

**INSTRUCTION MANUAL
FOR
SMART DIFFERENTIAL
PRESSURE TRANSMITTER
WITH HART COMMUNICATION
MODEL NO.: ELPRT-100SDP**

Authorised Dealer



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INTRODUCTION

ELPRT100S (DP) is a compact & light weight 24V DC Powered 2 wire Differential Pressure Transmitter with HART communication protocol. It contains a variable capacitance type sensing element for pressure measurement.

Differential capacitance between the sensing diaphragm & the capacitance plates on both sides of the sensing diaphragm is converted electronically to two wire 4-20mA DC signal.

It is having COG display to display parameters such as differential pressure, 50 segment bar graph and analog output.



SAFETY WARNING & GENERAL INSTRUCTIONS

1. Read User manual carefully and understand instructions & directions provided in this manual.
2. Installation, connections, commissioning and service shall carry out by only qualified and authorized person.
3. To protect instrument from any external hazards, customer should take necessary care while preparing site ready before installation.
4. Ensure proper supply voltage (24V DC) with proper polarity to the instrument, before Powering ON instrument.



FOR YOUR SAFETY

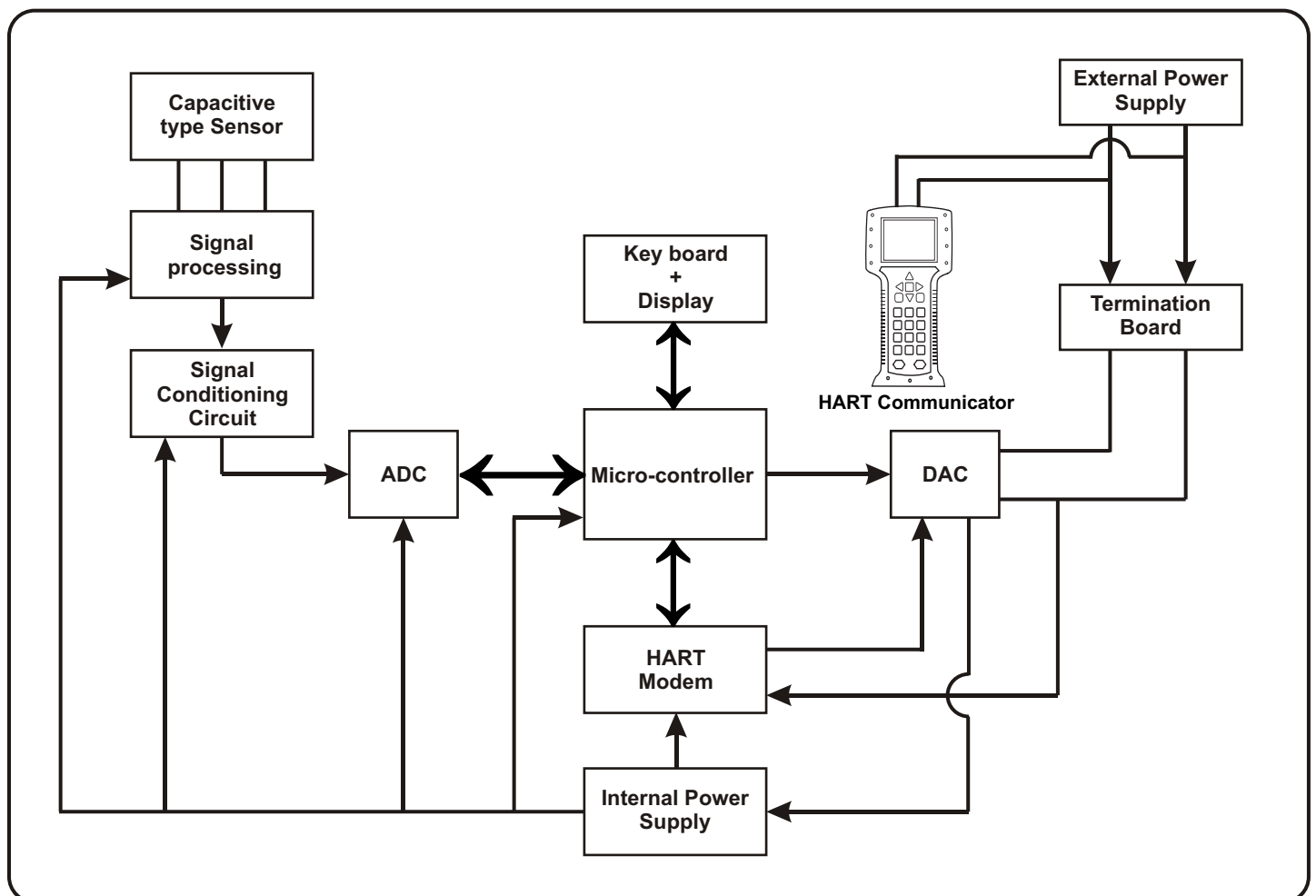
- * Select the appropriate pressure transmitter with regard to scale range, performance and specific measurement conditions prior to installing and starting the instrument.
- * Open pressure connections only after the system is without pressure!
- * Please make sure that the pressure transmitter is only used within the overload threshold limit all the time!
- * Take precautions with regard to remaining media in removed pressure transmitter. Remaining media in the pressure port may be hazardous or toxic! Have repairs performed by the manufacturer only.
- * Power off the instrument circuit before removing connector /cover

TRANSMITTER OVERVIEW

Major components of ELPRT100S(DP) are sensor module and electronic housing .The sensor module contains capacitive type sensor and sensor electronics . Capacitance output of the sensor is converted to a digital signal using A/D convertor

The micro-controller then takes the signal from A/D convertor and calculate the correct output of the transmitter. This signal is then send to the D/A convertor ,which converts the signal back to an analog signal and super imposes the HART signal on the 4-20mA output. Block is as shown below.

Block Diagram :



CONTENTS

Sr. No.	TITLE	PAGE
1.0	Technical Specifications	1
2.0	Assembly Overview.....	2
3.0	Termination Details.....	3
	3.1 Field termination View.....	3
	3.2 Loop diagram.....	3
	3.3 Key details.....	3
4.0	Installation.....	4
	4.1 Safety Warnings.....	4
	4.2 General Considerations.....	4
	4.3 Mechanical Considerations.....	4
	4.4 Mounting Details.....	5
	4.5 Mount The Transmitter.....	5
	4.6 Impulse Piping.....	6
	4.7 Mounting Requirements.....	7
5.0	Flow Chart.....	8
	5.1 General Overview of Operation.....	8
	5.2 Parameter Mode.....	9
	5.3 Calibration Mode.....	13
6.0	Calibration & Display Mode Operating Procedure.....	14
	6.1 4-20mA Current Calibration Procedure.....	14
	6.2 Display Mode Operating Procedure.....	14
7.0	Trouble Shooting Procedure.....	15

1. TECHNICAL SPECIFICATIONS

Instrument name	: Smart Differential Pressure Transmitter
Model No.	: ELPRT-100SDP
Sr. No.	: -----
Supply Voltage	: 24V DC
Output	: 4-20mA with super imposed signal for HART Protocol
4-20mA Saturation	: Low-3.9mA & High-20.8mA
Static Pressure Effect	: 1) Zero error : 0.1% / 1Mpa 2) Span error : 0.1% / 1Mpa
Calibration Range	: 0 - 20000mmWC
Span Range	: As per range code 5
Switch on delay	: 5 Sec.
Response Time	: 200mSec.
Damping	: 0 to 30Sec.
Static Pressure	: 100 Bar
Thermal Effect	: 0.1% of F.S. per °C
Insulation Resistance	: >250MW
Revers Polarity Protection	: Yes
Ingress Protection	: Ip67
Operating Temperature Range	: 0 to 55°C
Process Temperature	: 0 to 120°C
Diaphragms	: SS316
Flange	: SS316
Electronic Housing	: SS316/Die cast aluminium
Display	: 128x64 Graphic COG display with Backlight
Display Range	: 5 Digit
Accuracy	: +/-0.1% of full scale

1.1 Differential Pressure Transmitter Ranges:

Sr.No.	Range Code	LRL	URL
1	2	-132.8mmWC	132.8mmWC
2	3	-1.160 psi (-0.080 bar)	1.160 psi (0.080 bar)
3	4	-5.801 psi (-0.400 bar)	5.801 psi (0.400 bar)
4	5	-29.007 psi (-2.0 bar)	29.007 psi (2.0 bar)
5	6	-100 psi (-6.895 bar)	100 psi (6.895 bar)
6	7	-300 psi (-20.684 bar)	300 psi (20.684 bar)
7	8	-1000 psi (-68.948 bar)	1000 psi (68.948 bar)

2. ASSEMBLY OVERVIEW

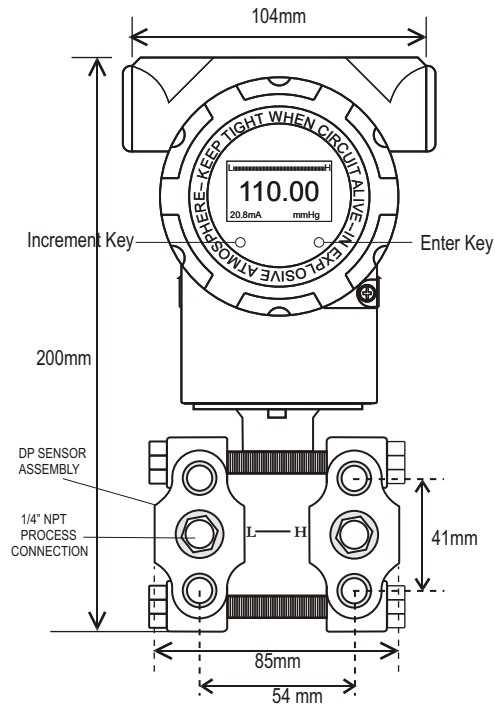


Fig 1 Front View(DP)

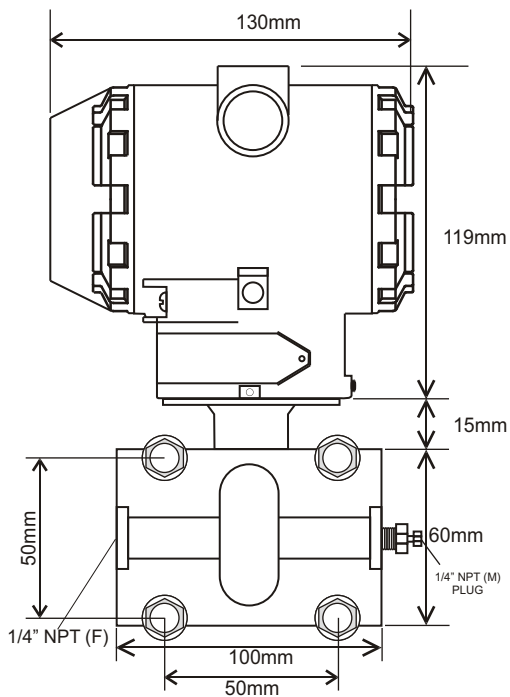


Fig 2 Side View (DP)

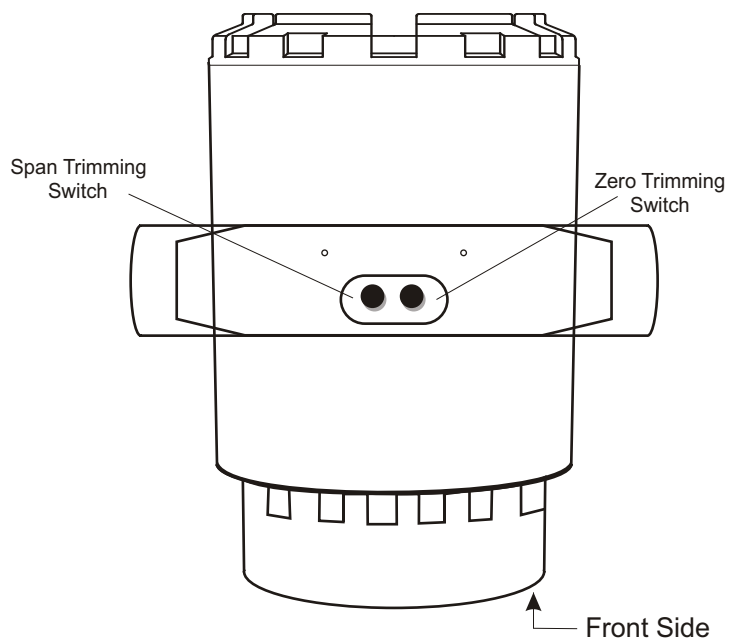


Fig 3 Top View(DP)
(Top Plate Removed)

NOTE : ALL DIMENSIONS ARE IN MM.

3. TERMINATION DETAILS

3.1 Field Termination View :-

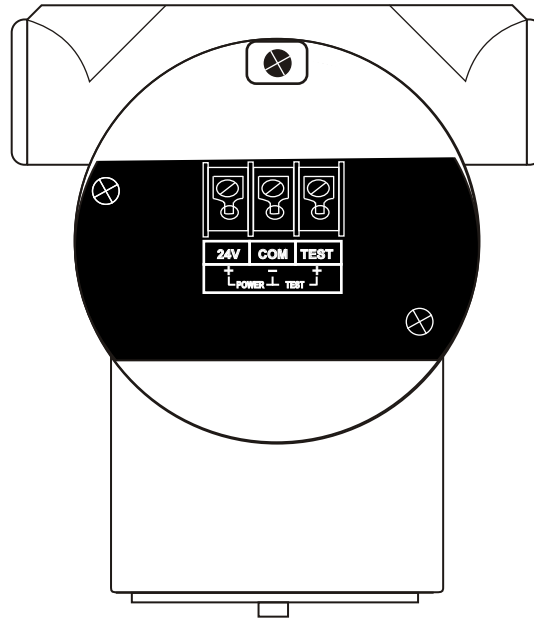
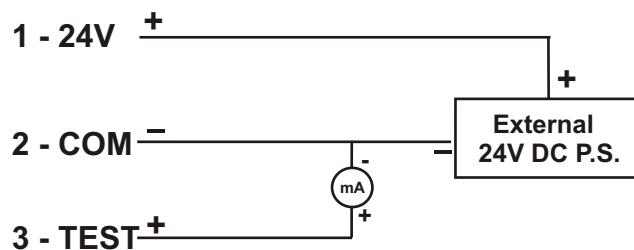


Fig.3 Rear View

3.2 Loop Diagram :-



3.3 Key Details :-



INCREMENT KEY: - This key is used to 1) Increment the digit from 0 to 9, by one at each time.
2) Go to the next parameter in Program mode.



ENTER/PROGRAMING KEY: - This key is used to 1) Go to Program mode
2) Shift the cursor to next digit in program mode.
3) To validate or save the parameter in program mode.



ZERO KEY: - This key is used to
1) Press this key for 2 sec. to come out of sub menu to higher menu.
2) To increment the value or to go to next parameter
3) In Run mode press this key for 1 sec. to change the pressure unit.



SPAN KEY: - This key is used to
1) Go to Program mode
2) Shift the cursor to next digit.
3) To validate or save the parameter value.

4. INSTALLATION

4.1 Safety Warnings :

1. Procedures & Instructions in this section may require Special Precautions to ensure the safety of the personnel performing the operation.
2. Process leaks may cause harm or result in death.
3. Install & tighten process connectors before applying pressure.
4. Do not attempt to loosen or remove flange bolts while the transmitter is in service.
5. Electrical shock can result in death or serious injury.
6. Avoid contact with the leads & terminals.
7. High voltage that may be present on leads can cause electrical shock.
8. Improper assembly of manifolds to traditional flange can damage Sensor Module.

4.2 General Considerations :

1. Measurement accuracy depends upon proper installation of the transmitter and impulse piping Mount the transmitter close to the process & use a minimum of piping to achieve best accuracy.
2. Also, consider the need for easy access, personnel safety, practical field calibration, & a suitable transmitter environment.
3. Install all the transmitter to minimize vibration, shock, & temperature fluctuation.

4.3 Mechanical Considerations :

1. For steam service or for applications with process temperatures greater than the limits of the transmitter, do not blow down impulse piping through the transmitter.
2. Flush lines with the blocking valves closed and refill lines with water before resuming measurement.
3. When the transmitter is mounted on its side, position the flange to ensure proper venting or draining.
4. Mount the flange as shown in Figure on page 9, keeping drain/vent connections on the bottom for gas service and on the top for liquid service.

4.4 Mounting Details

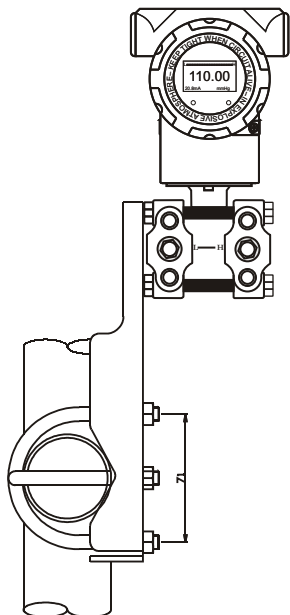


Fig.5 2" Pipe Mounting Front View

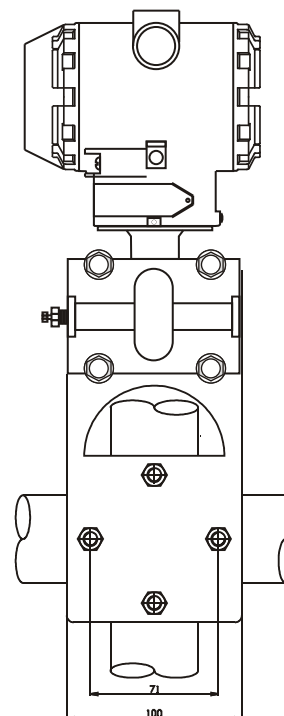


Fig.6 2" Pipe Mounting Side View

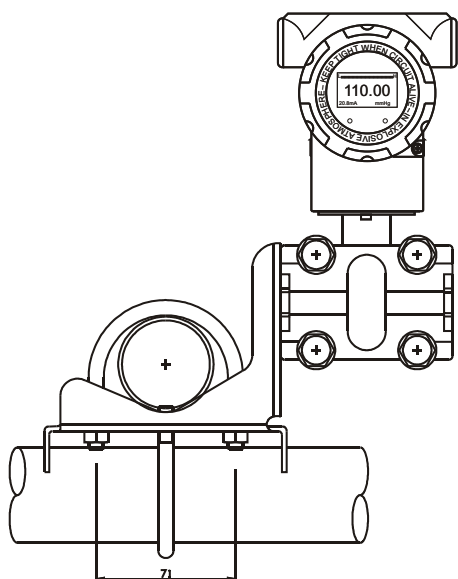


Fig.7 'U' Clamp Mounting Front View

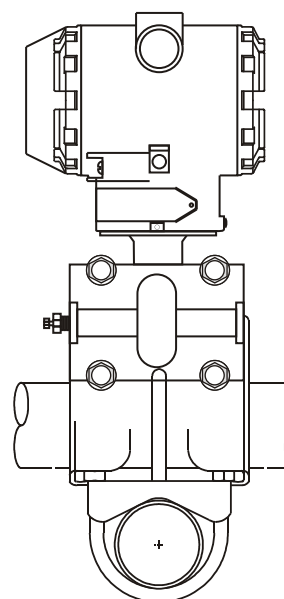


Fig.7 'U' Clamp Mounting Side View

4.5 Mount The Transmitter

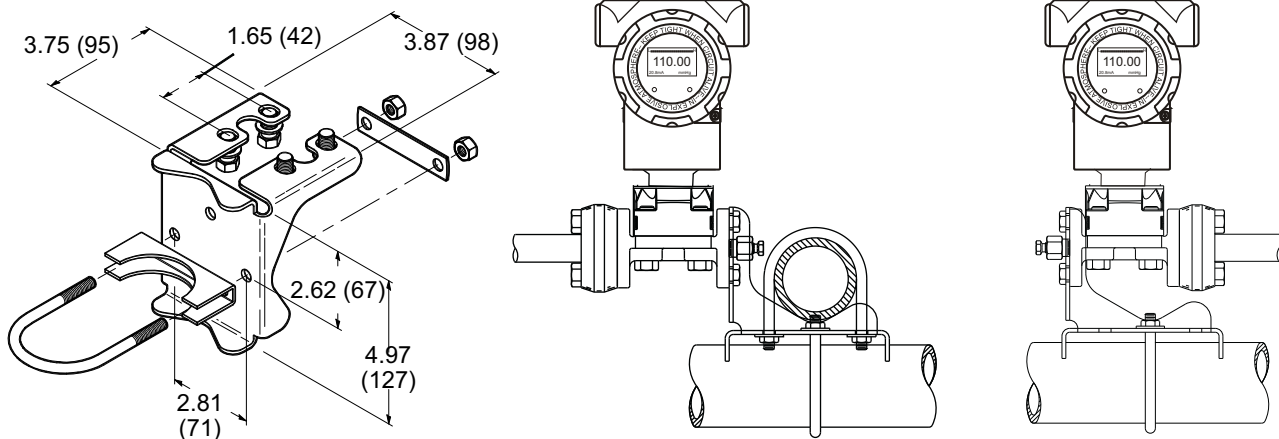
4.5.1 Process Flange Orientation

1. Mount the process flanges with sufficient clearance for process connections.
2. For safety reasons, place the drain / vent valves so the process fluid is directed away from possible human contact when the vents are used.
3. In addition, Consider the accessibility for a testing or calibration input.
4. Most Transmitters are calibrated in the horizontal position.
5. Mounting the transmitter in any other position will shift the zero point to the equivalent amount of the liquid head pressure caused by the varied mounting position.

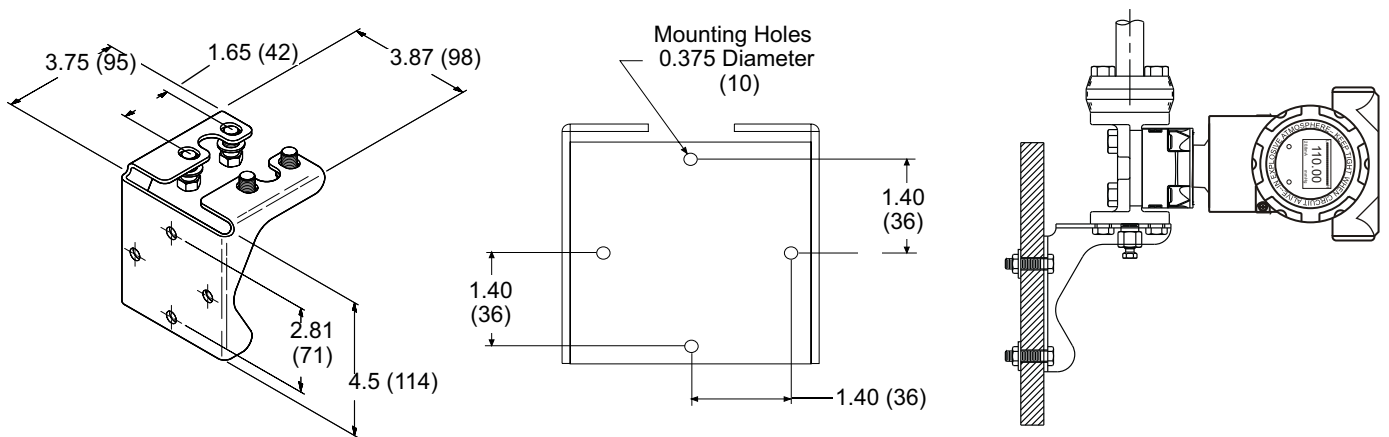
4.5.2 Mounting Bracket

Transmitter may be panel mounted or pipe mounted through an optional mounting bracket.

1. Pipe Mounting detail Drawing :



2. Panel Mounting detail Drawing :



Mounting Bracket dimensional drawing with panel mounting

4.6 Impulse Piping :

1. The piping between the process and the transmitter must accurately transfer the pressure to obtain accurate measurements.
2. There are six possible sources of impulse piping error : pressure transfer, leaks, friction loss (particularly if purging is used), tapped gas in a liquid line, liquid in a gas line & density variations between the legs.

3. Guidelines for Impulse Piping :

- a. Keep Impulse piping as short as possible.
- B. For liquid service, slope the impulse piping at least 1 in./foot (8 cm/m) upward from the transmitter towards the process connection.
- c. For the Gas service, slope the impulse piping at least 1 in./foot (8 cm/m) downward from the transmitter towards the process connection.
- d. Avoid the high points in the liquid lines & low points in the gas line.
- e. Make sure both impulse legs are at the same temperature.
- f. Use impulse piping large enough to avoid friction effects & blockage
- g. Vent all the gas from liquid piping legs.
- H. When using a sealing fluid, fill both piping legs to the same level.
- I. When purging, make the purge connection close to the process taps & purge through equal lengths of the same size pipes.
- j. Avoid purging through the transmitters.
- k. Keep corrosive or hot (above 250° F (121° C)) process material out of direct contact with the sensor module & flanges.
- l. Prevent sediment deposits in the impulse piping.
- m. Maintain equal leg of head pressure on both legs of the impulse piping.
- n. Avoid conditions that might allow process fluid to freeze within the process flange.

4.7 Mounting Requirements

Impulse piping configurations depend on specific measurement conditions. Refer to Figure for examples of the following mounting configurations:

4.7.1 Liquid Flow Measurement

1. Place taps to the side of the line to prevent sediment deposits on the Process isolators.
2. Mount the transmitter beside or below the taps so gases vent into the process line.
3. Mount drain/vent valve upward to allow gases to vent.

4.7.2 Gas Flow Measurement

1. Place taps in the top or side of the line.
2. Mount the transmitter beside or above the taps so to drain liquid into the process line.

4.7.3 Steam Flow Measurement

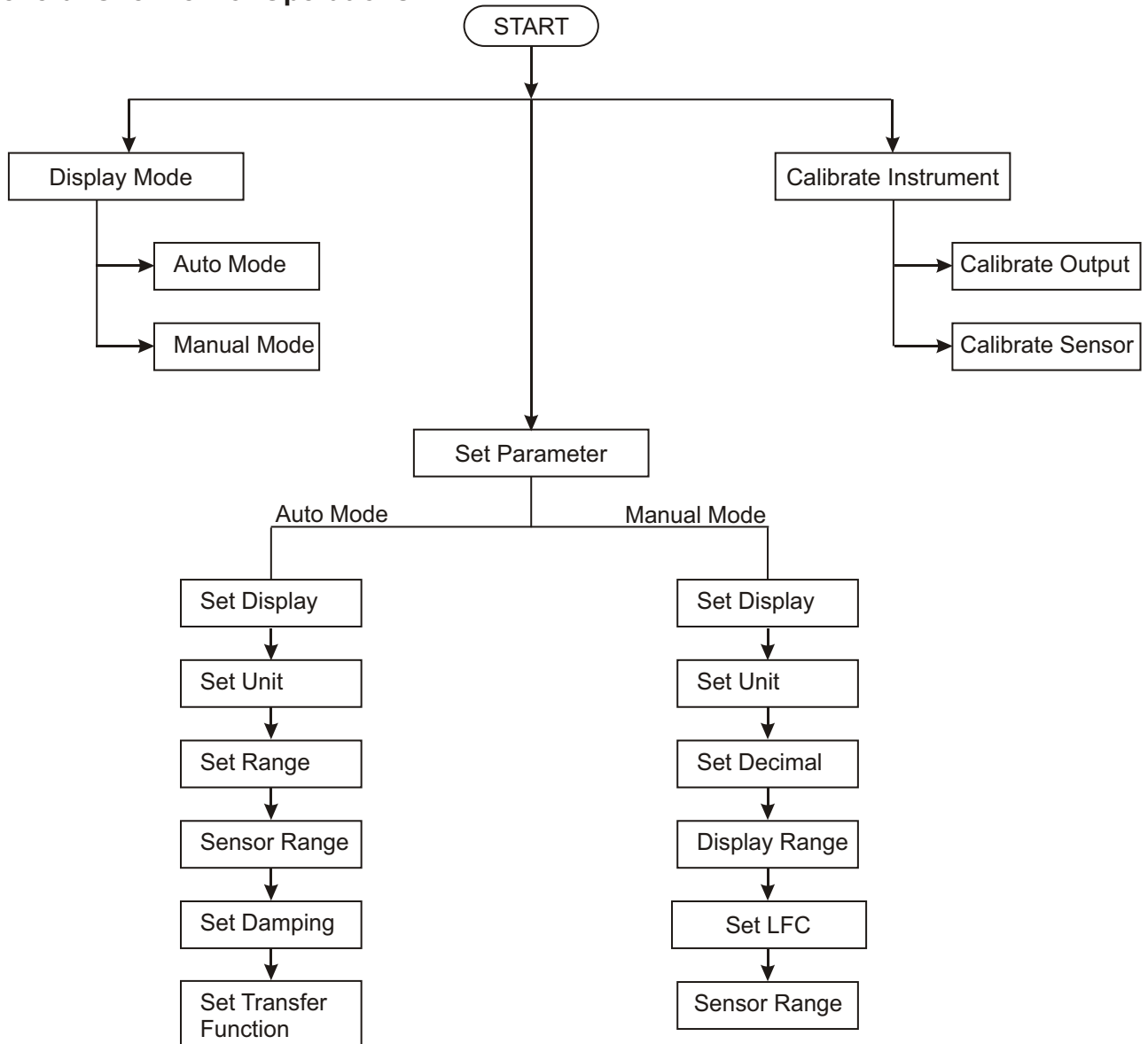
1. Place taps to the side of the line.
2. Mount the transmitter below the taps to ensure that impulse piping will remain filled with condensate.
3. In steam service above 250 °F (121 °C), fill impulse lines with water to prevent steam from contacting the transmitter directly and to ensure accurate measurement start-up.

NOTE:-

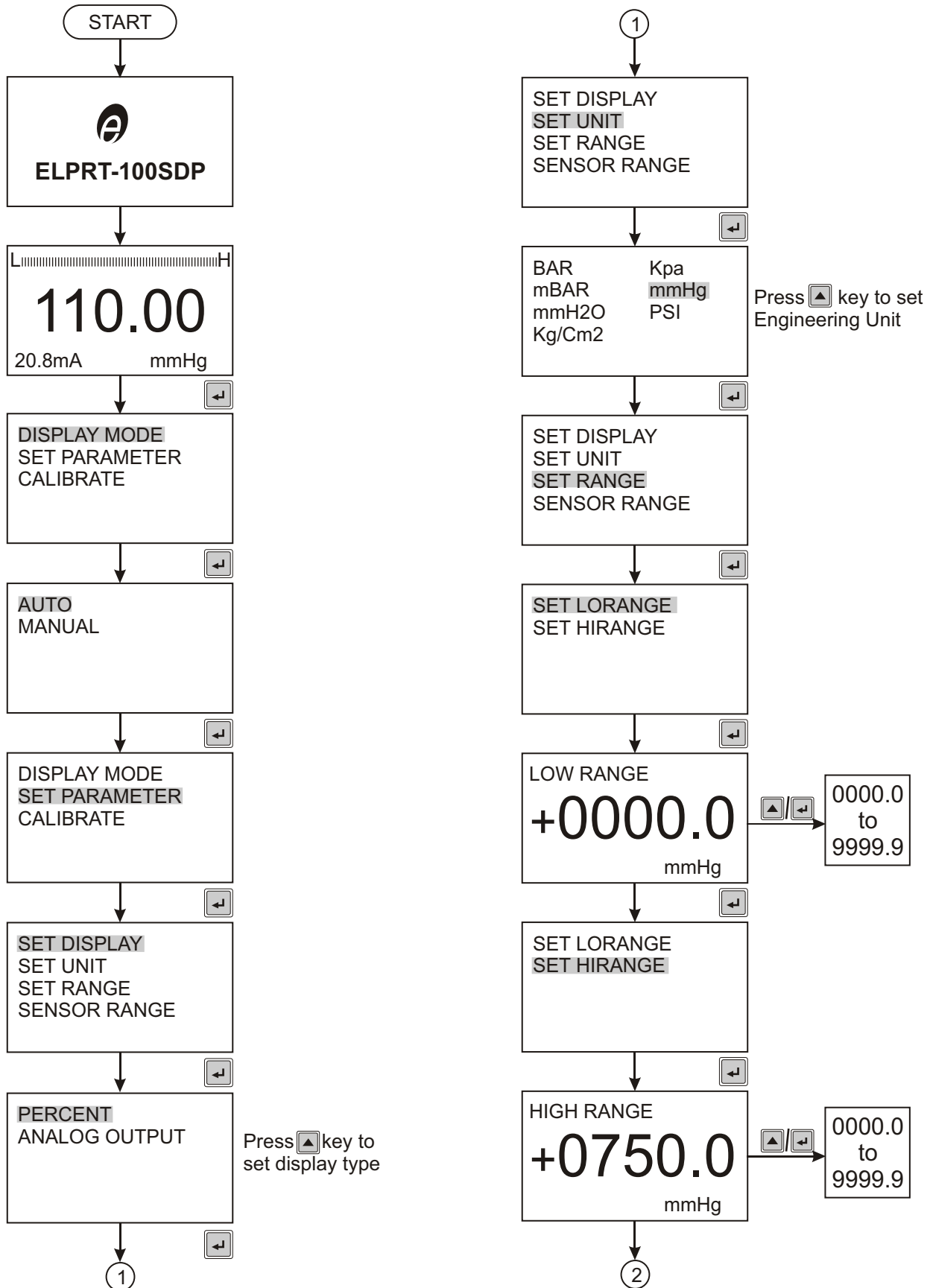
For steam or other elevated temperature services, it is important that temperatures at the process connection do not exceed the transmitter's process temperature limits.

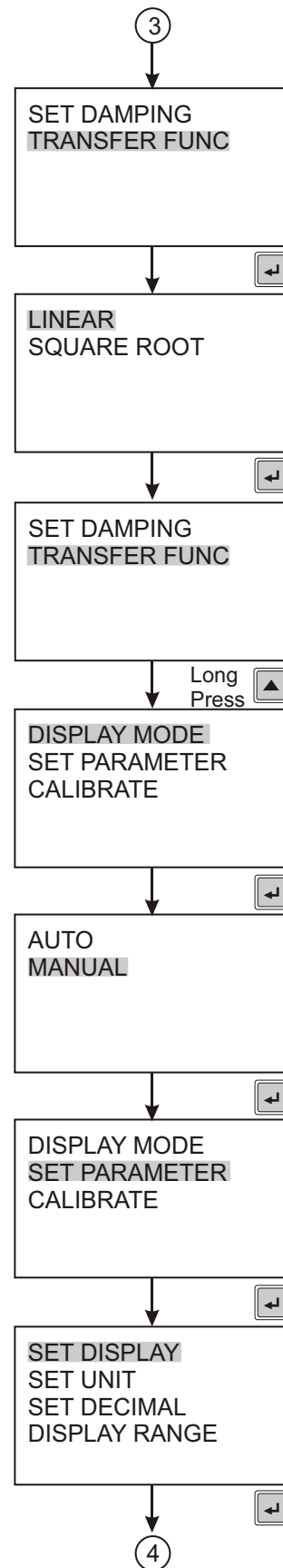
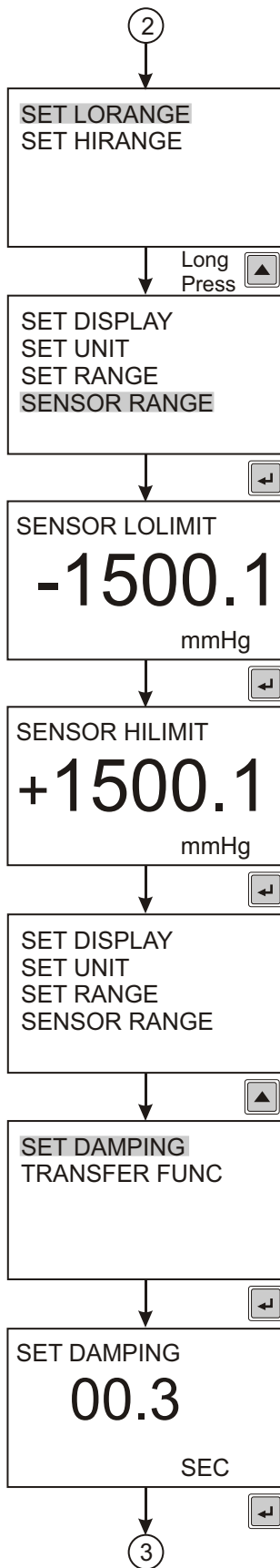
5. FLOW CHARTS

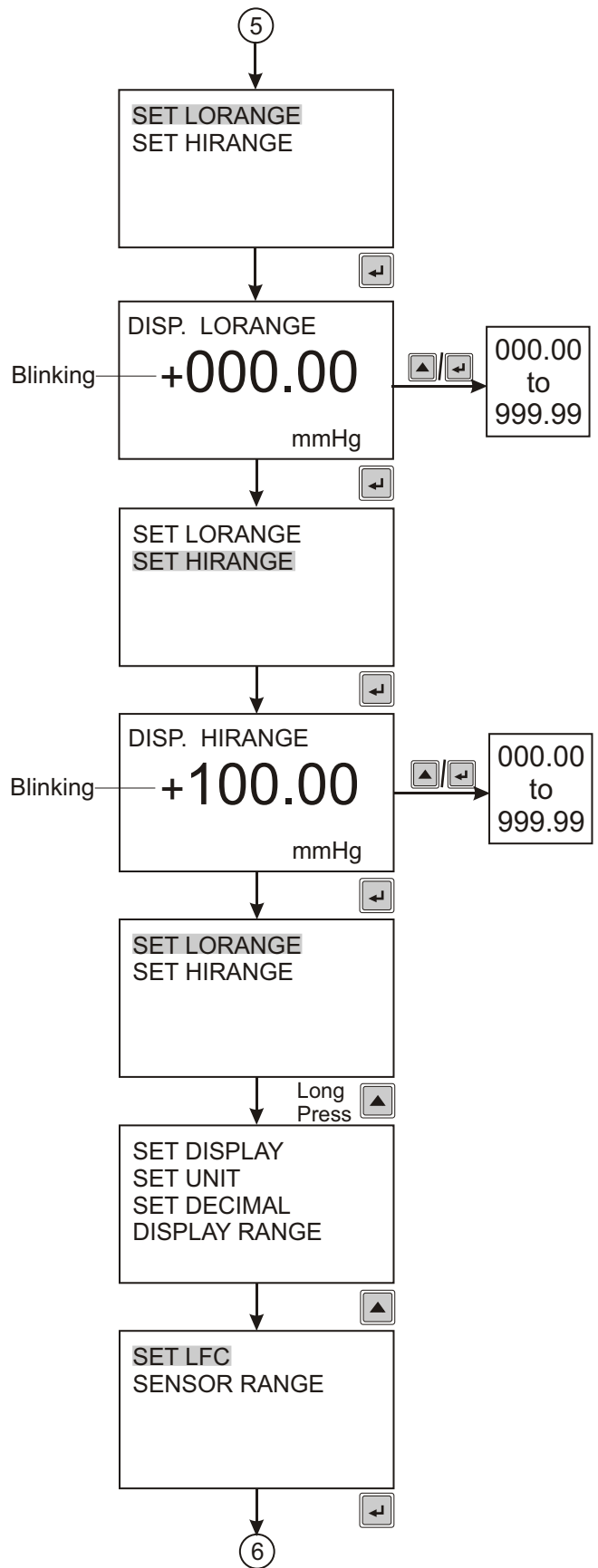
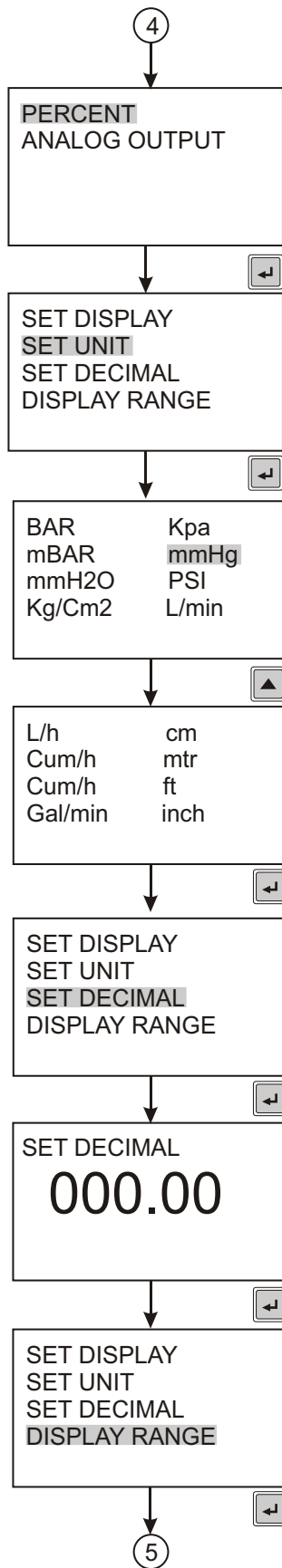
5.1 General Overview of Operations :

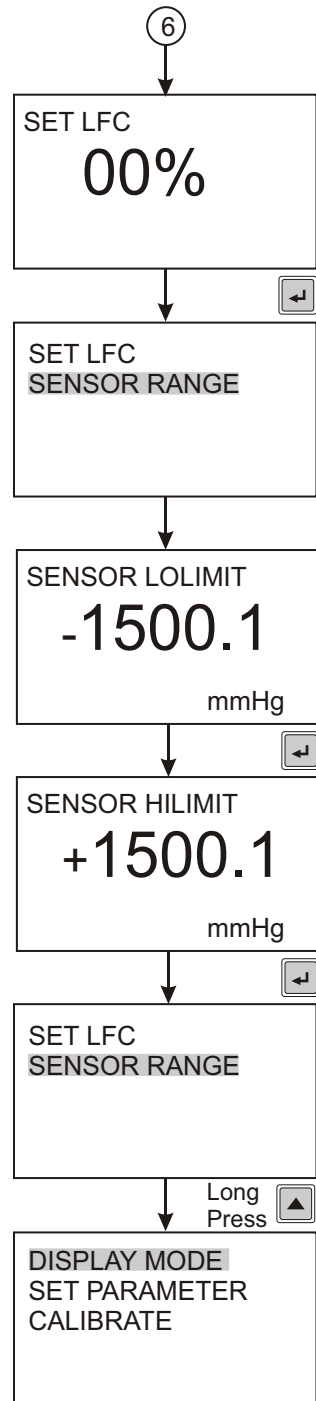


5.2 Parameter Mode :

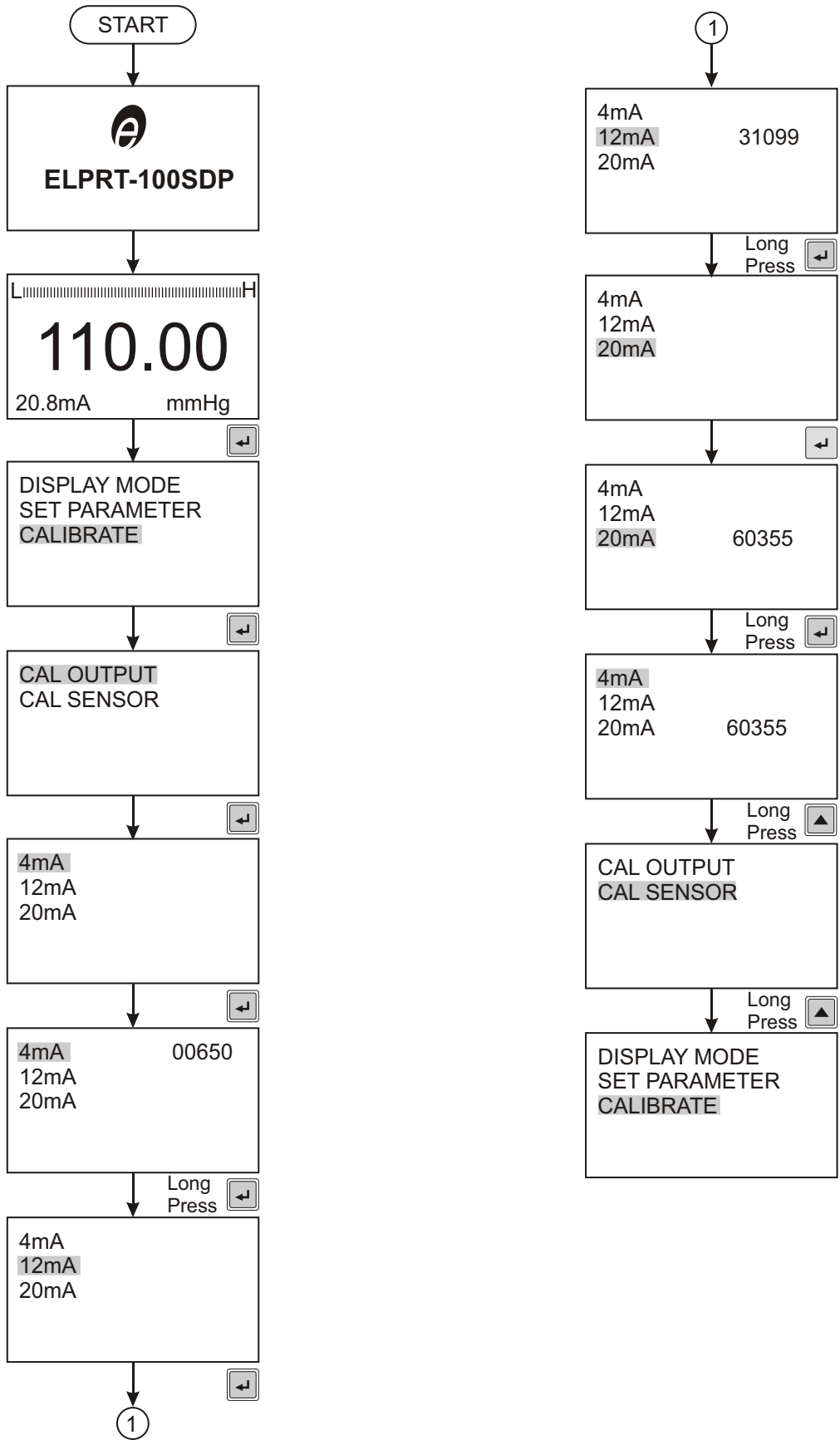








5.3 Calibration Mode :



6. CALIBRATION & DISPLAY MODE OPERATING PROCEDURE

6.1 4-20mA Current Calibration Procedure:

- 1) Enter into Output Calibration Menu.
- 2) Now select "4mA" by pressing enter key.
- 3) Adjust DAC counts to get 4mA on reference current meter.
- 4) Long press Increment key to increment counts rapidly.
- 5) Long press Enter key to decrement counts rapidly.
- 6) Hold Enter key for 6 seconds to Enter DAC count.
- 7) Repeat same procedure for 12mA and 20mA points.
- 8) To exit from output calibration mode, after entering DAC counts of any point (4mA or 12mA or 20mA) Long press increment key till instrument returns to Back Menu.

6.2 Display Procedure:

1.Auto Mode:

In Auto mode, the display shows input pressure directly on display. Input pressure is converted into selected unit and displayed. The selected transfer function is applied to output current. The decimal point position is auto in this mode.

2.Manual Mode:

In Manual mode, the display swings between entered display high range and display low range. There is no auto conversion of input pressure and selected unit. The selected unit for manual mode is displayed on display. When input pressure equals 4mA(Low Range Value) point, the display shows entered Display low range and when input pressure equals 20mA(High Range Value) point, the display shows entered Display low range. In between these two points display swings linear or Square root depending on setting of display transfer function. If input is less than entered LFC value, Display will show zero value only.

7. TROUBLE SHOOTING PROCEDURE

Failure	Possible cause	Procedure
No display indication.	<ol style="list-style-type: none"> 1. Absence of power supply at terminal block. 2. Loose connection on terminations. 3. Power Supply connected with reversed polarity. 4. Wrong power supply connections 	<ol style="list-style-type: none"> 1. Check for power supply & rectify the fault. 2. Tight the termination connections. 3. Check for polarity of power supply & rectify the fault. 4. Do proper supply connections refer termination details
Incorrect display indication.	<ol style="list-style-type: none"> 1. Loose connection on termination. 2. Incorrect calibration. 	<ol style="list-style-type: none"> 1. Tight the termination connection. 2. Recalibrate the instrument. Refer calibration procedure.
No output signal	Cable break No/incorrect voltage supply or current spike	Check connections and cable Check the supply voltage.
No/False output signal	Incorrectly wired.	Follow pin assignment (see instrument Label / operating instructions).
Output signal unchanged after change in pressure	Mechanical overload through overpressure.	Replace instrument; if failure reoccurs, consult the manufacture.
Signal span dropping off/too small	<p>Mechanical overload through overpressure</p> <p>Diaphragm is damaged, e.g. Through impact, abrasive/ aggressive media; corrosion of diaphragm/pressure connector; transmission fluid missing.</p> <p>Seal/Sealing face damaged / contaminated, seal mounted incorrectly, threads crossed.</p>	<p>Replace instrument; if failure reoccurs, consult the manufacture.</p> <p>Contact the manufacturer and replace the instrument.</p> <p>Clean the seal/sealing face, possibly replace the seal</p>
Signal span erratic / incorrect	<p>Working temperature too high / too low</p> <p>Violent fluctuations in the process media pressure.</p>	<p>Ensure permissible temperatures as per the operating instructions.</p> <p>Clean the seal/sealing face, possibly replace the seal</p>
Abnormal zero point signal.	<p>Working temperature too high/ too low.</p> <p>Abnormal mounting position.</p> <p>Overload limits exceeded.</p>	<p>Ensure permissible temperatures as per the operating instructions.</p> <p>Correct the zero point through the potentiometer, control panel or software.</p> <p>Ensure permissible overload limits are observe.</p>

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