SAPCON

## Loss of Head Indicator

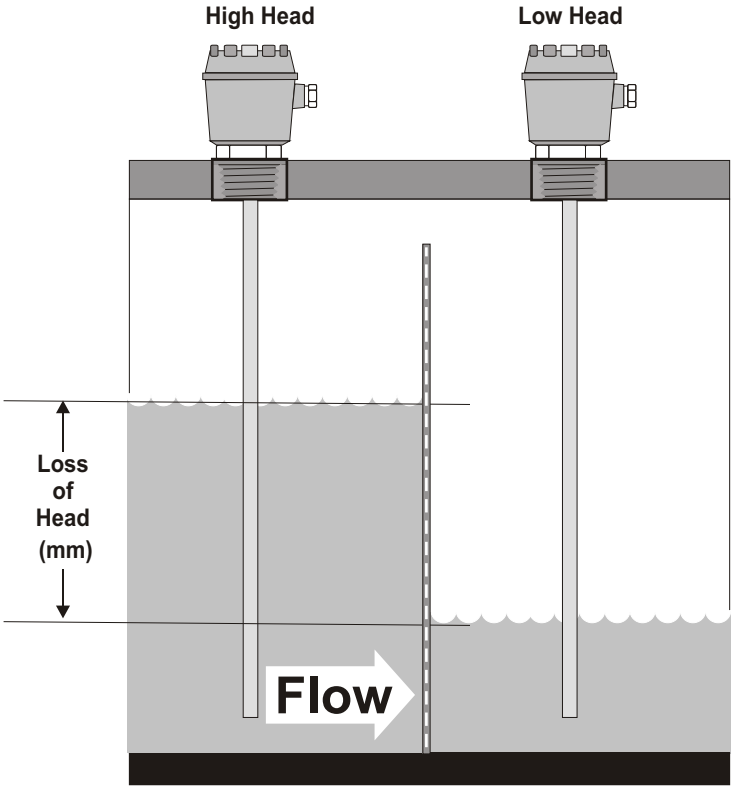
# MPLOH

**User's Manual**

. Connection Diagrams

. Quick Calibration Chart

. Quick Relay Configuration Chart

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## Introduction:

'Sapcon MPLOH' series instruments are RISC Processor based Quasi Differential Capacitance type Continuous Differential Level Indicators with built in Switching functions. The instrument is suitable for measuring the Loss of Head in Water Canals.

MPLOH is capable of displaying either Difference of Heads (LOH), High Head and Low Head in mili-meters as well as one of the head or LOH can be associated with 4-20mA loop. The 4-20mA Loop associated will then be available to be read as Percentage and also as absolute mm.
The two relays can be configured to either of the head / LOH as single point of pump control, thereby enabling six combinations of switching in both relays independent of eachother.

## Features:

* Latest RISC Core Microcontroller Technology.
* Heads and Difference are measured in milimeters from -400mm to 1500mm -50.0% to +150.0% is also provided for 4-20mA associated Head / Difference.
* Multipurpose 5 digit Seven Segment LED Display for best resolution and better viewing from distance.
* Two wire Pulse Coded Digital Communication enabling two sensors to be connected on same pair of wires to the evaluation unit.
  Supporting as much as 1 KM distance between Sensor and Evaluation Unit with shielded two core cables.
* Two Independent Potential Free relays, providing flexibility of selecting six combinations of switching..
* Galvanically Isolated True Two Wire 4-20mA Proportional to 0.0% and 100.0% level is available for remote indication purposes.
* Two wire implementation solves the malfunction problems that occurs with various PLC 4-20 input interfaces and thus better suits for higher end automation.
* 4-20mA Loop can handle 700 Ohm Loop Resistance with Internal Isolated Supply.
  The loop resistance can be 1K Ohm for External DC Supply of 24 Volts.

## Principle of Operation:

The capacitance formed by the sensing probe and the water is measured which is directly proportional to the level of water known as Head. By measuring heads at two points called High Head and Low Head a Difference can be calculated. This Difference is Loss of Head.

MPLOH measures the heads in mm and thus a calibration at site might be required. The two sensors digitally send their level values of head heights in digital format over the same set of wires, a shielded cable should be used to assure flawless operation.

**Evaluation Unit:**

| | |
|---|---|
| **Housing** | Cast Aluminum, Weather Proof, Stoving Enamel Painted.<br>Suitable for Back Panel / Wall Mounting. |
| **Cable Entries** | 3 Numbers of $\frac{1}{2}$" / $\frac{3}{4}$" BSP/NPT/ Double Compression. |
| **Operating Ambient Temperature** | -20 °C to +60 °C |
| **Power Supply** | Universal Mains 90 to 265 VAC, 50/60Hz (@ 2.9 VA) |
| **Sensor to Evaluation Unit Cable** | 2-Core; Resistance per core not to exceed 30 Ohms.<br>Use of Shielded Twisted Pair Cables is recommended for long runs of cable. Cable Lengths of 1000 Meters are thus supported with Grounded Cable Shields. |
| **Zero% Range** | 30pf to 150pf |
| **100% Range** | 10pf to 1800 pf (Difference from Zero%) |
| **Outputs** | Current 4 to 20mA. RL max = 700 Ohm using internal Isolated Supply.<br>RL max = 1K Ohm for external loop supply of 24VDC.<br><br>3 Potential Free relays with One set of Potential Free Change Over Contact per Relay.<br><br>Contact Ratings : 6 Amp @ 230VAC 50/60 Hz for non-inductive loads. |
| **Indication** | Continuous:<br>High Head, Low Head and Difference : -400 to 1500mm<br>4-20mA associated head/difference : -50% to 150%<br>digitally on Seven Segment Display<br>Switching: 5 mm Red LEDs' for Alarm Indication. |
| **Switching Hysterisis** | 10mm in Single Point Switching, 10 to 1490mm in Pump Control. |
| **Fail Safe Select<br>Set Point Select** | Field Selectable thru Interactive Relay Configuration Menu. |
| **Dimensions** | Refer Enclosed Drawings |
| **Weight** | 2.3 Kg Approx. |

**Electronic Insert - LDC117, LCDM 111: (High Head and Low Head both)**

| | |
|---|---|
| **Housing** | Plastic, potted with epoxy resin. |
| **Power Supply** | 16VDC @ 5mA derived from Sensor Communication Interface of Evaluation Unit. |
| **Measuring Frequency** | 250Khz to 100Khz. Reverse Frequency Measurement. |
| **Operating Ambient Temperature** | -20 °C to +60 °C |
| **Sensitivity** | 10 counts per pF |
| **Output** | Digitally Encoded Current (8mA-16mA) Pulse. |

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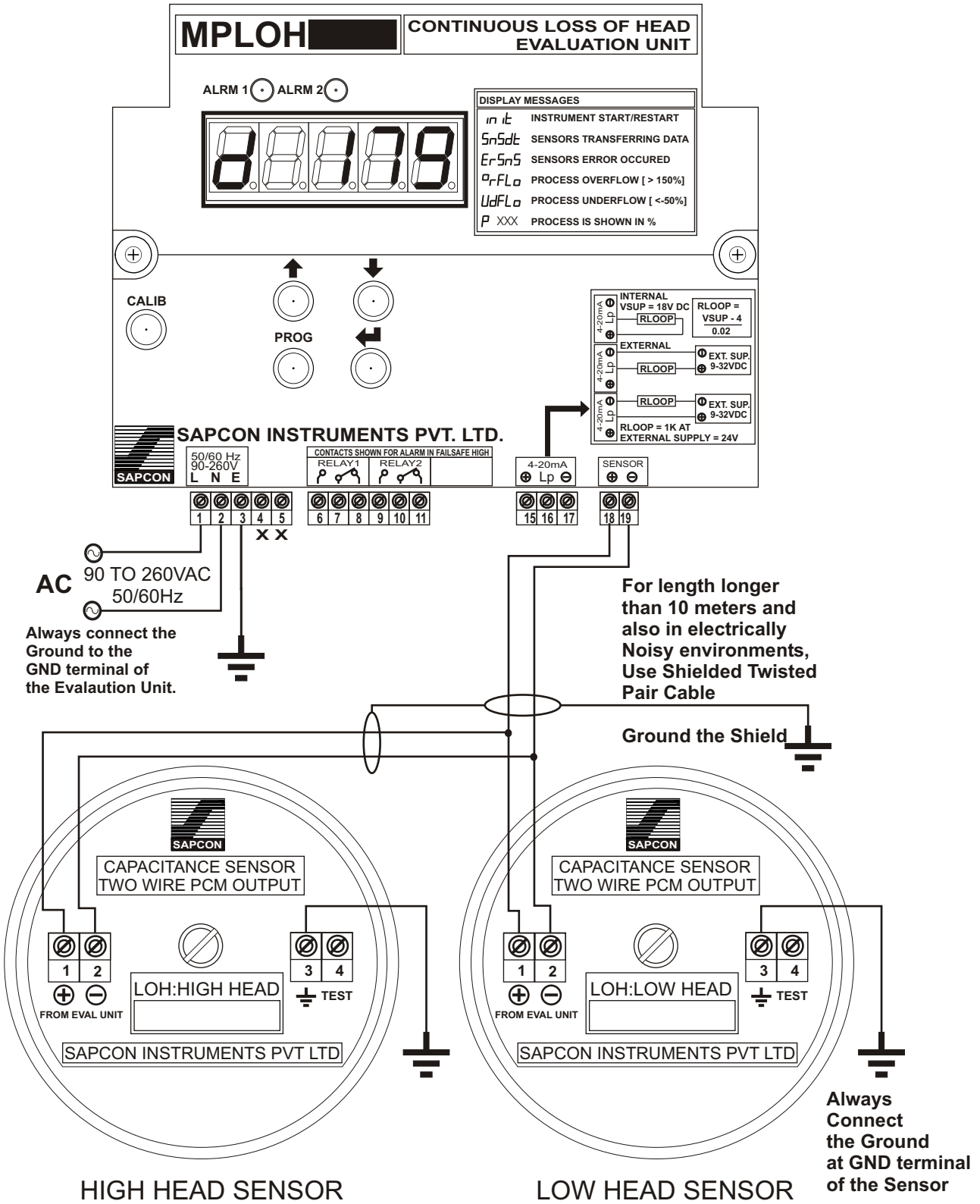
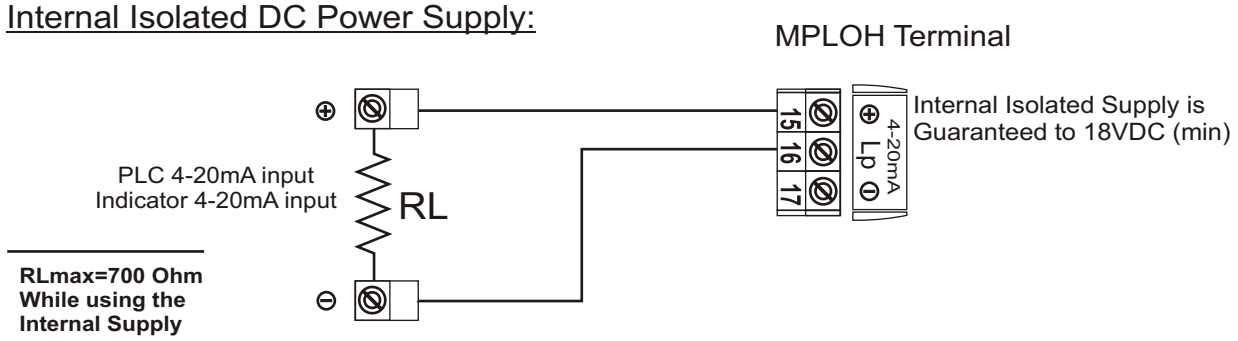
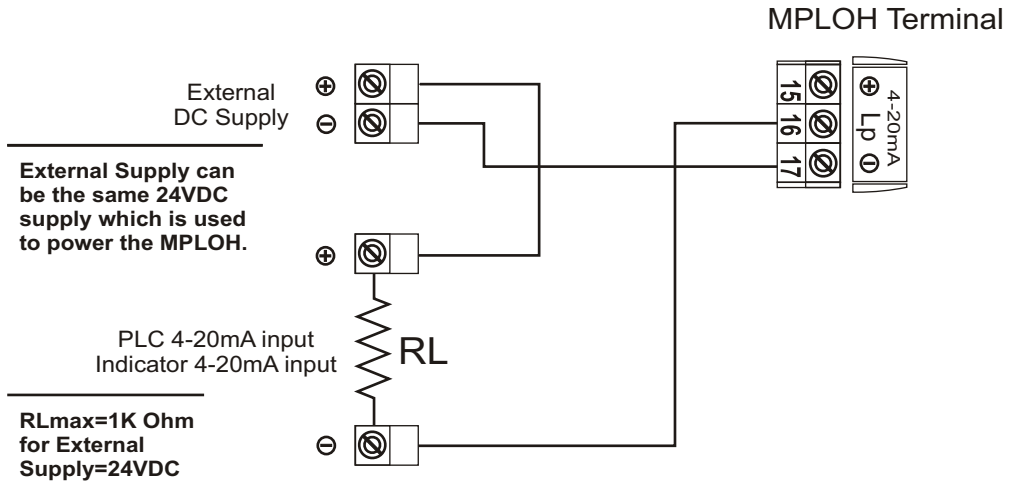

MPLOH
CONTINUOUS LOSS OF HEAD EVALUATION UNIT
ALRM 1
ALRM 2
DISPLAY MESSAGES
INSTRUMENT START/RESTART
SENSORS TRANSFERRING DATA
SENSORS ERROR OCCURED
PROCESS OVERFLOW [ > 150%]
PROCESS UNDERFLOW [ <-50%]
PROCESS IS SHOWN IN %
CALIB
PROG
INTERNAL
VSUP = 18V DC
RLOOP
RLOOP = VSUP - 4 / 0.02
EXTERNAL
EXT. SUP. 9-32VDC
RLOOP = 1K AT EXTERNAL SUPPLY = 24V
SAPCON INSTRUMENTS PVT. LTD.
50/60 Hz 90-260V L N E
CONTACTS SHOWN FOR ALARM IN FAILSAFE HIGH
RELAY1
RELAY2
4-20mA Lp
SENSOR
1 2 3 4 5 6 7 8 9 10 11 15 16 17 18 19
AC 90 TO 260VAC 50/60Hz
Always connect the Ground to the GND terminal of the Evalaution Unit.
For length longer than 10 meters and also in electrically Noisy environments, Use Shielded Twisted Pair Cable
Ground the Shield
CAPACITANCE SENSOR TWO WIRE PCM OUTPUT
FROM EVAL UNIT
LOH:HIGH HEAD
TEST
SAPCON INSTRUMENTS PVT LTD
LOH:LOW HEAD
Always Connect the Ground at GND terminal of the Sensor
HIGH HEAD SENSOR
LOW HEAD SENSOR

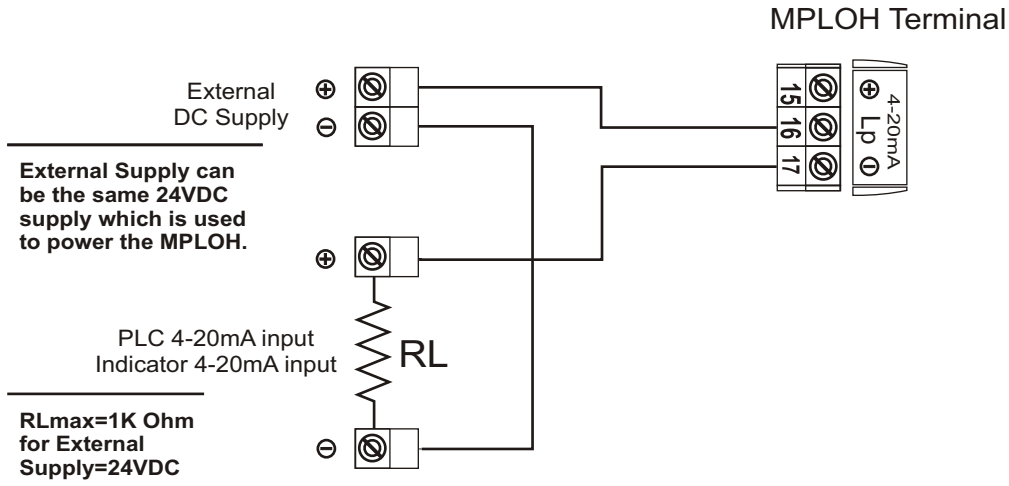
## Internal Isolated DC Power Supply:



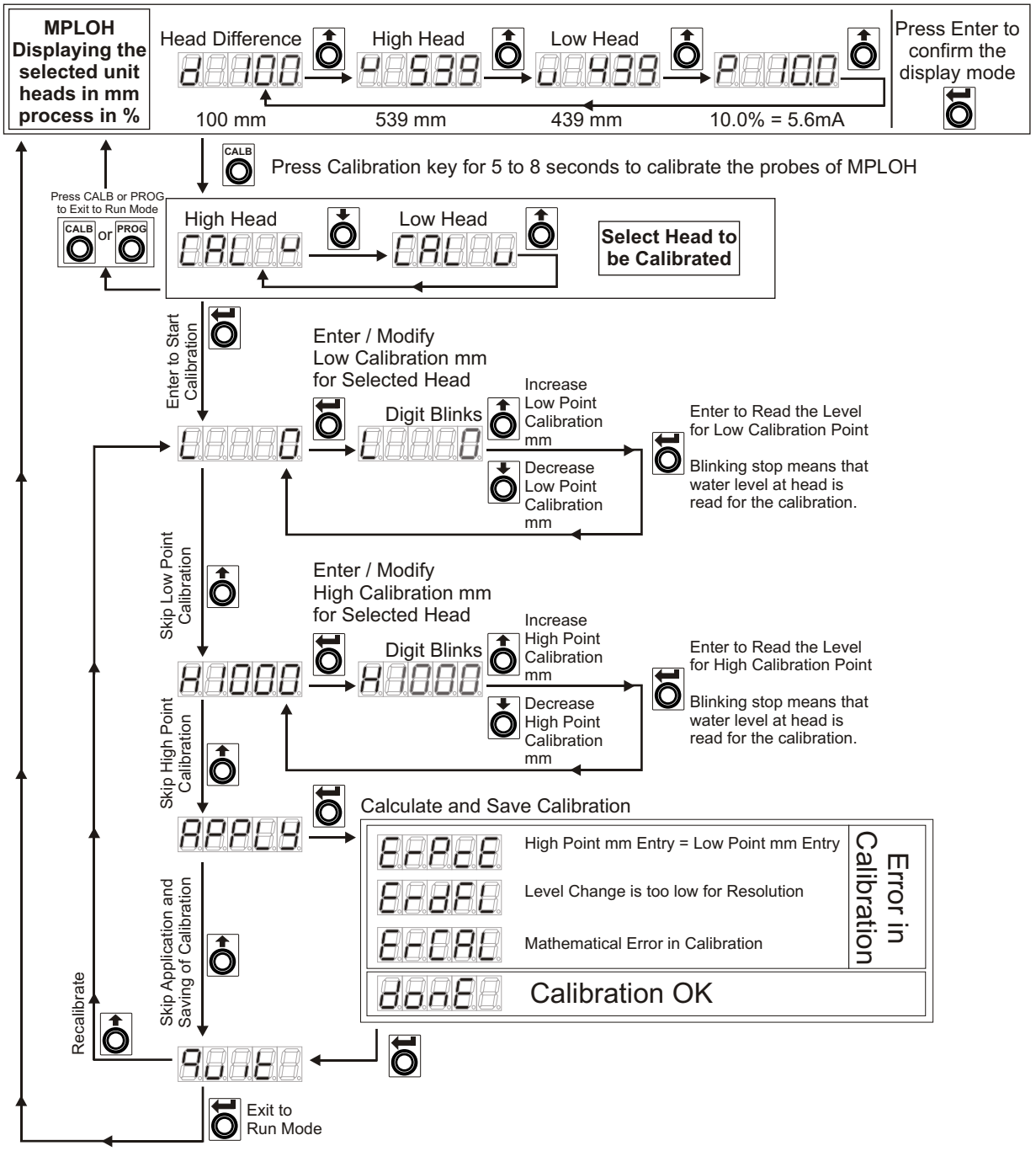

## External DC Power Supply (RL to Lp):

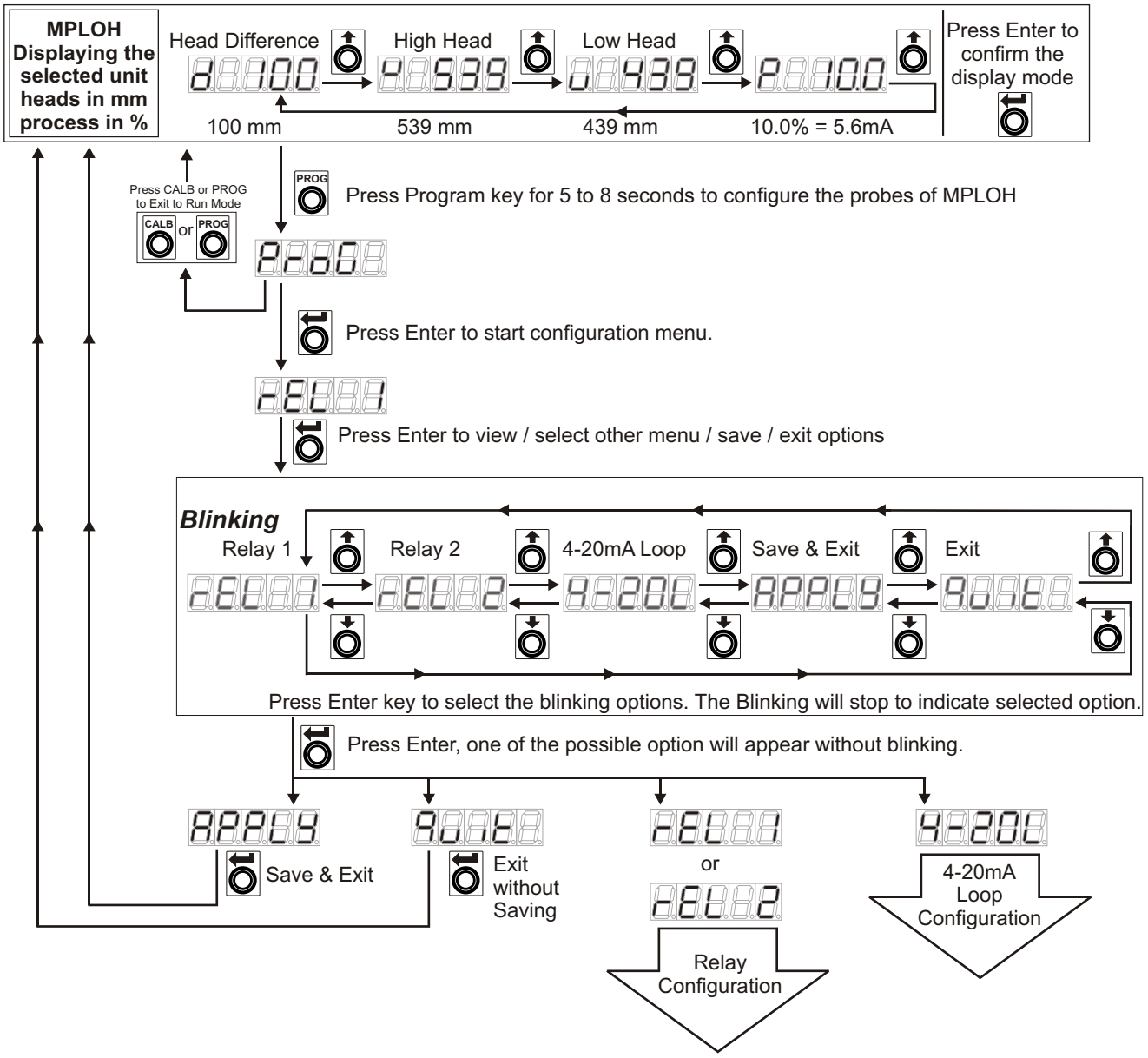


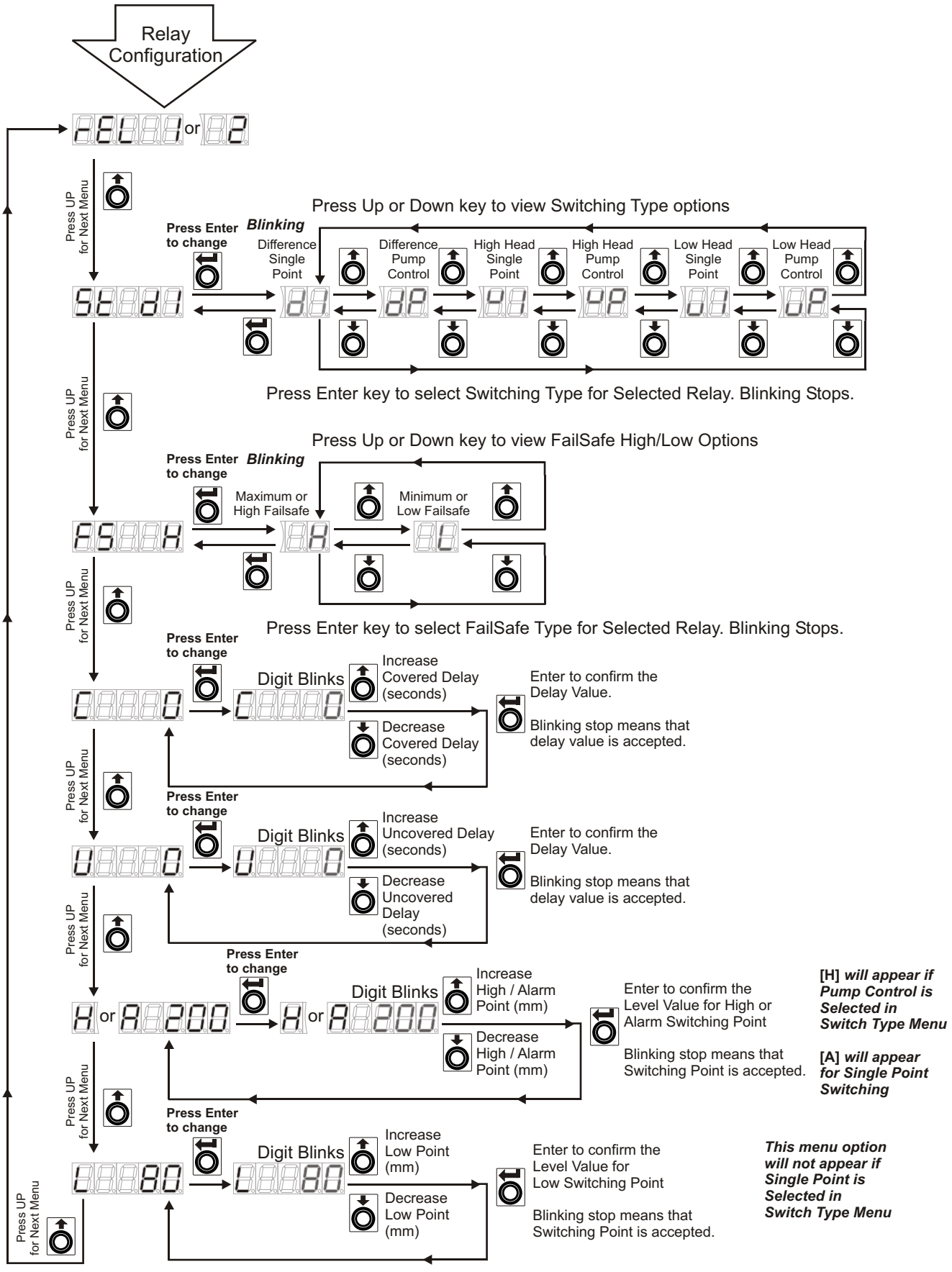

## External DC Power Supply (RL to Negative):

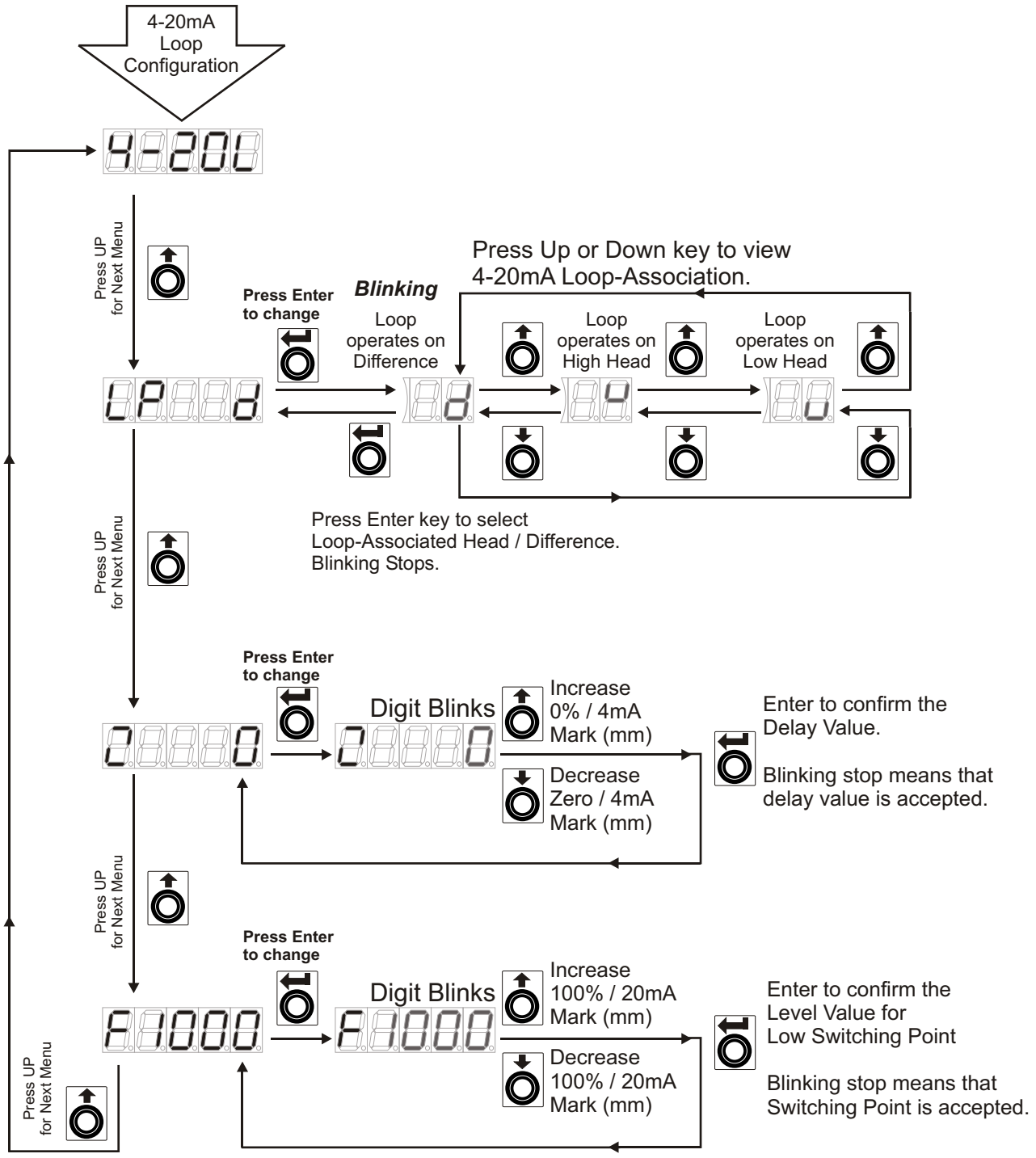



**Loop Resistance = ( Loop Supply Voltage – 4) ÷ 0.02 (Ohm)**


MPLOH Displaying the selected unit heads in mm process in %
Head Difference
High Head
Low Head
100 mm
539 mm
439 mm
10.0% = 5.6mA
Press Enter to confirm the display mode
CALB
Press Calibration key for 5 to 8 seconds to calibrate the probes of MPLOH
Press CALB or PROG to Exit to Run Mode
CALB or PROG
High Head
Low Head
Select Head to be Calibrated
Enter to Start Calibration
Enter / Modify Low Calibration mm for Selected Head
Digit Blinks
Increase Low Point Calibration mm
Decrease Low Point Calibration mm
Enter to Read the Level for Low Calibration Point
Blinking stop means that water level at head is read for the calibration.
Skip Low Point Calibration
Enter / Modify High Calibration mm for Selected Head
Digit Blinks
Increase High Point Calibration mm
Decrease High Point Calibration mm
Enter to Read the Level for High Calibration Point
Blinking stop means that water level at head is read for the calibration.
Skip High Point Calibration
Calculate and Save Calibration
High Point mm Entry = Low Point mm Entry
Level Change is too low for Resolution
Mathematical Error in Calibration
Error in Calibration
Calibration OK
Skip Application and Saving of Calibration
Recalibrate
Exit to Run Mode


MPLOH Displaying the selected unit heads in mm process in %
Head Difference
High Head
Low Head
100 mm
539 mm
439 mm
10.0% = 5.6mA
Press Enter to confirm the display mode
Press CALB or PROG to Exit to Run Mode
CALB
or
PROG
Press Program key for 5 to 8 seconds to configure the probes of MPLOH
Press Enter to start configuration menu.
Press Enter to view / select other menu / save / exit options
Blinking
Relay 1
Relay 2
4-20mA Loop
Save & Exit
Exit
Press Enter key to select the blinking options. The Blinking will stop to indicate selected option.
Press Enter, one of the possible option will appear without blinking.
Save & Exit
Exit without Saving
or
Relay Configuration
4-20mA Loop Configuration


Relay Configuration
or
Press UP for Next Menu
Press Up or Down key to view Switching Type options
Press Enter to change
Blinking
Difference Single Point
Difference Pump Control
High Head Single Point
High Head Pump Control
Low Head Single Point
Low Head Pump Control
Press Enter key to select Switching Type for Selected Relay. Blinking Stops.
Press Up or Down key to view FailSafe High/Low Options
Maximum or High Failsafe
Minimum or Low Failsafe
Press Enter key to select FailSafe Type for Selected Relay. Blinking Stops.
Digit Blinks
Increase Covered Delay (seconds)
Decrease Covered Delay (seconds)
Enter to confirm the Delay Value.
Blinking stop means that delay value is accepted.
Increase Uncovered Delay (seconds)
Decrease Uncovered Delay (seconds)
Increase High / Alarm Point (mm)
Decrease High / Alarm Point (mm)
Enter to confirm the Level Value for High or Alarm Switching Point
Blinking stop means that Switching Point is accepted.
[H] will appear if Pump Control is Selected in Switch Type Menu
[A] will appear for Single Point Switching
Increase Low Point (mm)
Decrease Low Point (mm)
Enter to confirm the Level Value for Low Switching Point
Blinking stop means that Switching Point is accepted.
This menu option will not appear if Single Point is Selected in Switch Type Menu


4-20mA
Loop
Configuration
4-20L
Press UP
for Next Menu
Press Enter
to change
Blinking
Loop
operates on
Difference
Press Up or Down key to view
4-20mA Loop-Association.
Loop
operates on
High Head
Loop
operates on
Low Head
Press Enter key to select
Loop-Associated Head / Difference.
Blinking Stops.
Press UP
for Next Menu
Press Enter
to change
Digit Blinks
Increase
0% / 4mA
Mark (mm)
Decrease
Zero / 4mA
Mark (mm)
Enter to confirm the
Delay Value.
Blinking stop means that
delay value is accepted.
Press UP
for Next Menu
Press Enter
to change
Digit Blinks
Increase
100% / 20mA
Mark (mm)
Decrease
100% / 20mA
Mark (mm)
Enter to confirm the
Level Value for
Low Switching Point
Blinking stop means that
Switching Point is accepted.
Press UP
for Next Menu



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