Operating Manual

RISH CON TPT

Programmable Tap Position Transducer with Dual Output and Modbus

A

TAP Position Transducer
Programmable Transducer With ModBus
Installation & Operating Instructions

Section **Contents**

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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
7. Electrical connections

are followed.

The device should only be handled by properly trained person who is familiar with it and is 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The guarantee is no longer valid if the instrument is further tampered.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 outputs. Display on the front panel shows the current TAP number which proportional to the measuring input resistance.TAP number is also shown on modbus.

Function :

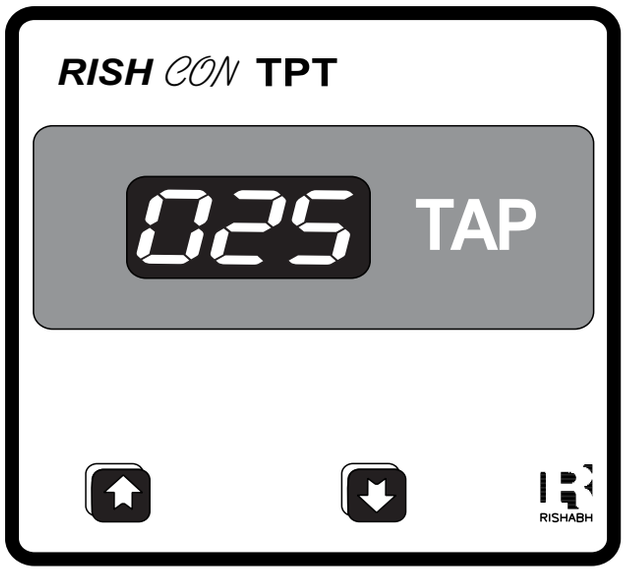
The Primary winding of the transformer can be divided into no. of desired turns(TAPs). Each tap has a specific resistance. The TAP is changed to manage the voltage requirement of the load, connected to secondary. As TAP changes, the resistance associated also changes. This change is measured by the Tap Position Transducer and the proportional analog output is thus produced in two output channels. Tap number is shown on Display and Modbus. On every TAP change TAP counter increases by 1 count and can be seen on Modbus only. The output can be given further to RTU or another indicator as desierd.

Features :

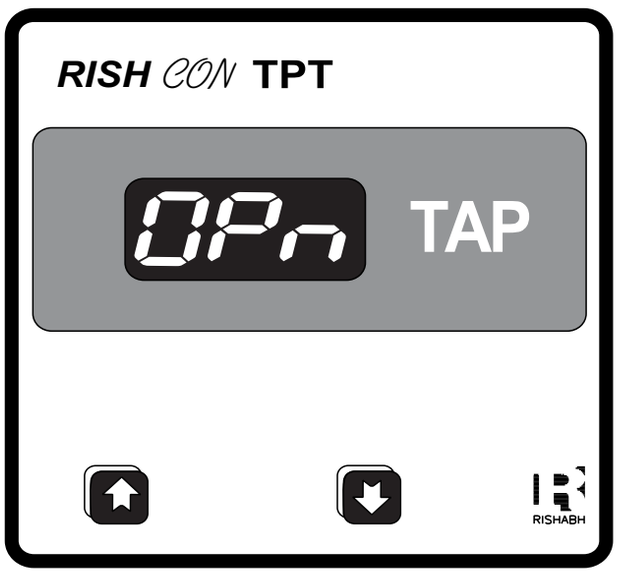
- Input masuring range can be programmed using **PC / Modbus / keys**, **simplifies project planning and engineering** (the final measuring range can be determined during the commissioning).
- **Programmable analog output range through PC / Modbus / keys** (impressed current or superimposed voltage for all ranges between – 20 to + 20 mA DC and – 12 to + 15 V DC resp) . universally applicable. Type of output (i.e. voltage or current) is programmable at factory only.
- **Electric insulation between measured variable(input), analog output signal and power supply.**
- Wide power supply range. Operating voltage ranges of 60-300 Volts DC/AC and 24-60 Volts DC/AC are available.
- Other programmable parameters: specific measured variable data (e.g. two, three or four-wire connections, open circuit sensor supervision if no input is connected.(The output signal assumes fixed preset value between – 10 and 110%). This is **highly flexible solutions for measurement problems.**
- **TAP position and TAP counter can be viewed on Modbus.**

3. 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 to the *RISH* CON TPT.



If input resistance is not applied to RISH CON TPT then measrement screen will show open(OPn).



4. Programming

The following section comprise step by step procedures for configuring the *RISH* CON TPT for individual user requirement.

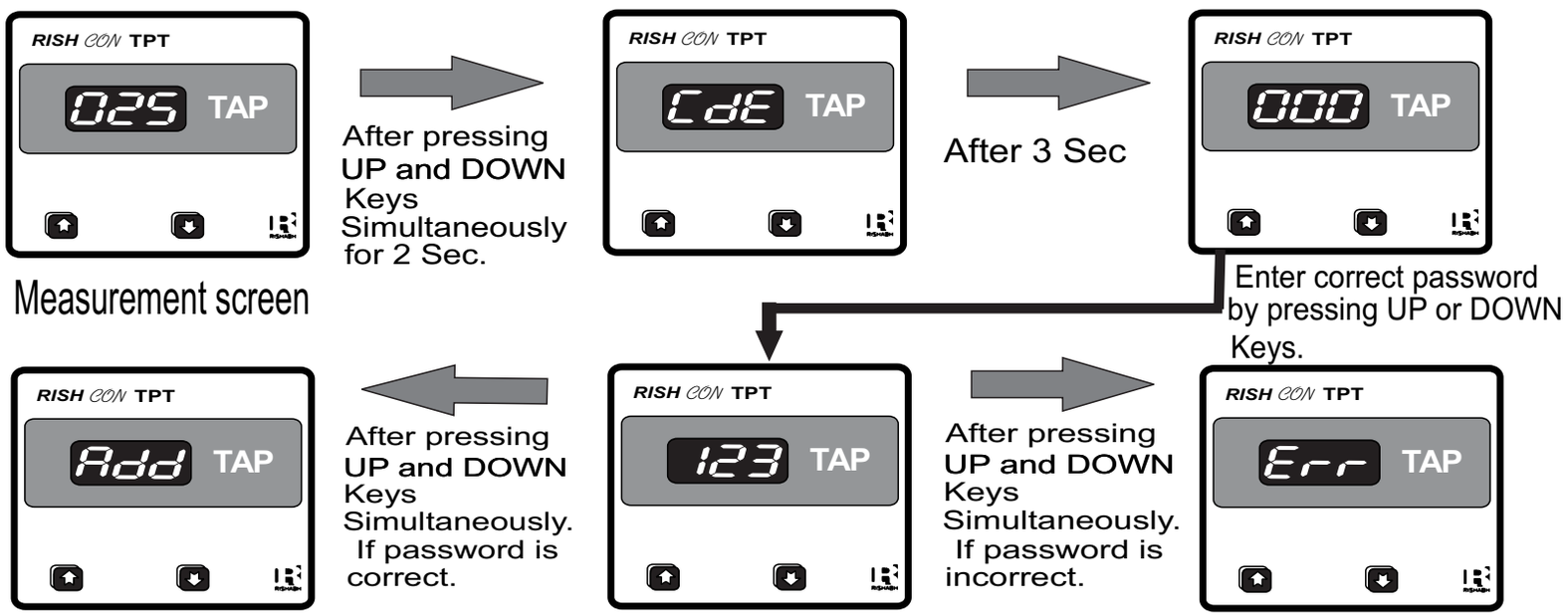
To access the setup screen press and hold the UP and DOWN. key for two seconds. This will take user to the password prote--ction entry stage.

4.1 Password Protection

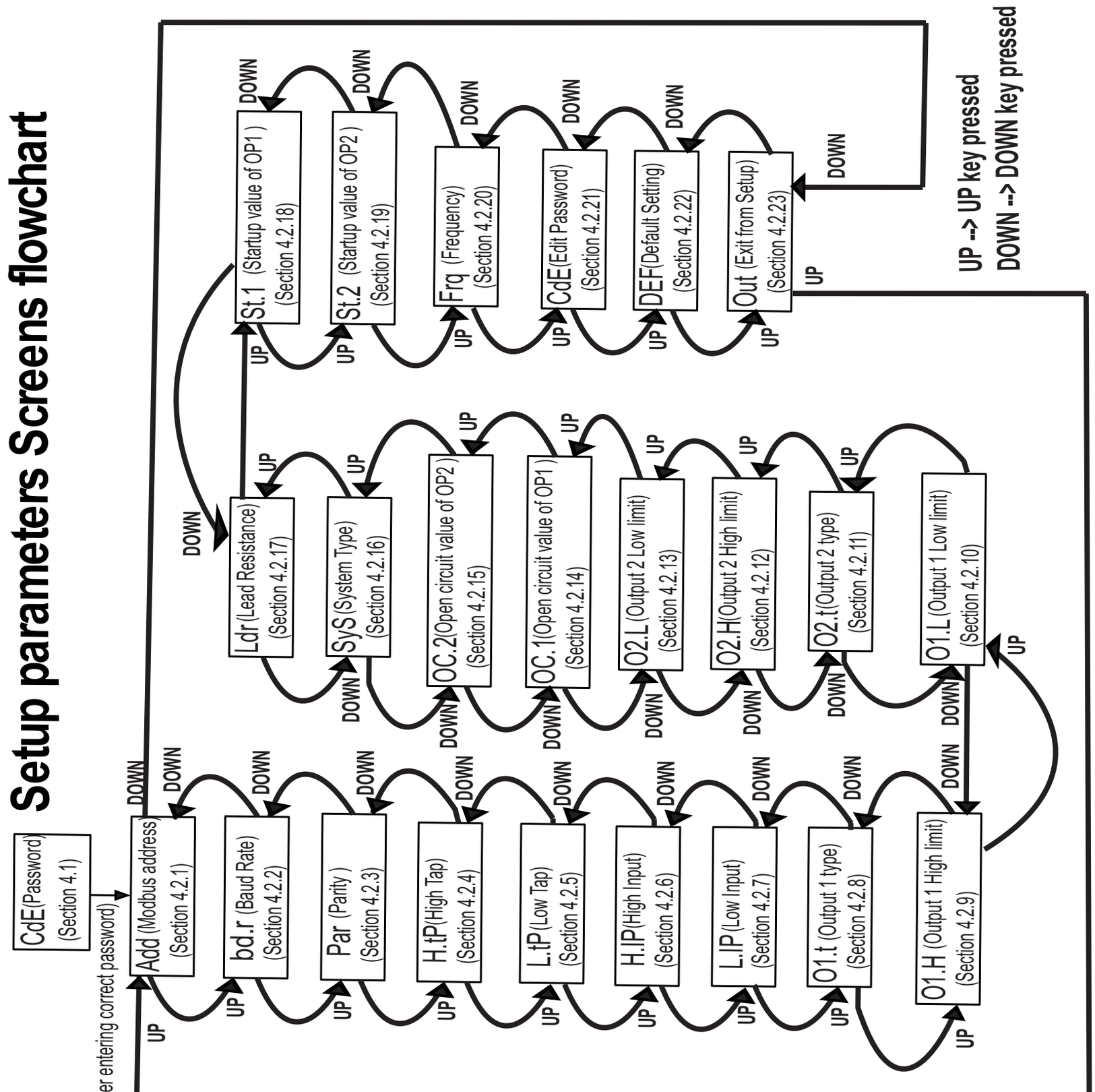
Password protection can be enabled to prevent unauthorised access to set-up screen , by default password protection is not enabled.

Password protection is enabled by selecting a number other than 000 , setting password of 000 disables 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.

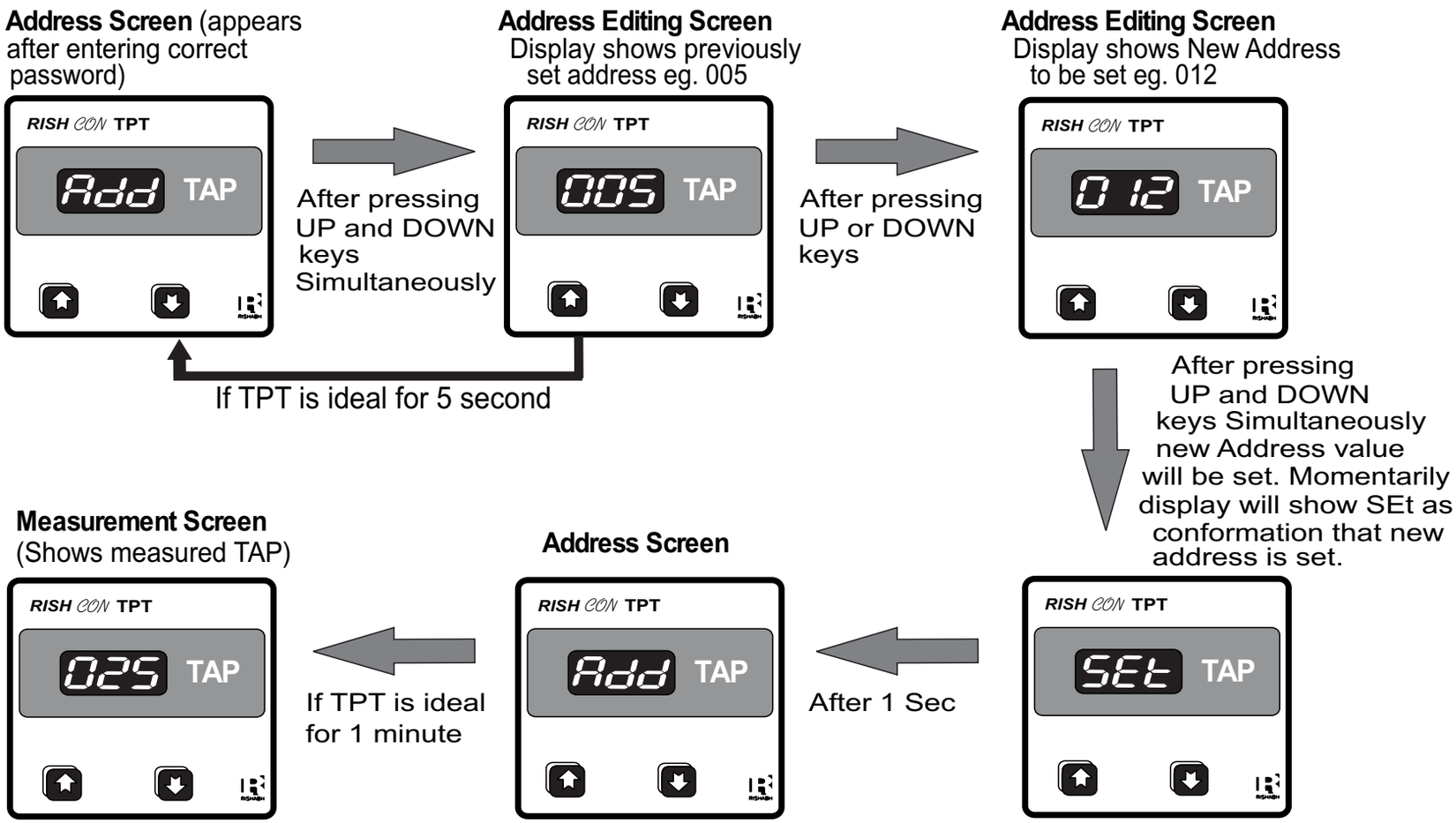


4.2 Setup Menu Selection



4.2.1 RS 485 (Modbus) Address Setting

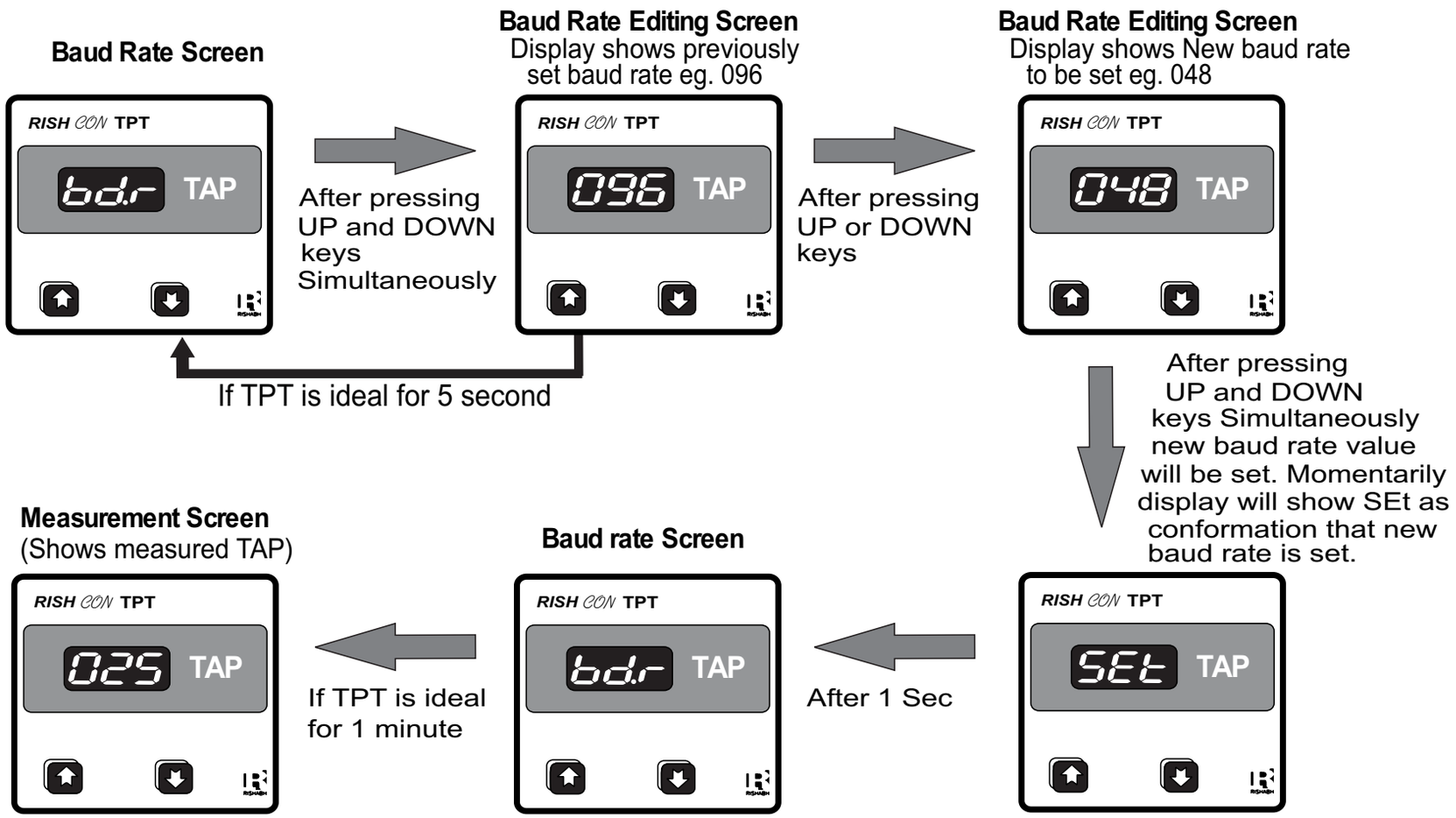
This screen applies to the RS 485 output only. This screen allows user to set RS 485 (Modbus) address of the device.
The range of allowable address is 1 to 247.
After entering correct password user will see Address screen.
After pressing UP and DOWN keys simultaneously user can see previously set address. 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.



4.2.2 RS 485 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. screen ,user will see Baud rate Screen. On baud rate screen, after 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.

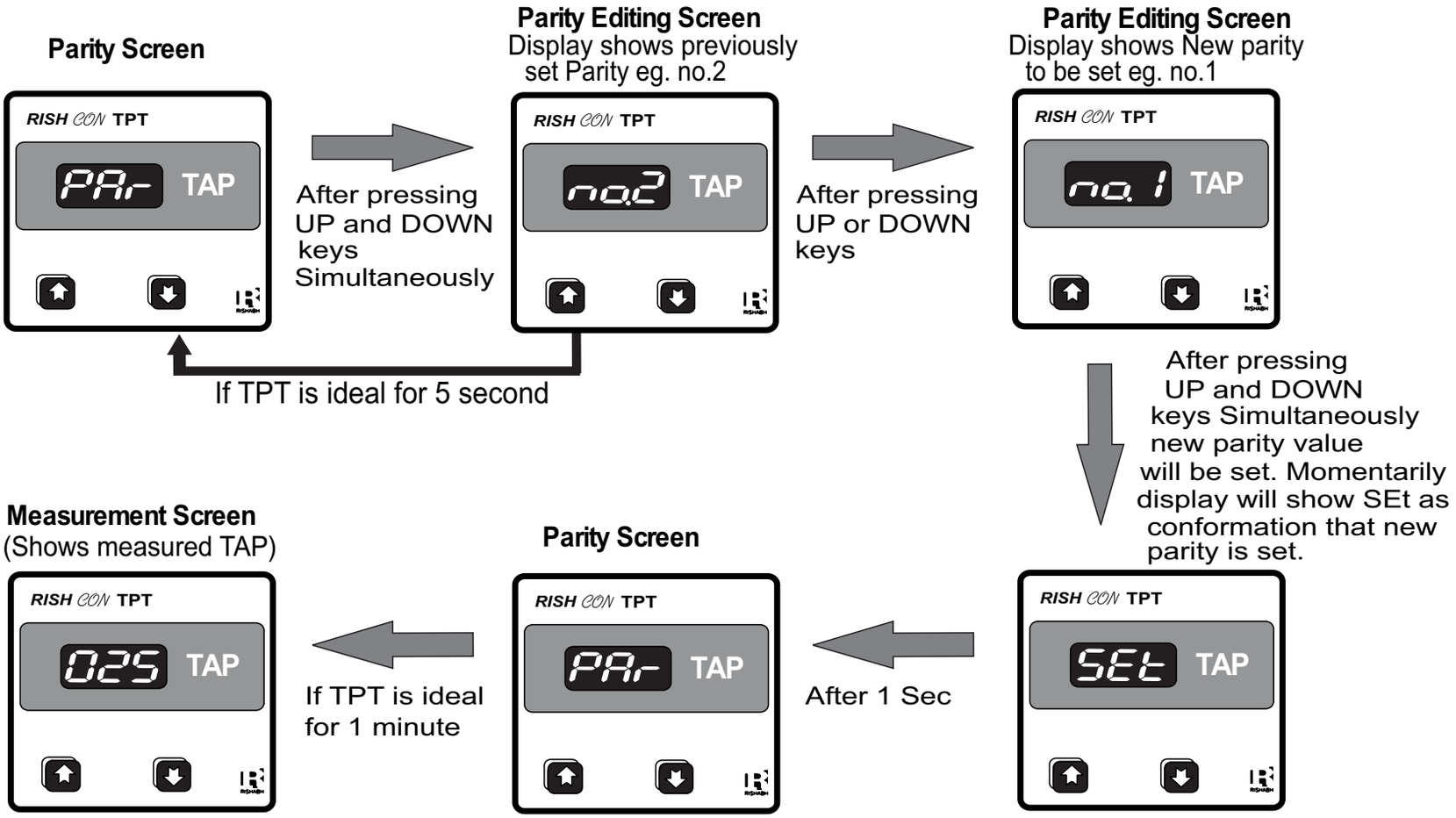


4.2.3 RS 485 Parity Selection Setting

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.

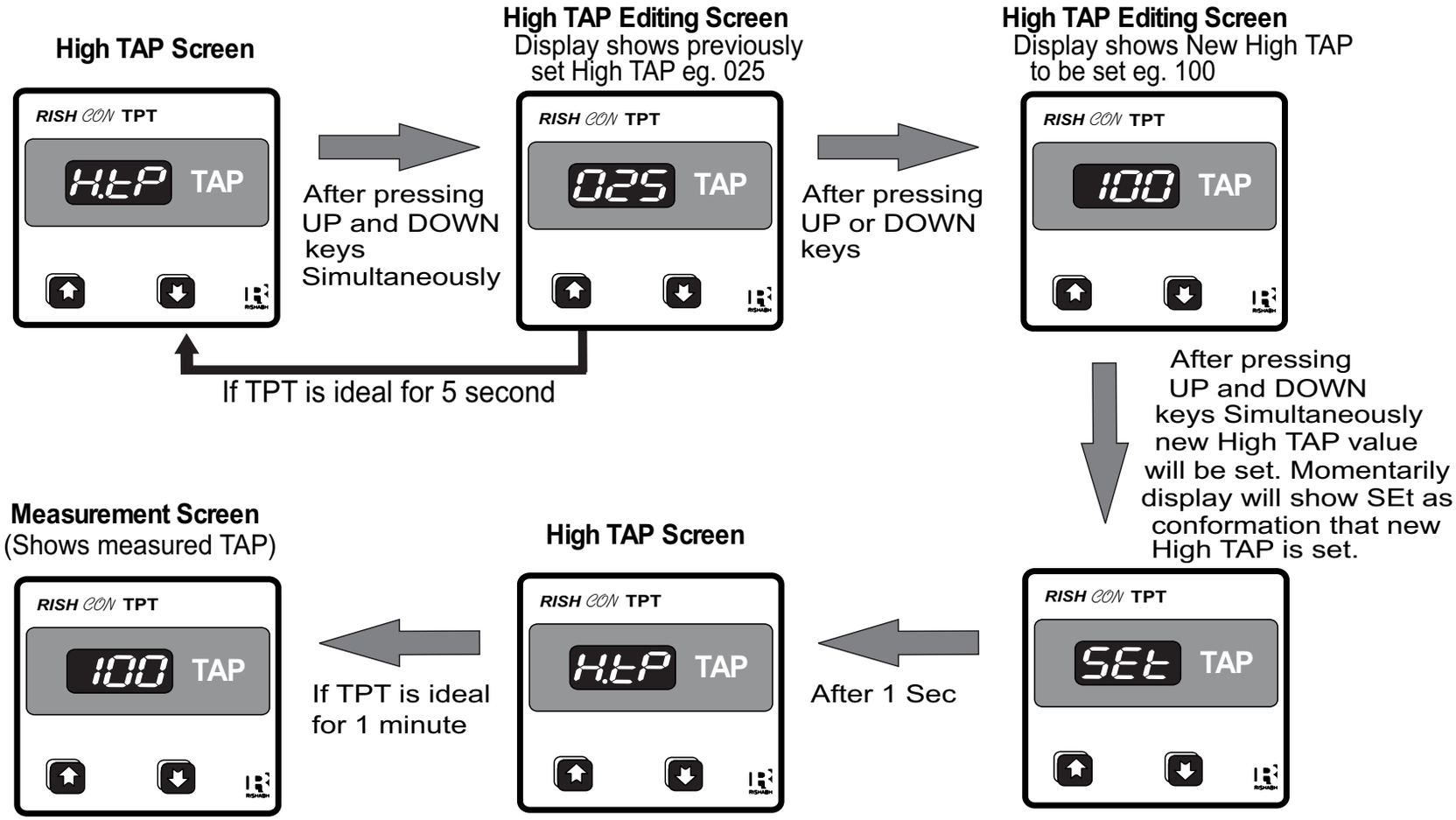
After pressing UP key from Baud rate screen or DOWN key from High. tap screen ,user will see Parity Screen. On parity screen, after pressing UP and DOWN keys simultaneously user can see previously set parity. At this screen user can change parity by pressing UP or DOWN keys depending upon parity value 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.



4.2.4 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).

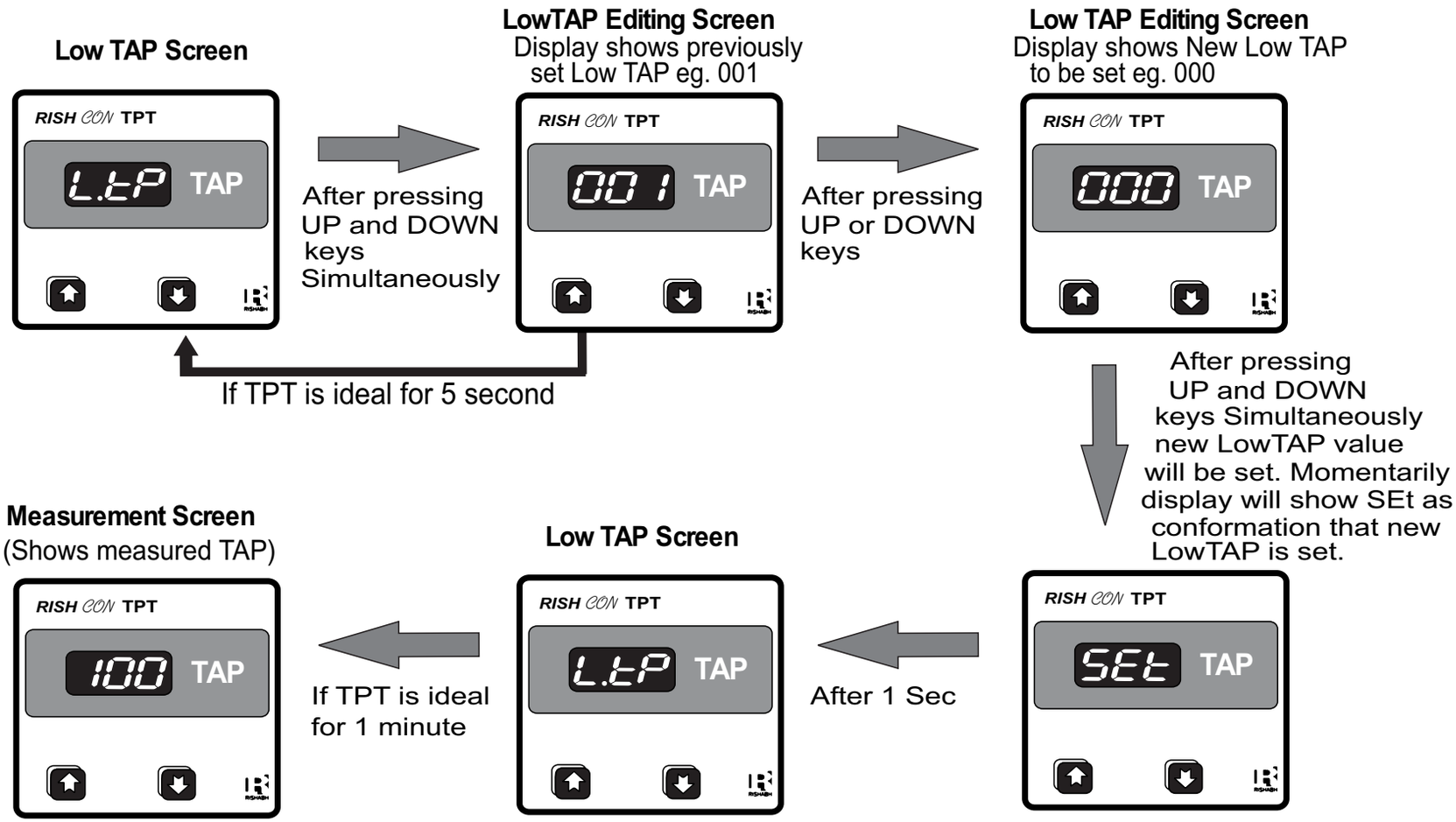
After pressing UP key from Parity screen or DOWN key from Low TAP screen ,user will see High TAP Screen. On High TAP screen, after pressing UP and DOWN keys simultaneously user can see previously set High TAP. At this screen user can change High TAP by pressing UP or DOWN keys depending upon High TAP 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.



4.2.5 Low TAP (Minimum TAP number)Setting

This screen allows user to set Low TAP number of OLTC (On load tap changer). User can set Low TAP value 0 or 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.



4.2.6 High Input(IP) Resistance Limit Setting

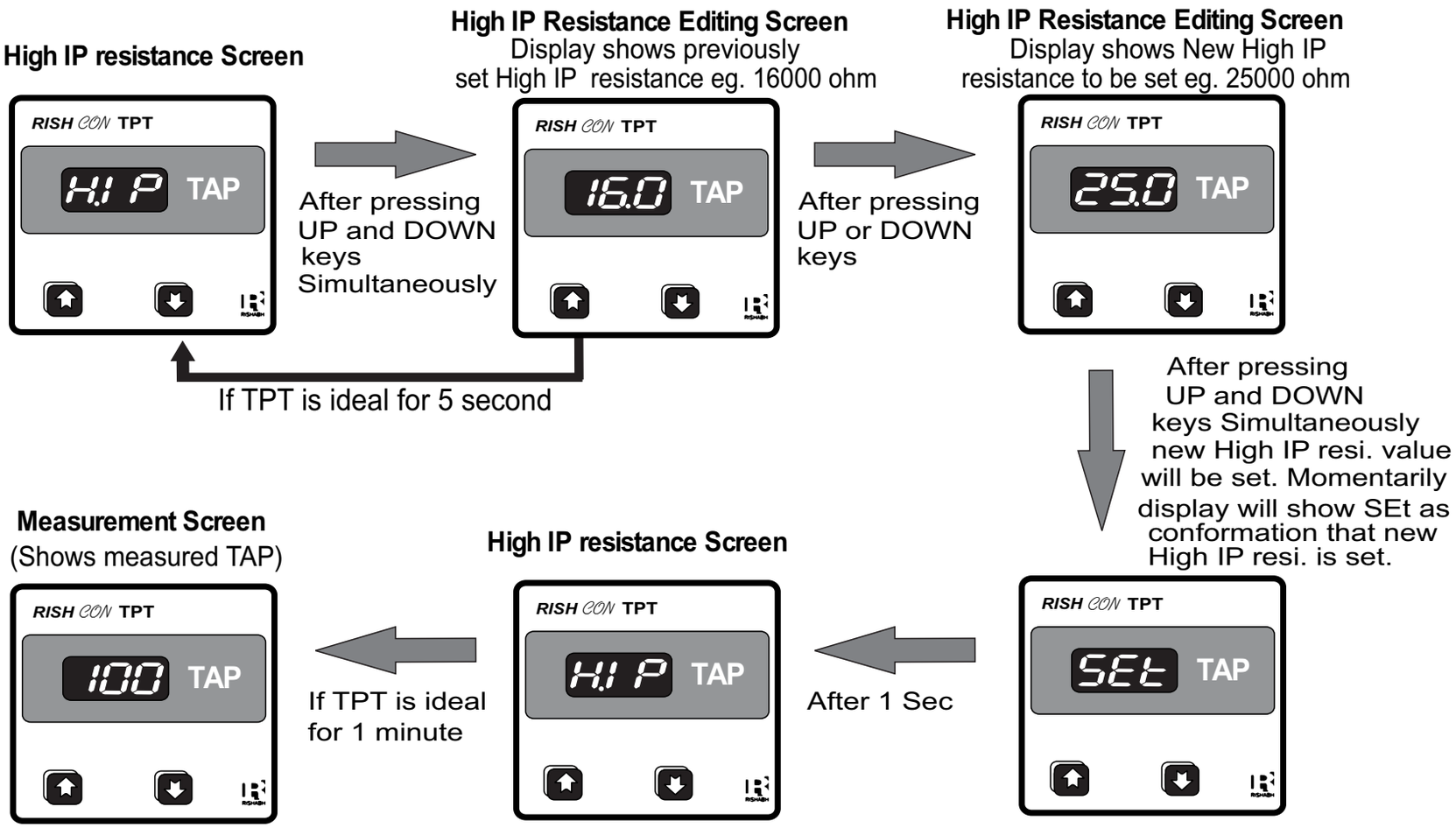
This screen allows user to set High IP Resistance of OLTC. User can set High IP resistance value from 500 ohm to 25000 ohm depending upon Low IP resistance value.

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.



4.2.7 Low Input(IP) Resistance Limit Setting

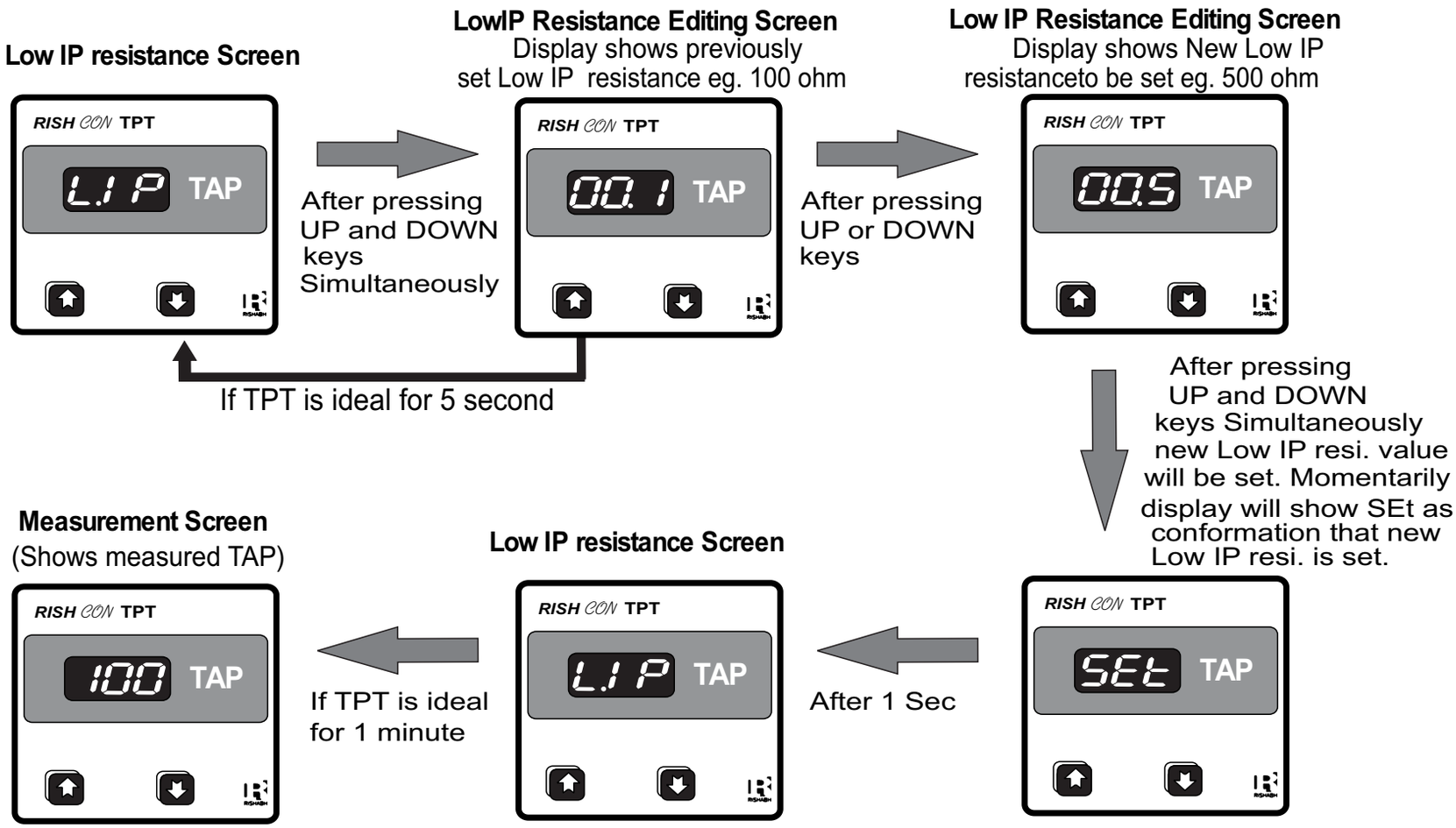
This screen allows user to set Low IP Resistance of OLTC. User can set Low IP resistance value from 0 ohm to 14999 ohm depending upon High IP resistance value.

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 .

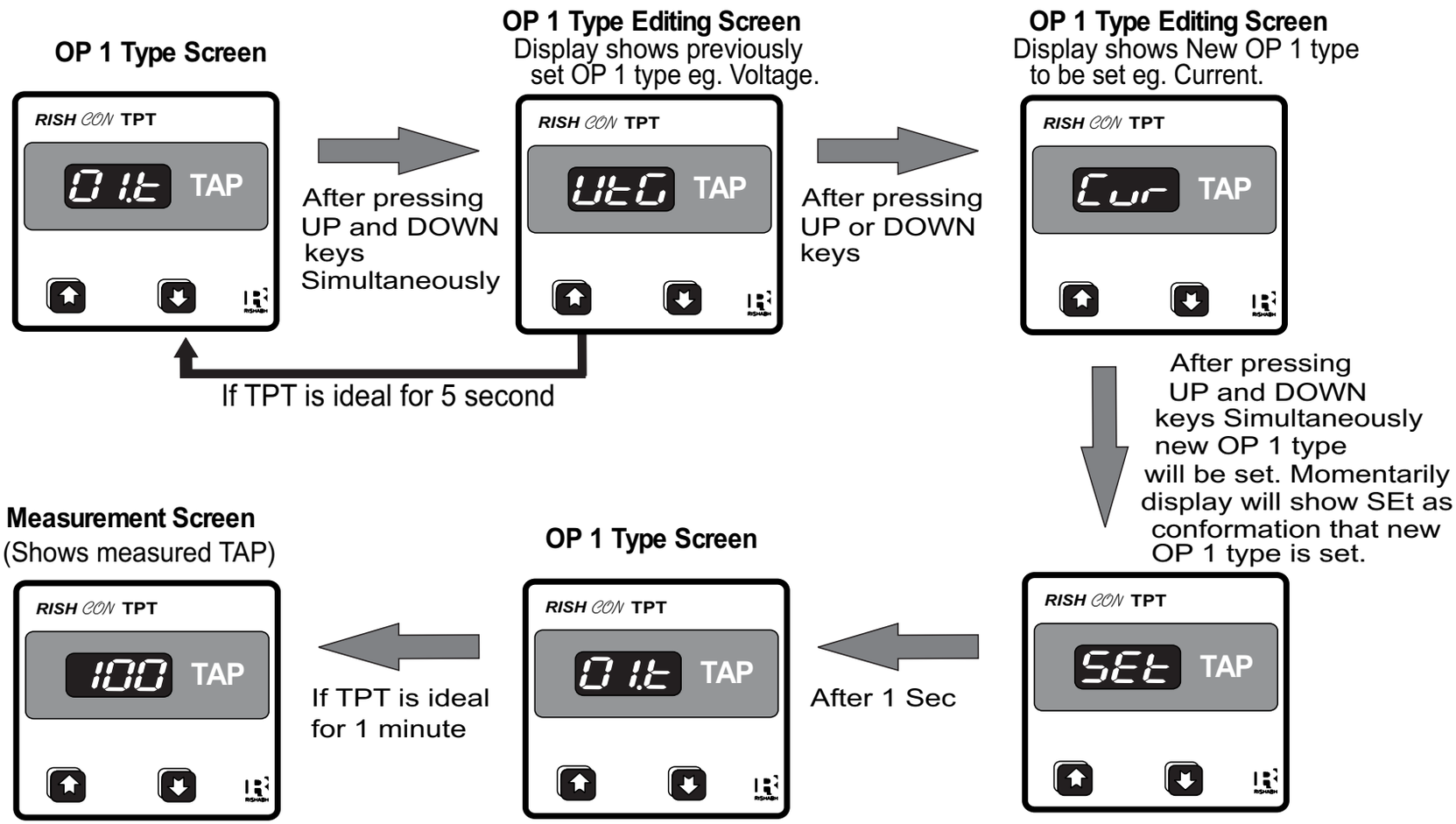
After pressing UP key from High IP resistance screen or DOWN key from OP 1 type screen ,user will see Low IP resistance Screen. On Low IP resistance screen, after pressing UP and DOWN keys simultaneously user can see previously set Low IP resistance. At this screen user can change Low IP resistance by 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.



4.2.8 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.



4.2.9 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.

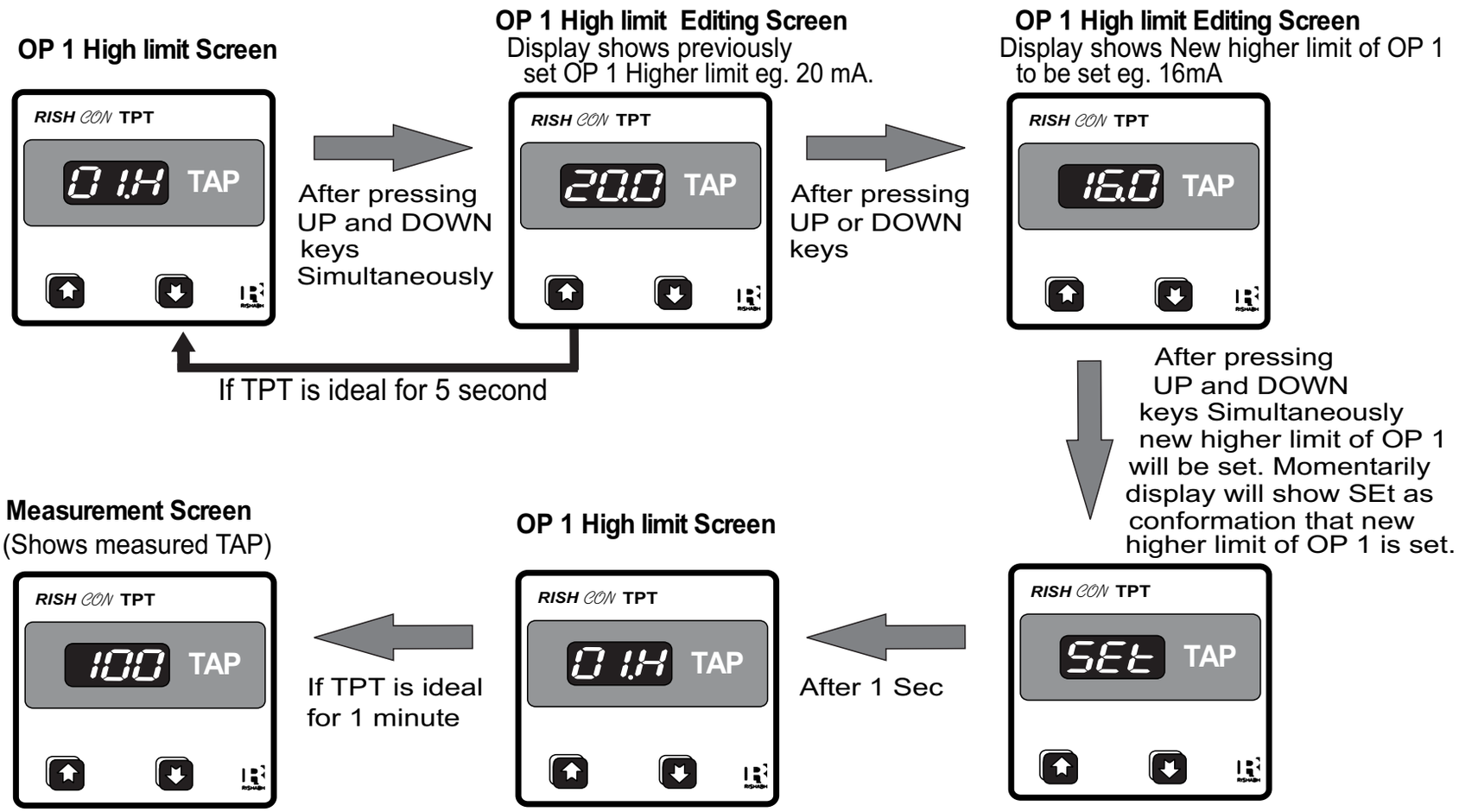
If OP 1 type is voltage output then Higher limit of OP 1 can be set between -8 V to 15 V with following condition.

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 values on display are in Volts .

After pressing UP key from OP 1 type screen or DOWN key from OP 1 Lower limit screen ,user will see OP 1 Higher limit Screen. On 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 keys. If TPT is ideal for 5 seconds on OP 1 Higher limit editing 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 setup and measured TAP will be shown.



4.2.10 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.

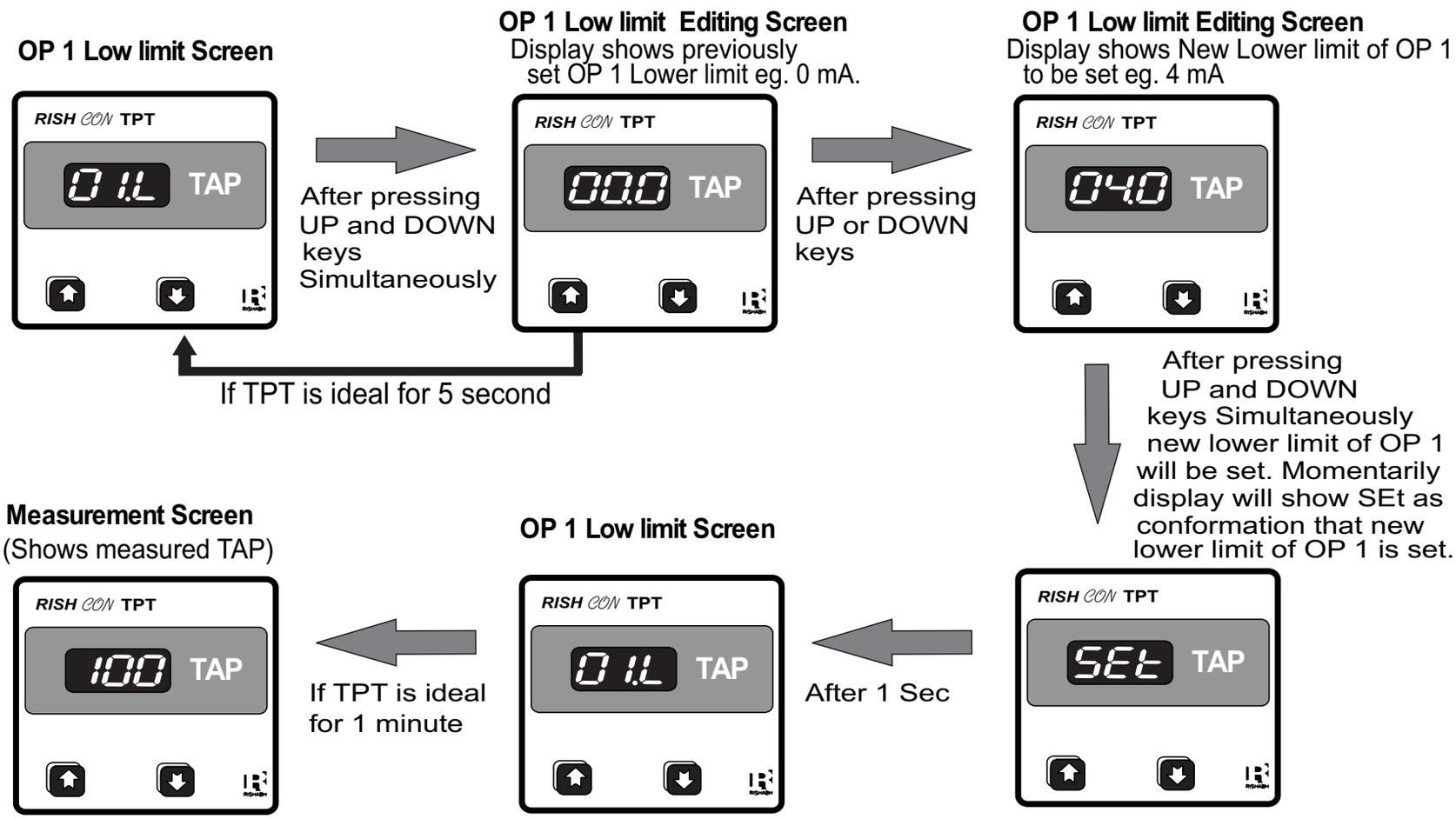
If OP 1 type is voltage output then Lower limit of OP 1 can be set between -12 V to 11 V with following condition.

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 values on display are in Volts .

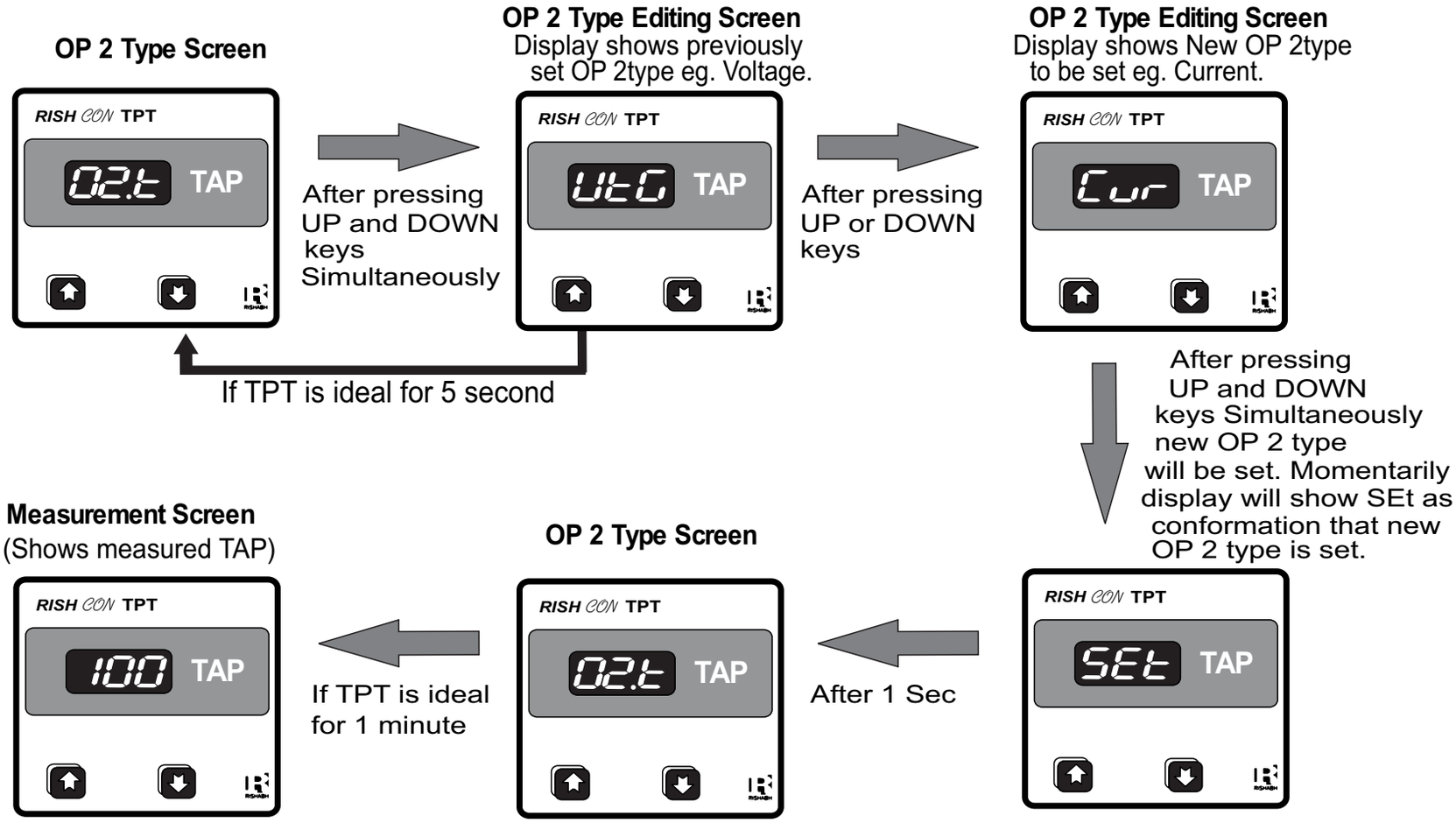
After pressing UP key from OP 1 high limit screen or DOWN key from OP 2 type screen ,user will see OP 1 Lower limit Screen. On OP 1 lower limit screen, after pressing UP and DOWN keys simultaneously user can see previously set lower limit of OP 1. At this screen user can change lower limit of OP 1 by 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 keys. If TPT is ideal for 5 seconds on OP 1 lower limit editing 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.



4.2.11 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 OP 1 Low 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.



4.2.12 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.

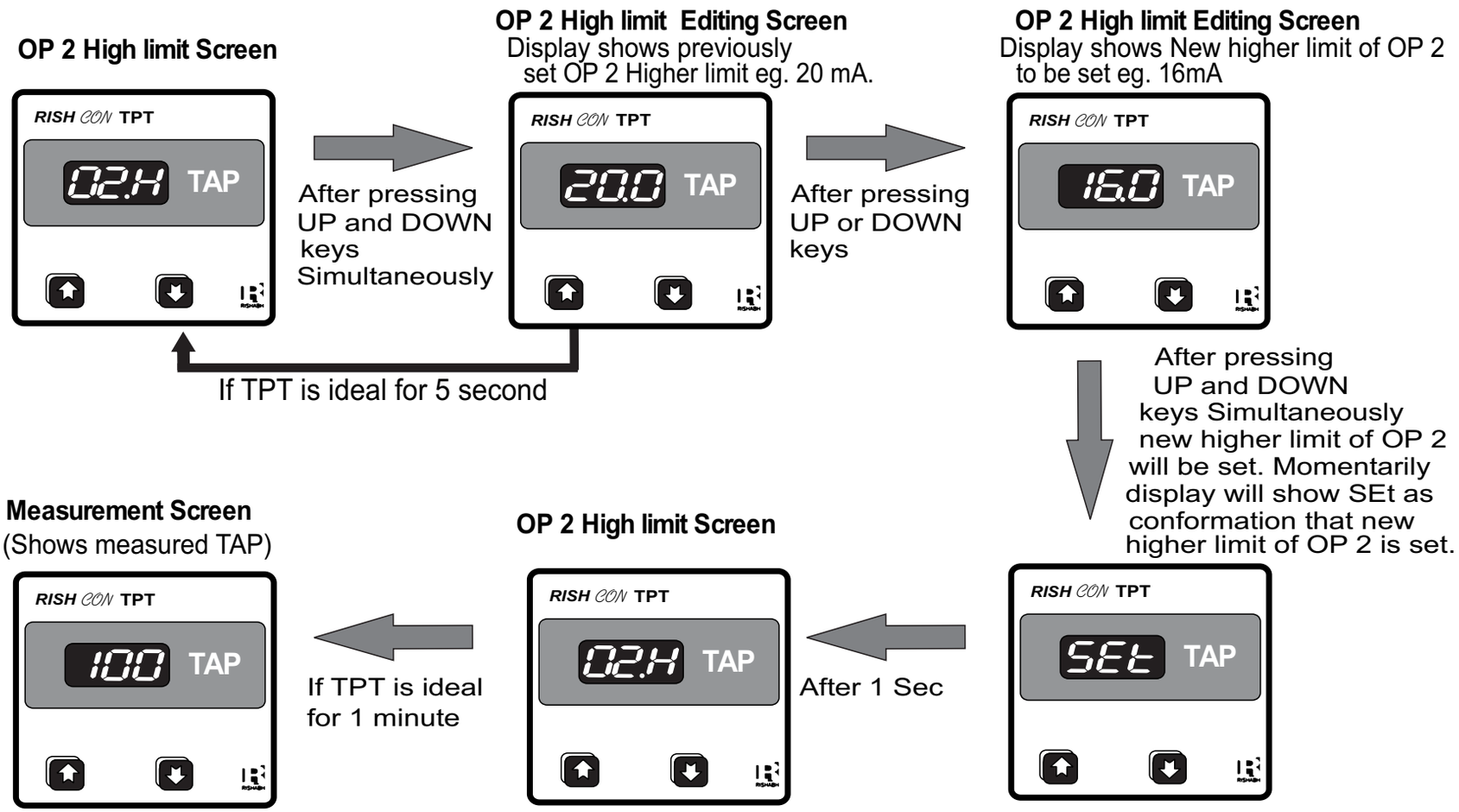
If OP 2 type is voltage output then Higher limit of OP 2 can be set between -8 V to 15 V with following condition.

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 values on display are in Volts .

After pressing UP key from OP 2 type screen or DOWN key from OP 2 Lower limit screen ,user will see OP 2 Higher limit Screen. On 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 keys. If TPT is ideal for 5 seconds on OP 2 Higher limit editing 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 setup and measured TAP will be shown.



4.2.13 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 2 can be set between -12 V to 11 V with following condition.

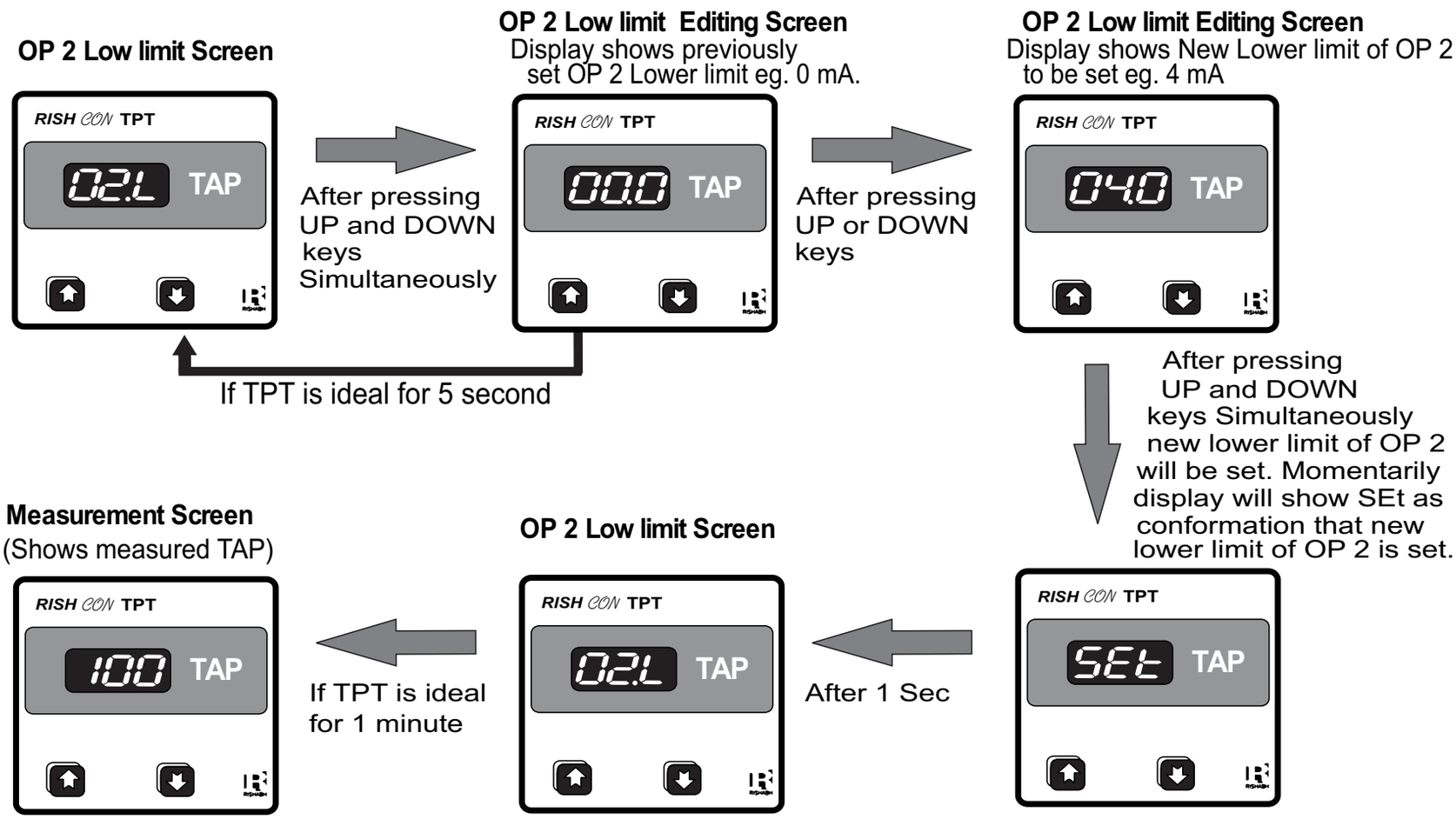
1) (Higher limit of OP 2 - Lower limit of OP 2) >= 4.

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 values on display are in Volts .

After pressing UP key from OP 2 high limit screen or DOWN key from Open circuit val of OP 1 screen ,user will see OP 2 Lower limit Screen.

On 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 keys. If TPT is ideal for 5 seconds on OP 2 lower limit editing 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.



4.2.14 Open Circuit (OC) value of 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 IP is open then Op1 will be = [((16*X)/100)-16)+20]

Eg. if OC 1= 110% then whenever IP will open OP 1will be 21.6 mA.

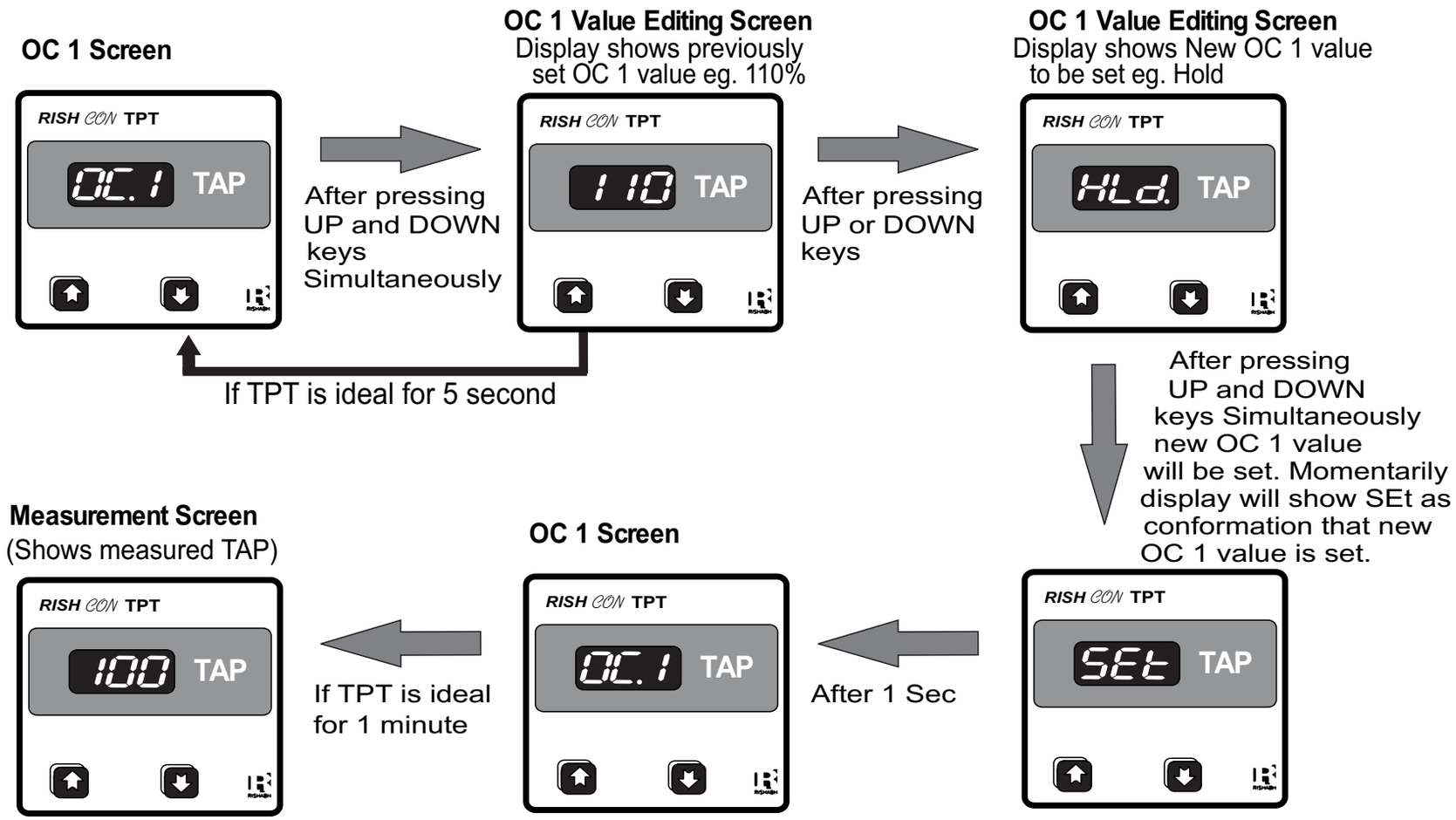
If OC value of OP 1 is set at Hold then TPT will deliver same output which it was delivering before IP gets open circuited.

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.



4.2.15 Open Circuit (OC) value of 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 OP2 span will be 16 mA. Now whenever IP is open then OP 2 will be = [((16*X)/100)-16)+20]

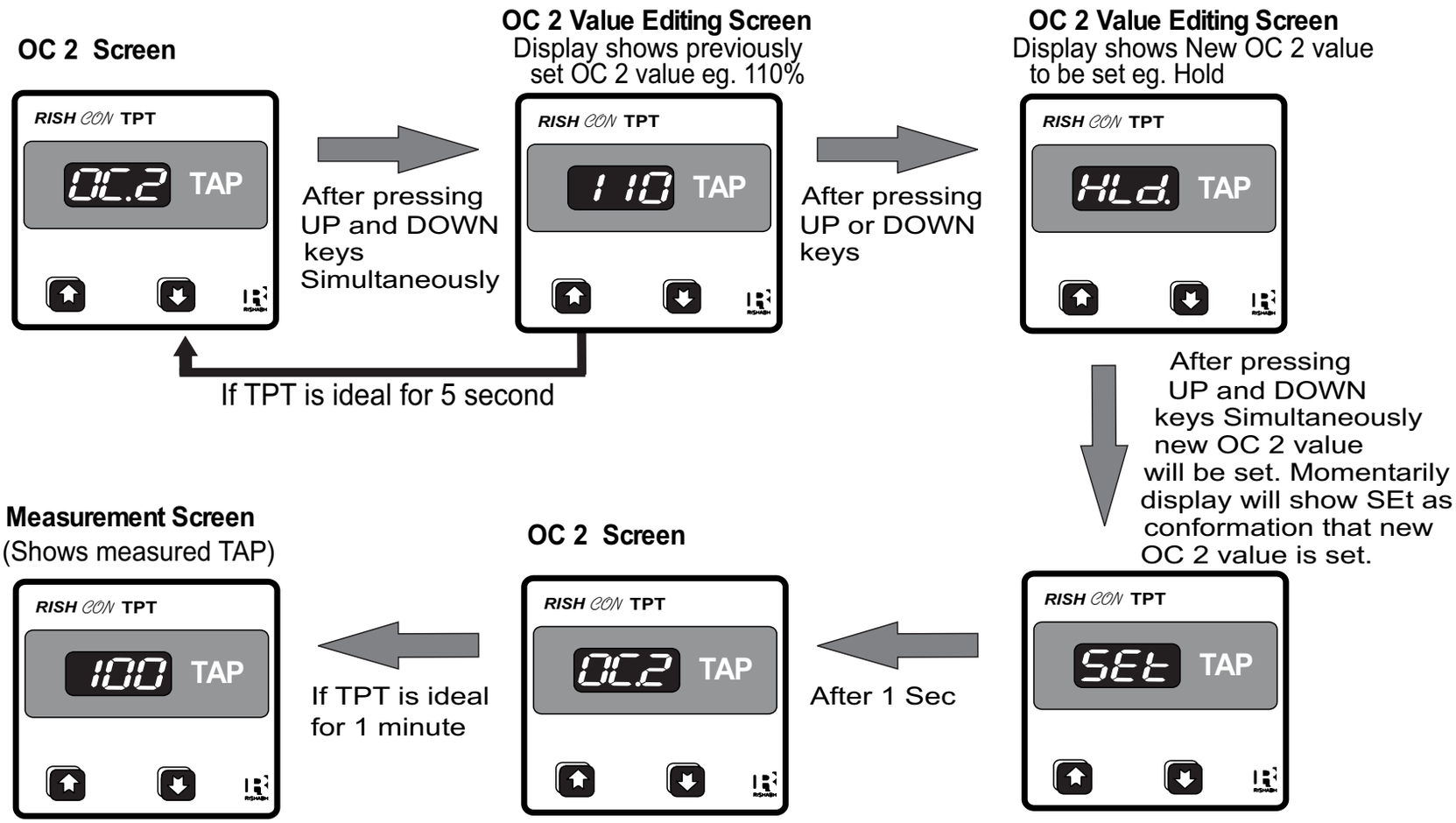
Eg. if OC 2= 110% then whenever IP will open OP 2 will be 21.6 mA.

If OC value of OP 2 is set at Hold then TPT will deliver same output which it was delivering output before IP gets open circuited.

After pressing UP key from OC 1 value screen or DOWN key from System type 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.



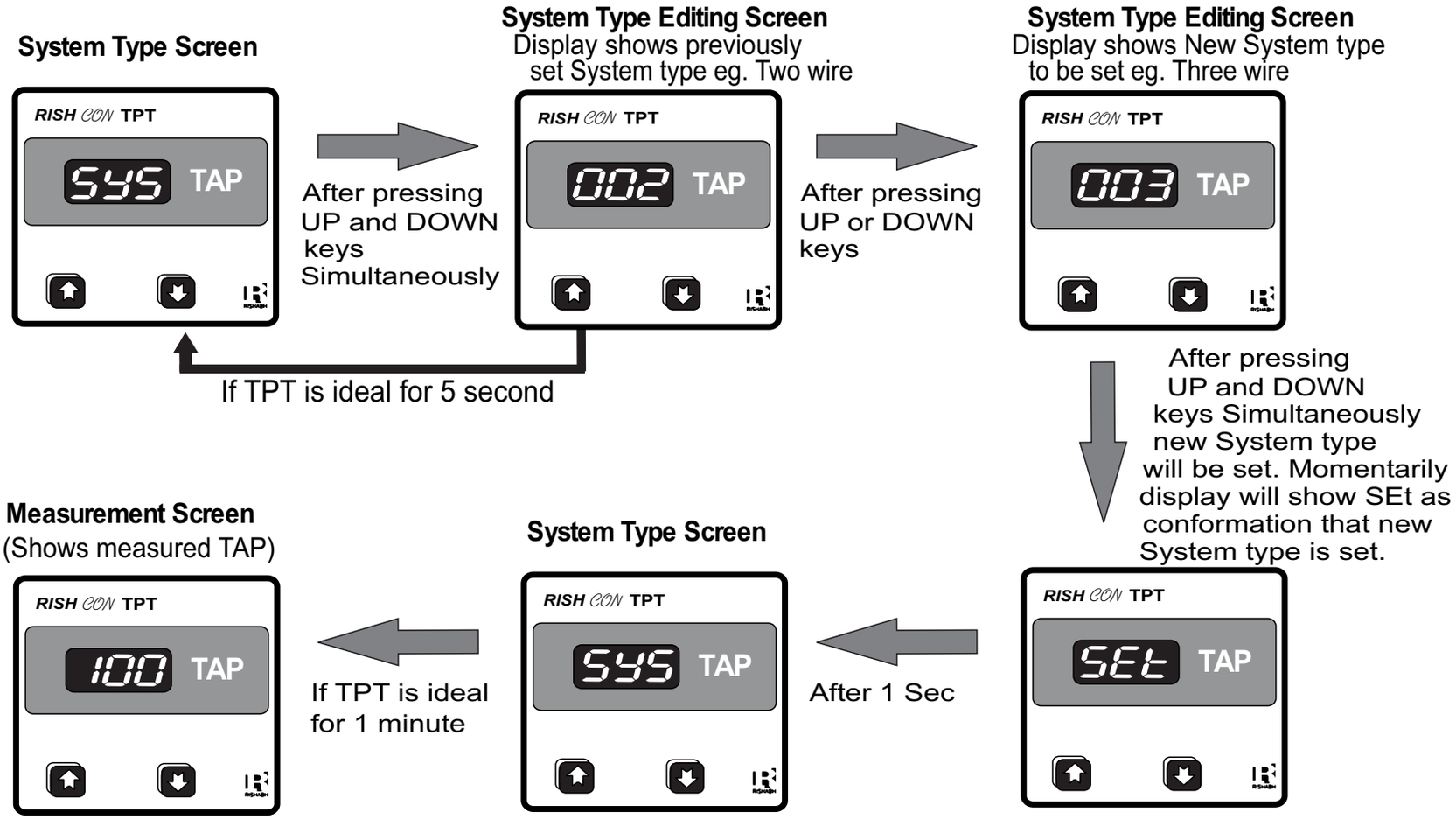
4.2.16 System type Setting

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.



4.2.17 Lead Resistance Setting

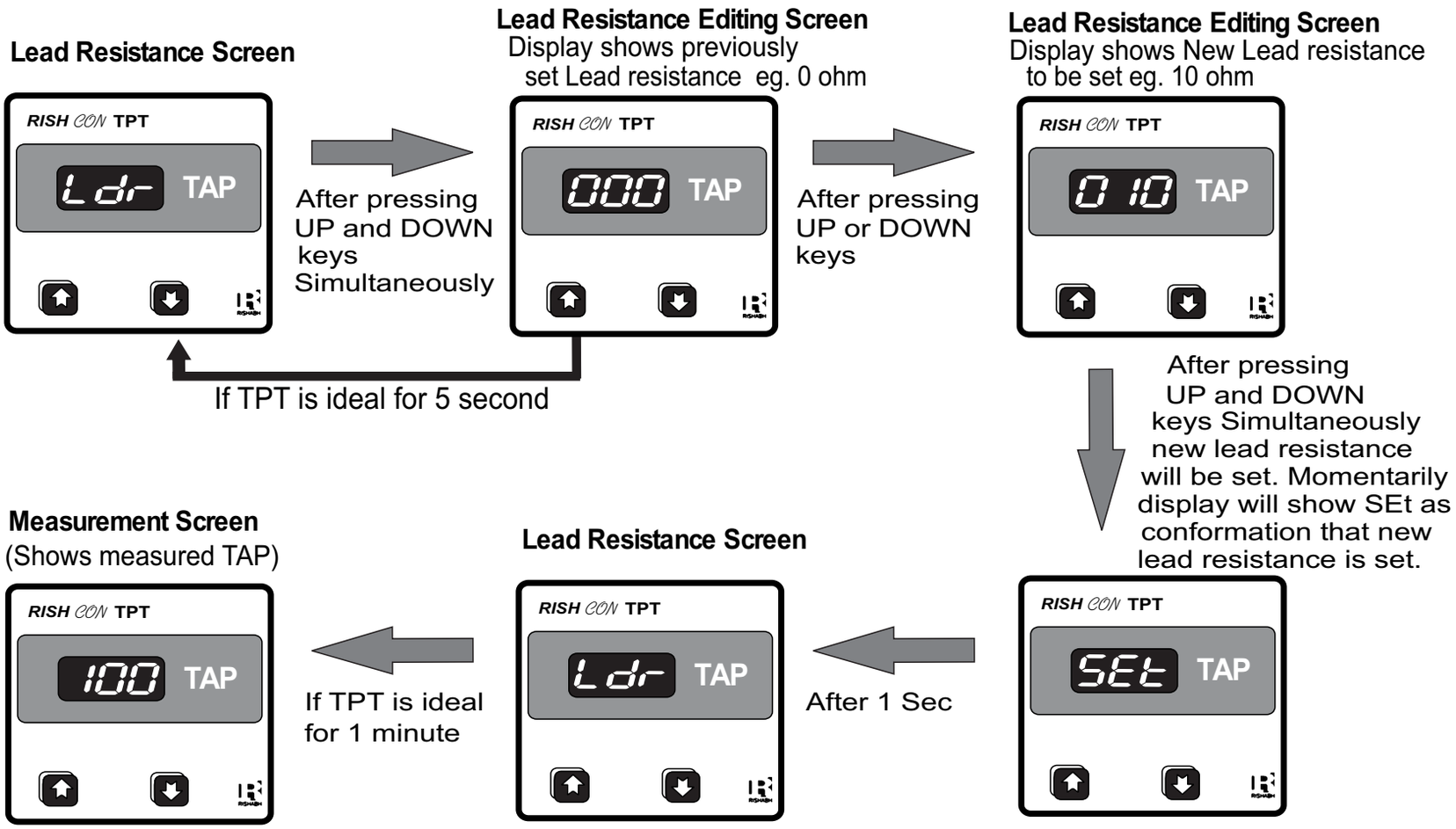
This screen allows user to set Lead resistance Lead resistance is . applicable for two wire system type only. User can Lead resistance from 0 ohm to 60 ohm.

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.



4.2.18 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.

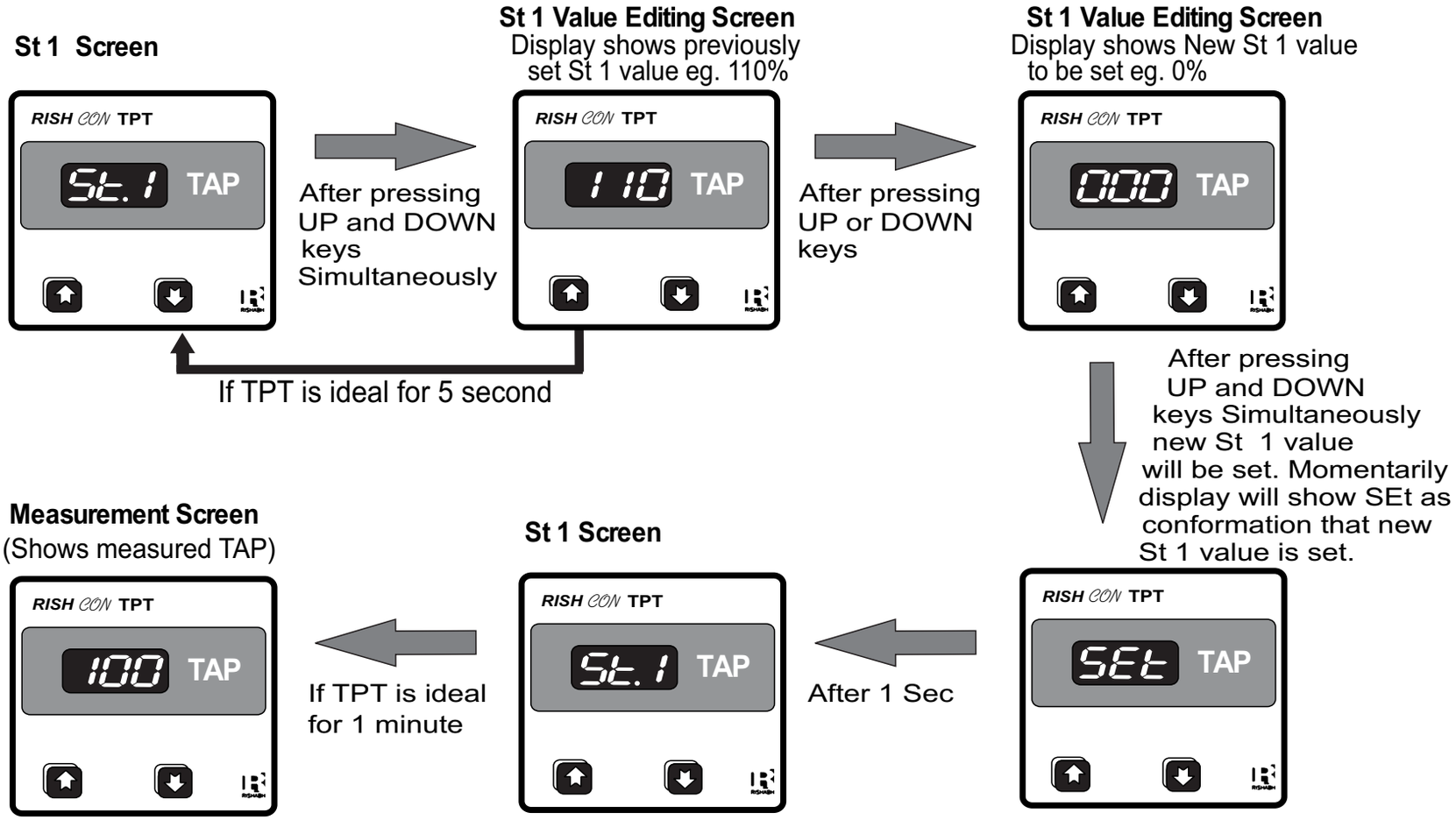
User can set Startup val of OP 1 from -10 % to 110% of output span .

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 1will 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.



4.2.19 Startup (St) value of OP 2 Setting

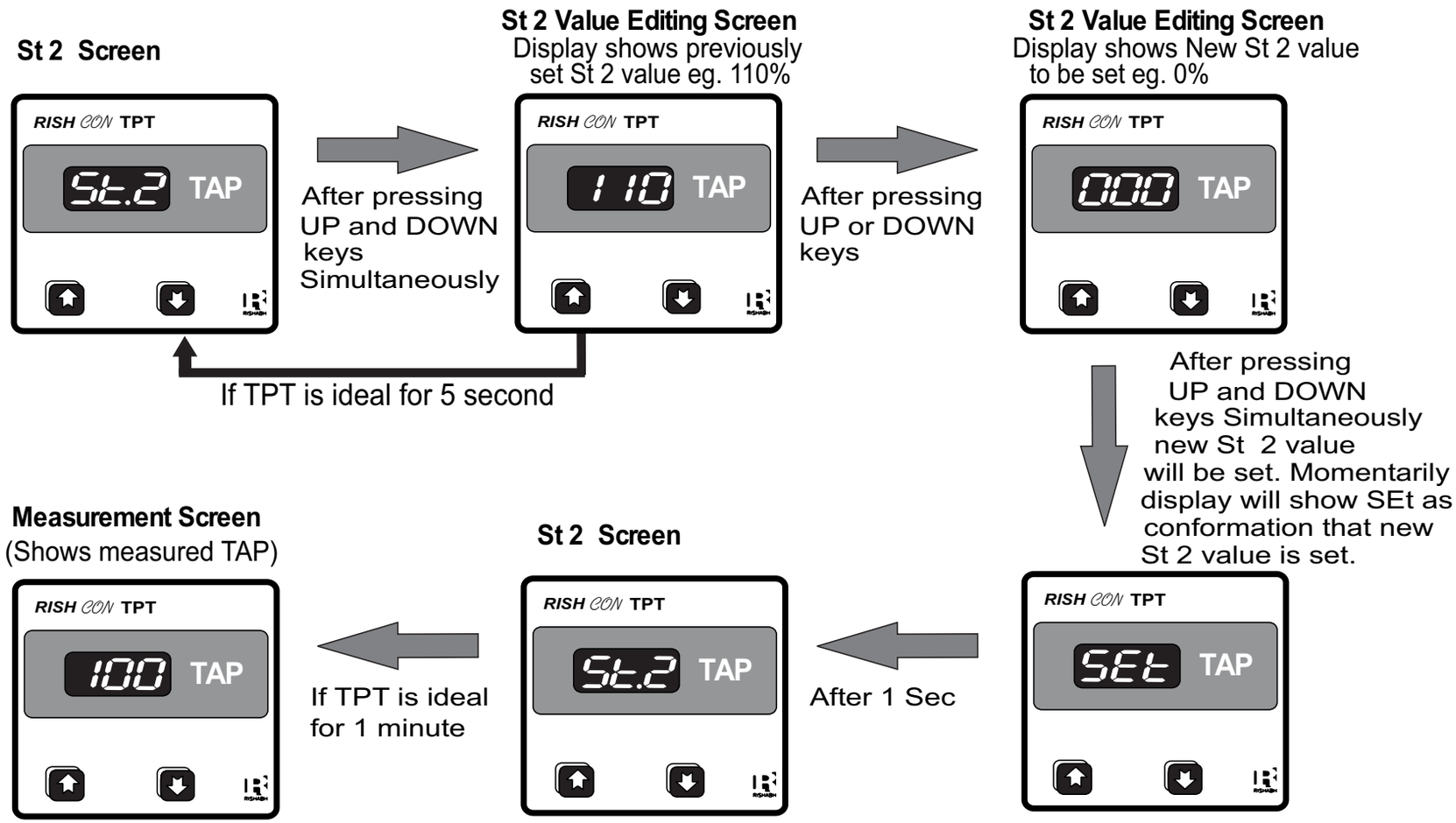
This screen allows user to set Startup value of OP 2 of TPT. Startup value of OP 2 (St 2 Value) is nothing but the Output given by TPT when TPT just turned on.

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 St 1 value screen or DOWN key from Supply Freq. 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.

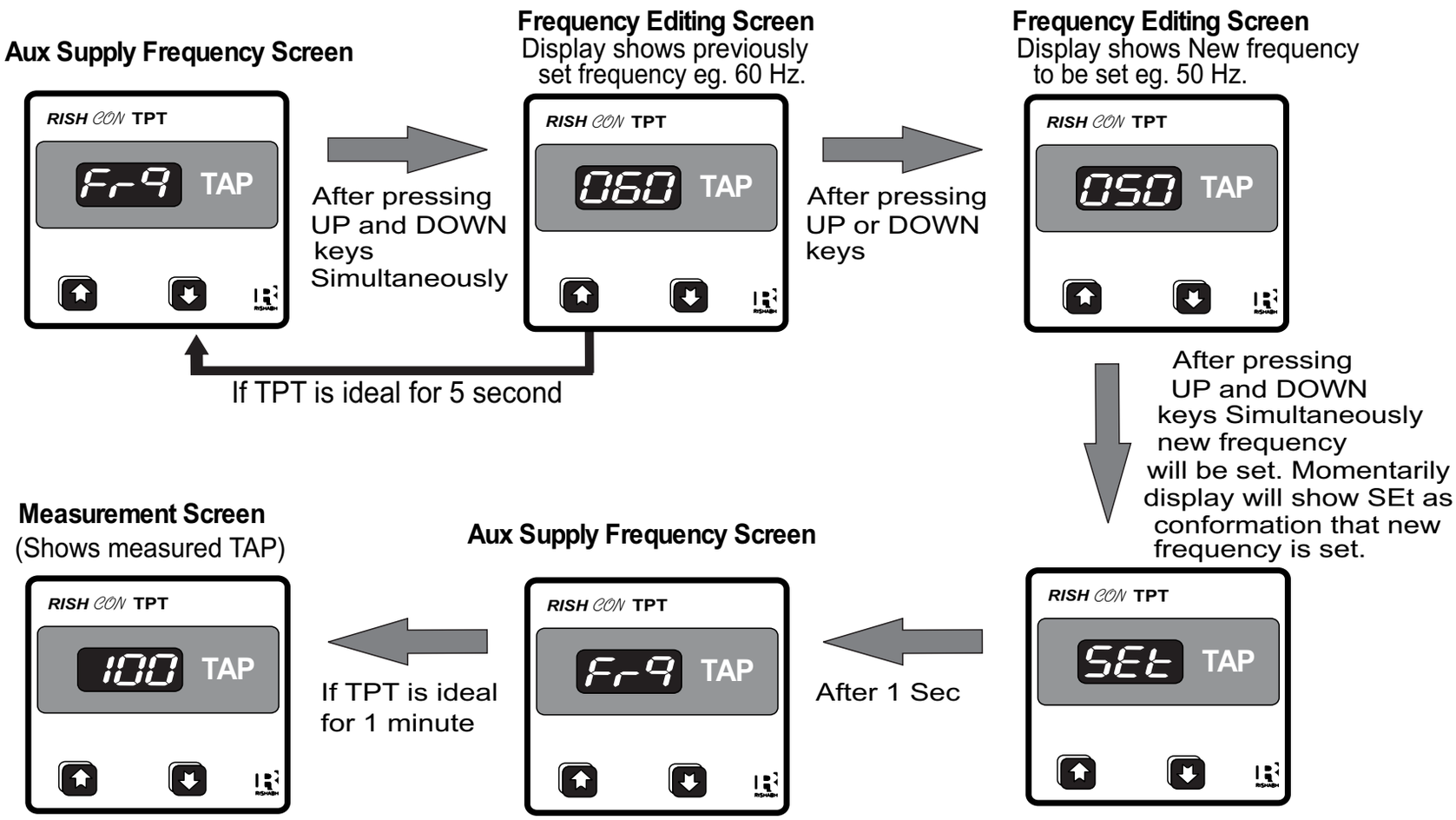


4.2.20 Auxilary Supply Frequency Setting

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.

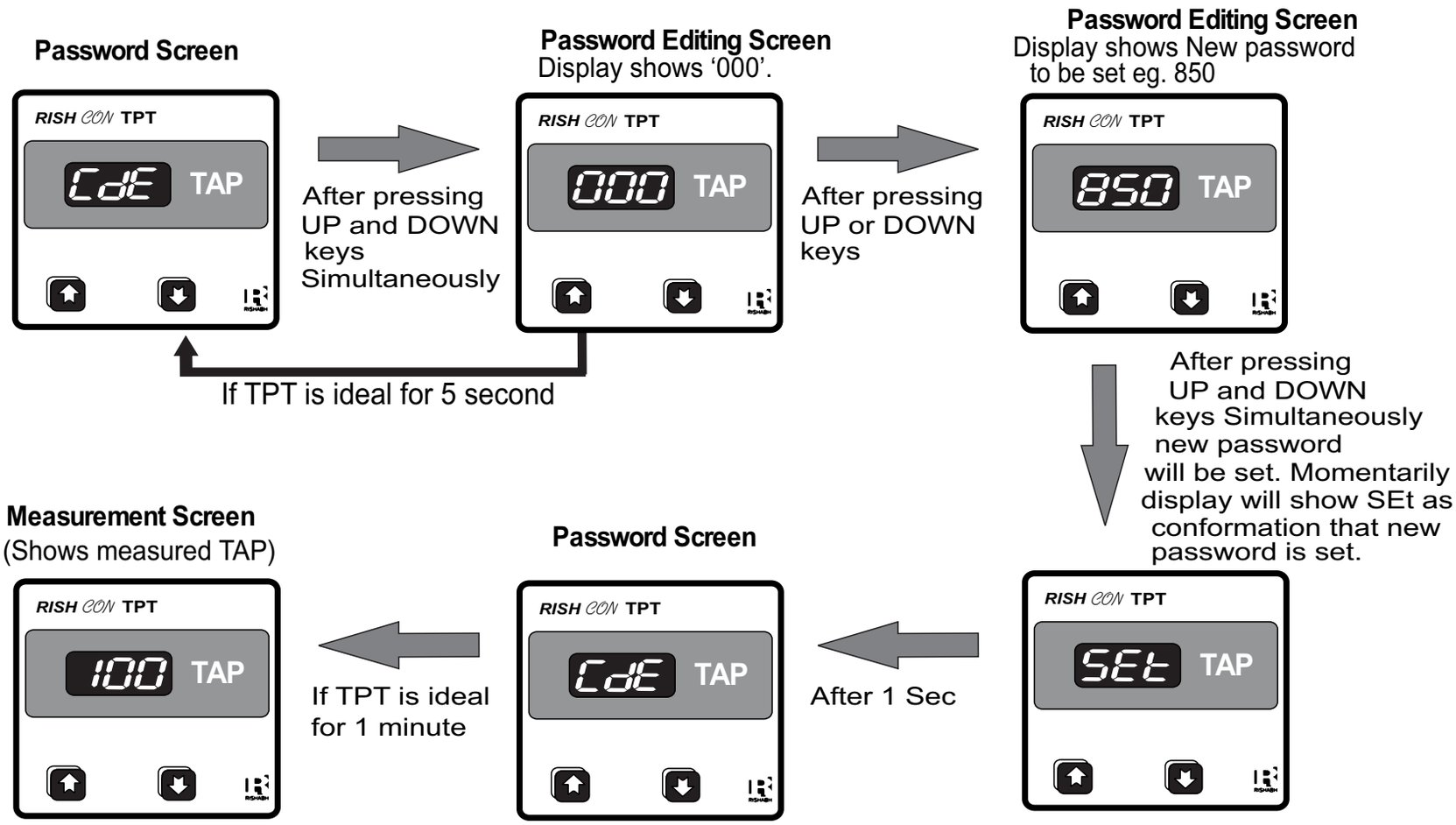


4.2.21 Password (Code) Setting

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.

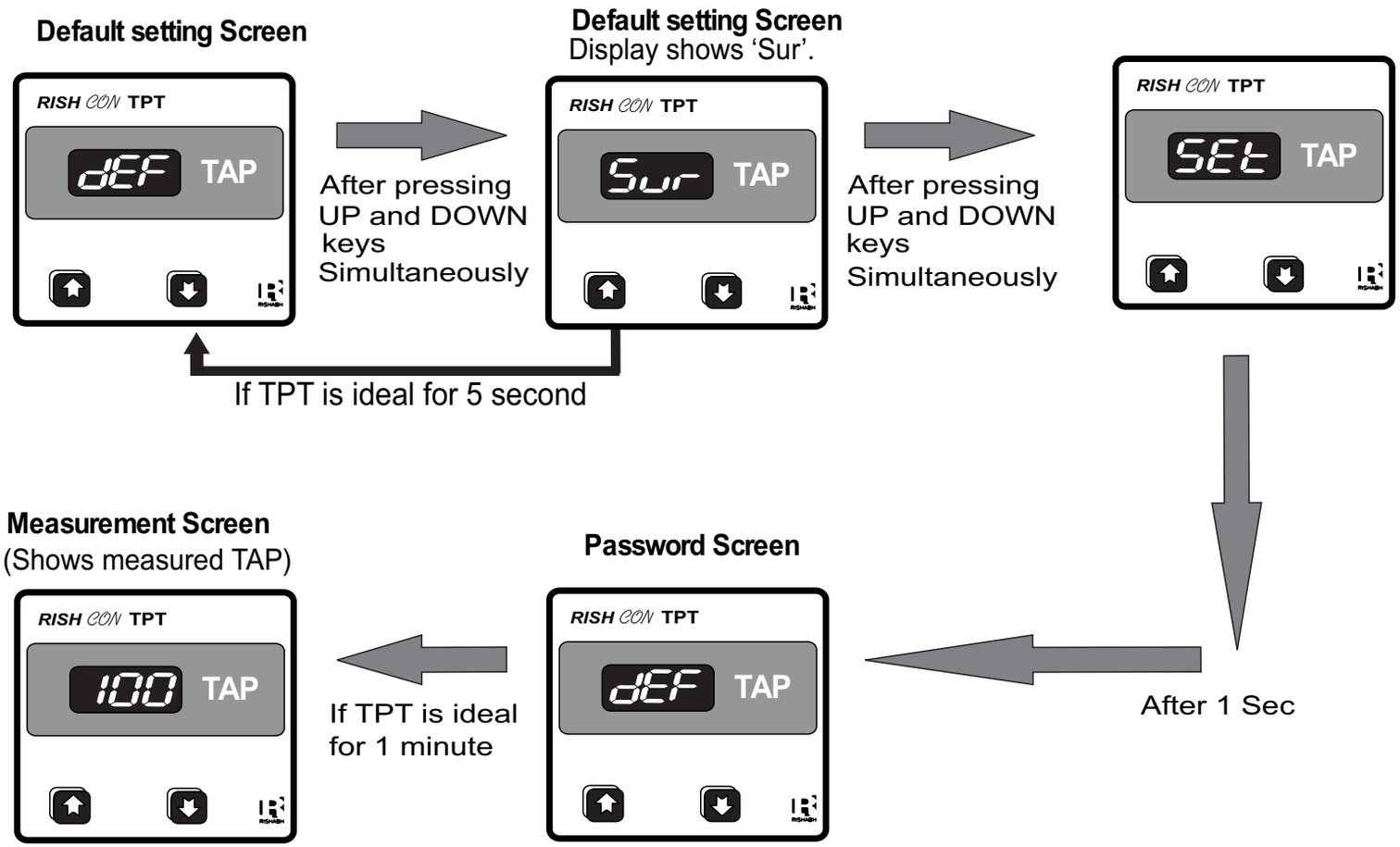


4.2.22 Default Setting

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.

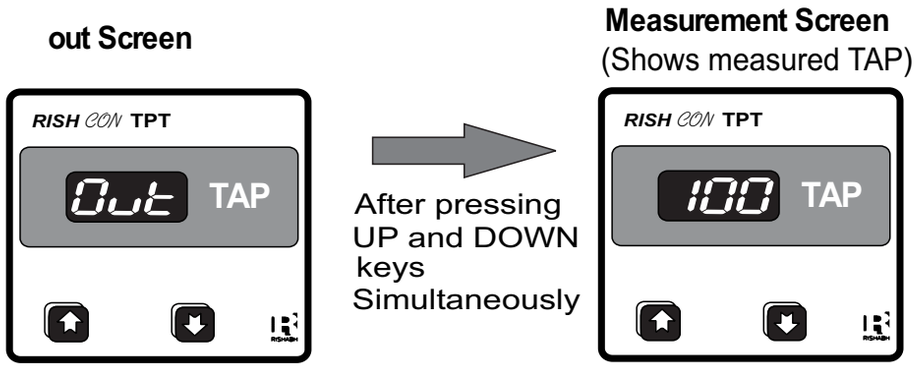


4.2.23 Out (Exiting)from Setup menu

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.



4.3 Programming via port available at back of TPT using PRKAB601 adapter .

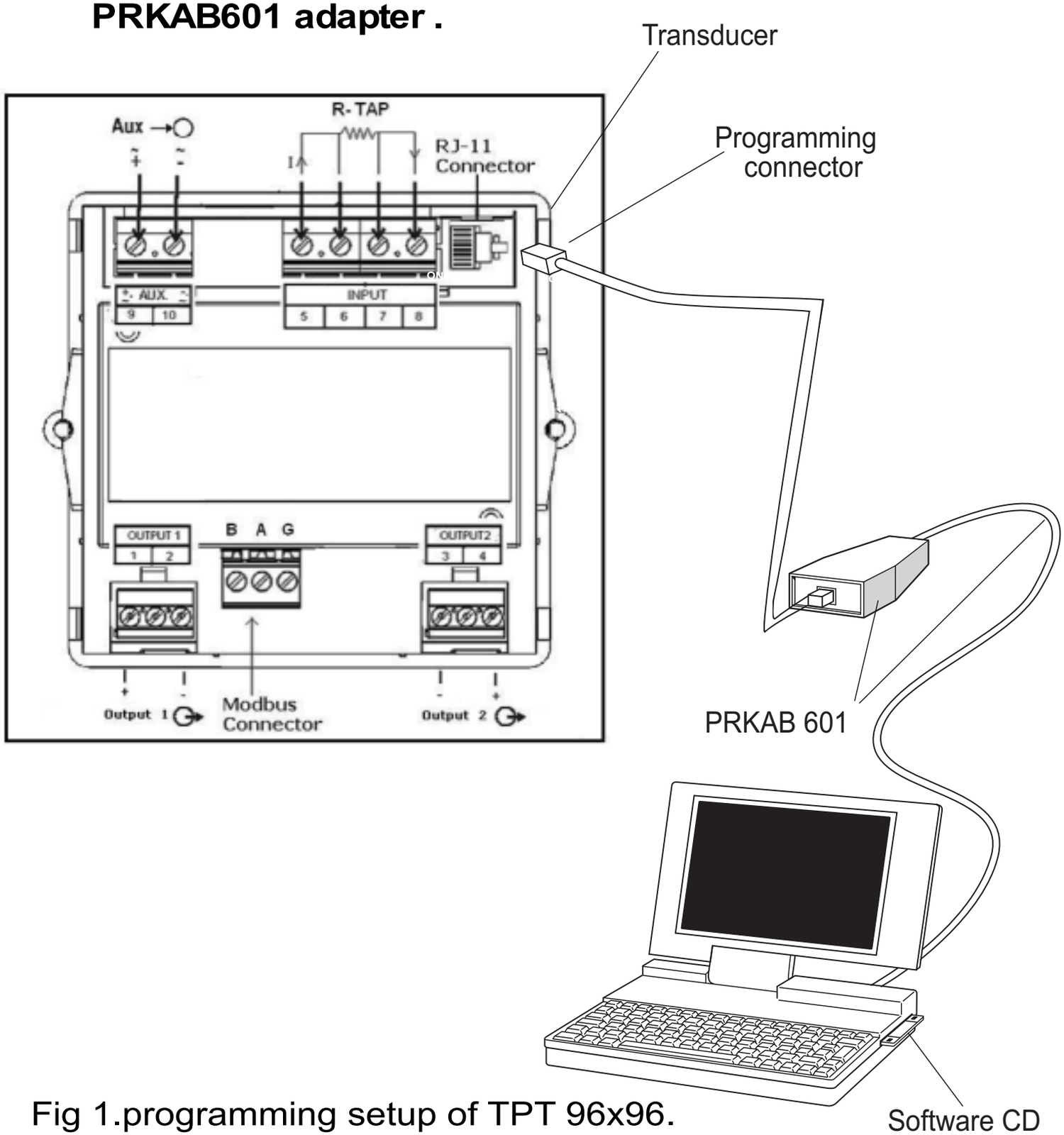


Fig 1.programming setup of TPT 96x96.

A PC with RS 232 C interface (Windows 98, XP),
the programming cable PRKAB 601 and the
configuration software TPT 96x96 are required to program the transducer. (Details of the programming cable and the software are to be found in the separate Data sheet: PRKAB 601.)

The connections between
“PC « PRKAB 601 « RISH CON TPT 96x96 ” can be seen from Fig.1
The power supply must be applied to RISH CON TPT before it can be programmed.
The configuration software TPT 96x96 is supplied on a CD.
The programming cable PRKAB 601 adjusts the signal level and provides the electrical insulation between the PC and RISH CON TPT.

The programming cable PRKAB 601 is used for programming.

All the programmable details listed in section “4.2 Setup menu selection ” .
The output signal range is programmable by configuration software.
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.

5. RS 485 (ModBus) Output

The TPT (Tap Position Transducer) supports MODBUS (RS 485) RTU protocol (2 wire).
Connection should be made using twisted pair shielded cable. All A & B connections are daisy chained together. The screens should also be connected to the ground terminal. To avoid the possibility of loop currents, an earth connection should be made at one point on the network Loop topology does not require any termination load . Line topology may or may not require terminating loads depending upon type and length of cable used. The impedance of termination load should match the impedance of cables and be at both ends of the line. the cable should be terminated at each end with 120 ohm (1/4 watt min.) resistor

The RS 485 network support max length of 1.2km. Including the master , a maximum of 32 instruments can be connected in RS 485 network. The permissible address range for the TPT is between 1 and 247 for 32 instruments. Broadcast mode (Address 0) is not allowed.

The maximum latency time of TPT is 250 ms 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 250 ms of the time to ellaps before assuming that TPT is not going to respond. If slave does not respond within 250 ms , master can ignore the previous query and can issue fresh query to 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 byte (32 bits)per parameter Floating point format (IEEE754) 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 i.e. 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	Preset Multiple Registers	Set the Content of read/write location (4X)

Exception Cases : An exception code will be generated when Meter receives ModBus query with valid parity & 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 supportes by meter
02	Illegal Data Address	Attempt to access an invalid address or an attempt to read or write part of floating point value
03	Illegal Data Value	Attempt to set a floating point variable to an invalid value

Accessing 3 X register for reading measured values:

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

Example:

To read parameters

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 :

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 Hi	Number of Registers Lo	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: 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.)

Table 1 : 3 X register addresses (measured parameters)

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex	
			High Byte	Low Byte
30001	1	Firmware Version	00	0
30003	2	TAP Counter	00	2
30005	3	TAP Number	00	4

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).

Accessing 4 X register for reading and Writing :

Each setting is held in 4x register. 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 address.

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 Hi	Number of Registers Lo	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)	F3 (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.)

Example : Writing System Type

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

Query : (change system type to 3 wire = 3)

Device Address	01 (Hex)
Function Code	10 (Hex)
Starting Address Hi	00 (Hex)
Starting Address Lo	04(Hex)
Number of Registers Hi	00(Hex)
Number of Registers Lo	02(Hex)
Byte Count	04 (Hex)
Data Register-1High Byte	40 (Hex)
Data Register-1 Low Byte	40(Hex)
Data Register-2 High Byte	00(Hex)
Data Register-2 Low Byte	00(Hex)
CRC Low	E6(Hex)
CRC High	48(Hex)

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)	04(Hex)	00 (Hex)	02(Hex)	00(Hex)	09 (Hex)
Device Address	Function Code	Start Address High	Start Address Low	Number of Registers Hi	Number of Registers Lo	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.)

Table 2 : 4 X register addresses

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex		Read / Write
			High Byte	Low Byte	
40001	1	Low IP Resistance	00	00	R/Wp
40003	2	High IP Resistance	00	02	R/Wp
40005	3	System Type	00	04	R/Wp
40007	4	Lead Resistance	00	06	R/Wp
40009	5	Aux Supply Frequency	00	08	R/Wp
40011	6	Output 1 Type	00	0A	R/Wp
40013	7	Output 2 Type	00	0C	R/Wp
40015	8	Lower limit of OP 1	00	0E	R/Wp
40017	9	Higher limit of OP 1	00	10	R/Wp
40019	10	Lower limit of OP 2	00	12	R/Wp
40021	11	Higher limit of OP 2	00	14	R/Wp
40023	12	Startup value of OP 1	00	16	R/Wp
40025	13	Startup value of OP 2	00	18	R/Wp
40027	14	Open circuit signaling selection	00	1A	R/Wp
40029	15	Open circuit value of OP 1	00	1C	R/Wp
40031	16	Open circuit value of OP 2	00	1E	R/Wp

Address (Register)	Parameter No.	Parameter	Modbus Start Address Hex		Read / Write
			High Byte	Low Byte	
40033	17	Maximum TAP number	00	20	R/Wp
40035	18	Minimum TAP number	00	22	R/Wp
40037	19	RS 485 Setup Code	00	24	R/Wp
40039	20	RS 485 Address	00	26	R/Wp
40041	21	Reset TAP Counter	00	28	R/Wp

Table 3 : Explanation for 4 X register

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 4.2.7	0
40003	High IP Resistance (ohm)	This address is used to set High limit of input resistance of OLTC. For details refer section 4.2.6	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

Address	Parameter	Description	Default Value
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 4.2.10. 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 4.2.9. 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 4.2.13. 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 4.2.12. 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 4.2.18	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 4.2.19	0

Address	Parameter	Description	Default Value
40027	Open circuit signaling selection	This address is used to set outputs at hold or at value. For details refer Section 4.2.14 and 4.2.15 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 4.2.14	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 4.2.15	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 4.2.4 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 4.2.5 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

Address	Parameter	Description	Default Value
40041	Reset TAP Counter	This address is used to reset TAP counter (value at register 30003). Writing 0 will erase (reset)TAP counter. writing any other value will return error	0

Table 4 : RS 485 Set-up Code

Baud Rate	Parity	Stop Bit	Decimal value
19200	NONE	01	12
19200	NONE	02	13
19200	EVEN	01	14
19200	ODD	01	15
9600	NONE	01	08
9600	NONE	02	09
9600	EVEN	01	10
9600	ODD	01	11
4800	NONE	01	04
4800	NONE	02	05
4800	EVEN	01	06
4800	ODD	01	07
2400	NONE	01	00
2400	NONE	02	01
2400	EVEN	01	02
2400	ODD	01	03

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.

6. Installation

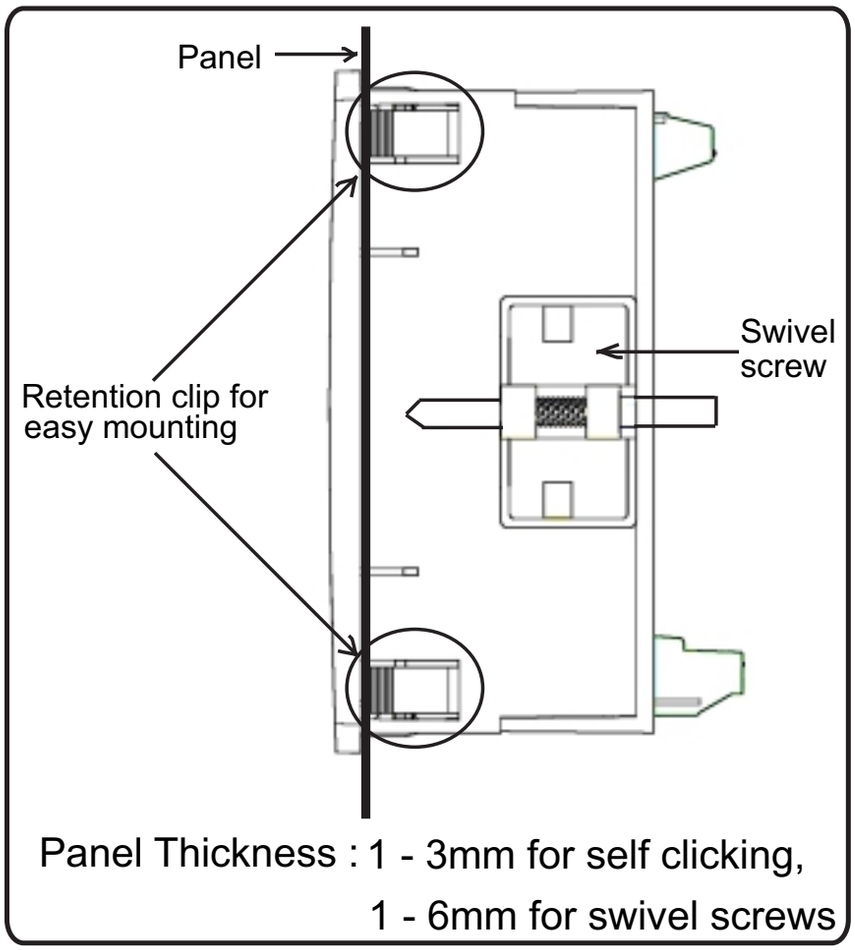


Fig 2.

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.**

Mounting of TPT is featured with easy “Clip-in” mounting. Push the transducer in the panel slot (size 92 X 92 mm), it will click fit into panel with the four integral retention clips on two sides of meter. If required additional support is provided with swivel screw as shown in figure 2. The front of enclosure conforms to IP 50. Additional protection to th panel may be obtained by use of an optional panel gasket. The terminal at the rear of the product should be protected from liquids.

The TPT should be mounted in reasonably stable ambient temperature and where the operating temperature is within the range of 0 to 45 ^{o}C. Vibration should be kept mimnimum and product should not be mounted where it will be subjected to excessive direct sunlight.

6.1 EMC installation requirement.

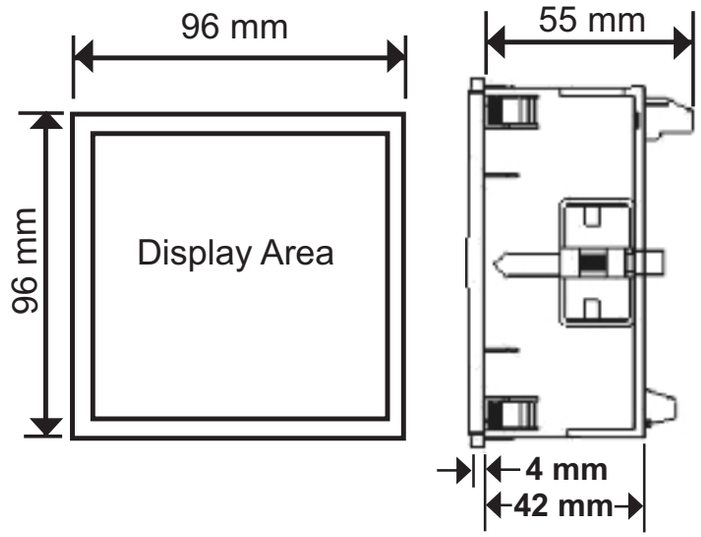
This product has been designed to meet the certification of the EU directives when installed to a good code of practice for EMC in industrial environments, e.g.

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

6.2 Case Dimention and Pannel Cut Out



With optional MODBUS .

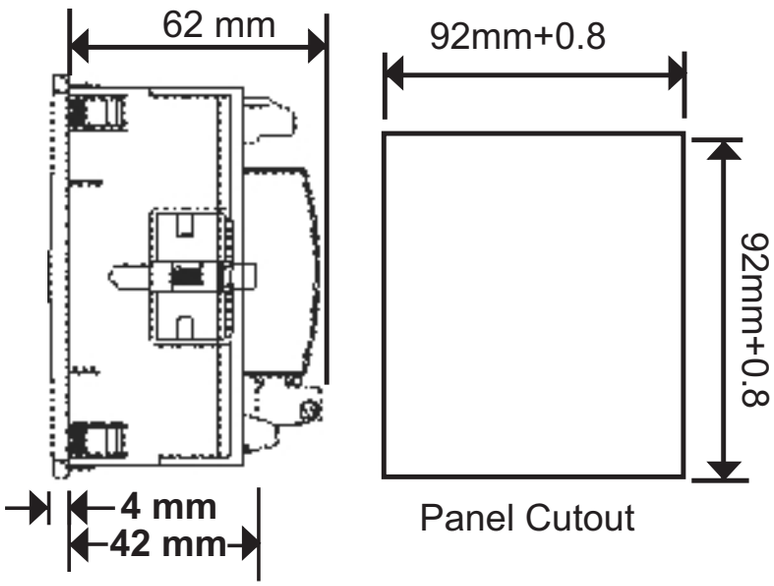


Fig 3..

7. Electrical connections

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 4mm^2 (12AWG) solid or 2.5mm^2 stranded cable.

Note :It is recommended to use wire with lug for connection with TPT.

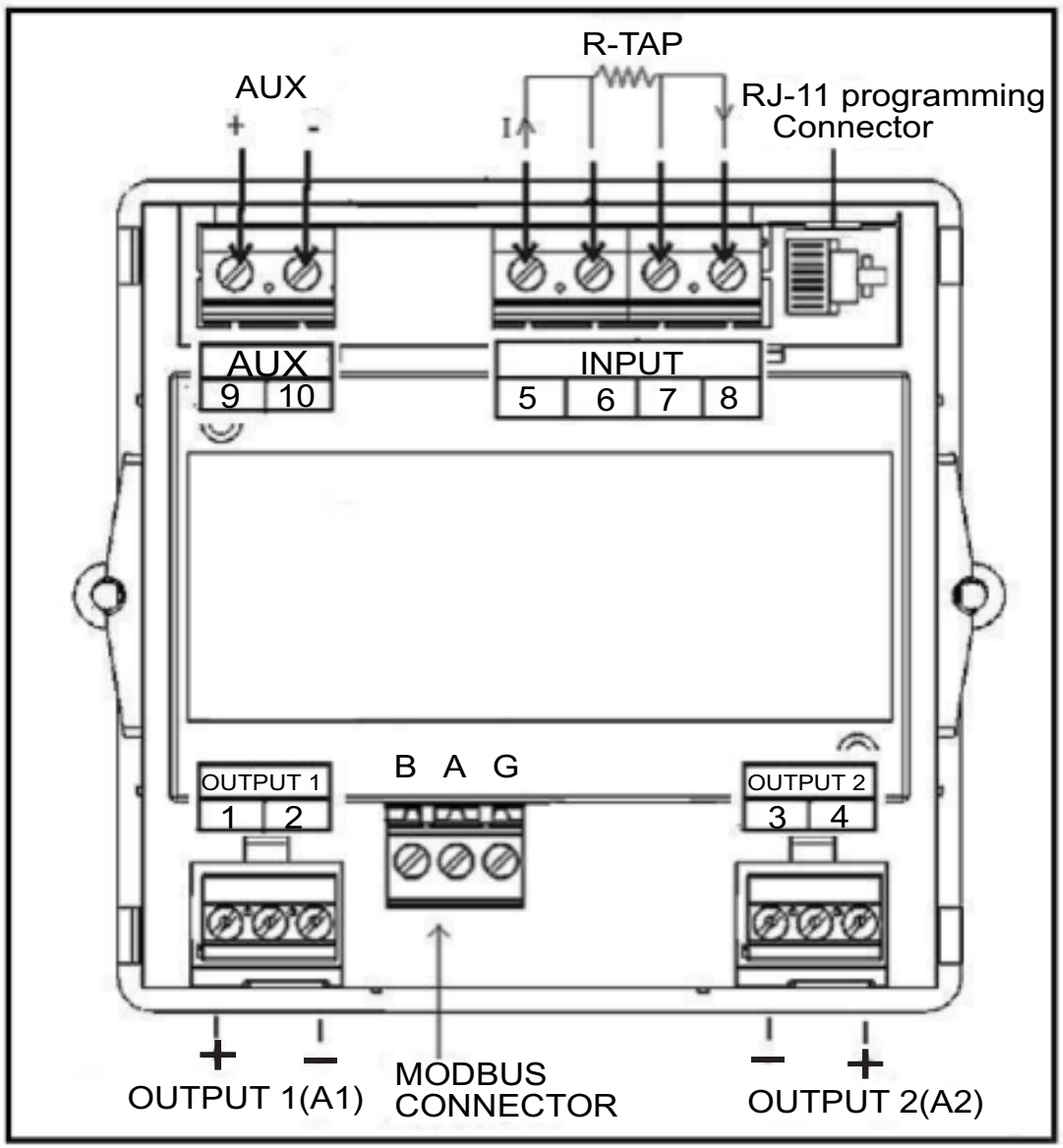


Fig 4. Connection terminals of TPT 96x96.

7.1 Measuring Output Leads

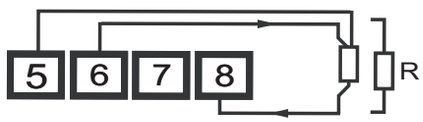
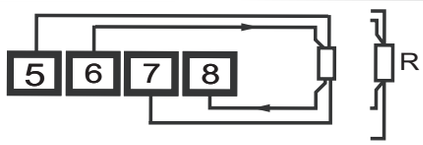
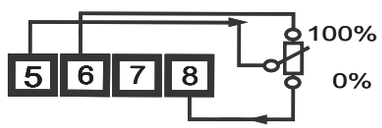
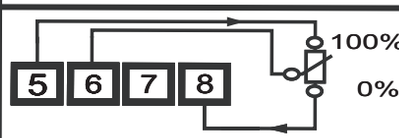
Connect the output leads for output 1 (A1) terminals 1(+) and 2(-), and for output 2 (A2) to terminals 3(-) and 4(+) as shown in figure 4.

Note : The maximum permisible external resistance Rext max of the transducer must not be exceeded (see Section '8')

7.2 Connecting the power supply

Connect the power supply to terminals 9(⏚) and 10(≂) as shown in fig 4. An external supply fuse with a rupture capacity ≤ 20A must be provided for DC supply voltages < 125V

7.3 measurement Connection Diagram

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

It is assumed that the lead of 3 wire connection have same resistance and no compensation is necessary. lead resistance must be less than 30 ohm per lead

8. Specifications

Measuring input

Measured variable M

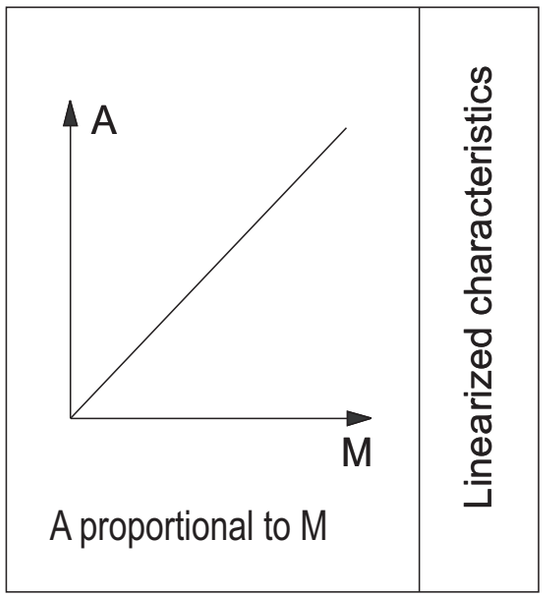
Table 5:

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

Note: High resistance - Low resistance >= 500
High resistance / Low resistance >= 1.667

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

Output Characteristic :



Operating sense: Programmable output signal (A) directly proportional to measured variable(M)

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 or Keys
Outputs A1 and A2 are isolated.

Standard ranges for IA: 0...20 mA or 4...20 mA

Non-standard ranges: Limits –20 to + 20 mA
Min. span 5 mA
Max. span 40 mA

Burden voltage: Negative > -19 V,
positive < +22 V

External resistance IA

$$R_{ext\ max.}\ [k] = \frac{15\ V}{I_{AN}\ [mA]}$$

I = full-scale output current

$$\text{For negative currents} = \frac{-12\ V}{I_{AN}\ [mA]}$$

I = full-scale output current

Residual ripple	< 0.5% p.p.
Response time	< 4 sec.
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 Current	<= 40 mA
Load capacity UA	20 mA

External resistance
UA1 / UA2

$$\text{Rext min[kohm]} = \frac{\text{UA [V]}}{2\ \text{mA}}$$

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) i.e. Startup value of OP. Setting range –10 to 110% programmable, i.e between 2.4 and 21.6 mA (for a scale of 4 to 20 mA).
When input variable is out of limits	A1 and A2 are at either a lower or an upper fixed value when the input variable..... a) falls more than 10% below the minimum value of the permissible range b)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

Power supply : 60... 230... 300 V AC/DC (45...65Hz)
Power supply : 24... 48... 60 V AC/DC (45...65Hz)

Power consumption: <3 W or <4.7 VA

Accuracy Data (Acc to IEC 60688)

Basic accuracy	: ± 0.2% of range
Reference Condition	: Ambient temperature 23°C ± 2 K
Nominal value of Aux supply voltage	: 230V 50Hz or 60Hz AC/DC OR 48V 50Hz or 60Hz AC/DC
Output Burden for current	: 0.5 * Rext max
Output Burden for voltage	: 2 * Rext min

Environmental conditions

Nominal range of use:	0...23...45°C (usage group II)
Operating temperature:	-20 to + 65°C
Storage temperature:	-40 to + 70°C
Relative humidity of annual mean:	< 75 % for standard climatic rating
Altitude :	2000 m max.
Indoor use statement	<=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

Infiuencing 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% (400A/T)

Standards

Electromagnetic Compatibility	According to IEC 61326-1 IEC 61000-4-3, level 3 IEC 61000-4-4, level 3
Operating Voltage	<300V bet all insulated circuits
Protection(acc. to IEC 60529 resp. EN 60529)	Enclosure front IP 50 Enclosure back (Terminals) IP 20
Safety design	Acc. to IEC 1010 resp. EN 61010
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
Double insulation	Power supply vs all other circuit Input vs output circuit
Vibration Strength	IEC60068-2-6, 10-150-10Hz, 0.15mm, 2G
Shock resistance	IEC60068-2-27, min. severity 50 G
Test voltages	Measuring input versus measuring output: – 2.3 kV, 50 Hz, 1 min. Power supply versus All: – 3.7 kV, 50 Hz, 1 min. Measuring output 1 vs Measuring output 2 – 0.5 kV ,50 Hz, 1 min.
Comman Mode voltage	100V

The Information contained in these installation instructions is for use only by installers trained to make electrical power installations and is intended to describe the correct method of installation for this product. However, ‘manufacturer’ has no control over the field conditions which influence product installation.

It is the user’s responsibility to determine the suitability of the installation method in the user’s field conditions. ‘manufacturer’ only obligations are responsibility to determine the suitability of the installation method in the user’s field conditions. ‘manufacturer’ only obligations are those in ‘manufacturer’ standard Conditions of Sale for this product and in no case will ‘manufacturer’ be liable for any other incidental, indirect or consequential damages arising from the use or misuse of the products.