Device handbook
SIRAX BT5600

Operating Instructions SIRAX BT5600

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Contents

1. Legal information

1.1 Safety and warning notices

In this document safety and warning notices are used, which you have to observe to ensure personal safety and to prevent damage to property.

If the warning notice is not followed death or severe personal injury **will** result.

If the warning notice is not followed damage to property or severe personal injury **may** result.

If the warning notice is not followed the device **may** be damaged or **may** not fulfill the expected functionality.

The installation and commissioning should only be carried out by trained personnel. Check the following points before commissioning:
- that the maximum values for all the connections are not exceeded, see „Technical data“ section,
- that the connection wires are not damaged, and that they are not live during wiring,
- that the power flow direction and the phase rotation are correct.

The instrument must be taken out of service if safe operation is no longer possible (e.g. visible damage). In this case, all the connections must be switched off. The instrument must be returned to the factory or to an authorized service dealer.

It is forbidden to open the housing and to make modifications to the instrument. The instrument is not equipped with an integrated circuit breaker. During installation check that a labeled switch is installed and that it can easily be reached by the operators.

Unauthorized repair or alteration of the unit invalidates the warranty.

Please observe that the data on the type plate must be adhered to!

The national provisions have to be observed in the installation and material selection of electric lines!

1.2 Qualified personnel

The product described in this document may be handled by personnel only, which is qualified for the respective task. Qualified personnel have the training and experience to identify risks and potential hazards when working with the product. Qualified personnel are also able to understand and follow the given safety and warning notices.

1.3 Intended use

The product described in this document may be used only for the application specified. The maximum electrical supply data and ambient conditions specified in the technical data section must be adhered. For the perfect and safe operation of the device proper transport and storage as well as professional assembly, installation, handling and maintenance are required.

1.4 Disclaimer of liability

The content of this document has been reviewed to ensure correctness. Nevertheless it may contain errors or inconsistencies and we cannot guarantee completeness and correctness. This is especially true for different language versions of this document. This document is regularly reviewed and updated. Necessary corrections will be included in subsequent version and are available via our webpage www.camillebauer.com.

1.5 Feedback

If you detect errors in this document or if there is necessary information missing, please inform us via e-mail to:
customer-support@camillebauer.com

1.6 Repair work and modifications

Repair work and modifications shall exclusively be carried out by the manufacturer. Do not open the housing of the device. In case of any tampering with the device, the guaranty claim shall lapse. We reserve the right of changing the product to improve it.

1.7 Calibration and new adjustment

Each device is adjusted and checked before delivery. The condition as supplied to the customer is measured and stored in electronic form.
The uncertainty of measurement devices may be altered during normal operation if, for example, the specified ambient conditions are not met.

1.8 Cleaning

The display and the control buttons should be cleaned at regular intervals. Use a dry or slightly damp cloth.

Damage caused by cleaning agents

Detergents can not only affect the clarity of the display, but also cause damage to the device. Therefore, do not use detergents.

1.9 Disposal

Device may only be disposed in a professional manner!

The disposal of devices and components may only be realised in accordance with good professional practice observing the country-specifi c regulations. Incorrect disposal can cause environmental risks.

1.10 Return

All devices delivered to Camille Bauer Metrawatt AG shall be free of any hazardous contaminants (acids, lyes, solutions, etc.).
Use original packaging or suitable transport packaging to return the device.

Damage by returning

Damages caused by improper returning, no warranties or guarantees can be given.

2. Introduction

2.1 Purpose of this document

This document describes the programmable Tap Position Transducer SIRAX BT5600. It is intended to be used by:
- Installers and commissioners
- Service and maintenance personnel
- Planner

Scope

This handbook is valid for all versions of the programmable Tap Position Transducer SIRAX BT5600. Some of the functions described in this document are available only, if the necessary optional components are included in the device.

Required knowledge

A general knowledge in the field of electrical engineering is required. For assembly and installation of the device knowledge of applicable national safety regulations and installation standard is required.

2.2 Scope of supply

- Programmable Tap Position Transducer SIRAX BT5600
- Mounting kit
- Operating Manual (ge, en)

2.3 Further documents

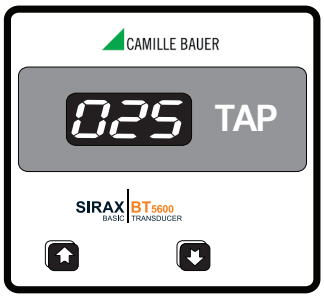
The following additional documents for the device are available electronically via www.camillebauer.com:
- Datasheet (ge, en)
- Declaration of conformity

3. Functional description

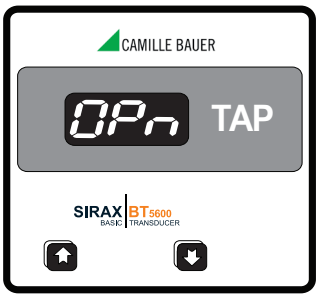
The purpose of the Tap position transducer is to convert tap position of transformers to equivalent analogue output. Outputs can be given as input to either RTU or indicator or recording instrument. Tap position transducers receives resistance input, which corresponds to tap position of transformer. Output is proportional to tap position. The device has one input channel and two independent outputs. Input variable and measuring range are programmed with the aid of a PC and the configuration software.

3.1 Measurement reading screen

In normal operation the user is presented with the measurement reading screen. On measurement screen TAP number is shown which corresponds to the input resistance.



If input resistrance is not applied then measurement screen will show open (OPn).



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 - 25k Ohms, 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.

4. Mechanical mounting

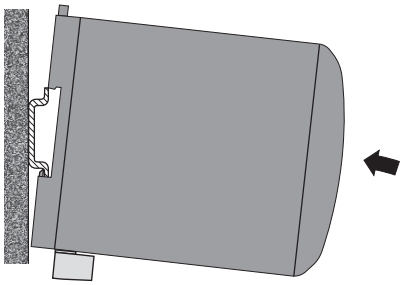
The SIRAX BT5600 is designed for DIN Rail or Panel mounting.

Please ensure that the operating temperature limits are not exceeded when determining the place of mounting (place of measurement): **–20 … +65° C**

By installing, the device becomes part of an electrical power installation that must be designed, operated and maintained in accordance with country-specific regulations so that the installation is safe and provides prevention against fire and explosion as far as possible. It is the task of this installation to ensure that dangerous connections of the device can not be touched during operation and that the spread of flames, heat and smoke from the interior is prevented. This may be done by providing an enclosure (e.g. case, cabinet) or using a room accessible to qualified personal only and compliant with local fire safety standards.

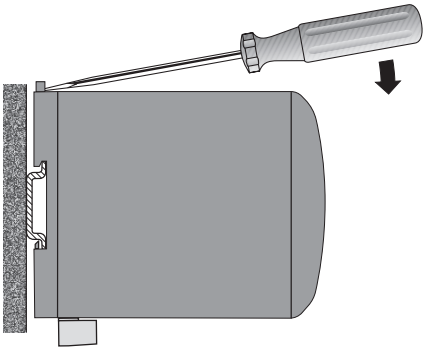
4.1 DIN Rail mounting

One Version of the SIRAX BT5600 is designed for DIN Rail mounting.



Mounting

Any mounting position is possible. Device may be clipped onto a top-hat rail according EN50022.

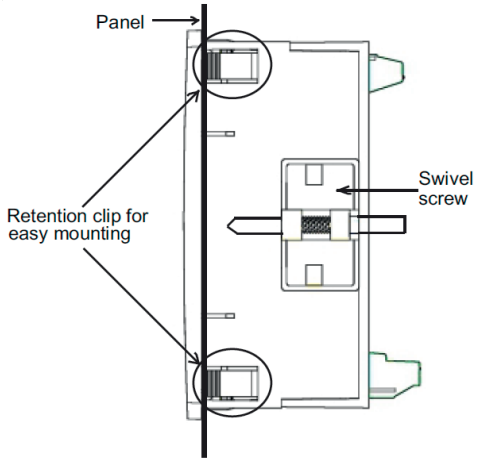


Demounting of the device

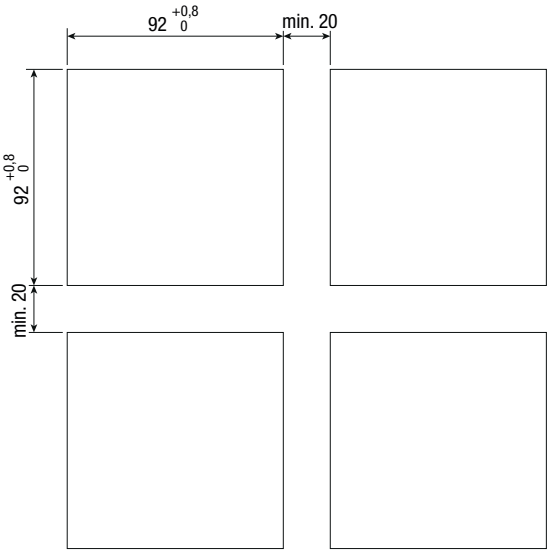
Disassembly of the device requires that all connected wires be without current. First, remove all push terminals and the wires of the current and voltage inputs. Ensure that possible current transformers are short-circuited before the current connections on the device are opened. Release the transducer from a top-hat rail.

4.2 Panel mounting

An other Version of the SIRAX BT5600 is designed for panel mounting.



Panel thickness: 1-3mm for self clicking
1-6mm for swivel screws



Variant with Easy Clip-in

a) Slide the device into the cutout from the outside until the easy clip-in snaps in. Orientation as shown.

Variant with Mounting clamps (Swivel screws)

a) Slide the device into the cutout from the outside. Orientation as shown.

b) From the side slide in the mounting clamps into the intended openings and pull them back about 2 mm

c) Tighten the fixation screws until the device is tightly fixed with the panel

Demounting of the device

The demounting of the device may be performed only if all connected wires are out of service. Remove all plug-in terminals and all connections of the current and voltage inputs. Pay attention to the fact, that current transformers must be shortened before removing the current connections to the device. Then demount the device in the opposite order of mounting.

5. Electrical connections

Ensure under all circumstances that the leads are free of potential when connecting them! Make sure that the cables are not live when makint the connections! The 230 V power supply terminal is potentially dangerous.

5.1 General safety notes

Please observe that the data on the type plate must be adhered to!

The national provisions have to be observed in the installation and material selection of electric lines!

The data required to carry out the prescribed measurement must correspond to those marked on the label of the device.

The total loop resistance connected to the output (receiver plus leads) does not exceed the maximum permissible value Rext.

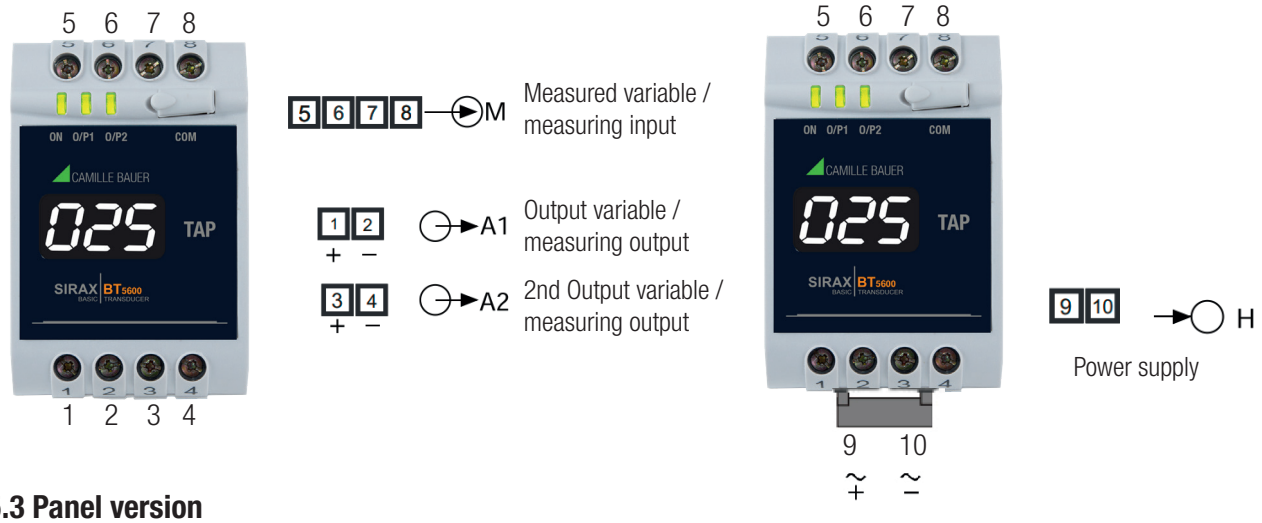
The measurement input and output cables should be twisted pairs and run as far as possible away from heavy current cables!

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

Symbol	Meaning
	Device may only be disposed of in a professional manner!
	Double insulation, device of protection class 2
CE	CE conformity mark. The device fulfills the requirements of the applicable EC directives. See declaration of conformity.
	Caution! General hazard point. Read the operating instructions.
	Attention: Danger to life!
	Please note

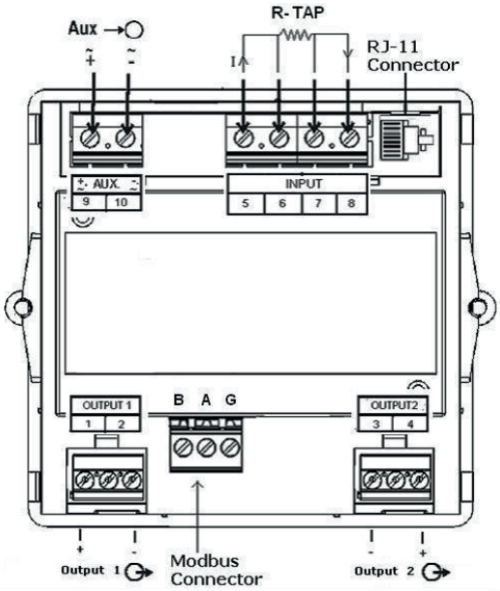
5.2 DIN Rail version

The electrical connections are made by screw terminals which are easily accessible from the front oft the transmitter and can accommodate wire gauges up to 1 x 2.5 mm^2.



5.3 Panel version

The connections are made directly to screw type terminals with indirect wire pressure. Numbering is cleared marked on the connector. Terminal will accept up to 4 mm^2 (12AWG) solid or 2.5 mm^2 stranded cable. It is recommended to use wire with lug for connectio.



5.4 Measuring output leads

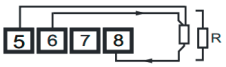
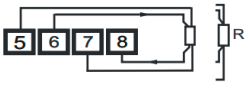
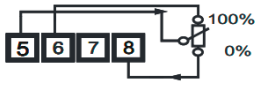
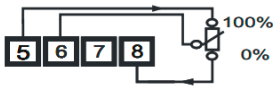
Connect the output leads for output 1 to terminals 1 (+) and 2 (-) and for output 2 to terminals 3 (+) and 4 (-) as shown in picture. The maximum permissible external resistance Rext. max of the transducer must not be exceeded.

5.5 Power supply

Connect the power supply to terminals 9 (+) and 10 (-) as shown in picture. A two-pole switch must be included in the supply connection where facility for switching Tap Position Transducer off is desired.

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

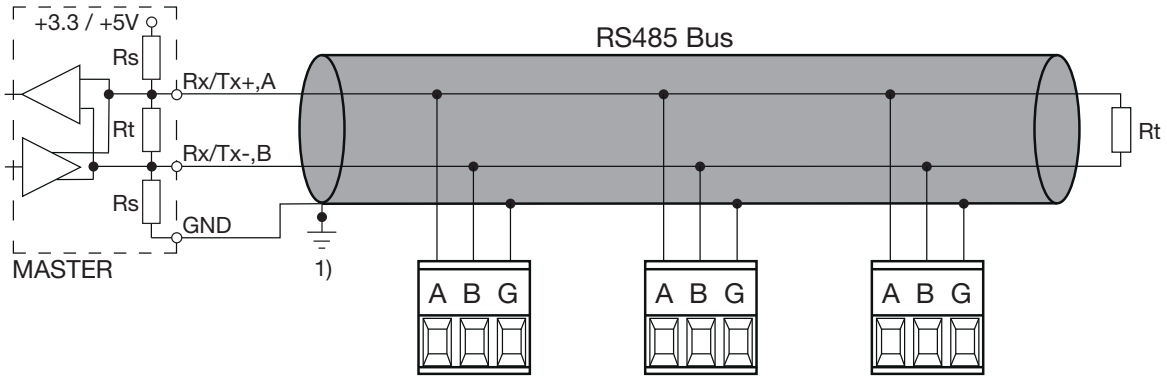
5.6 Measurement connection diagram

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

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 30 Ω per lead.

5.7 Modbus/RTU interface RS485 for version panel mounting

Via the optional Modbus interface measurement data may be provided for a superior system.



1) One ground connection only. This is possibly made within the master (PC).

Rt: Termination resistors: 120 Ω each for long cables (> approx. 10 m)

Rs: Bus supply resistors, 390 Ω each

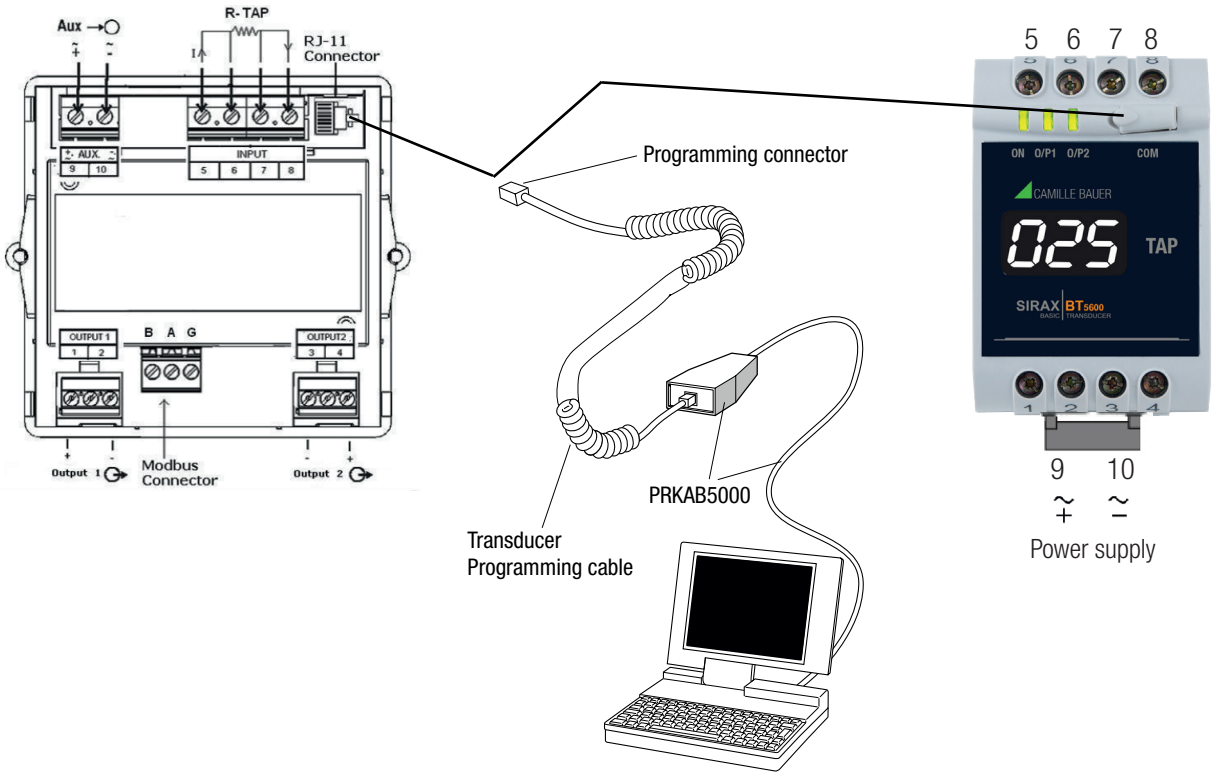
The signal wires (A, B) have to be twisted. GND (G) can be connected via a wire or via the cable screen. In disturbed environments shielded cables must be used. Supply resistors (Rs) have to be present in bus master (PC) interface. Stubs should be avoided when connecting the devices. A pure daisy chain network is ideal.

You may connect up to 32 Modbus devices to the bus. A proper operation requires that all devices connected to the bus have equal communication settings (baud rate, transmission format) and unique Modbus addresses.

The bus system is operated half duplex and may be extended to a maximum length of 1200 m without repeater.

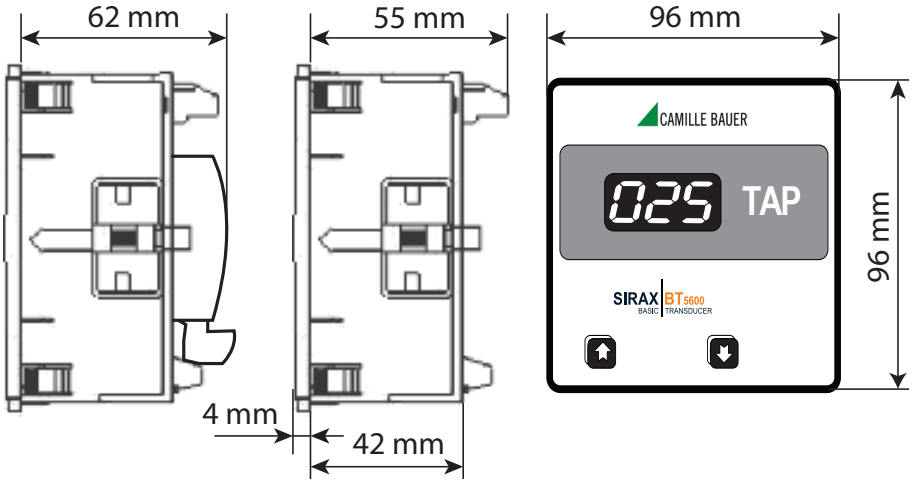
5.8 USB programming interface

Via programming cable PRKAB5000, programming software and the USB port on the SIRAX BT5600 the device can be programmed. The power supply must be applied to SIRAX BT5600 before it can be programmed. The programming cable PRKAB5000 adjust the signal level and provides the electrical insulation between the Computer and the SIRAX BT5600. The output signal, the input configuration and input range are programmable by Computer.

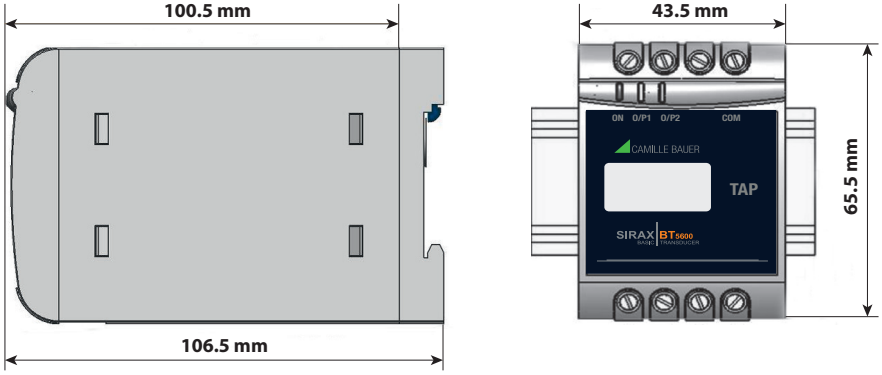


6. Commissioning

Before commissioning you have to check if the connection data of the device match the data of the plant.
If so, you can start to put the device into operation by switching on the power supply and the measurement inputs.



Panel mounting



DIN Rail mounting

Switch on the measuring input and the power supply. The green LED's 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} ≥160mA for the version with a power supply range of 24...60 V AC/DC

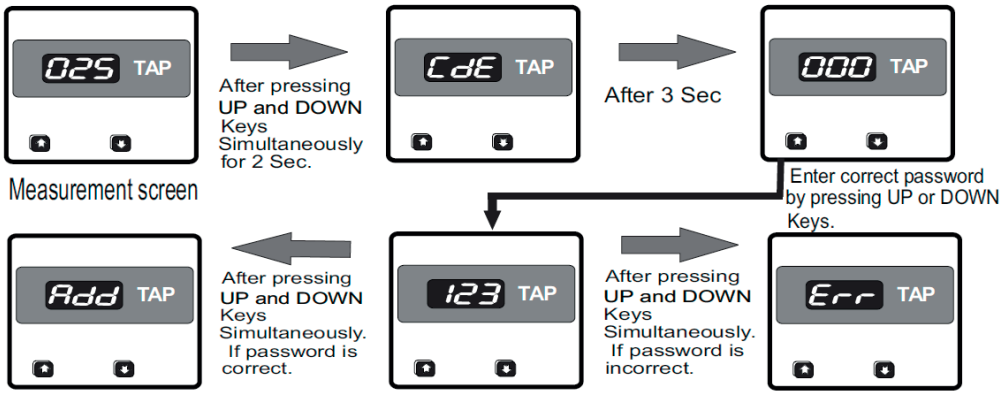
... I_{start} ≥35mA for the version with a power supply range of 85...230 V AC/DC

7. Programming

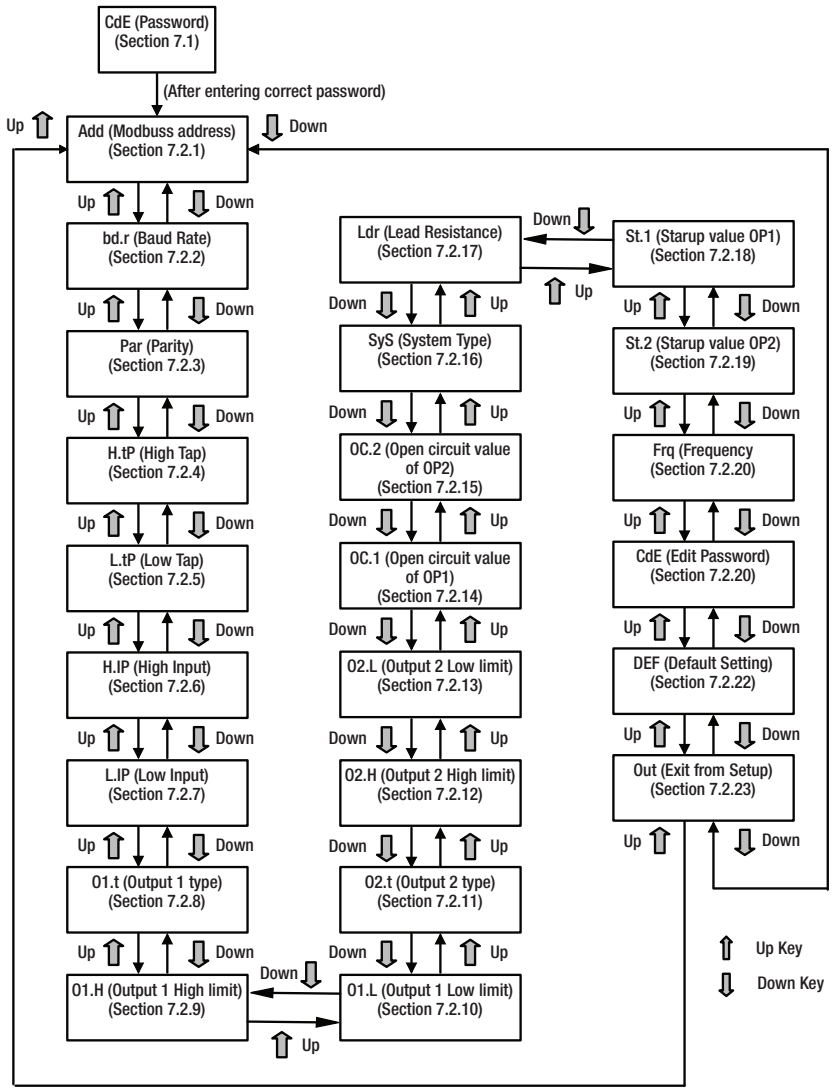
The SIRAX BT5600 in the version DIN Rail mounting just can be programmed via programming software. The version Panel mounting can be programmed via programming software or by two push-buttons. The following sections comprise step by step procedures for configuring the SIRAX BT5600 Version Panel mounting according to in-dividual user requirements. To access the set-up screens press and hold "▲ Up" and "▼ Down" keys simultaneously for 2 seconds. This will take the User into the Password Protection Entry Stage (Section 7.1).

7.1 Password protection

Password protection can be enabled to prevent unauthorised access to set-up screens, by default password protection is not enabled. Password protection is enabled by selecting a four digit number other than 0000, setting a password of 0000 disables the password protection. In password protection entry stage 'CdE' will be displayed on the display for 3 seconds , after 3 seconds '000' will be displayed. At this stage by pressing UP or DOWN keys we can scroll from '000' to '999' . After selecting correct number (previously set password value) press UP and DOWN key simultaneously to access setup screens. If we enter wrong password (which is not previous set password) then Err will be shown and TPT comes on measurement screen again.

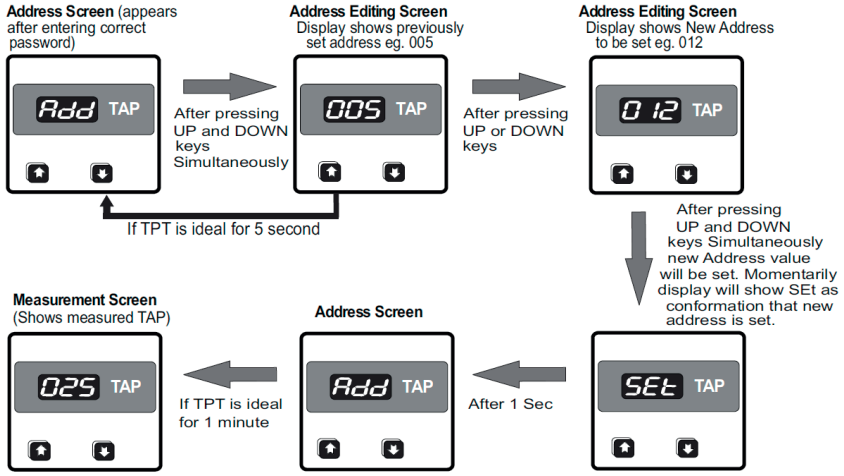


7.2 Setup Menu selection



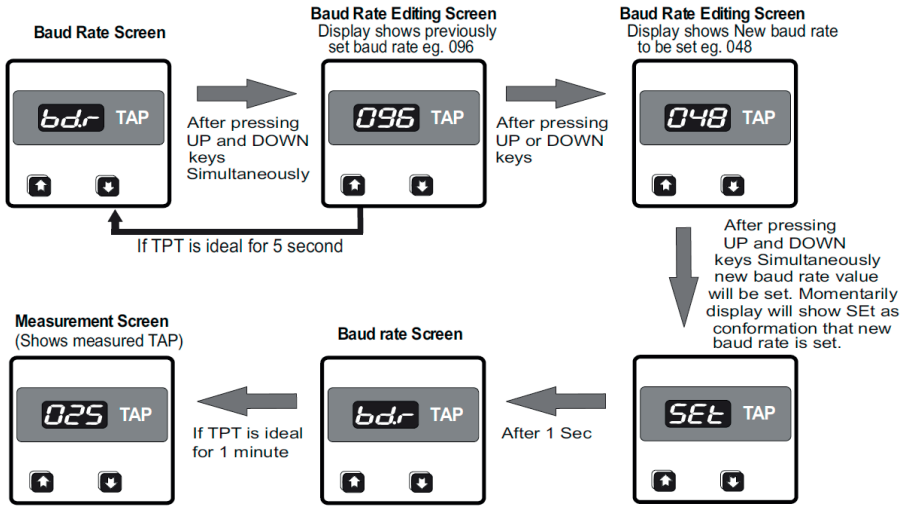
7.2.1 RS485 Modbus/RTU address setting

This screen applies to the RS 485 output only. This screen allows user to set RS 485 (Modbus) address of the device.
The range of allowable address is 1 to 247. After entering correct password user will see Address screen. After pressing UP and DOWN keys simultaneously user can see previously set address. At this screen user can change address by pressing UP or DOWN keys depending upon address value to be set and can set new address by pressing simultaneously UP and DOWN keys. If TPT is ideal for 5 seconds on address editing screen then TPT come back on address screen. If TPT is ideal for 1 minute on address screen then TPT come out of setup and measured TAP will be shown.



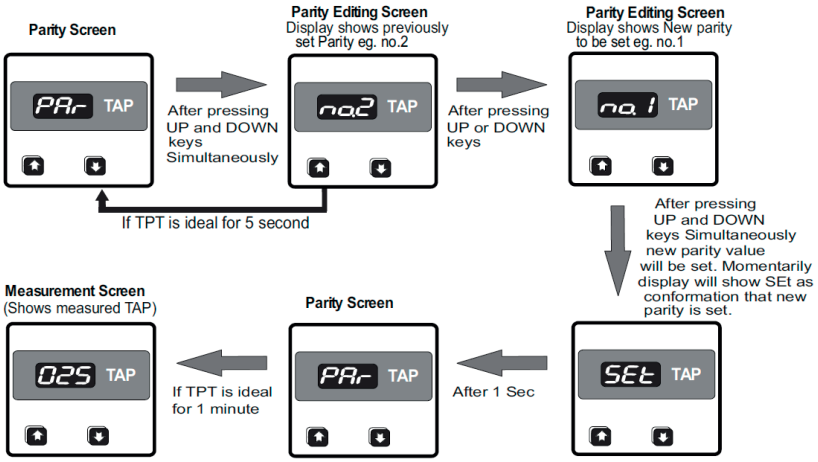
7.2.2 RS485 Modbus/RTU baud rate setting

This screen applies to the RS 485 output only. This screen allows user to set Baud Rate of RS 485 (Modbus) Port. The Values display on screen are 024(2400),048(4800),096(9600),192(19200).
After pressing UP key from Address screen or DOWN key from Parity pressing UP and DOWN keys simultaneously user can see previously set baud rate. At this screen user can change baud rate by pressing UP or DOWN keys depending upon baud rate value to be set and can set new baud rate by pressing simultaneously UP and DOWN keys. If TPT is ideal for 5 seconds on baud rate editing screen then TPT come back on baud rate screen. If TPT is ideal for 1 minute on baud rate screen then TPT come out of setup and measured TAP will be shown.



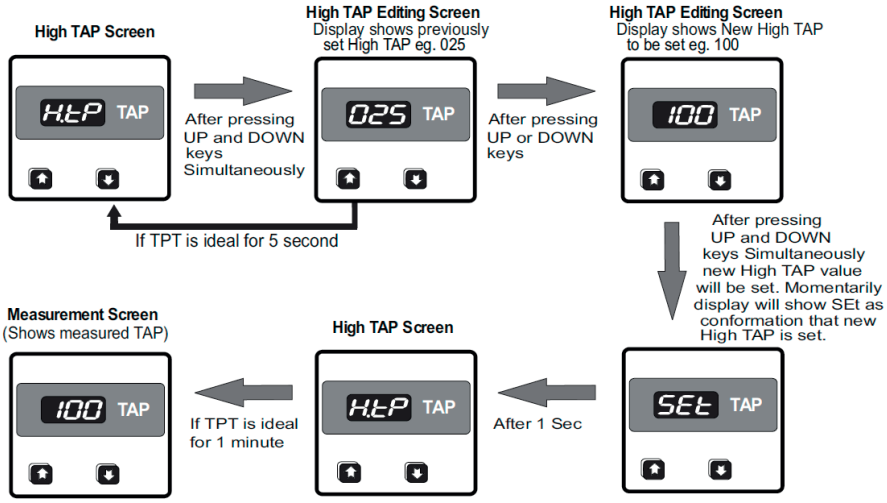
7.2.3 RS485 Modbus/RTU parity selection setting

This screen applies to the RS 485 output only. This screen allows user to set Parity of RS 485 (Modbus). The Values display on screen are no.1, no.2, Eu.1, Od.1.
no.1 :- None parity with 1 stop bit, no.2 :- None parity with 2 stop bit,
Eu.1 :- Even parity with 1 stop bit, Od.1 :- Odd parity with 1 stop bit.
After pressing UP key from Baud rate screen or DOWN key from High. pressing UP and DOWN keys simultaneously user can see previously set parity. At this screen user can change parity by pressing UP or DOWN keys depending upon parity value to be set and can set new parity by pressing simultaneously UP and DOWN keys. If TPT is ideal for 5 seconds on parity editing screen then TPT come back on Parity screen. If TPT is ideal for 1 minute on parity screen then TPT come out of setup and measured TAP will be shown.



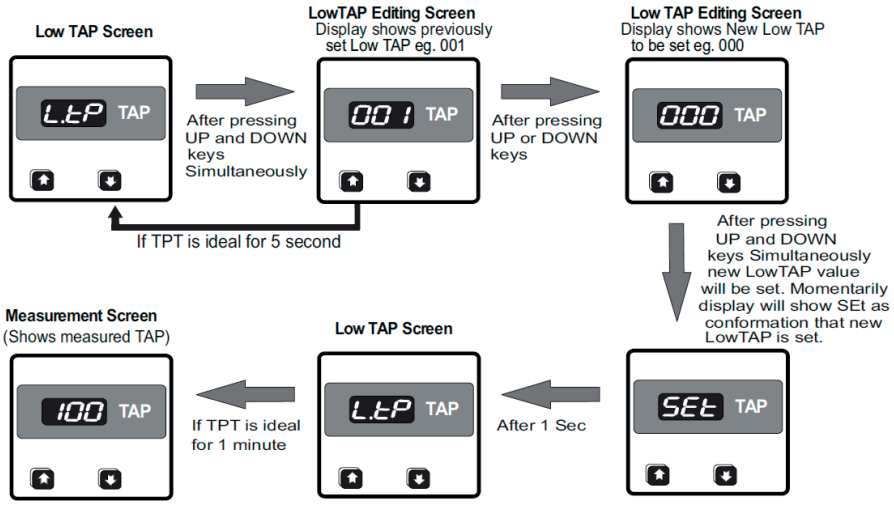
7.2.4 High TAP (maximum TAP number) setting

This screen allows user to set High TAP number of OLTC(On load tap changer). User can set High TAP value from 1 to 100 (if Low TAP value is 0) or from 2-101 (if Low TAP value is 1). After pressing UP key from Parity screen or DOWN key from Low TAP screen ,user will see High TAP Screen. On High TAP screen, after pressing UP and DOWN keys simultaneously user can see previously set High TAP. At this screen user can change High TAP by pressing UP or DOWN keys depending upon High TAP value to be set and can set new High TAP by pressing simultaneously UP and DOWN keys. If TPT is ideal for 5 seconds on High TAP editing screen then TPT come back on High TAP screen. If TPT is ideal for 1 minute on High TAP screen then TPT come out of setup and measured TAP will be shown.



7.2.5 Low TAP (minimum TAP number) setting

This screen allows user to set Low TAP number of OLTC (On load tap changer). User can set High TAP value from 0 to 1. After pressing UP key from High TAP screen or DOWN key from High IP screen ,user will see Low TAP Screen. On Low TAP screen, after pressing UP and DOWN keys simultaneously user can see previously set Low TAP. At this screen user can change Low TAP by pressing UP or DOWN keys depending upon Low TAP value to be set and can set new Low TAP by pressing simultaneously UP and DOWN keys. If TPT is ideal for 5 seconds on Low TAP editing screen then TPT come back on Low TAP screen. If TPT is ideal for 1 minute on Low TAP screen then TPT come out of setup and measured TAP will be shown.

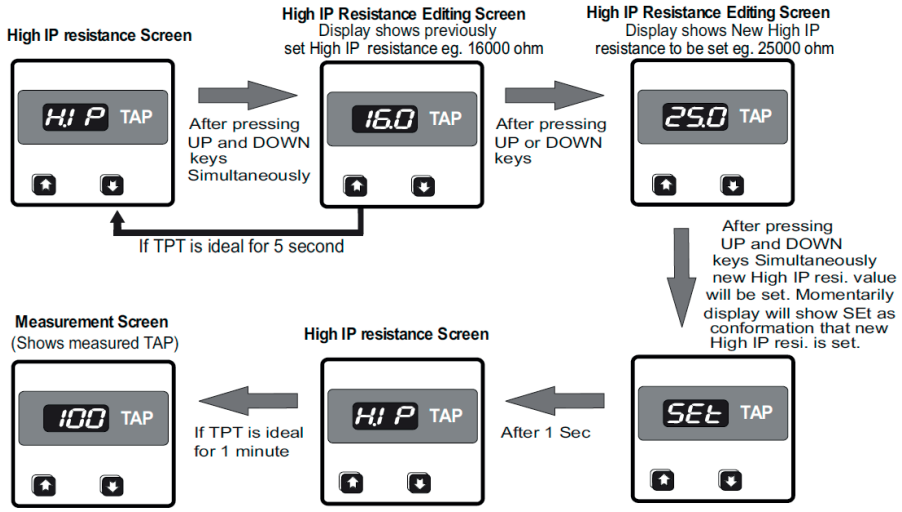


7.2.6 High input (IP) resistance limit setting

This screen allows user to set High IP Resistance of OLTC. User can set High IP resistance value from 500 ohm to 25000 ohm depending upon Low IP resistance value. Conditions for setting High IP resistance depending upon Low IP resistance are as follows.

1) High IP resistance >= Low IP resistance * 1.667
2) High IP resistance >= Low IP resistance + 500

Values on display are in Kohm. Eg. 25000 ohm will be displayed as 25.0 and 500 ohm will be displayed as 00.5. After pressing UP key from Low TAP screen or DOWN key from Low IP resistance screen ,user will see High IP resistance Screen. On High IP resistance screen, after pressing UP and DOWN keys simultaneously user can see previously set High IP resistance. At this screen user can change High IP resistance by pressing UP or DOWN keys depending upon High IP resistance value to be set and can set new High IP resistance by pressing simultaneously UP and DOWN keys. If TPT is ideal for 5 seconds on High IP resistance editing screen then TPT come back on High IP resistance screen. If TPT is ideal for 1 minute on High IP resistance screen then TPT come out of setup and measured TAP will be shown.

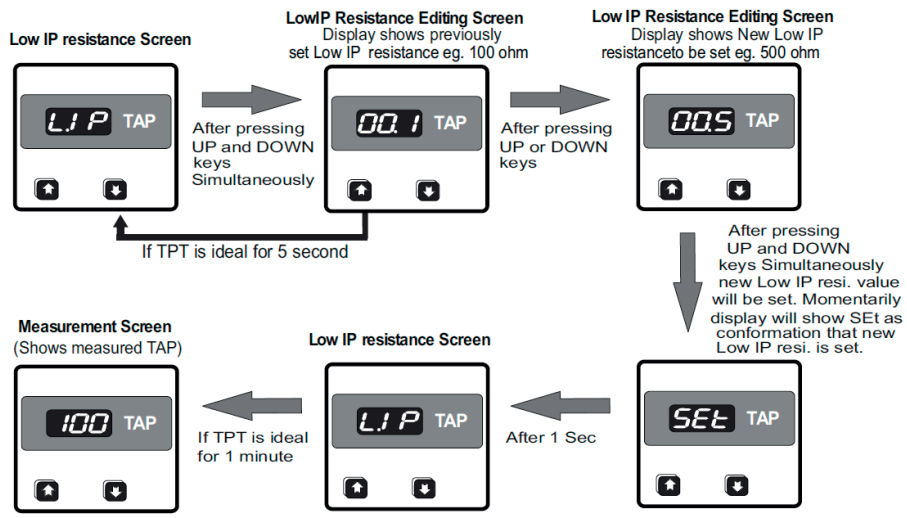


7.2.7 Low input (IP) resistance limit setting

This screen allows user to set Low IP Resistance of OLTC. User can set Low IP resistance value from 0 ohm to 14999 ohm depending upon High IP resistance value. Conditions for setting Low IP resistance depending upon High IP resistance are as follows.

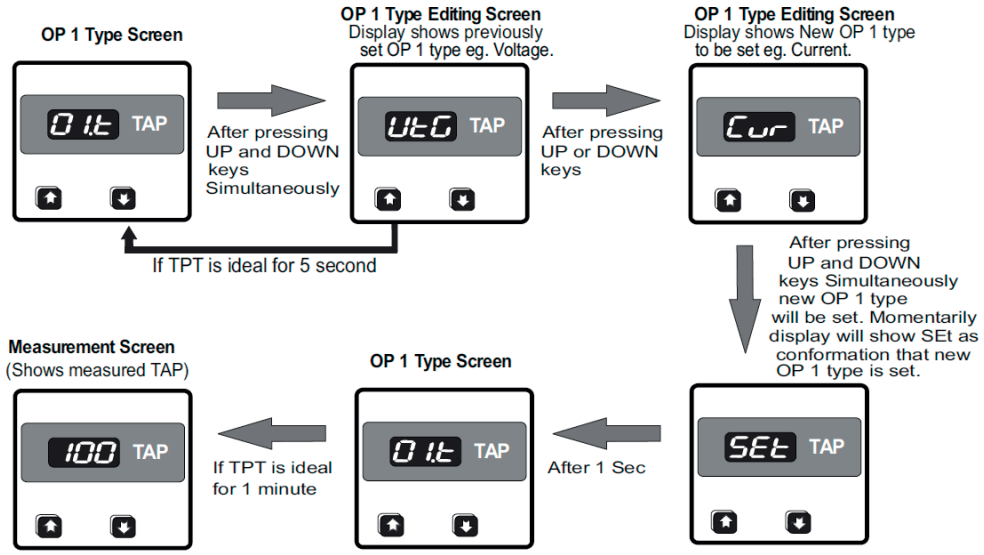
1) Low IP resistance <= High IP resistance / 1.667
2) Low IP resistance <= High IP resistance - 500

Values on display are in Kohm. Eg. 14000 ohm will be displayed as 14.0 and 100 ohm will be displayed as 00.1. After pressing UP key from High IP resistance screen or DOWN key from OP 1 type screen ,user will see Low IP resistance Screen. On Low IP resistance screen, after pressing UP and DOWN keys simultaneously user can see previously set Low IP resistance. At this screen user can change Low IP resistance by pressing UP or DOWN keys depending upon Low IP resistance value to be set and can set new Low IP resistance by pressing simultaneously UP and DOWN keys. If TPT is ideal for 5 seconds on Low IP resistance editing screen then TPT come back on Low IP resistance screen. If TPT is ideal for 1 minute on Low IP resistance screen then TPT come out of setup and measured TAP will be shown.



7.2.8 Output 1 (OP 1) type setting

This screen allows user to set OP 1 type of TPT. User can set OP 1 type as voltage (VtG) output or Current (Cur) output. After pressing UP key from Low IP res. screen or DOWN key from OP 1 High value screen, user will see OP 1 type Screen. On OP 1 type screen, after pressing UP and DOWN keys simultaneously user can see previously set OP 1 type. At this screen user can change OP 1 type (i.e. voltage or current)by pressing UP or DOWN keys and can set new OP 1 type by pressing simultaneously UP and DOWN keys. If TPT is ideal for 5 seconds on OP 1 type editing screen then TPT come back on OP 1 type screen. If TPT is ideal for 1 minute on OP 1 type screen then TPT come out of setup and measured TAP will be shown.



7.2.9 Output 1 (OP 1) higher limit setting

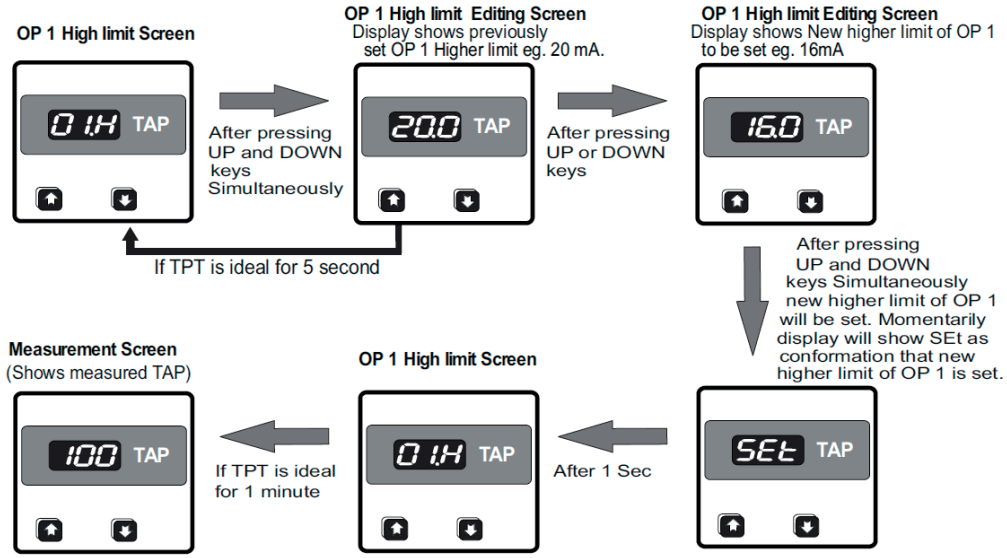
This screen allows user to set Higher limit of OP 1 of TPT. User can set Higher limit of OP 1 in different ranges depending upon OP 1 type and Lower limit of OP 1. If OP 1 type is current output then Higher limit of OP 1 can be set between -17 mA to 22 mA with following condition.

1) (Higher limit of OP 1 - Lower limit of OP 1) >= 5.
2) (Higher limit of OP 1 - Lower limit of OP 1) <= 40.

If OP 1 type is voltage output then Higher limit of OP 1 can be set between -8 V to 15 V with following condition.

1) (Higher limit of OP 1 - Lower limit of OP 1) >= 4.
2) (Higher limit of OP 1 - Lower limit of OP 1) <= 27.

For current output values on display are in mA and for voltage output After pressing UP key from OP 1 type screen or DOWN key from OP 1 higher limit screen, after pressing UP and DOWN keys simultaneously user can see previously set higher limit of OP 1. At this screen user can change higher limit of OP 1 by pressing UP or DOWN keys depending upon higher limit of OP 1 to be set and can set new higher limit of OP 1 by pressing simultaneously UP and DOWN screen then TPT come back on OP 1 Higher limit screen. If TPT is ideal for 1 minute on OP 1 Higher limit screen then TPT come out of OP 1 Lower limit screen ,user will see OP 1 Higher limit Screen. On setup and measured TAP will be shown.



7.2.10 Output 1 (OP 1) lower limit setting

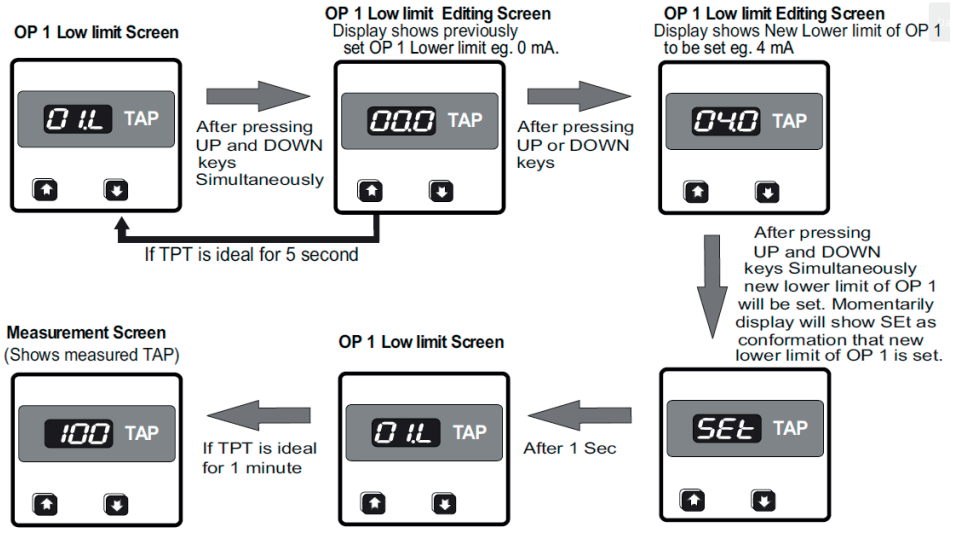
This screen allows user to set Lower limit of OP 1 of TPT. User can set Lower limit of OP 1 in different ranges depending upon OP 1 type and Higher limit OP 1. If OP 1 type is current output then Lower limit of OP 1 can be set between -22 mA to 17 mA with following condition.

1) (Higher limit of OP 1 - Lower limit of OP 1) >= 5.
2) (Higher limit of OP 1 - Lower limit of OP 1) <= 40.

If OP 1 type is voltage output then Lower limit of OP 1 can be set between -12 V to 11 V with following condition.

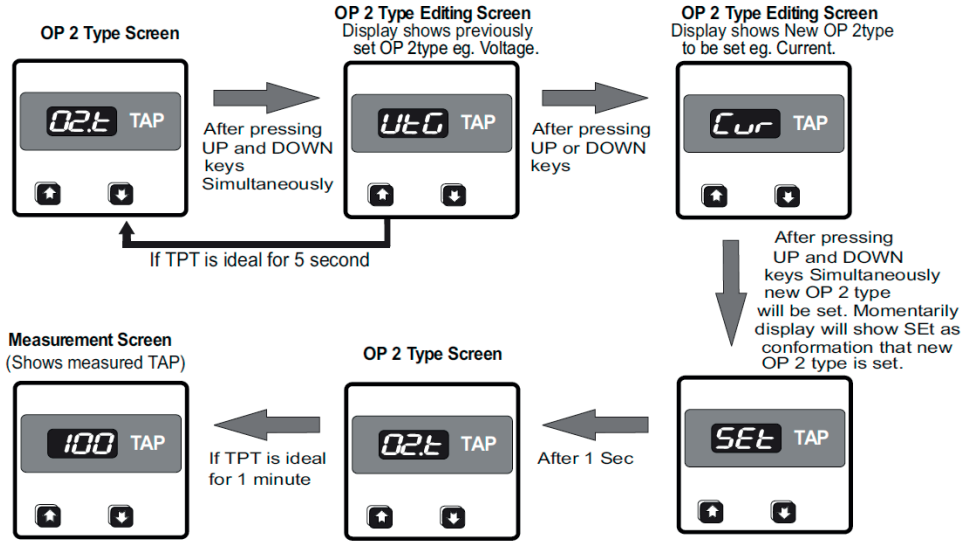
1) (Higher limit of OP 1 - Lower limit of OP 1) >= 4.
2) (Higher limit of OP 1 - Lower limit of OP 1) <= 27.

For current output values on display are in mA and for voltage output After pressing UP key from OP 1 high limit screen or DOWN key from OP 1 lower limit screen, after pressing UP and DOWN keys simultaneously user can see previously set lower limit of OP 1. At this screen user can change lower limit of OP 1 by pressing UP or DOWN keys depending upon lower limit of OP 1 to be set and can set new lower limit of OP 1 by pressing simultaneously UP and DOWN screen then TPT come back on OP 1 lower limit screen. If TPT is ideal for 1 minute on OP 1 lower limit screen then TPT come out of setup and measured TAP will be shown.



7.2.11 Output 2 (OP 2) type setting

This screen allows user to set OP 2 type of TPT. User can set OP 2 type as voltage (VtG) output or Current (Cur) output. After pressing UP key from Low IP res. screen or DOWN key from OP 2 High value screen, user will see OP 2 type Screen. On OP 2 type screen, after pressing UP and DOWN keys simultaneously user can see previously set OP 2 type. At this screen user can change OP 2 type (i.e. voltage or current)by pressing UP or DOWN keys and can set new OP 2 type by pressing simultaneously UP and DOWN keys. If TPT is ideal for 5 seconds on OP 2 type editing screen then TPT come back on OP 2 type screen. If TPT is ideal for 1 minute on OP 2 type screen then TPT come out of setup and measured TAP will be shown.



7.2.12 Output 2 (OP 2) higher limit setting

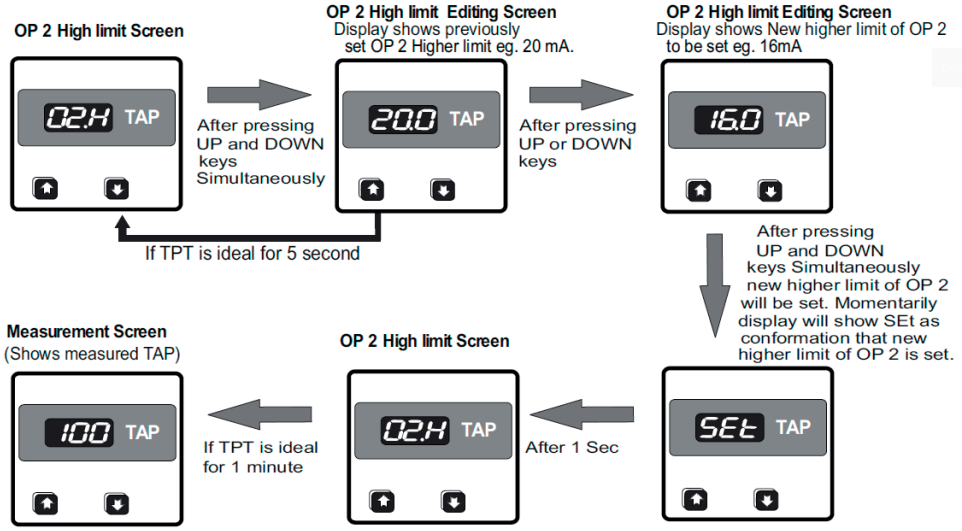
This screen allows user to set Higher limit of OP 2 of TPT. User can set Higher limit of OP 2 in different ranges depending upon OP 2 type and Lower limit of OP 2. If OP 2 type is current output then Higher limit of OP 2 can be set between -17 mA to 22 mA with following condition.

1) (Higher limit of OP 2 - Lower limit of OP 2) >= 5.
2) (Higher limit of OP 2 - Lower limit of OP 2) <= 40.

If OP 2 type is voltage output then Higher limit of OP 2 can be set between -8 V to 15 V with following condition.

1) (Higher limit of OP 2 - Lower limit of OP 2) >= 4.
2) (Higher limit of OP 2 - Lower limit of OP 2) <= 27.

For current output values on display are in mA and for voltage output After pressing UP key from OP 2 type screen or DOWN key from OP 2 higher limit screen, after pressing UP and DOWN keys simultaneously user can see previously set higher limit of OP 2. At this screen user can change higher limit of OP 2 by pressing UP or DOWN keys depending upon higher limit of OP 2 to be set and can set new higher limit of OP 2 by pressing simultaneously UP and DOWN screen then TPT come back on OP 2 Higher limit screen. If TPT is ideal for 1 minute on OP 2 Higher limit screen then TPT come out of OP 2 Lower limit screen ,user will see OP 2 Higher limit Screen. On setup and measured TAP will be shown.



7.2.13 Output 2 (OP 2) lower limit setting

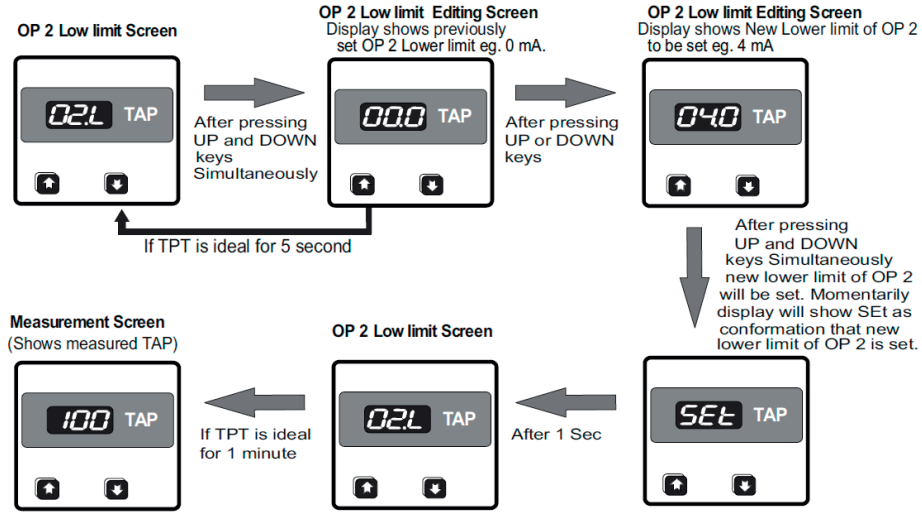
This screen allows user to set Lower limit of OP 2 of TPT. User can set Lower limit of OP 2 in different ranges depending upon OP 2 type and Higher limit OP 2. If OP 2 type is current output then Lower limit of OP 2 can be set between -22 mA to 17 mA with following condition.

1) (Higher limit of OP 2 - Lower limit of OP 2) >= 5.
2) (Higher limit of OP 2 - Lower limit of OP 2) <= 40.

If OP 2 type is voltage output then Lower limit of OP 1 can be set between -12 V to 11 V with following condition.

1) (Higher limit of OP 2 - Lower limit of OP 2) >= 4.
2) (Higher limit of OP 2 - Lower limit of OP 2) <= 27.

For current output values on display are in mA and for voltage output After pressing UP key from OP 2 high limit screen or DOWN key from OP 2 lower limit screen, after pressing UP and DOWN keys simultaneously user can see previously set lower limit of OP 2. At this screen user can change lower limit of OP 2 by pressing UP or DOWN keys depending upon lower limit of OP 2 to be set and can set new lower limit of OP 2 by pressing simultaneously UP and DOWN screen then TPT come back on OP 2 lower limit screen. If TPT is ideal for 1 minute on OP 2 lower limit screen then TPT come out of setup and measured TAP will be shown.



7.2.14 Open circuit (OC) value of output 1 (OP 1) setting

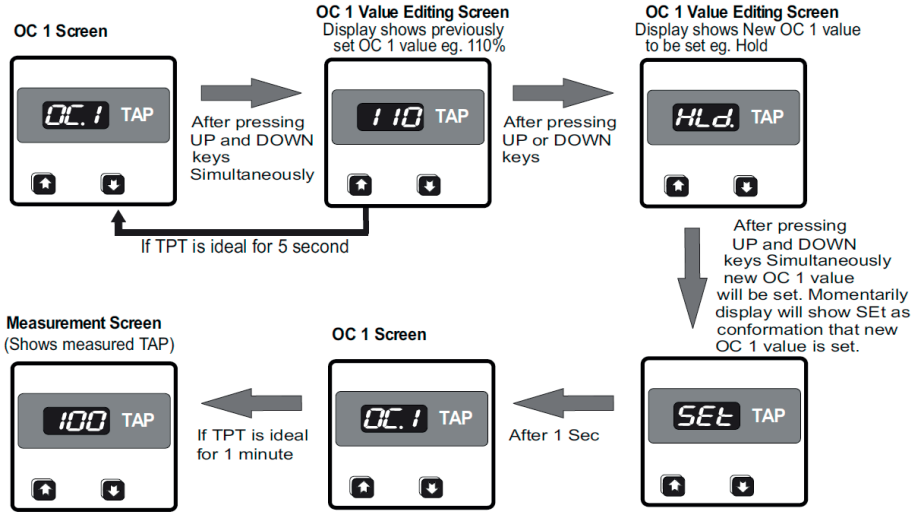
This screen allows user to set Open Circuit value of OP 1 of TPT. Open Circuit value of OP 1 (OC 1 Value) is nothing but the Output given by TPT when input is Open (i.e. no IP given to TPT or IP above range given.) User can set OC val of OP 1 from -10 % to 110% of output span or at Hold. Consider OP 1 is set as 4 to 20 mA and OC value of OP 1 is set as X%. In such conditions OP1 span will be 16 mA. Now whenever I P i s open then Op1 will be = [((16*X)/100)-16)+20] Eg. if OC 1= 110% then whenever IP will open OP 1 will be 21.6 mA. If OC value of OP 1 is set at Hold then TPT will deliver same output which it was delivering before IP gets open circuited.

Note: If OC value of OP 1 is set at hold then OC value of OP 2 will be set at hold automatically and vice versa.

After pressing UP key from OP 2 low limit screen or DOWN key from OC 2 value screen, user will see OC 1 value Screen. On OC 1 value screen, after pressing UP and DOWN keys simultaneously user can see previously set OC 1 value. At this screen user can change OC 1 value by pressing UP or DOWN keys depending upon OC 1 value to be set and can set new OC 1 value by pressing simultaneously UP and DOWN keys.

Note: Hold option will be seen after 110% by pressing UP key.

If TPT is ideal for 5 seconds on OC 1 value editing screen then TPT come back on OC 1 value screen. If TPT is ideal for 1 minute on OC 1 value screen then TPT come out of setup and measured TAP will be shown.



7.2.15 Open circuit (OC) value of output 2 (OP 2) setting

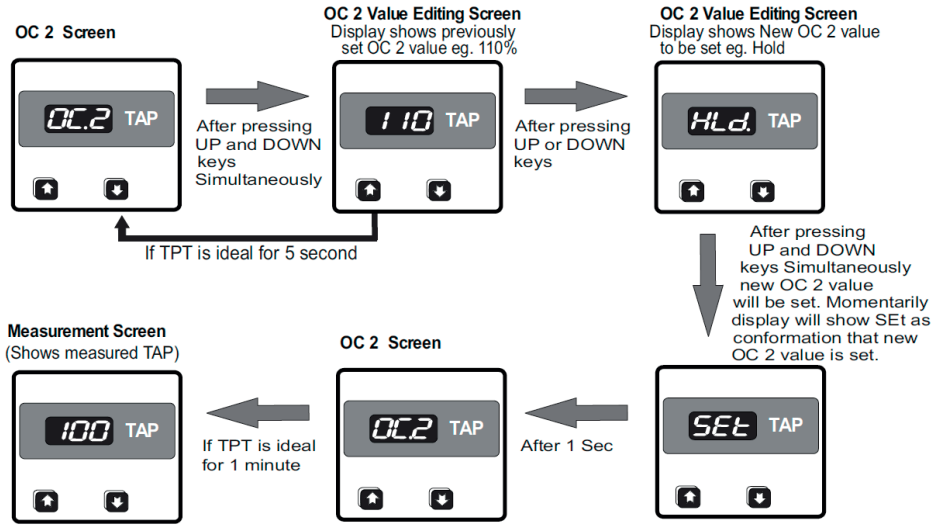
This screen allows user to set Open Circuit value of OP 2 of TPT. Open Circuit value of OP 2 (OC 2 Value) is nothing but the Output given by TPT when input is Open (i.e. no IP given to TPT or IP above range given.) User can set OC val of OP 2 from -10 % to 110% of output span or at Hold. Consider OP 2 is set as 4 to 20 mA and OC value of OP 2 is set as X%. In such conditions OP 2 span will be 16 mA. Now whenever I P i s open then Op 2 will be = [((16*X)/100)-16)+20] Eg. if OC 2= 110% then whenever IP will open OP 2 will be 21.6 mA. If OC value of OP 2 is set at Hold then TPT will deliver same output which it was delivering before IP gets open circuited.

Note: If OC value of OP 2 is set at hold then OC value of OP 2 will be set at hold automatically and vice versa.

After pressing UP key from OP 2 low limit screen or DOWN key from OC 2 value screen, user will see OC 2 value Screen. On OC 2 value screen, after pressing UP and DOWN keys simultaneously user can see previously set OC 2 value. At this screen user can change OC 2 value by pressing UP or DOWN keys depending upon OC 2 value to be set and can set new OC 2 value by pressing simultaneously UP and DOWN keys.

Note: Hold option will be seen after 110% by pressing UP key.

If TPT is ideal for 5 seconds on OC 2 value editing screen then TPT come back on OC 2 value screen. If TPT is ideal for 1 minute on OC 2 value screen then TPT come out of setup and measured TAP will be shown.

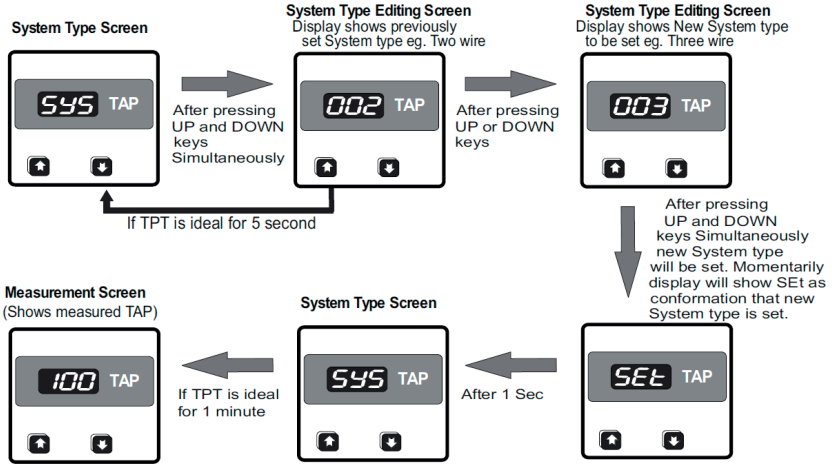


7.2.16 System type setting

This screen allows user to set system type of TPT. User can set system type of TPT in 5 different configurations. Those are as follow.

1) Two wire (on display shown as '2')
2) Three wire (on display shown as '3')
3) Four wire (on display shown as '4')
4) Transmitter WF (on display shown as '5')
5) Transmitter WF DIN (on display shown as '6')

If we have to set system type as 3 wire then we should set '3' on display screen. After pressing UP key from OC 2 value screen or DOWN key from Lead resistance screen ,user will see System type Screen. On System type screen, after pressing UP and DOWN keys simultaneously user can see previously set System type. At this screen user can change System type by pressing UP or DOWN keys depending upon System type to be set and can set new System type by pressing simultaneously UP and DOWN keys. If TPT is ideal for 5 seconds on System type editing screen then TPT come back on System type screen. If TPT is ideal for 1 minute on System type screen then TPT come out of setup and measured TAP will be shown.

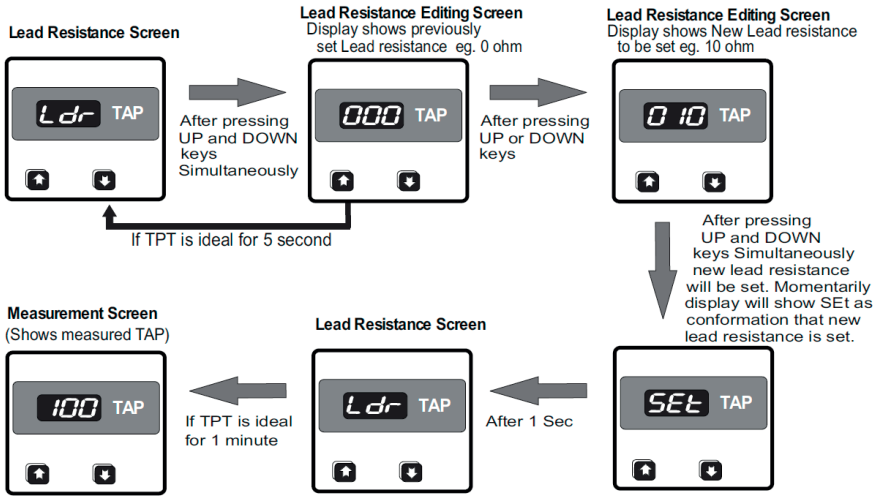


7.2.17 Lead resistance setting

This screen allows user to set Lead resistance Lead resistance is applicable for two wire system type only. User can Lead resistance from 0 ohm to 60 ohm.

Note: In Lead resistance screen, values on screen are in ohms.

After pressing UP key from system type screen or DOWN key from Start up value of OP1 screen ,user will see Lead resistance Screen. On Lead resistance screen, after pressing UP and DOWN keys simultaneously user can see previously set Lead resistance value. At this screen user can change Lead resistance value by pressing UP or DOWN keys depending upon Lead resistance value to be set and can set new Lead resistance value by pressing simultaneously UP and DOWN keys. If TPT is ideal for 5 seconds on Lead resistance value editing screen then TPT come back on Lead resistance value screen. If TPT is ideal for 1 minute on Lead resistance value screen then TPT come out of setup and measured TAP will be shown.

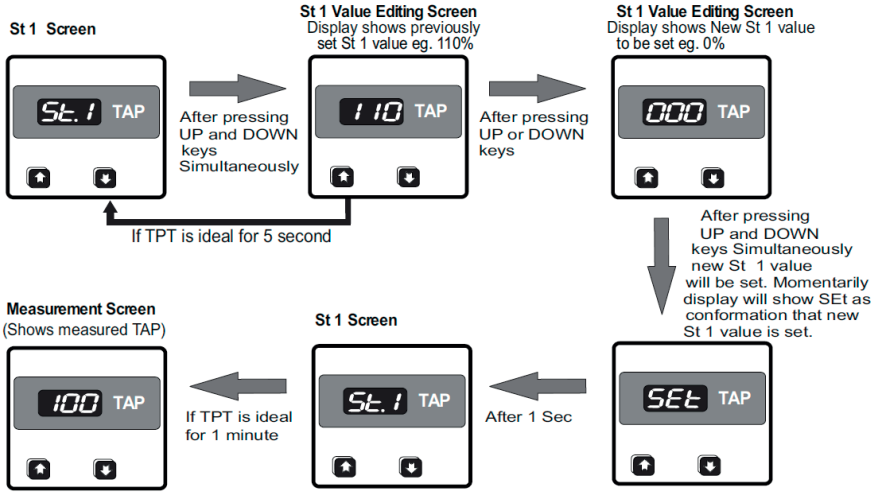


7.2.18 Startup (St) value of OP 1 Setting

This screen allows user to set Startup value of OP 1 of TPT. Startup value of OP 1 (St 1 Value) is nothing but the Output given by TPT when TPT just turned on. User can set Startup val of OP 1 from -10 % to 110% of output span. Consider OP 1 is set as 4 to 20 mA and St value of OP 1 is set as X%. In such conditions OP1 span will be 16 mA. Now whenever TPT just turns on, Op1 will be = [((16*X)/100)-16)+20], Eg. if St 1= 110% then whenever TPT will turn on, OP 1 will be 21.6 mA.

After pressing UP key from Lead resi limit screen or DOWN key from St 2 value screen ,user will see St 1 value Screen. On St 1 value screen, after pressing UP and DOWN keys simultaneously user can see previously set St 1 value. At this screen user can change St 1 value by pressing UP or DOWN keys depending upon new St 1 value to be set and can set new St 1 value by pressing simultaneously UP and DOWN keys.

If TPT is ideal for 5 seconds on St 1 value editing screen then TPT come back on St 1 value screen. If TPT is ideal for 1 minute on St 1 value screen then TPT come out of setup and measured TAP will be shown.

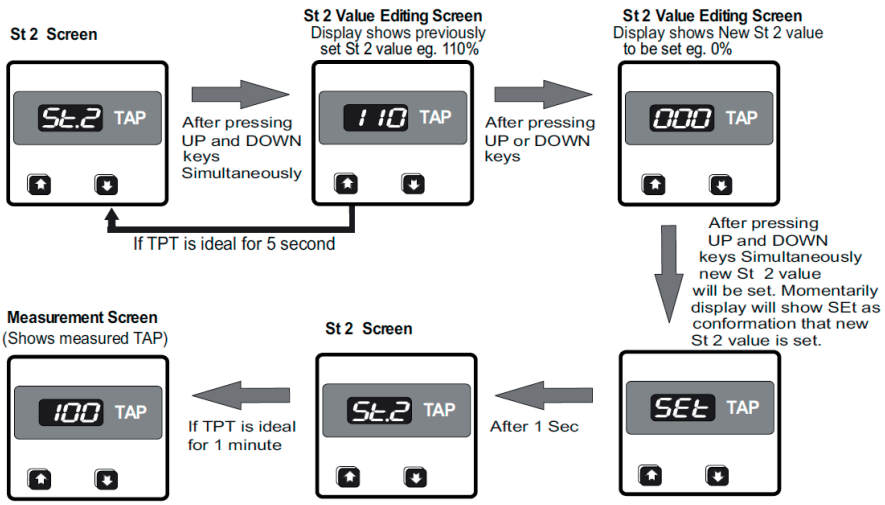


7.2.19 Startup (St) value of OP 2 Setting

This screen allows user to set Startup value of OP 2 of TPT. Startup value of OP 2 (St 2 Value) is nothing but the Output given by TPT when TPT just turned on. User can set Startup val of OP 2 from -10 % to 110% of output span. Consider OP 2 is set as 4 to 20 mA and St value of OP 2 is set as X%. In such conditions OP 2 span will be 16 mA. Now whenever TPT just turns on, OP 2 will be = [((16*X)/100)-16)+20], Eg. if St 2= 110% then whenever TPT will turn on, OP 2 will be 21.6 mA.

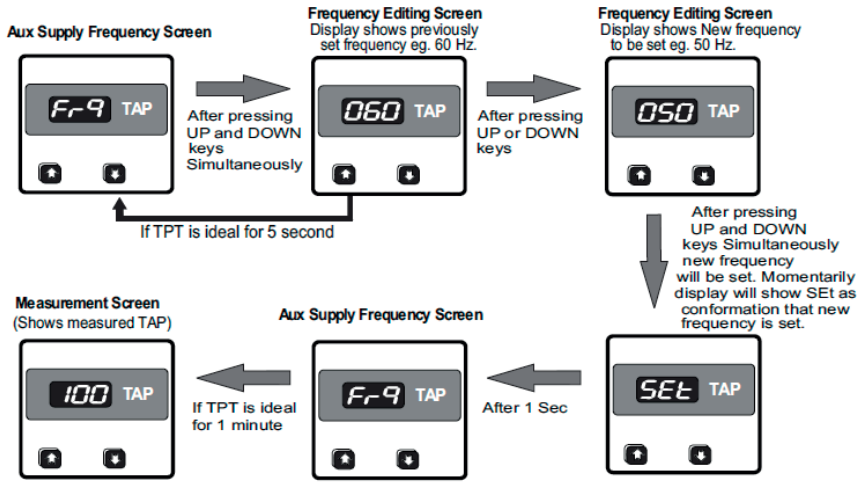
After pressing UP key from Lead resi limit screen or DOWN key from St 2 value screen ,user will see St 2 value Screen. On St 2 value screen, after pressing UP and DOWN keys simultaneously user can see previously set St 2 value. At this screen user can change St 2 value by pressing UP or DOWN keys depending upon new St 2 value to be set and can set new St 2 value by pressing simultaneously UP and DOWN keys.

If TPT is ideal for 5 seconds on St 2 value editing screen then TPT come back on St 2 value screen. If TPT is ideal for 1 minute on St 2 value screen then TPT come out of setup and measured TAP will be shown.



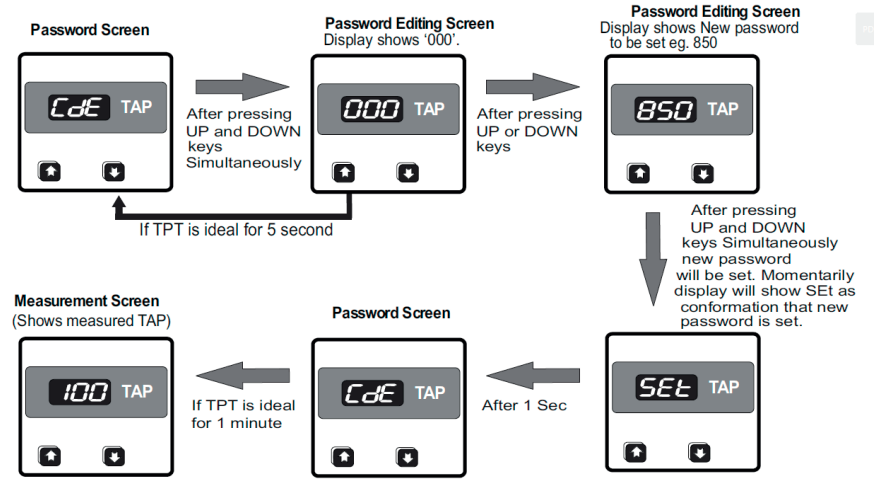
7.2.20 Auxilary Supply Frequency Setting

This screen allows user to set aux supply frequency of TPT. User can set frequency as 50 Hz or 60 Hz. After pressing UP key from St 2 value screen or DOWN key from password change screen, user will see frequency Screen. On freq. screen, after pressing UP and DOWN keys simultaneously user can see previously set Frequency. At this screen user can change Frequency by pressing UP or DOWN keys and can set new frequency by pressing simultaneously UP and DOWN keys. If TPT is ideal for 5 seconds on frequency editing screen then TPT come back on frequency screen. If TPT is ideal for 1 minute on frequency screen then TPT come out of setup and measured TAP will be shown.



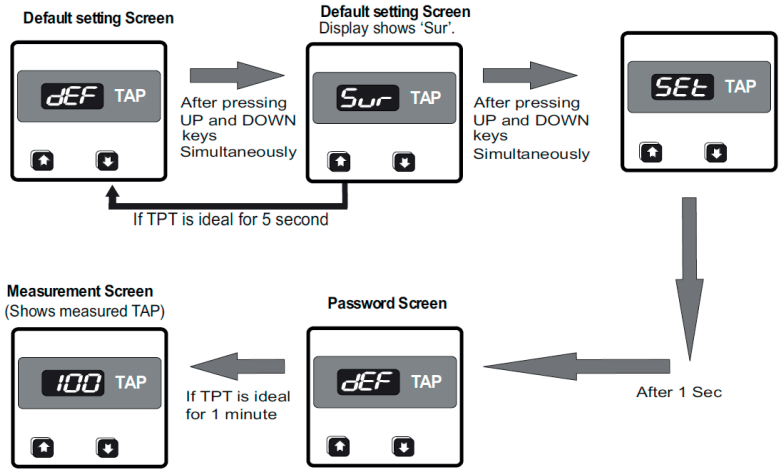
7.2.21 Password (code) setting

This screen allows user to change password of TPT. User can set password from 000 to 999. After pressing UP key from frequency screen or DOWN key from default setting screen, user will see password Screen. On Password setting screen, after pressing UP and DOWN keys simultaneously user will see '000 '. At this screen user can change password by pressing UP or DOWN keys and can set new password by pressing simultaneously UP and DOWN keys. If TPT is ideal for 5 seconds on password editing screen then TPT come back on password screen. If TPT is ideal for 1 minute on Password screen then TPT come out of setup and measured TAP will be shown.



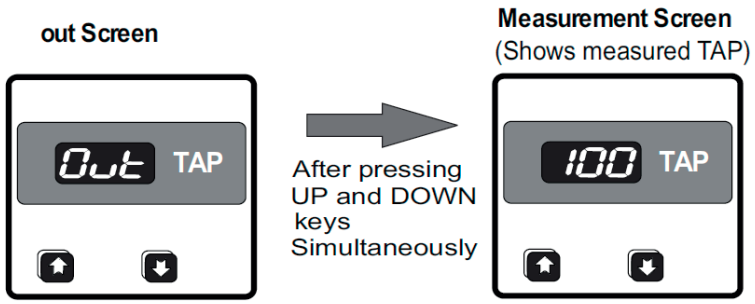
7.2.22 Default setting

This screen allows user to set default valus of all parameters. Table 3 on page 47 shows default values of all parameters. Tap Counter and password values also gets clear after writing default values. After pressing UP key from password screen or DOWN key from Out screen, user will see Default setting Screen. On Default setting screen, after pressing UP and DOWN keys simultaneously user will see 'Sur '(sure) . This sure screen again conforms that user wants to write default values. At 'Sure' screen by pressing simultaneously UP and DOWN keys user can set all parameters at there default values. If TPT is ideal for 5 seconds on 'Sure' screen then TPT come back on Default setting screen. If TPT is ideal for 1 minute on default setting screen then TPT come out of setup and measured TAP will be shown.



7.2.23 Out (Exiting) from setup setting

This screen allows user to exit setup menu at any moment. After pressing UP key from Default setting screen or DOWN key from Address screen, user will see Out Screen. On Out setting screen, after pressing UP and DOWN keys simultaneously user will exit from setup menu and measured tap will be shown. If TPT is ideal for 1 minute on OUT screen then TPT come out of setup and measured TAP will be shown.



8. Interface definition Modbus/RTU (RS485)

The SIRAX BT5600 in the panel mounting version supports the MODBUS (RS485) RTU protocol (2-wire).

Connection should be made using twisted pair shielded cable. All "A" and "B" connections are daisy chained to-gether. The screens should also be connected to the “Gnd” terminal. To avoid the possibility of loop currents, an Earth connection should be made at one point on the network. Loop (ring) topology does not require any termination load. Line topology may or may not require terminating loads depending on the type and length of cable used. The impedance of the termination load should match the impedance of the cable and be at both ends of the line. The cable should be terminated at each end with a 120 ohm (1/4 Watt min.) resistor.

RS 485 network supports maximum length of 1.2km. Including the Master, a maximum of 32 instruments can be connected in RS485 network. The permissible address range for The Meter is between 1 and 247 for 32 instruments. Broadcast Mode (address 0) is not allowed.

The maximum latency time of an Meter is 200ms i.e. this is the amount of time that can pass before the first response character is output.

After sending any query through software (of the Master), it must allow 200ms of time to elapse before assuming that the Meter is not going to respond. If slave does not respond within 200 ms, Master can ignore the previous query and can issue fresh query to the slave.

The each byte in RTU mode has following format:

	8-bit binary, hexadecimal 0-9, A-F 2 hexadecimal characters contained in each 8-bit field of the message
Format of Data Bytes	4 bytes (32 bits) per parameter. Floating point format (to IEEE 754) Most significant byte first (Alternative least significant byte first)
Error Checking Bytes	2 byte Cyclical Redundancy Check (CRC)
Byte format	1 start bit, 8 data bits, least significant bit sent first 1 bit for even/odd parity 1 stop bit if parity is used; 1 or 2 bits if no parity

Communication Baud Rate is user selectable from the front panel between 2400, 4800, 9600, 19200 bps.

Function code:

03	Read Holding Registers	Read content of read /write location (4X)
04	Read input Registers	Read content of read only location (3X)
16	Presets Multiple Registers	Set the content of read / write locations (4X)

Exception Cases: An exception code will be generated when Meter receives ModBus query with valid parity and error check but which contains some other error (e.g. Attempt to set floating point variable to an invalid value) The response generated will be “Function code” ORed with HEX (80H). The exception codes are listed below

01	Illegal function	The function code is not supported by Meter
02	Illegal Data Address	Attempt to access an invalid address or an attempt to read or write part of a floating point value
03	Illegal DataValue	Attempt to set a floating point variable to an invalid value

8.1 Accessing 3X and 4X register for reading measured values

Two consecutive 16 bit registers represent one parameter. Refer TABLE 1 for the addresses of 3X registers (Parameters measured by the instruments). Each parameter is held in the 3X registers. Modbus Code 04 used to access all parameters.

Example:
To read parameter
TAP Number: Start address = 04 (Hex) Number of registers = 02

Note : Number of registers = Number of parameters x 2
Each Query for reading the data must be restricted to 3 parameters or less. Exceeding the 3 parameter limit will cause a ModBus exception code to be returned.

Query for 3X read:

01 (Hex)	04 (Hex)	00 (Hex)	04 (Hex)	00 (Hex)	02 (Hex)	30 (Hex)	0A (Hex)
Device address	Function code	Start address High	Start address Low	Number of Registers High	Number of Registers Low	CRC Low	CRC High

Start Address High : Most significant 8 bits of starting address of the parameter requested.
Start Address low : Least significant 8 bits of starting address of the parameter requested.
Number of register Hi : Most significant 8 bits of Number of registers requested.
Number of register Lo : Least significant 8 bits of Number of registers requested.

3X Response: TAP Number (25)

01 (Hex)	04 (Hex)	04 (Hex)	41 (Hex)	C8 (Hex)	00 (Hex)	00 (Hex)	6E (Hex)	46 (Hex)
Device address	Function code	Byte Count	Data Register1 High Byte	Data Register1 Low Byte	Data Register2 High Byte	Data Register2 Low Byte	CRC Low	CRC High

Byte count : Total number of data bytes received.
Data register 1 High Byte : Most significant 8 bits of Data register 1 of the parameter requested.
Data register 1 Low Byte : Least significant 8 bits of Data register 1 of the parameter requested.
Data register 2 High Byte : Most significant 8 bits of Data register 2 of the parameter requested.
Data register 2 Low Byte : Least significant 8 bits of Data register 2 of the parameter requested.
(Note : Two consecutive 16 bit register represent one parameter.)

Tabelle 1: 3 X and 4X register addresses for measured parameters

Address (3X register)	Parameter No.	Parameter	Start Address Hex 3X	
			High Byte	Low Byte
30001	1	Firmware Version	00	00
30003	2	TAP Counter	00	02
30005	3	TAP Number	00	04

Note: 1) TAP counter can increment up to 60000 count. After 60000 count ,it gets reset and starts count from 1 again.
2) Whenever Display will show Open (i.e. IP is Open), at register 30005 will show 200 (indicates that IP is Open).

8.2 Accessing 4 X register for reading & writing settings

Each setting is held in the 4X registers. ModBus code 03 is used to read the current setting & code 16 is used to write/change the setting. Refer Table 2 for 4X Register addresses.

Example: Reading System Type

System type: Start address = 04 (Hex)
Number of registers = 02
Number of registers = Number of Parameters x 2

Query:

01 (Hex)	03 (Hex)	00 (Hex)	04 (Hex)	00 (Hex)	02 (Hex)	85 (Hex)	CA (Hex)
Device address	Function code	Start address High	Start address Low	Number of Registers High	Number of Registers Low	CRC Low	CRC High

Start Address High: Most significant 8 bits of starting address of the parameter requested.
Start Address low: Least significant 8 bits of starting address of the parameter requested.
Number of register Hi: Most significant 8 bits of Number of registers requested.
Number of register Lo: Least significant 8 bits of Number of registers requested.
(Note: Two consecutive 16 bit register represent one parameter.)

Response: System Type (2 wire = 2)

01 (Hex)	03 (Hex)	04 (Hex)	40 (Hex)	00 (Hex)	00 (Hex)	00 (Hex)	EF (Hex)	3F (Hex)
Device address	Function code	ByteCount	Data Register1 High Byte	Data Register1 Low Byte	Data Register2 High Byte	Data Register2 Low Byte	CRC Low	CRC High

Byte Count: Total number of data bytes received.
Data register 1 High Byte: Most significant 8 bits of Data register 1 of the parameter requested.
Data register 1 Low Byte: Least significant 8 bits of Data register 1 of the parameter requested.
Data register 2 High Byte: Most significant 8 bits of Data register 2 of the parameter requested.
Data register 2 Low Byte: Least significant 8 bits of Data register 2 of the parameter requested.
(Note: Two consecutive 16 bit register represent one parameter.)

Example: Writing System type

System type: Start address = 04 (Hex) Number of registers = 02

Query: (Change System type to 3wire = 3)

01 (Hex)	10 (Hex)	00 (Hex)	00 (Hex)	00 (Hex)	02 (Hex)	04 (Hex)	40 (Hex)	40 (Hex)	00 (Hex)	00 (Hex)	E6 (Hex)	48 (Hex)
Device address	Function code	Start address High	Start address Low	Number of Registers High	Number of Registers Low	Byte Count	Data Register1 High Byte	Data Register1 Low Byte	Data Register2 High Byte	Data Register2 Low Byte	CRC Low	CRC High

Start Address High: Most significant 8 bits of starting address of the parameter requested.
Start Address low: Least significant 8 bits of starting address of the parameter requested.
Number of register Hi: Most significant 8 bits of Number of registers requested.
Number of register Lo: Least significant 8 bits of Number of registers requested.

Byte Count: Total number of data bytes received..
Data register 1 High Byte: Most significant 8 bits of Data register 1 of the parameter requested.
Data register 1 Low Byte: Least significant 8 bits of Data register 1 of the parameter requested.
Data register 2 High Byte: Most significant 8 bits of Data register 2 of the parameter requested.
Data register 2 Low Byte: Least significant 8 bits of Data register 2 of the parameter requested.
(Note: Two consecutive 16 bit register represent one parameter.)

Response: System Type (2 wire = 2)

01 (Hex)	10 (Hex)	00 (Hex)	00 (Hex)	00 (Hex)	02 (Hex)	04 (Hex)	40 (Hex)	40 (Hex)	00 (Hex)	00 (Hex)	E6 (Hex)	48 (Hex)
Device address	Function code	Start address High	Start address Low	Number of Registers High	Number of Registers Low	Byte Count	Data Register1 High Byte	Data Register1 Low Byte	Data Register2 High Byte	Data Register2 Low Byte	CRC Low	CRC High

Start Address High: Most significant 8 bits of starting address of the parameter requested.
Start Address low: Least significant 8 bits of starting address of the parameter requested.
Number of register Hi: Most significant 8 bits of Number of registers requested.
Number of register Lo: Least significant 8 bits of Number of registers requested.

(Note: Two consecutive 16 bit register represent one parameter.)

Tabelle 2: 4 X register addresses

Address (register)	Parameter No.	Parameter	Read /write	Modbus start address Hex	
				High Byte	Low Byte
40001	1	Low IP Resistance	R/WP	00	00
40003	2	High IP Resistance	R/Wp	00	02
40005	3	System Type	R/Wp	00	04
40007	4	Lead Resistance	R/Wp	00	06
40009	5	Aux Supply Frequency	R/Wp	00	08
40011	6	Output 1 Type	R/Wp	00	0A
40013	7	Output 2 Type	R/Wp	00	0C
40015	8	Lower limit of OP 1	R/Wp	00	0E
40017	9	Higher limit of OP 1	R/Wp	00	10
40019	10	Lower limit of OP 2	R/Wp	00	12
40021	11	Higher limit of OP 2	R/Wp	00	14
40023	12	Startup value of OP 1	R/Wp	00	16
40025	13	Startup value of OP 2	R/Wp	00	18
40027	14	Open circuit signaling selection	R/Wp	00	1A
40029	15	Open circuit value of OP 1	R/Wp	00	1C
40031	16	Open circuit value of OP 2	R/Wp	00	1E
40033	17	Maximum TAP number	R/Wp	00	20
40035	18	Minimum TAP number	R/Wp	00	22
40037	19	RS 485 Setup Code	R/Wp	00	24
40039	20	RS 485 Address	R/Wp	00	26
40041	21	Reset TAP Counter	R/Wp	00	28

Table 3: Explanation for 4 X register

Note: Writing any invalid values (non-applicable values) to any of the following locations will result in modbus error.

Address	Parameter	Description	Default Value
40001	Low IP Resistance (ohm)	This address is used to set Low limit of input resistance of OLTC. For details refer section 7.2.7	0
40003	High IP Resistance (ohm)	This address is used to set High limit of input resistance of OLTC. For details refer section 7.2.6	25000
40005	System Type	This address is used to set system type Write one of the following value to this address 1) 2 = Two wire 2) 3 = Three wire 3) 4 = Four wire 4) 5 = WF transmitter 5) 6 = WF DIN transmitter writing any other value will return error	2
40007	Lead Resistance (ohm)	This address is used to set Lead resistance. Lead resistance is applicable to two wire system types only. range of lead resistance is from 0 to 60 ohm writing any other value will return error.	0
40009	Aux supply Frequency (Hz)	This address is used to set Aux Supply frequency. Frequency can be set as 50 or 60 Hz. writing any other value will return error.	50
40011	OP 1 Type	This address is used to set output 1 type Write one of the following value to this address 1) 0 = OP 1 is voltage 2) 1 = OP 1 is current writing any other value will return error	1
40013	OP 2 Type	This address is used to set output 2 type Write one of the following value to this address 1) 0 = OP 2 is voltage 2) 1 = OP 2 is current writing any other value will return error	1
40015	Lower limit of OP 1 (mA / V)	This address is used to set Lower limit of OP 1. For details refer section 7.2.10. writing any other value will return error.	4
40017	Higher limit of OP 1 (mA / V)	This address is used to set Higher limit of OP 1. For details refer section 7.2.9. writing any other value will return error.	20

40019	Lower limit of OP 2 (mA / V)	This address is used to set Lower limit of OP 2. For details refer section 7.2.13. writing any other value will return error.	4
40021	Higher limit of OP 2 (mA / V)	This address is used to set Higher limit of OP 2. For details refer section 7.2.12. writing any other value will return error.	20
40023	Startup Value Of OP 1 (%)	This address is used to set startup value of OP 1. Startup value can be set from -10 to 110 % . writing any other value will return error.For details refer 7.2.18	0
40025	Startup Value Of OP 2 (%)	This address is used to set startup value of OP 2. Startup value can be set from -10 to 110 % . writing any other value will return error. For details refer 7.2.19	0
40027	Open circuit signaling selection	This address is used to set outputs at hold or at value. For details refer Section 7.2.14 and 7.2.15. Write one of the following value to this address 1) 0 = Open circuit OP will be value set in register 40029 and 40031 2) 1 = OP circuit OP will be hold writing any other value will return error	0
40029	Open circuit value of OP 1 (%)	This address is used to set open circuit value of OP 1. OC value can be set from -10 to 110 % . writing any other value will return error. For details refer 7.2.14	110
40031	Open circuit value of OP 2 (%)	This address is used to set open circuit value of OP 2. OC value can be set from -10 to 110 % . writing any other value will return error. For details refer 7.2.15	110
40033	Maximum TAP number	This address is used to set Max TAP no. of OLTC. Max TAP can be set from 1 to 100 (if min tap no is 0) or 2 to 101 (if min TAP no is 1).For details refer 7.2.4 writing any other value will return error.	25
40035	Minimum TAP number	This address is used to set Min TAP no. of OLTC. Min TAP can be set either 0 or 1. For details refer section 7.2.5 writing any other value will return error.	0
40037	RS 485 Setup code	This address is used to set baud rate, parity, number of stop bits. refer table 4 for details.	9
40039	RS 485 Address	This address is used to set Device address between 1 to 247.writing any other value will return error.	1
40041	Reset TAP Counter	This address is used to reset TAP counter (value at register 30003). Writing 0 will erase (reset)TAP counter. 0 writing any other value will return error	0

Table 4: RS485 Set-up Code

Baud rate	Parity	Stop bit	Decimal value
2400	NONE	01	00
2400	NONE	02	01
2400	EVEN	01	02
2400	ODD	01	03
4800	NONE	01	04
4800	NONE	02	05
4800	EVEN	01	06
4800	ODD	01	07

Baud rate	Parity	Stop bit	Decimal value
9600	NONE	01	08
9600	NONE	02	09
9600	EVEN	01	10
9600	ODD	01	11
19200	NONE	01	12
19200	NONE	02	13
19200	EVEN	01	14
19200	ODD	01	15

Note: Codes not listed in the table above may give rise to unpredictable results including loss of communication. Exercise caution when attempting to change mode via direct Modbus writes.

9. Technical data

Measuring ranges

Input

Measured Variable	Measuring ranges		
	Limits	Min. span	Max. span
Variation of resistance of remote sensors / potentiometers Low Resistance Range	0 ... 3700 Ω [1]	500 Ω	3700 Ω
High Resistance Range	0 ... 25000 Ω [1]	500 Ω	25000 Ω

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

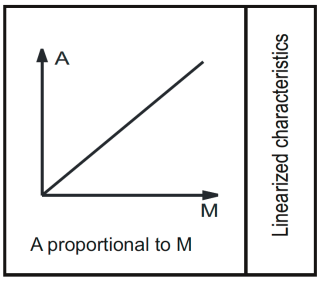
Measuring current: 0.081mA for measuring range 0...3700 Ω
0.012mA for measuring range 0...25000 Ω

Output 1 and Output 2

The output signals available at output 1 and output 2 can be configured for either an impressed DC current or superimposed DC voltage. The desired range is programmed using a computer or push buttons. The output 1 and output 2 are DC isolated.

DC current standard ranges:	0...20mA or 4...20mA
DC current Non-Standard ranges:	Limits -20...+20mA Min. Span 5mA Max. Span 40mA
Burden voltage:	Negative > -19V Positive < 22V
External Resistance IA1:	Rext max. [kΩ] = 15V/IAN (mA) or -12V/IAN (mA) IAN (mA) = Full scale current
Burden voltage IA2:	< 0.3 V
Residual ripple in Output current:	< 0.5% p.p.
Response time:	< 4s
DC voltages UA standard ranges:	0...5V, 1...5V, 0...10V, 2...10V
DC voltages UA non-standard ranges:	Limits -12V ... +15V Min. Span 4V Max. Span 27V
Open-circuit current:	≤ 40mA
Load capacity UA1 / UA2:	20mA
External Resistance:	Rext min. [kΩ] = UA (V)/20mA UA (V) = 15V or -12V

Output characteristics



Fixed setting for output signal 1 and 2

After switching on:	Output 1 and 2 are at a fixed value for 5s after switching on (default). Setting range - 10% ... 110% programmable, e.g. between 2.4mA ... 21.6mA (for a scale of 4 ... 20mA)
When input variable out of limits:	Output 1 and 2 are at either a lower or an upper fixed value whenthe 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. -20mA (for a scale of 0 ... 20mA) Upper fixed value = 110%, e.g. 22mA (for a scale of 0 ... 20mA)
	The fixed value of output 1 and 2 is configured to either maintain their values at the instant the open-circuit occurs or adopt a preset value between -10% ... 110%, e.g. between 1.2V ... 10.8V (for a scale of 2V ... 10V).

Power supply

Power supply:	60...230...300 V AC/DC (45...66 Hz) 24...48...60 V AC/DC (45...66 Hz)
Power consumption:	< 3W or < 4.7VA

Accuracy (Acc. to IEC 60688)

Basic accuracy:	± 0.2% of range
Reference ambient temperature:	23 °C / ± 2K
Nominal value of power supply:	230 V AC/DC; 50/60 Hz 48 V AC/DC; 50/60 Hz
Output burden for current:	0.5 * Rext max
Output burden for voltage:	2 * Rext min

Additional error (additive)

For linearised characteristic:	± 0.3%
For a high ratio between full-scale value and measuring range greater factor 10:	± 0.3%
For current output less than 10mA span:	± 0.3%
For voltage output less than 8V span:	± 0.3%
For two-wire resistance measurement:	2 (basic and additional error)

Influencing parameter and variation

Temperature:	± 0.15% per 10°C
Burden influence:	< ± 0.1% for current output < ± 0.1% for voltage output
Magnetic field:	< ± 0.2% (400 A/T)

Environmental conditions

Nominal range of use:	0 ... +45 °C (usage Group II)
Operating temperature:	-20 ... +65 °C
Storage temperature:	-40 ... +65 °C
Climatic rating:	Climate case 3Z acc. to VDI/VDE 3540
Relative humidity of annual mean:	≤75% for standard climatic rating
Indoor use statement:	≤95% for enhanced climatic rating
Altitude:	≤2000 m max
Shock:	500 m/s^2 (50g) (acc. to IEC 60068-2-27)
Vibration:	10 ... 150 ... 10 Hz, 0.15 mm amplitude, 20 m/s^2 (2g) (acc. to IEC 60068-2-6)

Safety

EMC compatibility:	Acc. to IEC 61326-1 / IEC 61000-4-3, level 3 / IEC 61000-4-4, level 3
Safety design:	Acc. to IEC 60010
Pollution degree:	2
Installation category:	III for power supply
Installation category:	II for Measuring input, programming connector, measuring outputs
Double insulation:	Power supply versus all other circuits Measuring input versus measuring output
Common mode voltage:	100 V
Operating voltages:	<300 V, between all insulated circuits
Test voltages:	2.3 kV (50 Hz, 1 min.), between measuring input and programming connector to measuring outputs 3.7 kV (50 Hz, 1 min.), between Power supply and all other circuits 0.5 kV (50 Hz, 1 min.), between Measuring output 1 versus measuring output 2
Flammability class:	UL94 V-0, self-extinguishing, non-dripping, halogen-free
Housing protection class:	IP40 (front), IP20 (housing/terminal) for Version DIN Rail mounting IP50 (front), IP20 (housing/terminal) for Version Panel mounting

Mechanical attributes

Installation position:	Any
Material housing:	Polycarbonate
Weight:	approx. 350g

Communication interface

RS485 Modbus/RTU for Version Panel mounting 96x96mm

Modbus /RTU:	via plug-in terminal, 2.5 mm^2
Physics:	RS-485, max. 1200 M (4000 ft)
Baud rate:	2'400, 4'800, 9'600, 19'200 Baud
Parity:	Odd or Even with 1 Stopbit None with 1 or 2 Stopbits
Number of participants:	< 32