Operating Manual

RISH CON - TPT

Programmable Tap position transducer with dual output and display

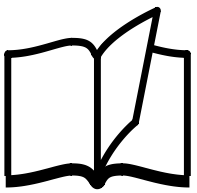
IC: 15001225 **Rev A: 8/06/2013**

Operating Instructions
Tap position transducer with dual output

Contents

1. Read first and then...

The proper and safe operation of the device assumes that the Operating Instructions are read and the safety warnings given in the various Sections



6. Installation and programming
7. Electrical connections
8. Commissioning

are observed.

The deice should only be handled by appropriately trained personnel who are familiar with it and authorised to work in electrical installations.

The guarantee is no longer valid if the instrument is further tampered.

2. Brief Description

Application :

The purpose of the Tap position transducer is to convert tap position of transformers to equivalent analog output. Outputs can be given as input to either RTU or indicator or recording instrument.
The device has one input channel and two independent out puts.

Function :

Tap position transducers receives resistance input, which corresponds to tap position of transformer. Out put is proportional to tap position.

Features :

- Input variable (variation of resistance) and measuring range programmed using PC / **Simplifies project planning and engineering** (the final measuring range can be determined during commissioning).
  Short delivery times and low stocking levels.
- **Analog output signal range also programmed with PC** (impressed current or superimposed voltage for all ranges between – 20 and + 20 mA DC resp.
  – 12 and + 15 V DC) / **Universally applicable. Short delivery times and low stocking levels. Output type (Voltage or Current) are factory programmed.**
- **Electric insulation between measured variable, analog output signal and power supply.**
- **Wide power supply tolerance / Only two operating voltage ranges between 24 and a maximum of 300V DC/AC.**
- Other programmable parameters: specific measured variable data (e.g. two, three or four-wire connection),operating sense (output signal directly or inversely proportional to the measured variable) and open circuit sensor supervision (output signal assumes fixed preset value between – 10 and 110%) / **Highly flexible solutions for measurement problems**.

3. Scope of Supply

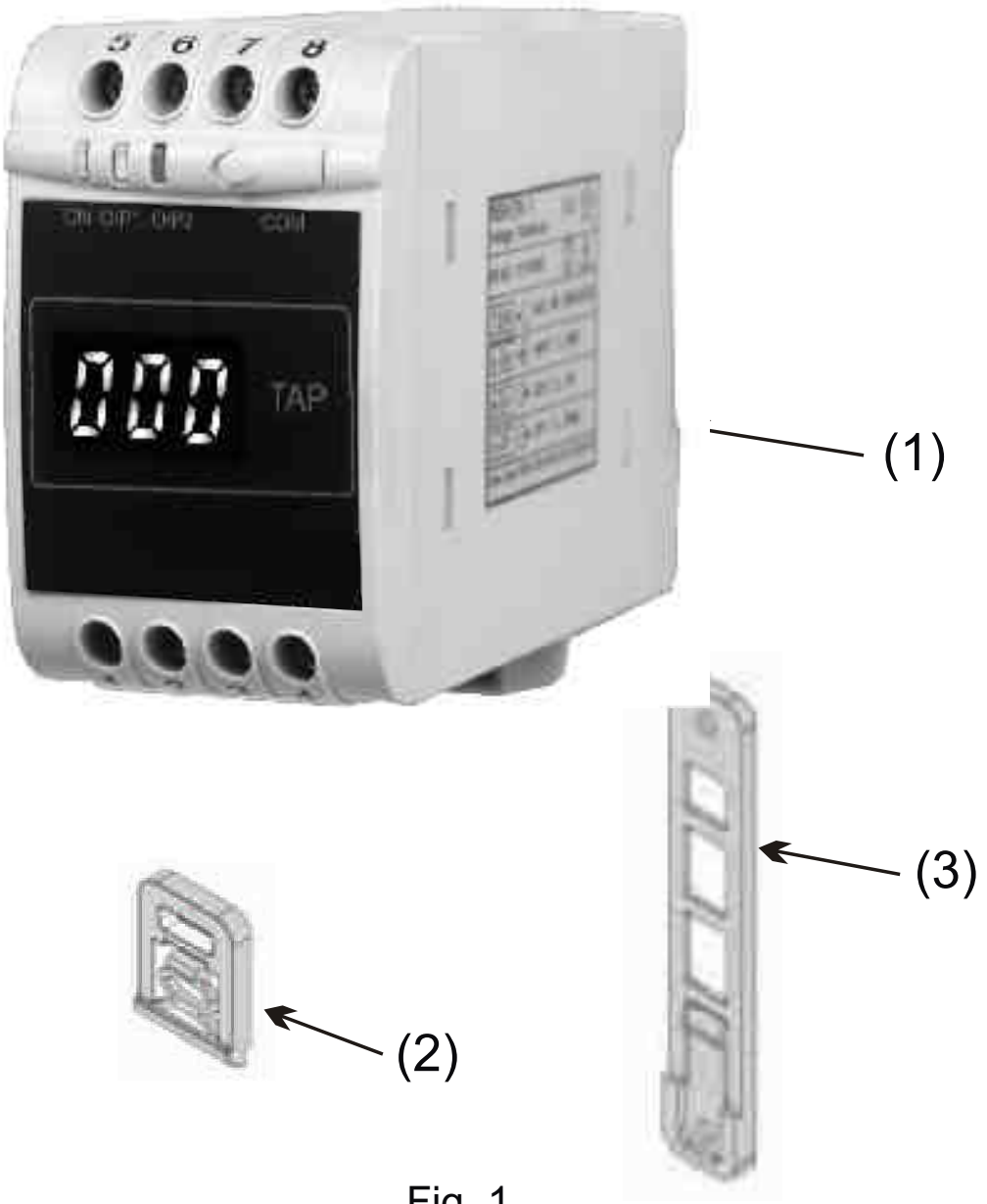


Fig. 1

1. Tap position transducer
2. Clamp strap
3. Wall mounting holder
4. Operating Instructions

4. Overview of Parts

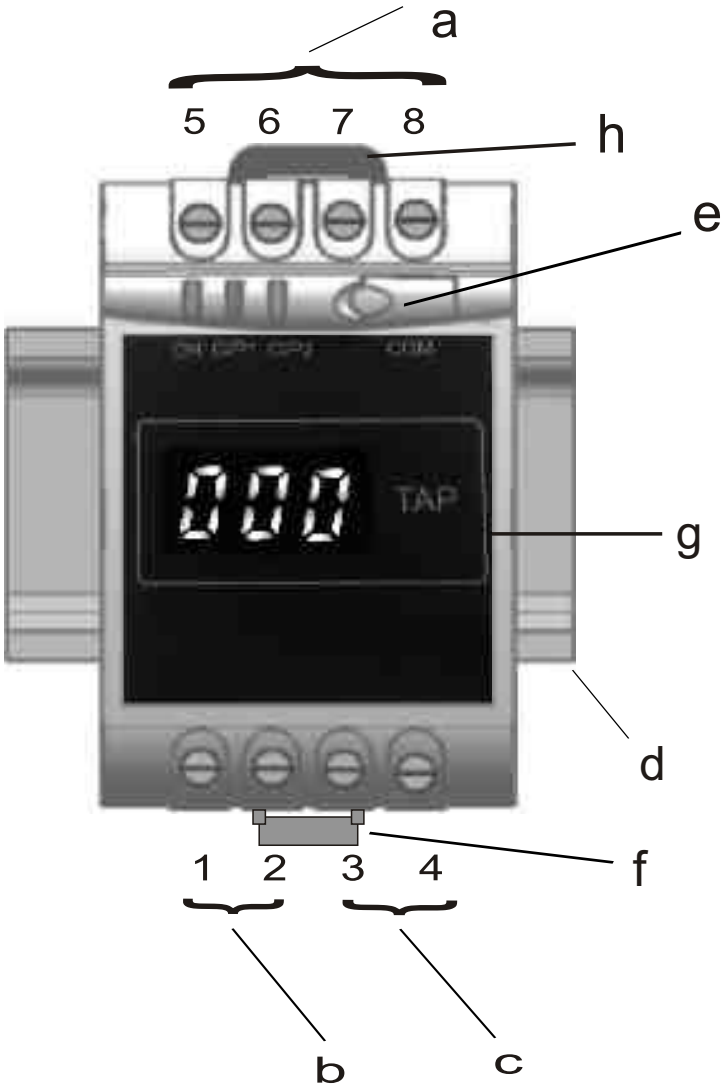


Fig. 2 Parts

a. Measuring variable / measuring input - M
b. Output 1 - A1
c. Output 2 - A2
d. Top hat rail
e. Programming port
f. Aux supply
g. Front Sticker
h. Fixing bracket

5. The Display:

Description of Display Reading :

The display is intended to show the current TAP number. It is configurable. e.g. if max taps are set at 25 and if input range of resistance is 0 - 25Kohms, then a 1K change in input will be reflected by 1 TAP change on the display. i.e. for this case, for 0 input, TAP number will be 0, for 1K input, TAP number will be 1, for 2K input, TAP number will be 2, and likewise.

6. Technical Data

Measuring input

Measured variable M

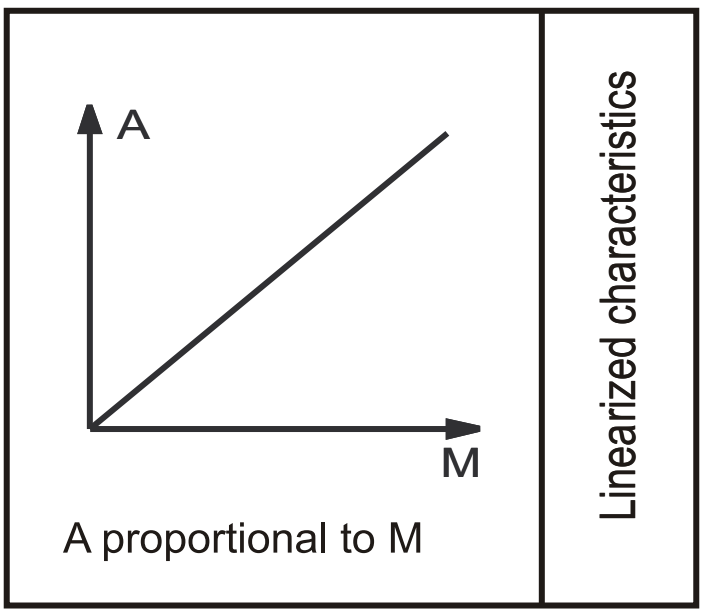
Table 1:

Measured variables	Measuring ranges		
	Limits	Min. span	Max. span
Variation of resistance of remote sensors / potentiometers low resistance range	0...3700Ω[1]	100 Ω	3700 Ω
high resistance range	0...25000Ω[1]	500 Ω	25000Ω

[1]Permissible value of the ratio “full-scale value/span = 100”.

Measuring current : 0.081 mA for measuring range 0 to 3700Ω
or 0.012 mA for measuring range 0 to 25000Ω

Output Characteristic :



Operating sense:	Programmable output signal (A) directly or inversaly proportional to measured variable(M)
Setteling time (IEC 770):	1sec approx.

Measuring output ⊖→
Output signals A1 and A2

The output signals available at A1 and A2 can be configured for either an impressed DC current IA or superimposed DC voltage UA .The desired range is programmed using a PC. Outputs A1 and A2 are DC isolated.

Standard ranges for IA	0...20 mA or 4...20 mA
Non-standard ranges	Limits –22 to + 22 mA Min. span 5 mA Max. span 40 mA
Burden voltage	Neg. –13.2...–18 V, pos. 16.5...21 V
External resistance IA1	$R_{ext\ max.}\ [k] = \frac{15\ V}{I_{AN}\ [mA]}$ I = full-scale output current
	$= \frac{-12\ V}{I_{AN}\ [mA]}$ I = full-scale output current

Burden voltage IA2	< 0.3 V
Residual ripple	< 0.5% p.p.
Standard ranges for UA	0...5, 1...5, 0...10 or 2...10 V
Non-standard ranges	Limits –12 to + 15 V Min. span 4 V Max. span 27 V
Open-circuit voltage	≤ 40 mA
Load capacity UA1 / UA2	20 mA
External resistance UA1 / UA2	$R_{ext}\ [k\Omega] \geq \frac{UA\ [V]}{20\ mA}$

Fixed setting for output signals A1 and A2 :

After switching on	A1 and A2 are at a fixed value for 5 s after switching on (default). Setting range –10 to 110% programmable, e.g. between 2.4 and 21.6 mA (for a scale of 4 to 20 mA).
When input variable out of limits	A1 and A2 are at either a lower or an upper fixed value when the input variable..... ..... falls more than 10% below the minimum value of the permissible range … exceeds the maximum value of the permissible range by more than 10%. Lower fixed value = –10% ,

e.g. –2 mA (for a scale of 0 to 20 mA).
Upper fixed value = 110% ,
e.g. 22 mA (for a scale of 0 to 20 mA).

The fixed value of A1 and A2 is configured to either maintain their values at the instant the open-circuit occurs or adopt a preset value between –10 and 110% , e.g. between 1.2 and 10.8 V (for a scale of 2 to 10 V).

Power supply H →○

AC/DC power pack (DC and 45...65Hz for AC)

Table 2: Rated voltages and tolerances

Rated voltage U_N	Tolerances	Instrument version
24... 60 V DC / AC	AC / DC ± 10 %	Standard
85...230 V DC / AC		

Power consumption: <3 W or <4.7 VA

Accuracy (acc. to DIN/IEC770)
Basic accuracy : Limit of error $\leq \pm$ 0.2%

Ambient conditions

Commissioning temperature:	-10 to +55^{0}C
Operating temperature:	-20 to + 65^{0}C
Storage temperature:	-40 to + 65^{0}C
Relative humidity of annual mean:	$\leq$ 75 % for standard climatic rating
Altitude :	2000 m max.
Indoor use statement	$\leq$ 95% for enhanced climatic rating
Additional error (additive)	± 0.3% for linearised characteristic
	± 0.3% for a high ratio between full-scale value and measuring range greater than factor 10.
	± 0.3% for current output less than 10 mA span
	± 0.3% for voltage output less than 8 V span
	2 · (basic and additional error) for two-wire resistance measurement

Influencing parameter and variation

Temperature	0.15% per 10^{0}C

Standards

Electromagnetic Compatibility	The standards DIN EN 50 081-2 & DIN EN 50 082-2 are observed
Intrinsically safe	Acc. to DIN EN 50 020: 1996-04
Protection(acc. to IEC 529 resp. EN 60 529)	Housing IP 40 Terminals IP 20
Safety design	Acc. to IEC 1010 resp. EN 61 010
Operating voltages	Measuring input < 40 V Programming connector, measuring outputs < 25 V power supply < 250 V
Rated insulation voltages	Measuring input, programming connector, measuring outputs, power supply < 250 V
Pollution degree	2
Installation category II	Measuring input, programming connector, measuring outputs.
Installation category III	Power supply
Test voltages	Measuring input and programming connector to: – Measuring outputs 2.3 kV, 50 Hz, 1 min. – Power supply 3.7 kV, 50 Hz, 1 min. Measuring outputs to: – Power supply 3.7 kV, 50 Hz, 1 min.

Serial interface for the PC to:
– everything else 4 kV,
50 Hz, 1 min. (PRKAB 601).

Measuring output(1) to:
– Measuring output(2) 0.5 kV
50 Hz, 1 min.

7. Installation

Fig. 3

As the front of the enclosure conforms to IP40.The terminals of the product should be protected from liquids

Caution

1. **In the interest of safety and functionality this product must be installed by a qualified engineer, abiding by any local regulations.**
2. **Voltages dangerous to human life are present at some of the terminal connections of this unit. Ensure that all supplies arede-energised before attempting any connection or disconnection.**
3. **These products do not have internal fuses therefore external fuses must be used to ensure safety under fault conditions.**

The **Tap Position Transducer** can be mounted either on a top-hat rail or directly on to a wall or a mounting plate.

The **Tap Position Transducer** should be mounted in a reasonably stable ambient temperature and where the operating temperature is within range 0 to 45 C. Vibration should be kept to a minimum and the product should not be mounted where it will be subjected to excessive direct sunlight.

6.1 EMC Installation Requirements

This product has been designed to meet the certification of the EU directives when installed to a good code of practice for EMC in industrial environments, e.g.

1. Screened output and low signal input leads or have provision for fitting RF suppression components, such as ferrite absorbers, line filters etc., in the event that RF fields cause problems.

   Note: It is good practice to install sensitive electronic instruments that are performing critical functions, in EMC enclosures that protect against electrical interference which could cause a disturbance in function.

2. Avoid routing leads alongside cables and products that are, or could be, a source of interference.

3. To protect the product against permanent damage, surge transients must be limited to 2kV pk. It is good EMC practice to suppress differential surges to 2kV at the source. The unit has been designed to automatically recover in the event of a high level of transients. In extreme circumstances it may be necessary to temporarily disconnect the auxiliary supply for a period of greater than 5 seconds to restore correct operation.The Current inputs of these products are designed for connection in to systems via Current Transformers only, where one side is grounded.

4. ESD precautions must be taken at all times when handling this product.

A PC with RS 232 C interface (Windows 3.1x, 95, 98, NT or 2000), the programming cable PRKAB 601 and the configuration software are required to program the transducer.

The connections between

"PC « PRKAB 601 « Tap Position Transducer" can be seen from Fig.4.
The power supply must be applied to Tap Position Transducer before it can be programmed.
The software is supplied on a CD.
The programming cable PRKAB 601 adjusts the signal level and provides the electrical insulation between the PC and Tap Position Transducer.

The programming cable PRKAB 601 is used for programmingboth standard and Ex versions.

Of the programmable details listed in section "Features / Benefits" one parameter – the output signal type is fixed.
The output signal range is programmable by PC.

The input configuration and input range also programmable.

As per description differnt parameter setting is possible only care has to take is the output signal type selected in parameter setting to be matched with actual product ordered.

8. Electrical connections

The electrical connections are made to screw terminals which are easily accessible from the front of the transmitter (see Fig.6) and can accommodate wire gauges up to 1 x 2.5mm^2.

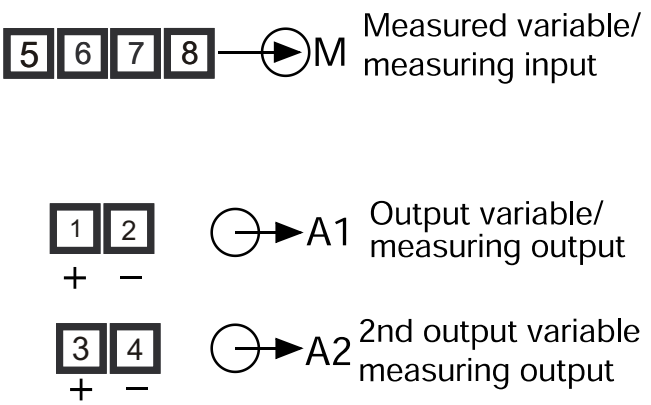


Fig. 5 Input & Output Terminal allocation

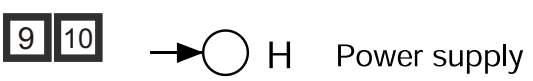


Fig. 6 Aux Terminal allocation

Make sure that the cables are not live when making the connections!

The 230V power supply terminal is potentially dangerous.

Also note that …

… the data required to carry out the prescribed measurement must correspond to those marked on the nameplate of Tap Position Transducer (⊖► measuring input M, ⊖► measuring outputs A1 and A2, →◯ power supply H and see Fig. 5)

… the total loop resistance connected to the output (receiver plus leads) **does not** exceed the maximum permissible value $R_{ext.}$ see **"Measuring output"** in Section "5. Technical data" for the maximum values of $R_{ext.}$!

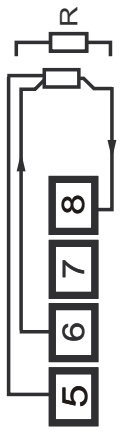
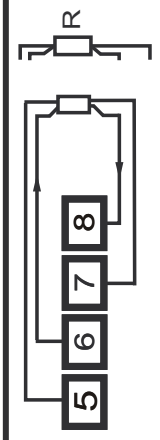
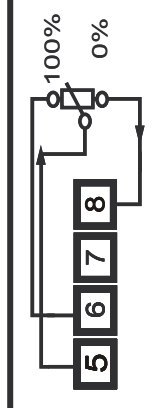
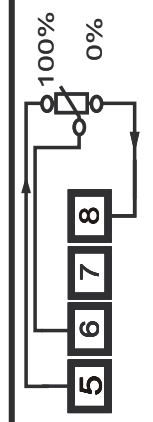
… the measurement input and output cables should be twisted pairs and run as far as possible away from heavy current cables!

In all other respects, observe all local regulations when selecting the type of electrical cable and installing them!

7.1 Alternative measurement connections

Connect the measuring leads to suit the application as given in Table 3.

Table 3 : Connection Diagram

Measurement	Measuring range limits	Measuring span	No.	Wiring diagram
two-wire connection	0... 3700Ω / 0...25000 Ω	100... 3700Ω / 500...25000Ω	1	
Resistance Measurement three-wire connection	0... 3700 Ω/ 0...25000 Ω	100...3700Ω / 500...25000Ω	2	
Resistance Measurement four-wire connection	0... 3700 Ω/ 0...25000 Ω	100...3700Ω / 500...25000Ω	3	
Resistance Transmitter WF	0... 3700 Ω/ 0...25000 Ω	100...3700Ω / 500...25000Ω	4	
Resistance Transmitter WF DIN	0... 3700 Ω/ 0...25000 Ω	100...3700Ω / 500...25000Ω	5	

Three- wire connection (connection diagram No.2 in Table 3)

It is assumed that the three leads of three-wire connection have identical resistances and no compensation is necessary. The leads resistance must not be greater than 30Ω per lead.

7.2 Measuring output leads

Connect the output leads for output A1 to terminals 1 (+) and 2 (–) and for output A2 to terminals 3 (+) and 4 (–) as shown in Fig. 5

Note: The maximum permissible external resistance R_{ext} max of the transducer must not be exceeded (see Section "5. Technical data").

7.3 Connecting the power supply

Connect the power supply to terminals 9(⏚) and 10 (≂) as shown in Fig. 6

A two-pole switch must be included in the supply connection where facility for switching Tap Position Transducer off is desired.

Note: An external supply fuse with a rupture capacity ≤ 20 A must be provided for DC supply voltages < 125 V.

9. Commissioning

Switch on the measuring input and the power supply. The green LEDs glows continuously.

The power supply unit must be capable of supplying a brief current surge when switching on. The transmitter presents a low impedance at the instant of switching which requires a current I_{start} of …

… $I_{start} \geq 160$ mA for the version with a power supply range of 24 – 60 V DC/AC

or

… $I_{start} \geq 35$ mA for the version with a power supply range of 85 – 230 V DC/AC

10. Maintenance

No maintenance is required.

11. Dimensional Drawing

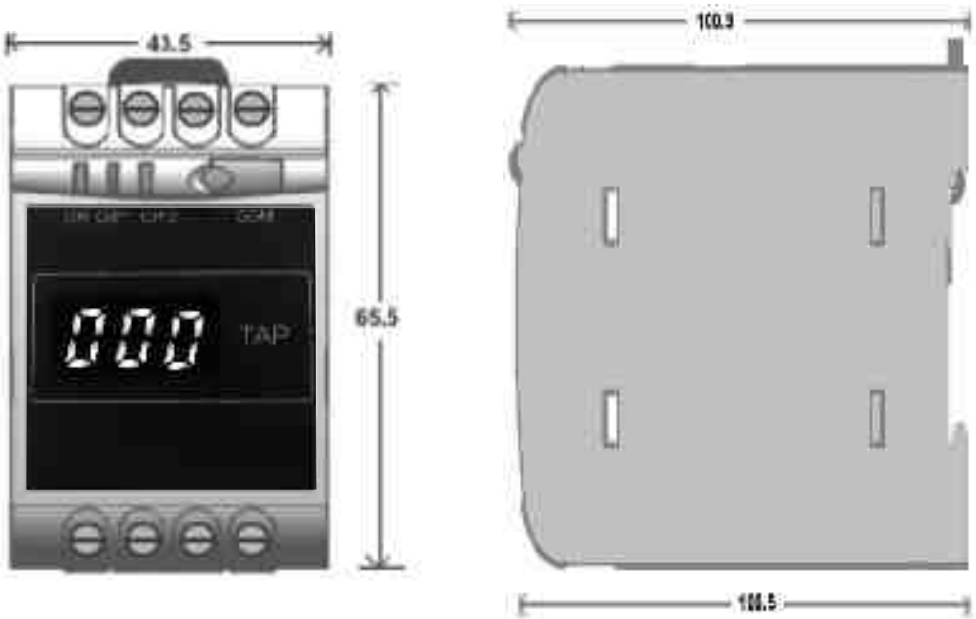


Fig. 6 Dimensional measurements

12. Ordering Information :

PRODUCT NAME- INPUT RANGE CODE-DISPLAY-OUTPUT1 RANGE CODE- OUTPUT2 RANGE CODE AUXILLARY SUPPLY

1) Product Name : TPT

2) Standard input range codes :

Input resistance (KΩ)	Ordering Code
0…..25	1
0…..20	2
0…..18	3
0…..17	4

3) Tap Position Indicator Display

Display	Ordering Code
With Display	1
Without Display	2

4) Standard output1 range codes:-

Current (mA)	Ordering Code	Voltage (V)	Ordering Code
0…..20	1	0…..10	3
4…..20	2	2…..10	4

5) Standard output2 range codes :-

Current (mA)	Ordering Code	Voltage (V)	Ordering Code
0…..20	1	0…..10	3
4…..20	2	2…..10	4

6) Auxiliary supply voltage

Auxiliary supply	Ordering Code
85 …230V AC/DC	H
24…60V AC/DC	L

Example:-

To order model of 0 to 25 KΩ input , with Tap Position indicator Display, output1 0 to 10V , output2 4 to 20 mA and auxiliary supply 24 to 60 V AC DC,

ordering information will be as follow :-

TPT-1-1 -3-2-L

RISHABH INSTRUMENTS PVT. LTD.
F-31, M.I.D.C., Satpur, Nashik 422 007, India.
Tel. : +91 253 2202162, 2202202,
Fax : +91 253 2351064
Email : marketing@rishabh.co.in
www.rishabh.co.in