

Transformer Step Indicator

M A N U A L



TSI Series October 2018

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For your safety, please read the following before using.

1. Safety Cautions

⚠ Warning

1. It must be mounted on Panel.

It may give an electric shock.

2. Do not connect terminals while power on.

It may give an electric shock.

3. Do not disassemble and modify this unit. If it is necessary please contact us.

It may give an electric shock and cause fire.

4. Please check the terminals numbers when connecting power lines.

It may cause fire.

5. When cleaning the unit, do not use water or an oil-based detergent.

It may cause an electric shock or fire and so the unit will be damaged.

6. Please connect properly after checking the polarity.

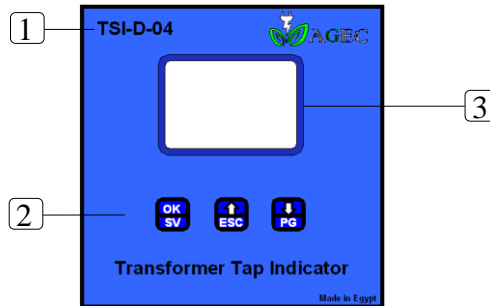
It may cause fire.

2. Features:

- 1- Measure and display the transformer tap position.
- 2- Different inputs select (Resistance, 4-20mA or 0-20mA).
- 3- Internal power supply output 24VDC-0.3A.
- 4- Current output (0-20mA or 4-20mA)
- 5- Adjust the low and high values (Scaling).
- 6- Calibration and elimination if cable resistance.
- 7- Step resistance can adjusted to real value.
- 8- All setting stored in EEPROM.
- 9- Seven segment display
- 10- Parameters adjust via keypad.

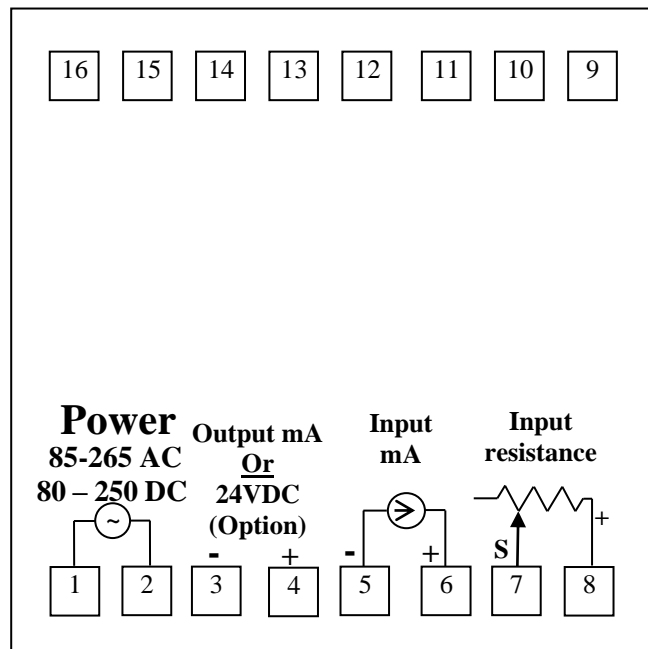
3. Device identification

3.1. Front



- ① Model number Series.
- ② 3 tactile push button keys.
- ③ Step indicator display.

3.2. Terminal Connection



4. Operation theory

The TSI-D-04 used to monitor the tap of the transformer in transformation stations and show it in 2 seven segments.

The TSI-D-04 after connecting the power it shows the tap of transformer.

The TSI-D-04 contains 3 tactile push button keys under the display used to:

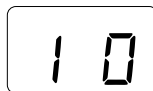
- Select the input resistance or mA.
- Adjust the total number of steps
- Adjust one step resistance in ohm.
- Select the output current mA (0-20mA or 4-20mA).
- Calibration cable resistance and fine adjust of step resistance.

When the user want to change the total no. of steps and the one step resistance this will discuss in programming section

5. Operations Procedures:

5.1. Start up:


First when connect power to the indicator the display will show for example the following:






This reading is the actual value according to input type, No. of steps and transformer position.


5.2. Settings:

To enter to the programming mode:





- Press and hold  for 3 sec.
- The screen will show *PG* which mean programming mode.
- Still press until the screen show *10* which mean type of input (*r5* : resistance , *mA* : mA)

To select between resistance and mA:





- Press  when the screen shows *10*, the screen will show the adjusted mode (for example : *r5*)
- To set the mode to mA, Press  , the screen will show *mA*.
- To set the mode to resistance, Press  , the screen will show *r5*.

- Then press , the screen will show 5t.





To set the total number of steps 5t:

- Press  when the screen shows 5t, the screen will show the adjusted number (for example : 19)
- To change the value, Press  or , until set the required value.
- Then press , the screen will show 5u.
- If the mode is r5, the screen will show r5 and if the mode is i1d, the screen will show i1d.





To select between 0-20mA and 4-20mA mode i1d

- Press  when the screen shows i1d, the screen will show the adjusted mode (for example : 0i)
- To set the mode to 4-20mA, Press , the screen will show 4i.
- To set the mode to 0-20mA, Press , the screen will show 0i.
- Then press , the screen will show a5.


To set the resistance of each step r5:

- Press  when the screen shows r5, the screen will show the adjusted number (for example : 10)
- To change the value, Press  or , until set the required value.
- Then press , the screen will show 5u.
- Then the screen will show a5 .

To select between 0-20mA and 4-20mA output a5



- Press  when the screen shows a5, the screen will show the adjusted mode (for example : 0i)
- To set the mode to 4-20mA, Press , the screen will show 4i.
- To set the mode to 0-20mA, Press , the screen will show 0i.
- Then press , the screen will show i n.

To exit from the programming mode:





- Press and hold  when the screen shows i n , 5t , i1d or a5.
- The screen will show E5 which mean exit from programming mode.
- Still press until the screen show actual step of the transformer.

5.3. Calibration






To enter to the calibration mode:

- Press and hold  for 3 sec.
- The screen will show CL which mean Calibration mode.
- Then press , the screen show Cr which mean cable resistance.

To calibrate cable resistance Cr

- Press  when the screen shows Cr , the screen will show 1 (step 1) .
- The transformer tap must now adjust to step 1 to correct measure.
- To save the actual cable resistance, Press , the screen will show Su .
- Press  to go to the next parameter without saving.
- Press  to exit from the calibration to measuring mode.

To fine adjust of step resistance Sr

- Press  when the screen shows Sr , the screen will show 0 (default) .
- Sr is the two number after decimal point in step resistance , for example if we need to set step resistance to 7.25 Ω , we need to set St to 7 and Sr to 25.
- To change the value, Press  or , until set the required value.
- Then press , the screen will show Su .
- Then the screen will show Cr .
- Press  to go back from the calibration mode to measuring mode.

6. Notes:

- If the device is not connected to resistance nor mA modes, it should give an error message: Er
- If the current step exceeds the maximum step, the device should give an out of range error message: ot
- The maximum step can range from 2 to 99 steps.
- The One-Step-Resistance can range from 2 to 99 Ω .

7. Technical Specifications:

7.1 Electrical Specifications:

Inputs:

Power supply range : 85 -265VAC / 80-250VDC or 9-30VDC.

Signal current range : 4-20mA or 0-20mA

Resistance range : 180 Ω (17 -19 Step).

Outputs:

Power supply : 24 VDC – 0.3 A (option)

Signal current range : 4-20mA or 0-20mA (option)

7.2 Mechanical Specifications:

Dimension : 9.6 cm * 9.6 cm * 11.2 cm

7.3 Protection Specifications

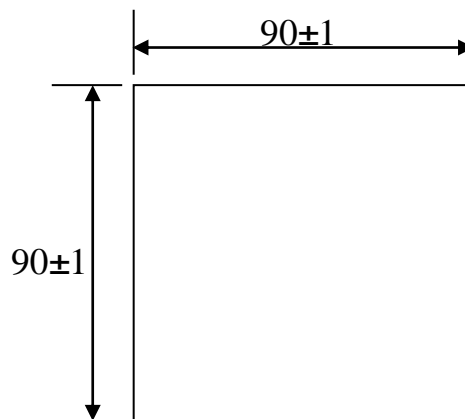
Electrical: 1A fuse and 250VAC varistor in power input.

Temperature : +5°C to +60°C.

Enclosure IP : IP 45.

- The enclosure is isolated according to standard EN 60439-1 specification.
- The enclosure is protected against external mechanical shocks.

8. Panel Cutout



(Unit: mm)

9. Ordering information

TSI X- X X- X X					
TSI					Transformer Step Indicator Sires.
Power Supply	A				85 - 265 VAC or 80 - 250 VDC.
	B				9 - 30 VDC.
Resistance Input		0			No Resistance input.
		R			Resistance input – Step resistance (Programmable).
mA Input			0		No mA input.
			C		mA input - 4-20ma or 0-20mA (Programmable).
mA Output				0	No mA output.
				C	mA output - 4-20ma or 0-20mA (Programmable).
Power Supply Output				0	No Aux supply output.
				S	24 VDC – 0.3A Aux supply output.