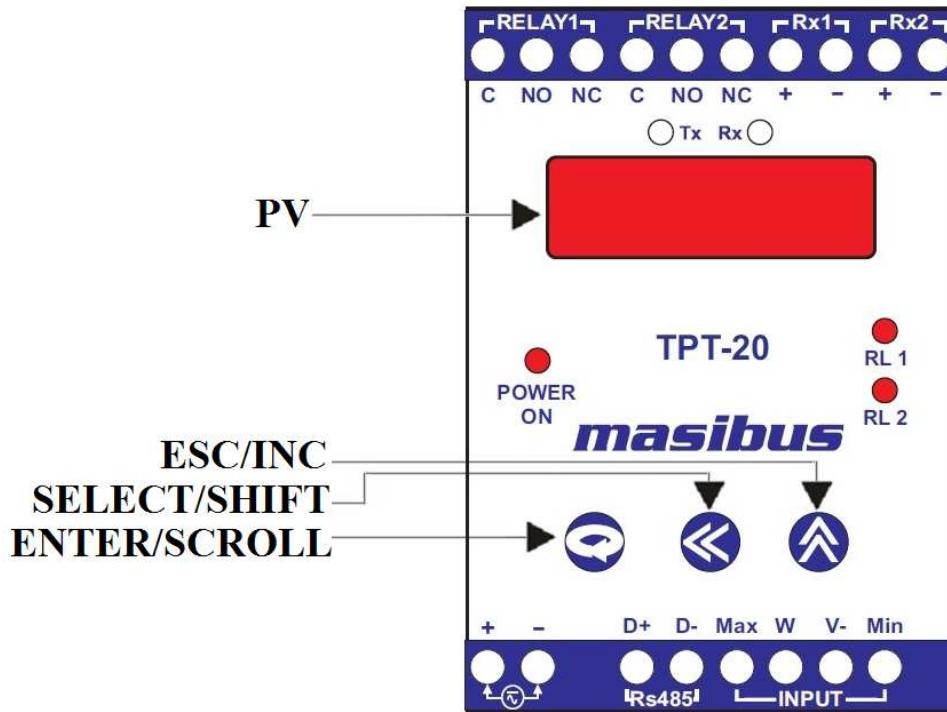


Vertical mounting arrangement of multiple units must be avoided.

2.4 Removal

Release the Snap-on catch using a screwdriver and then detach the module from the bottom edge of the DIN Rail.

3. Front Panel



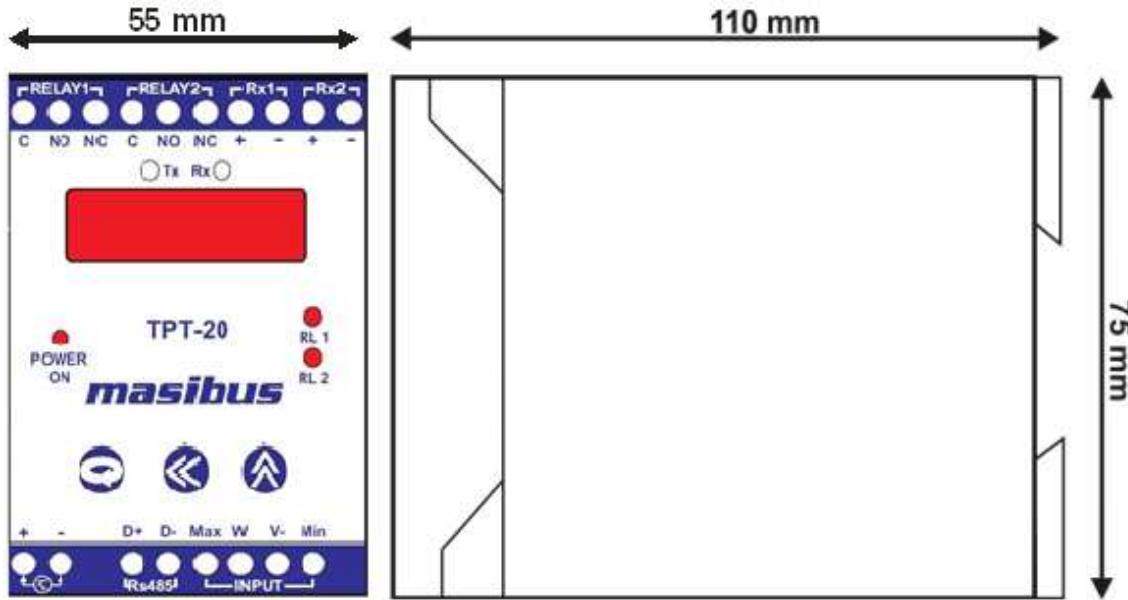
ENTER / SCROLL Key – This key is used to start menu, scroll through the menu and save values.

SELECT / SHIFT Key – This key is used to select the menu options, for shifting the digit of the selected parameters and for Resistance value display in Run Mode.

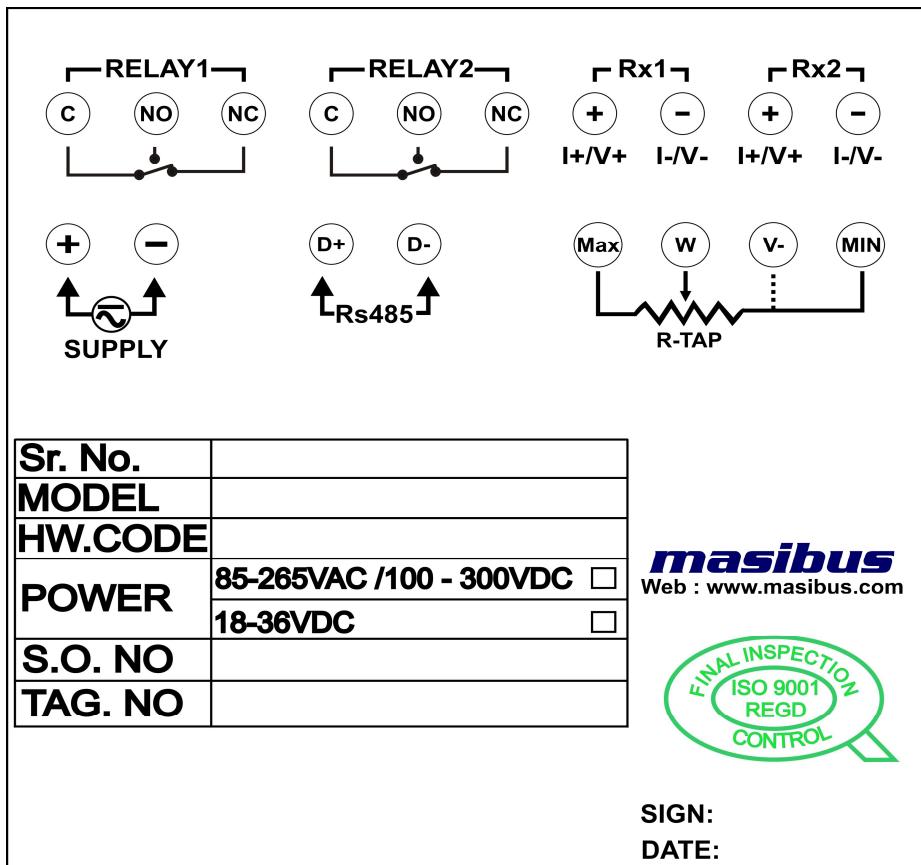
ESC / INC Key – This key is used to revert back to the parent menu from the sub menu levels and Increment the selected digit. This key is also used to check the TAP Counter value.

ENTER+INC Key – These simultaneous keys are used as Acknowledgement key for Relay.

4. Dimensions



5. Terminal Position Detail:



6. Menu Function List

PrOG	St - 1	Set point value for relay-1
	Hy - 1	0 TO 100
	St - 2	Set point value for relay-2
	Hy - 2	0 TO 100

* Output will not be scaled but only limit to this configured % of output.

INP	IPTY	3-Wire / 4-Wire	
	EdLY	Tap Changeover Delay	
	LTrP	Lower Tap Value (0/1)	
	HTrP	Higher Tap Value	
	Lo iP	Lower Input Resistance	
	hi iP	Higher Input Resistance	
CONF	OUT	OPNO	1, 2
		OPtY	0/4 to 20mA, 0/1 to 5V, 0 to 10VDC
		OP_2	Lower Tap value for Retransmission Zero
		OP_5	Higher Tap value for Retransmission Span
		OPLO	* % of Output (O/P Low limit will be limited to this value. Range is 0-25 % of O/P Span)
		OPHI	* % of output (O/P Hi limit will be limited to this value. Range is 75-100 % of O/P Span)
		OPSC	UPSC/DNSC
		d Ir	DIR/REV
	rELY	rLNO	1, 2
		ACP	Auto, Manual
		LOGC	High, Low
		C AL	Tap Value, Number of Tap Count, Input Open
	CON	SrNO	1-247
		bAUD	4800, 9600, 19200
	AdU	FSET	To configure device with Factory settings
		PASS	To Change device configuration Password
		tOUT	10-300 Second
CAL	INP	SPAN	
		2Er0	
	OUT	OPNO	1, 2
		2Er0	
		SPAN	
	uEr	To check the version of the software	

7. Parameter Description

CONF	Configuration Mode
CAL I	Calibration Mode
INP	Input type Parameter Settings
OUT	Output type Parameter Settings
Adv	Advance Parameter Settings
Ver	Software Version
IPtY	Input Type
tdLY	Tap Delay in Sec (Open not shown)
LtRP	Lower Tap Value
HtRP	Higher Tap Value
Lo IP	Lower Input Resistance
hi IP	Higher Input Resistance
OPNO	Output Channel No
OPTY	Output Type
OP_2	% of O/P Zero for scaling
OP_5	% of O/P Span for scaling
OPL0	* % of the O/P Zero range
OPHI	* % of the O/P Span range
OPSC	Up/down Scale one sensor open
d Ir	Forward/Reverse Output
FSET	Factory Setting
PASS	Password
tOUT	Time out From the Menu (10 to 300 Sec)
OPEN	Sensor Open Condition
CRIT	Calibration in Process
FErr	Factory setting Error
rELY	Relay
rLNO	Relay number
OPSE	Open sensor
LOGC	Relay control Logic
CA	Configure alarm
tRP	Tap Value
Cnt	Tap Count Value
oPSc	Open Input
rtr	Retransmission
SnO	Device Slave ID
bAUD	Baud Rate
St - 1	Set point for relay one
HY - 1	Hysteresis for Relay one
St - 2	Set point for Relay two
HY - 2	Hysteresis for Relay two

8. Menu Guideline

8.1 Program Menu

- Set point for relay-1.
- Hysteresis for relay-1. (0-10)
- Set point for relay -2.
- Hysteresis for relay-2. (0-10)

8.2 Configuration Menu

8.2.1 Input Selection

- Input Type Selection
- Tap Delay Setting in Seconds
- Lower Tap Value setting
- Higher Tap Value setting
- Lower Input Resistance Value setting
- Higher Input Resistance Value Setting

8.2.2 Output Selection

8.2.2.1 Retransmission:-

- Output Channel Selection (1 or 2)
- Output Type Selection (0/4-20 mA, 0/1-5 V, 0-10 V that will be provided as factory setting)
- Output Zero Setting for Lower Tap Value
- Output Span Setting for Higher Tap Value
- Output Low Setting (Minimum 0.0-25.0 % of Span)
- Output High Setting (Maximum 75.0-100.0 % of Span)
- Output Upscale / Downscale Setting for OPEN input
- Output Direction setting (Direct / Reverse)

8.2.2.2 Relay:-

- Relay No. Selection for setting purpose (1 or 2)
- Relay Acknowledgement Setting Automatic or Manual
- Selection for Operating relay above (high) or below (low) set point.
- Selection of relay type i.e. Tap value or number of Tap Count or Open Input.

8.2.2.3 Communication:-

- Device Slave ID Selection (1 to 247)
- Baud Rate Selection (4800, 9600, 19200)

8.2.3 Advance Options

- Factory Setting- To retrieve the factory default setting.
- Password Update
- Time Limit setting for device to come back to RUN mode on No key operation
(Range: 10 to 300 seconds)

8.3 Calibration Menu

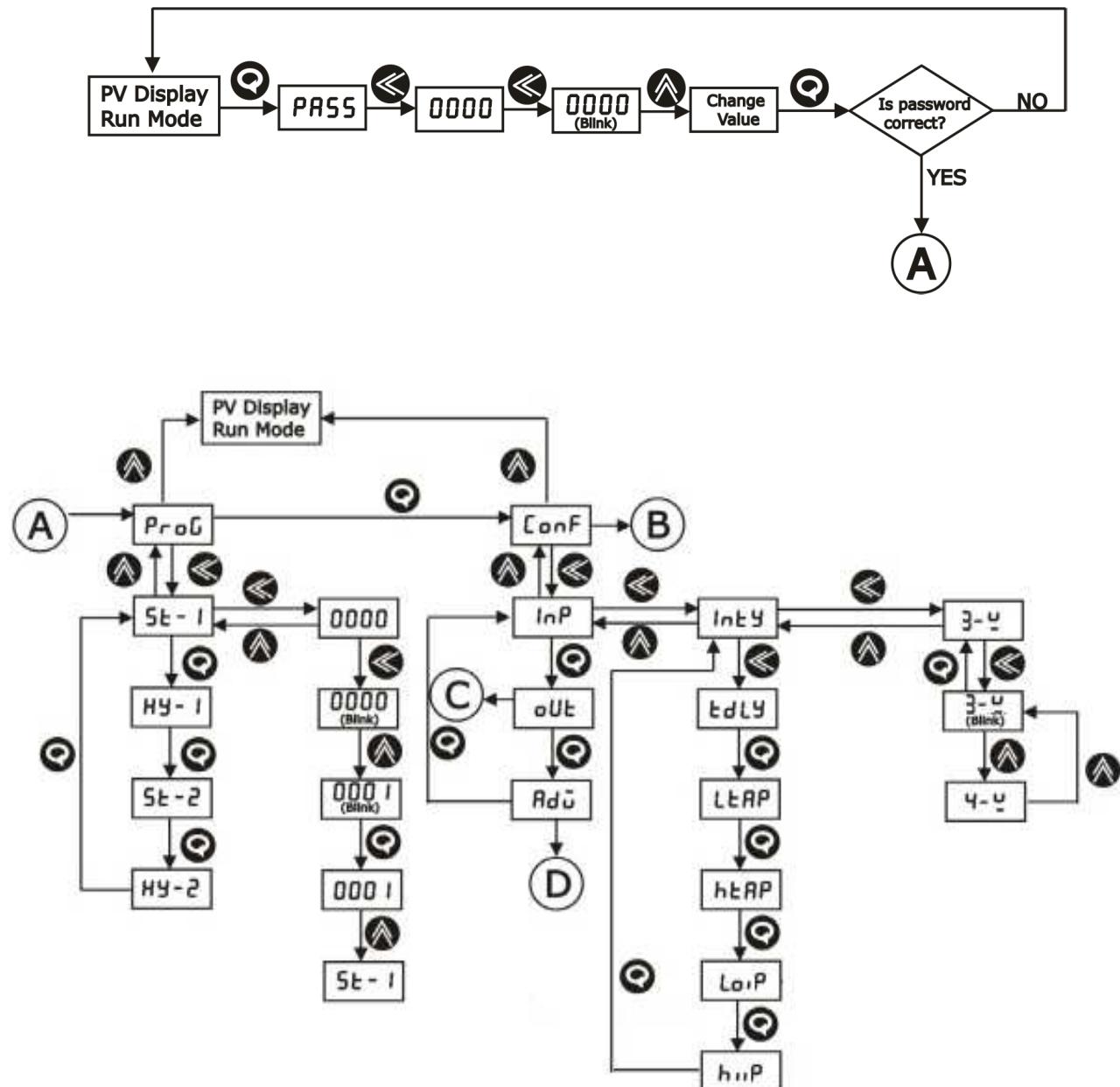
- **Input Calibration**
 - Input Zero Calibration
 - Input Span Calibration
- **Output Calibration**
 - Output Channel Selection for calibration
 - Output Zero Calibration
 - Output Span Calibration

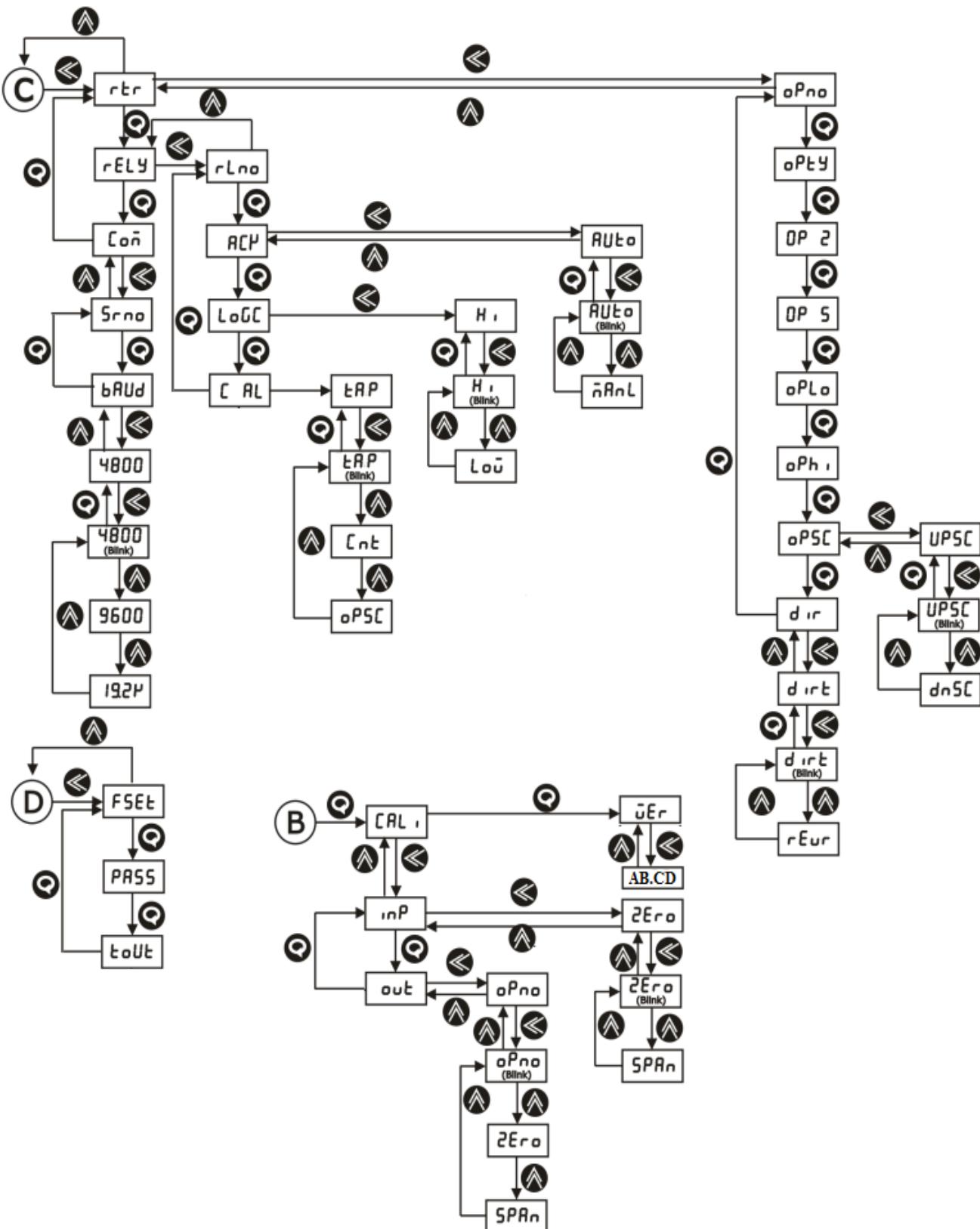
8.4 Software Version

- Version Number of the Software

Note: To Reset the TAP Counter to 0, Enter “1111” in F5EE .

9. Menu Layout





10. Modbus Detail:

The table show Analog data to be transmitted and its sequence.

10.1 Configuration parameter Read – write.

Sr. no.	Analog Parameters	Absolute Address	Type of Access	Parameter Type	Values Applicable
1	Set point for Relay1	40001	Read/write	Int	For Tap: Between HI and Lo Tap Value For number of Tap Count: Between 0 to 9999
2	Hysteresis for Relay1	40002	Read/write	Int	1-10
3	Set point for Relay2	40003	Read/write	Int	For Tap: Between HI and Lo Tap Value For number of Tap Count: Between 0 to 9999
4	Hysteresis for Relay2	40004	Read/write	Int	0-10
5	I/P type	40005	Read/write	Int	11-12
6	Delay for Tap Open (TDLY)	40006	Read/write	Int	1-60 Sec.
7	Lower Tap Value (LTAP)	40007	Read/write	Int	0-1
8	Higher Tap Value (HTAP)	40008	Read/write	Int	Up to 100 Note: Max Input Resistance must not fall out of maximum Specified Resistance. Use equation: ((High Tap Value - Low Tap Value) x Tap Resistance))
9	Lower Input Resistance Value (LOIP)	40009	Read/write	Int	>=0 and <Higher Input Value and <Maximum Resistance of Model
10	Higher Input Resistance Value (HIIP)	40010	Read/write	Int	>Lower Input Resistance Value and <=Maximum resistance of Model
11	Number of Tap Counter Reset	40011	Read/write	Int	Value: 1 After resetting Tap Counter, value will become 0
12	O/P type1	40012	Read/write	Int	1-5 *
13	O/P Z of O/P 1	40013	Read/write	Int	>=LTAP
14	O/P S of O/P 1	40014	Read/write	Int	<=HTAP
15	O/P Lo for O/P1 (% of O/P Zero range)	40015	Read/write	Int	Enter Value: 0-250 (Corresponds to 0 to 25%)
16	O/P High for O/P1 (% of O/P Span range)	40016	Read/write	Int	Enter Value: 750-1000 (Corresponds to 75 to 100%)
17	Open sensor for O/P1	40017	Read/write	Int	1-2
18	Direction for O/P1	40018	Read/write	Int	3-4
19	O/P type2	40019	Read/write	Int	1-5
20	O/P Z of O/P 2	40020	Read/write	Int	>=LTAP
21	O/P S of O/P 2	40021	Read/write	Int	<=HTAP
22	O/P Lo (% of O/P Zero range) for O/P2	40022	Read/write	Int	Enter Value: 0-250 (Corresponds to 0 to 25%)
23	O/P High (% of O/P Span range) for O/P2	40023	Read/write	Int	Enter Value: 750-1000 (Corresponds to 75 to 100%)
24	Open sensor for O/P2	40024	Read/write	Int	1-2
25	Direction for O/P2	40025	Read/write	Int	3-4
26	Relay ack. for relay1	40026	Read/write	Int	1-2
27	Relay logic for relay1	40027	Read/write	Int	1-2
28	Configure alarm for relay1	40028	Read/write	Int	1-3
29	Relay ack. for relay2	40029	Read/write	Int	1-2
30	Relay logic for relay2	40030	Read/write	Int	1-2
31	Configure alarm for relay2	40031	Read/write	Int	1-3
32	Device Slave ID	40032	Read/write	Int	1-247
33	Baud rate	40033	Read/write	Int	1-3
34	Password	40034	Read/write	Int	0-9999
35	Time out from the menu	40035	Read/write	Int	10-300

*Note: The values for above configuration parameter are as follows:

a) I/P Type:

- 3-Wire - 11
- 4-Wire - 12

e) Relay Ack. for relay:

- Auto - 1
- Manual - 2

b) O/P type:

- 0-20 mA - 1
- 4-20 mA - 2
- 0-5 V - 3
- 1-5 V - 4
- 0-10 V - 5

f) Relay control logic:

- Hi - 1
- Low - 2

c) Open sensor for O/P:

- Up - 1
- Down - 2

g) Configure alarm for relay:

- Tap - 1
- Tap Counter - 2
- Open - 3

d) Direction for O/P:

- Direct - 3
- Reverse - 4

h) Baud rate:

- 4800 - 1
- 9600 - 2
- 19200 - 3

10.2 Configuration parameter Read:

Sr. no	Analog Parameters	Absolute Address	Type of Access	Parameter Type
1	Tap Value	30001	Read	Int
2	Resistance	30002	Read	Int
3	Tap Counter	30003	Read	Int

Note:

- a) If TPT-20 process value (Tap) is out of limit, it will show “Open” on display but it will send ‘32767’ on Modbus
- b) The serial no of TPT-20 must be within 001 to 247.
- c) Before initiating the communication, match the Baud rate and Device ID of Master and Slave devices.

11. Specifications

11.1 Input Specification:

No. of Input	: One
Input Type	: Tap Resistance, 3-Wire/4-Wire
Maximum Tap Resistance	: Refer Input Range Table
Per Tap Resistance	: Programmable (Refer Input Range Table)
No. Of Tap	: Programmable upto 100. ((High Tap Value- Low Tap Value) x Tap Resistance)) Must be less than Maximum Tap Resistance.
Tap Change Counter	: Up to 9999. After 9999, Counter automatically resets to 0. User can manually reset to 0 at any time.
Tap Delay	: 1-60 Seconds (User Configurable)
Temp-co	: I/P to Display: <100 ppm Display to O/P: <150 ppm

11.1.1 Input range table:

Model	Measuring Ranges			
	Limits	Min. Span	Max. Span	Min. Tap Resistance
Option 1	0-2500Ω	100Ω	2500Ω	100Ω
Option 2	0-25000Ω	250Ω	25000Ω	250Ω

11.2 Display & Keys:

Process Value	: 0.3" Four-digit Seven segment Red LED
Status Indication	: Red LED's One for Power, Two for Relays, Two for Communication
Keys	: 3 keys (ENT, SEL & ESC) for configuration, calibration and Operation

11.3 Retransmission Output:

Number of output	: 2 (O/P-2 is Optional)
Output Signal	: 0/4-20mA, 0/1-5VDC, 0-10V DC (At a time either voltage or Current o/p will be provided for each channel, that will be factory set)
Load resistance	
For Current o/p	: < 750Ω
For Voltage o/p	: > 4KΩ
Output accuracy	: ±0.25 % of Full Scale

11.4 Relay Output (Optional)

Relays (Optional)	: 2 Nos.
Type	: Single Change over (C, NO, NC)
Rating	: 2A @ 230VAC / 30VDC
Relay Alarm Functions	: Tap Position, Tap Counter, Open Input

11.5 Communication:

Interface	: RS-485 (2 Wire)
Protocol	: Modbus-RTU
Communication Method	: 2 wire half duplex
Data Frame	: N, 8, 1
Baud rate	: 4800, 9600, 19200 bps
Address Range	: 001 to 247
Distance of Communication	: 1200 meter (Twisted pair cable as per EIA 485 standard)
Maximum Slaves	: 32 without repeaters

11.6 Power Supply

Standard	: 85-265VAC/ 100-300VDC
Optional	: 18-36VDC
Power consumption	: <10 VA

11.7 Isolation (Withstanding voltage):

* Three port isolation i.e. between input/output/power supply (1500VAC for 1 minute)

11.8 Insulation resistance:

2000MΩ or at 500 V DC between input, output and power supply.

11.9 Physical:

Size	: 55(W) x 75(H) x 110(D) mm
Mounting	: Din Rail
Terminal Cable Size	: 2.5mm ²
Weight	: < 250 gm

11.10 Environmental:

Operating temperature	: 0-55 °C
Storage temperature	: 0-80 °C
Humidity	: 20-95 % RH non-condensing

11.11 Advance Option:

Password Setting	: Available
Output Direction	: Direct / Reverse (User programmable)

12. Relay Logic:

RELAY LOGIC	ACK CONF.	RELAY / LED	Status while in NORMAL	Status while in ABNORMAL		Status while in NORMAL after ABNORMAL Condition	Status after ACK IN NORMAL CONDITION
HIGH / LOW	Auto	LED	OFF	FLASH	ACK is not applicable	OFF	OFF
		RELAY	OFF	ON		OFF	OFF
	Manual	LED	OFF	FLASH		STEADY	OFF
		RELAY	OFF	ON		ON	OFF

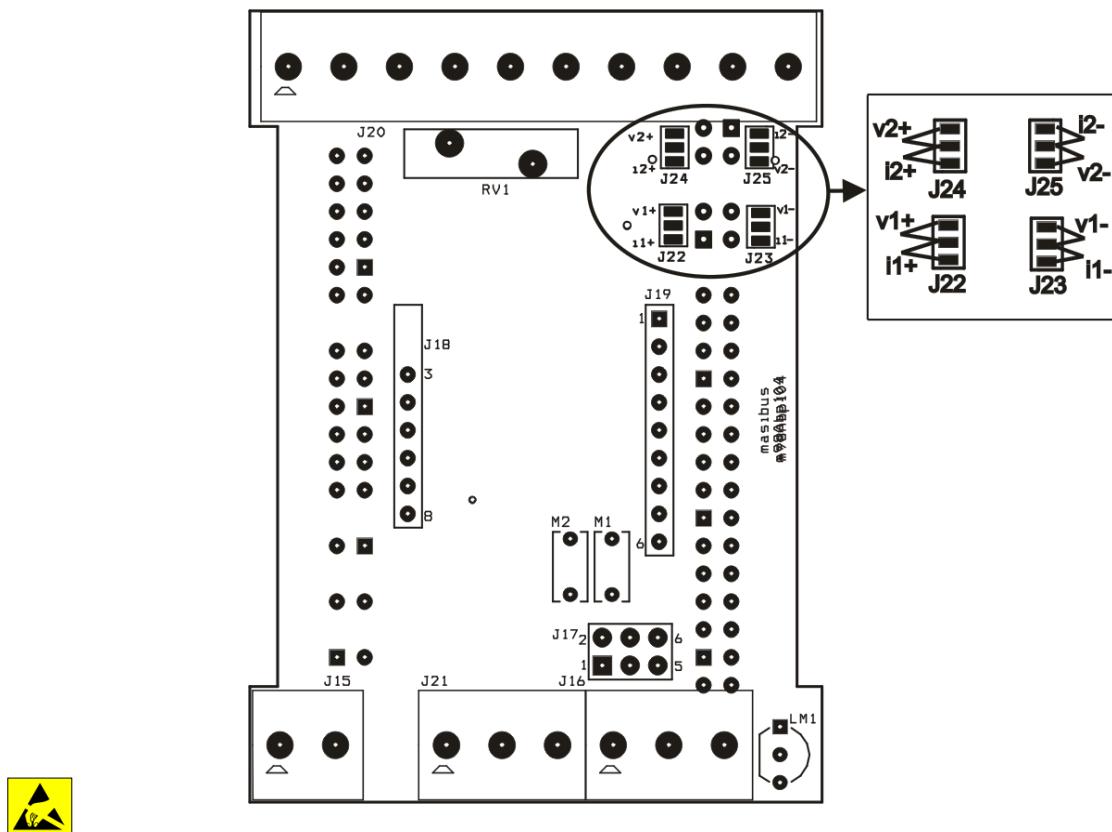
Table 1

Configure Alarm Setting	Value on which Relay Work
Tap	TAP Value
Cnt	TAP Count Value
OPSC	Input Open Condition

Table 2

13. Appendix:

13.1 Internal Jumper Setting For Retransmission Output

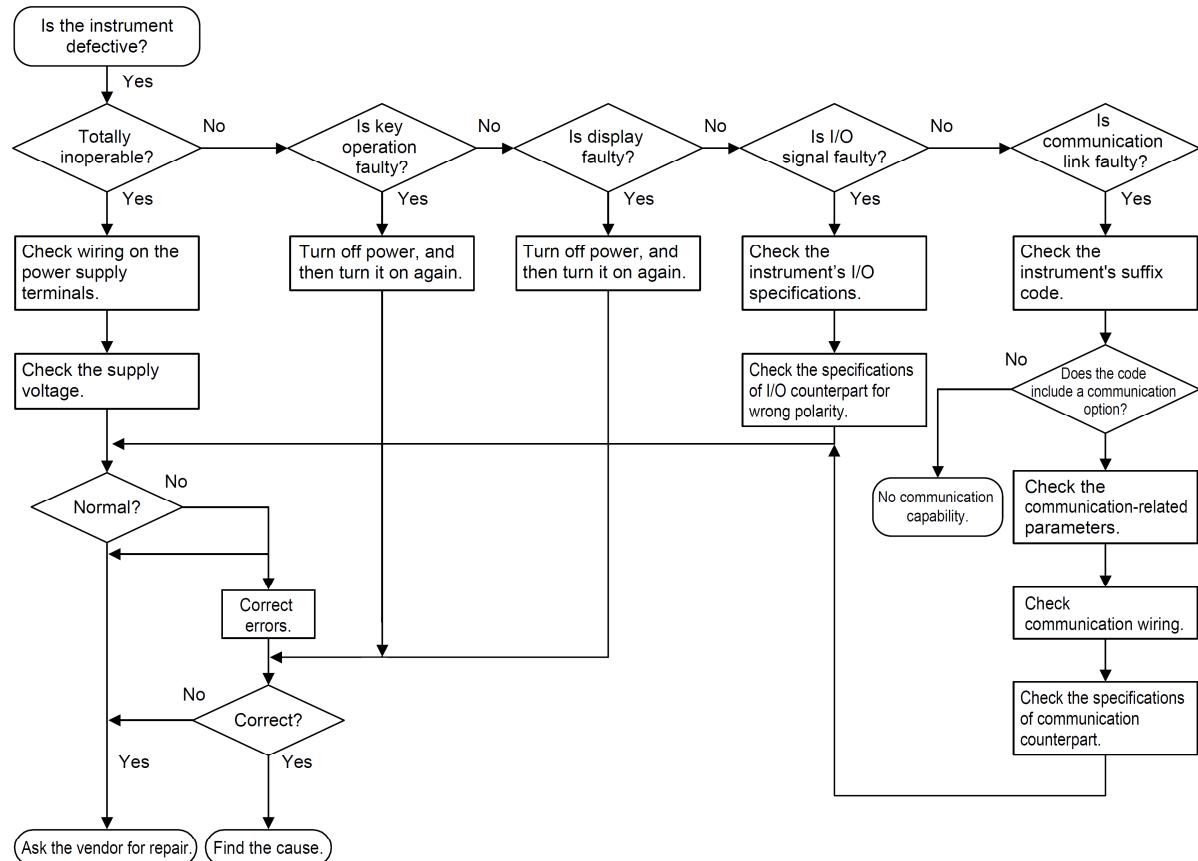


For retransmission output voltage or current, connect jumper as shown above on back plate PCB.

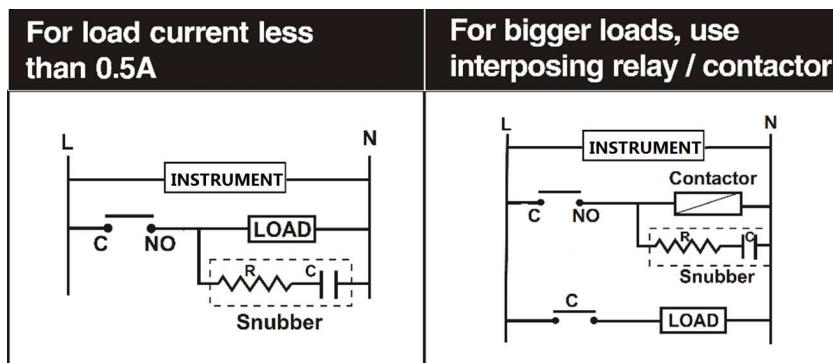
Static discharge will cause damage to equipment. Always ground yourself with wrist grounding strap when handling electronics to prevent static dis-charge.

13.2 Troubleshooting:

For primary troubleshooting of instrument use following procedure:



13.3 Load connection



Electrical precautions during use

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

13.4 Input Connection

