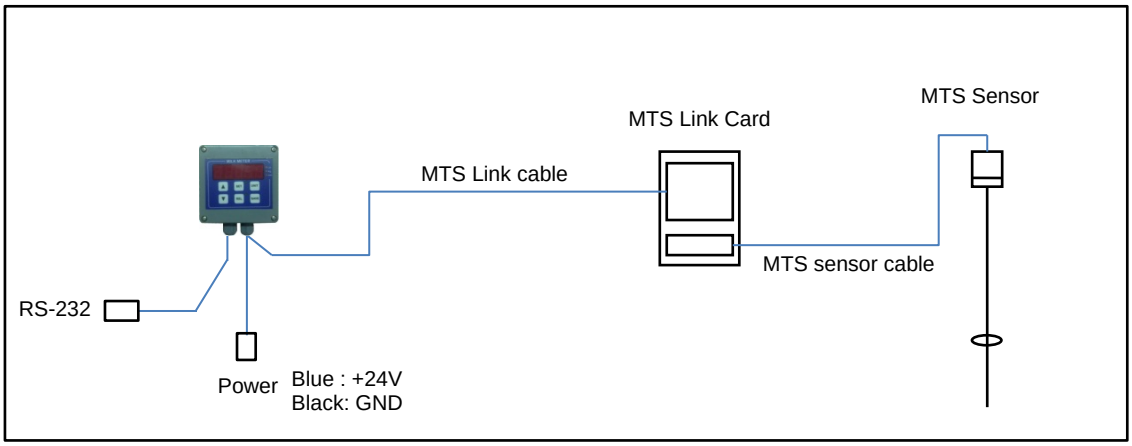
1 Product Specifications

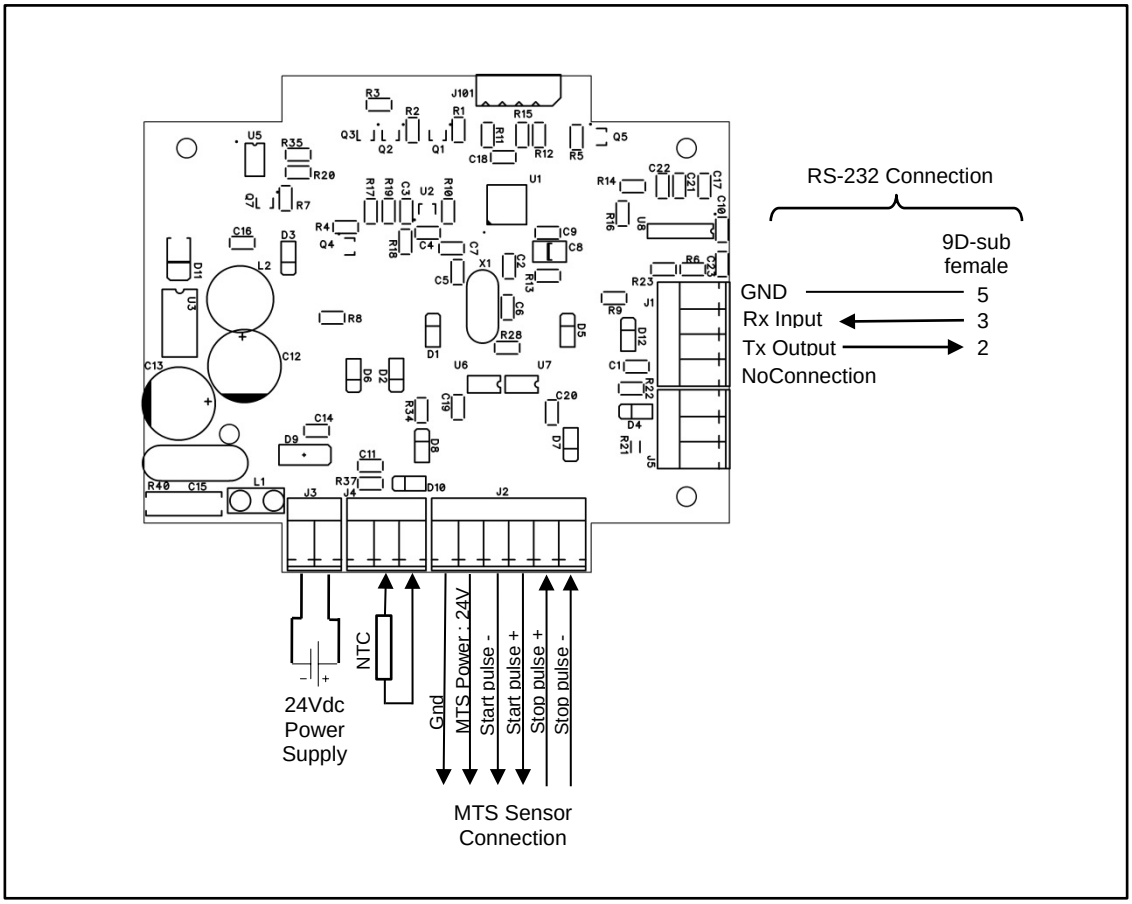
Technical Data		
General Features		
Type	MILKMETER- MM1	
Supply Voltage	24Vdc +/- 20%	
Current consumption	130 mA.	
Level Sensor Type	MTS Basic (start/stop)	
Display	5-digit, 7-segment , 14-mm	
Keypad	6-keys push button	
Communication	RS232 9600 bps,8-bits, no parity,1-stop	
Liter display resolution	1 [lt]	
Calibration Table	Supported	
Calibration Table Row count	5000 position max.	
Level reading resolution	0.5 [mm]	
Size	100 x 120 x 55 [mm] (W) (H) (D)	
Case	Plastic ABS , IP-65 protection	
Analog Outputs (option card)		
Voltage Output	0 – 10 V (if current not selected)	
Current Output	0 – 20 mA 4 – 20 mA	(If voltage not selected)
Resolution	16-bit	
Accuracy	0-10V, 0-20 mA : < 0.05% of full scale 4-20 mA : < 0.02% of full scale	
Protection	Short circuit	
Digital Outputs (option card)		
Output Type	Up to 3 relay contacts	
Contact ratings	6A, 250Vac, resistive loads	

2 Electrical Connections

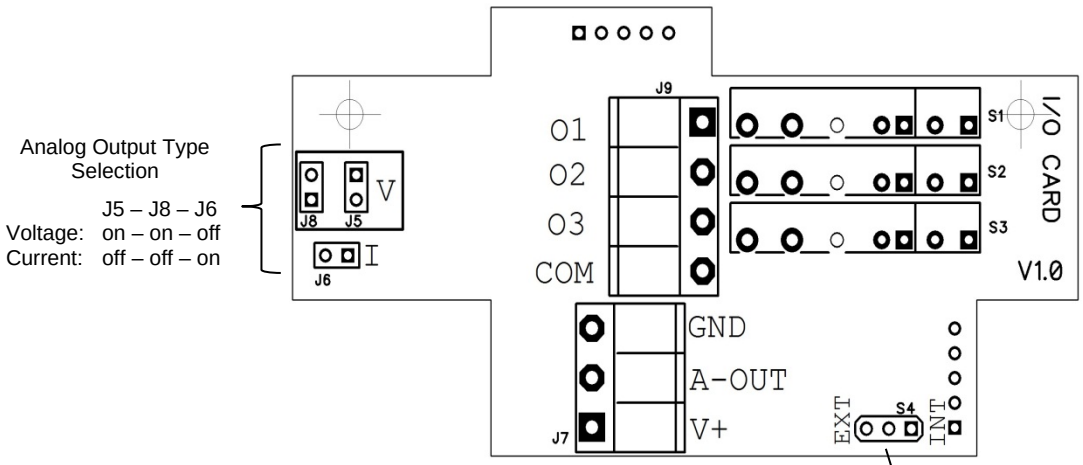
Connection Diagram



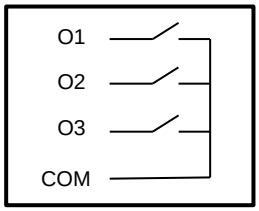
Internal Connection



Extension Card



Relay outputs
Electrical diagram



Power Supply Selection
for Analog Output

EXT: External
INT : Internal

3 Using Menu

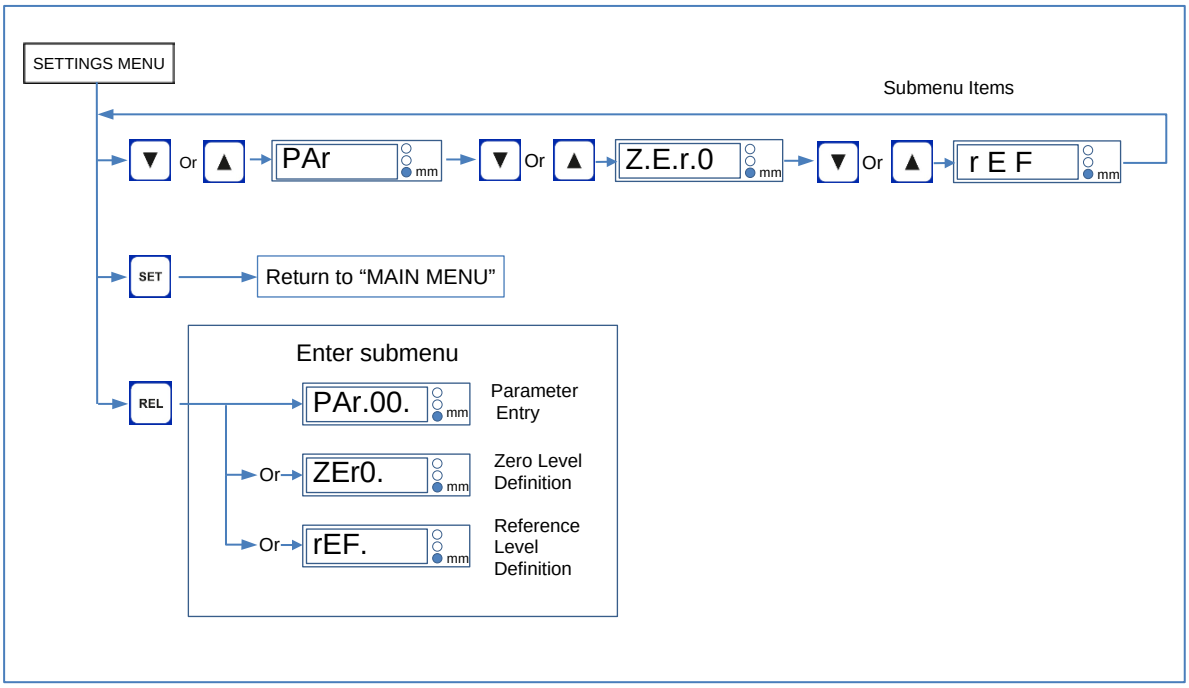
3.1 Main Menu : When power on.

3.1.1 Relative Displaying

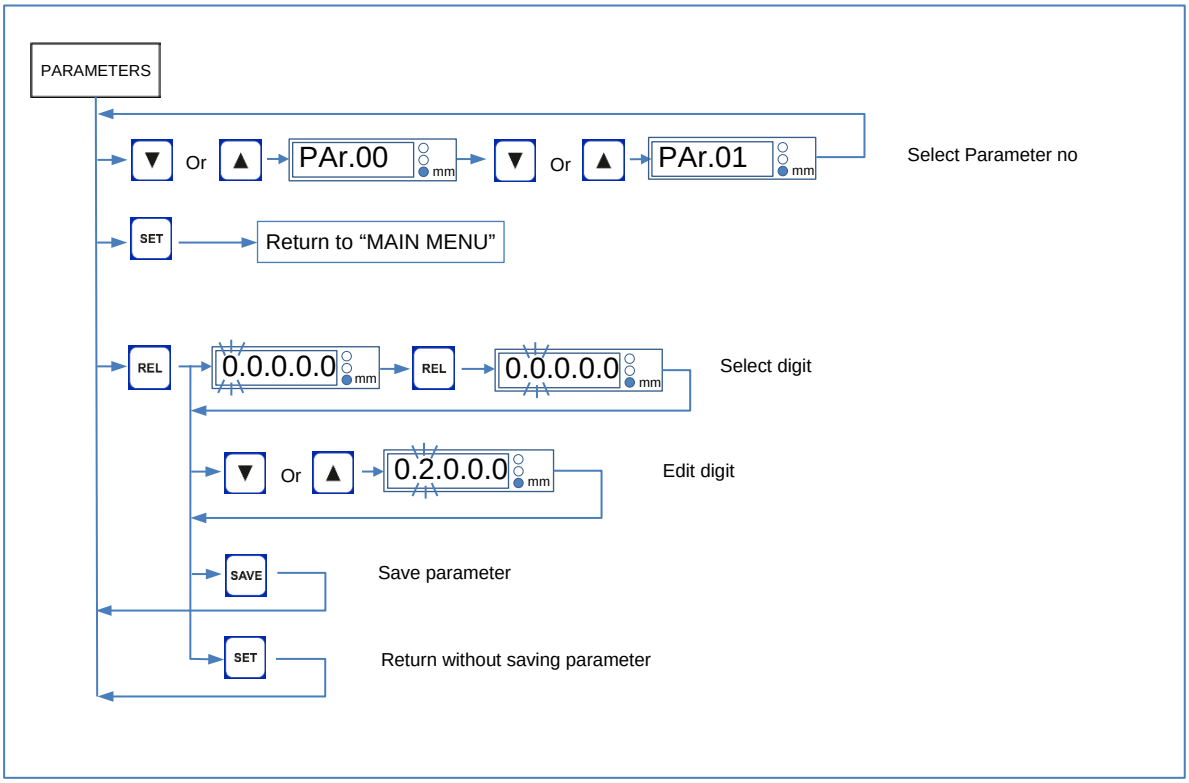
In relative displaying mode, the displayed volume or weight is difference between the “actual value” and the value that when the REL (REL) key is depressed. Relative displayed value may be positive or negative depends on the actual value. When the relative displaying is active, the key LED lits. Relative displaying mode does not affected by power on/off.

3.2 Settings Menu

SET key is pressed for about 3 second to enter settings menu.



3.2.1 Parameter Entry

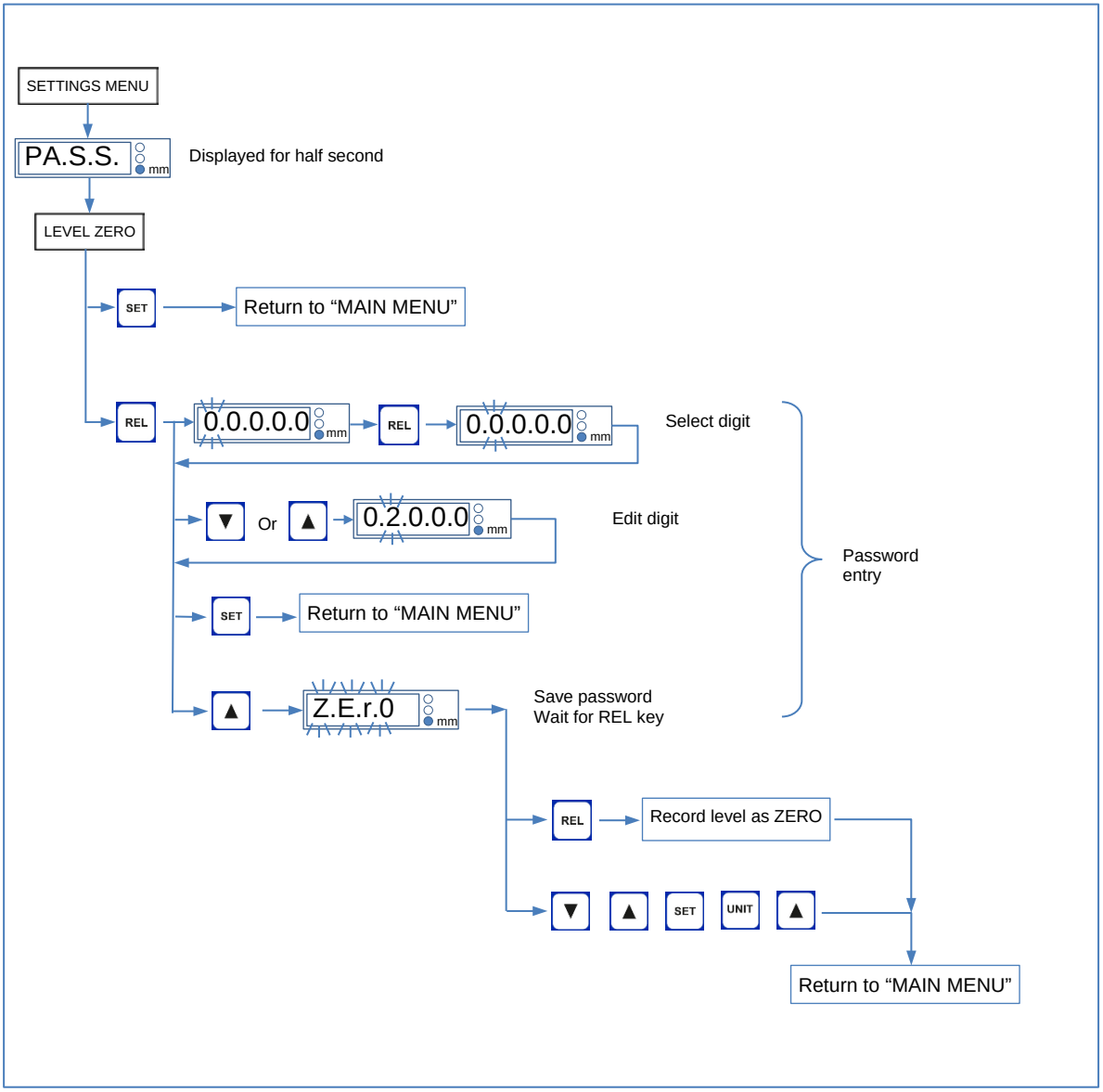


3.2.2 Tank Level Calibration

Milkmeter measures level relative to a reference point. For each tank it is necessary to define this reference point for proper measurement. There are two methods to define reference point for milkmeter; Level Zero Process and Reference Level Definition. In Level Zero Process reference point is accepted as zero point, and in Reference Level Definition the reference point is extracted from the position of float and parameter-P.18 together. User chooses one method whichever suits the application.

3.2.2.1 Level Zero Process

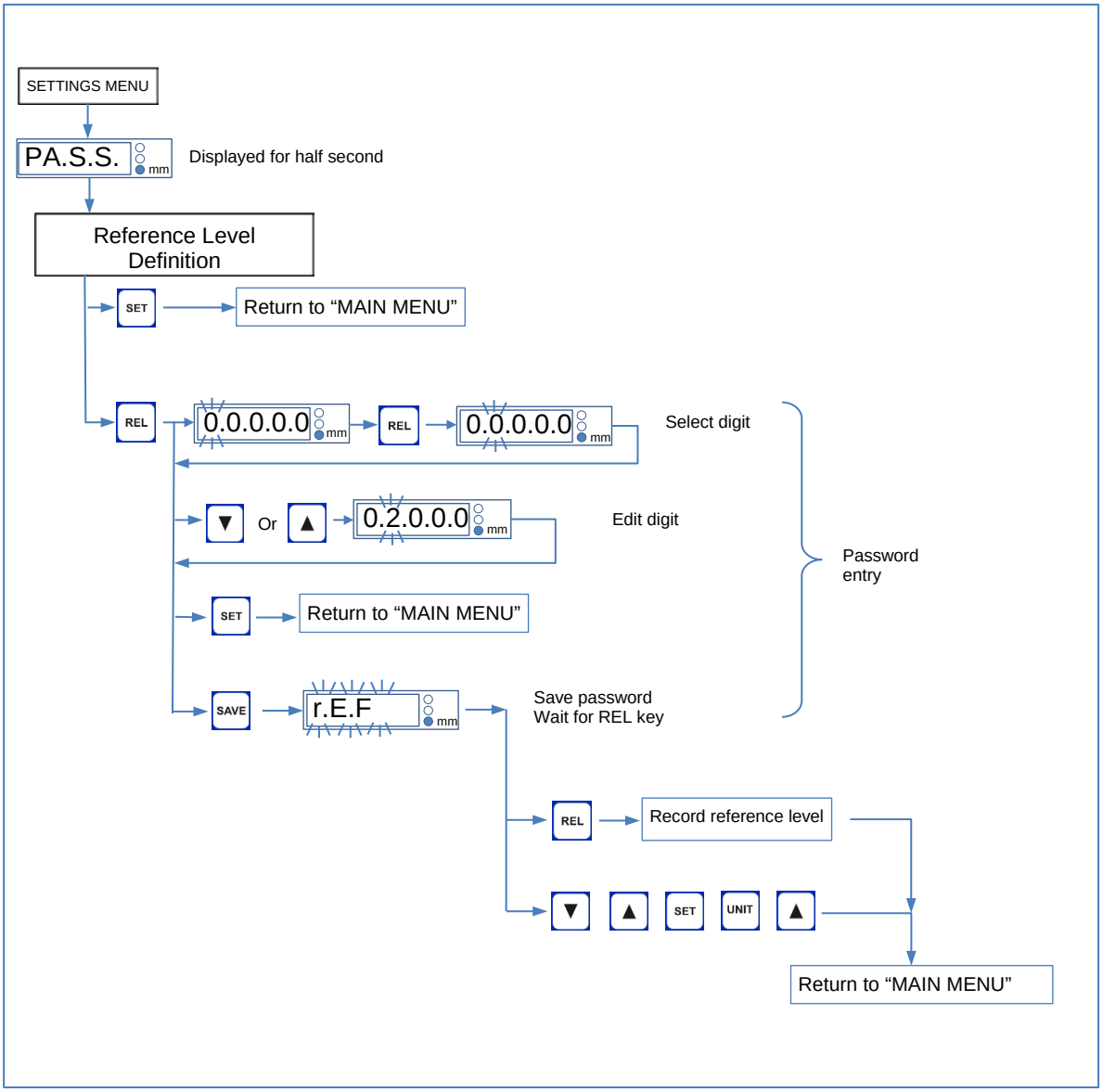
Level Zero Process is used to specify the tank minimum level. This level should be properly entered to get true level measurements. The levels below this point are assumed as zero. The zero level should be arranged with which liquid is measured in the tank to cancel out the float effects.



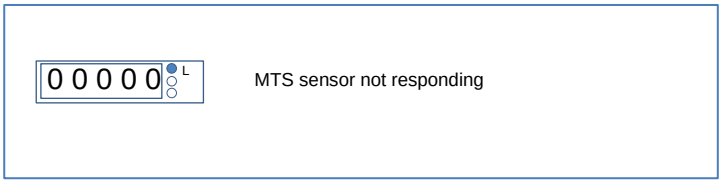
3.2.2.2 Reference Level Definition

Reference Level Definition uses the float current position and parameter-18. In this method, tank is filled exactly up to the level defined by P.18 [millimeter], or, P.18 is adjusted to known value where the float is. Then reference level definition process is executed on milkmeter. Milkmeter calculates automatically the reference point and level measurement is done relative to this reference point.

P.18 is under password protection. Write passcode "32211" to P.19 before changing P.18



4 Alarm



5 Calibration Table

Calibration table is loaded to Milkmeter through the Windows based PC Interface program “MILKMETER”. The calibration file should be prepared by user in the text format. Calibration file has numeric lines which refers the liter values. The numeric values should be integer in liter. First line in the file corresponds to zero mm. The second line corresponds to level value that represented by P.08. The third line corresponds to the 2*P.08, and so on.

For example,
if P.08 = 00001, which means that table resolution is 1 mm,
the first line is the volume for 0 mm,
second line is the volume for 1 mm,
third line is the volume for 2 mm, and so on.
If the P.08 = 00010, which means that table resolution is 10 mm, in this case
first line is the volume for 0 mm,
second line is the volume for 10 mm,
third line is the volume for 20 mm, and so on.

The calibration table can be easily prepared by Windows Notepad.

6 Parameters

- P.00 : Volume/mass calculation/indication method.

P.00 Value	Affect
00000	Volume or mass is taken from calibration table.
00001	Volume or mass is calculated for perpendicular cylindrical tank.

- P.01 : Temperature sensor selection

P.01 Value	Affect
00000	Temperature sensor is not present.
00001	Temperature sensor is present.

- P.02 : Level sensor calculation mode selection.

P.02 Value	Affect
00000	Level is calculated from analog input (4-20mA input). *Not implemented yet.*
00001	Level is calculated from MTS Sensor specific coefficient. The coefficient is supplied and labeled on the sensor by Manufacturer. Unit is [m/s].

- P.03 : Level sensor propagation constant in [m/s]. It is supplied on the datasheet of the manufacturer.

P.03 Value	Affect
0000.0	Propagation constant of MTS sensor. Unit is [m/s]. Parameter entry resolution is .1 m. Example : 2789.8

- P.04 : Maximum tank height for analog output / input scaling.

P.04 Value	Affect
0300.0	Tank height. Unit is [mm]. Parameter is used to scale analog inputs and outputs with millimeter. Parameter entry resolution is .1 mm. Example : 0600.0

- P.05 : Volume offset value. Unit is liter [Lt]. Resolution is 1 Lt. Offset value is always added to table value (or calculated value) to obtain displayed volume.

P.05 Value	Affect
00050	Volume offset value. Unit is [Lt]. Parameter entry resolution is 1 Lt. Example : 00047

- P.06 : Milk Density. Unit is [gr/cm^3].

P.06 Value	Affect
01.030	Milk density to calculate weight from volume. Example: 01.030

- P.07 : Vertical Cylindrical Tank diameter.

P.07 Value	Affect
0000.0	Vertical Cylindrical Tank diameter. Unit is [mm]. Data entry resolution is 0.1 mm.

- P.08 Calibration table resolution. Unit is [mm]. This parameter specifies the distance between two sequential table elements. When the measured distance level is between two table elements, the volume is calculated by interpolation.

P.08 Value	Affect
00001	Calibration table resolution. Unit is [mm]. Data entry resolution is 1 mm.

- P.09 Analog output type selection. (With extension card)

  There are two main type of analog output: Voltage and current output. There are 5 different usage of analog output related to scale factors.

Note: Make jumper settings of extension card be consistent with P.09.

P.09 Value	Affect
00001	Analog output type selection. Data entry range 0 - 5. 0: 0-10V with Table maximum value 1: 0-20mA with Table maximum value 2: 4-20mA with Table maximum value 3: 0-10V with P.13(tank capacity parameter) 4: 0-20mA with P.13(tank capacity parameter) 5: 4-20mA with P.13(tank capacity parameter)

- P.10 Voltage output full scale calibration value. (With extension card)

  This parameter is used to calibrate full scale value to be10.00V. Adjust the value to see 10V on measuring equipment.

P.10 Value	Affect
58000	Calibrates voltage output exactly to 10.00V for full scale

- P.11 Current output full scale calibration value. (With extension card)

  This parameter is used to calibrate full scale value to be 20.00mA. Adjust the value to see 20 mA on measuring equipment.

  For current output type 4-20 mA:
  Calibrate 4 mA offset value, P.12, before calibration P.11.

P.11 Value	Affect
57600	Calibrates current output exactly to 20.00 mA for full scale

- P.12 Current output zero offset calibration value for 4-20 mA. (With extension card)

  This parameter is used to calibrate zero offset value to be 4.00mA. Adjust the value to see 4 mA on measuring equipment.

P.12 Value	Affect
57600	Calibrates current offset value exactly to 4.00 mA.

- P.13 Tank Capacity.

  Tank capacity is used to get the ratio with the measured value. Analog output is then produced from this ratio. Tank capacity is entered in liter.

P.13 Value	Affect
06000	Tank capacity in liter.

- P.14 Limit-1 value for logic output-1. (With extension card)

  Limit-1 value is used to control logic output-1(relay contact). If measured value is smaller than limit-1, the output-1 state is OFF, otherwise output-1 state is ON. Limit-1 is entered in liter.

P.14 Value	Affect
00200	Limit-1 value for logic output-1. [liter]

- P.15 Limit-2 value for logic output-2. (With extension card)

  Limit-2 value is used to control logic output-2(relay contact). If measured value is smaller than limit-2, the output-2 state is OFF, otherwise output-2 state is ON. Limit-2 is entered in liter.

P.15 Value	Affect
00500	Limit-2 value for logic output-2. [liter]

- P.16 Limit-3 value for logic output-3. (With extension card)

  Limit-3 value is used to control logic output-3(relay contact). If measured value is smaller than limit-3, the output-3 state is OFF, otherwise output-3 state is ON. Limit-3 is entered in liter.

P.16 Value	Affect
01200	Limit-3 value for logic output-3. [liter]

- P.17 Analog output representation selection. (With extension card)

  Parameter-17 is used to select either the analog output represents the liter or millimeter.

P.17 Value	Affect
00001	Analog output representation selection. 0: Liter, 1: millimeter

- P.18 Reference Level Definition.

  Parameter-18 is reference level used during tank level calibration. In the reference level process, this parameter is accepted as measured level value and all other measurements adjusted automatically according to this point.

  P.18 is under password protection. Write passcode “32211” to P.19 before changing P.18

P.18 Value	Affect
0250.0	Reference level value in millimeter.

- P.19 Passcode.

  Parameter-19 is used as pass code entry for parameter-18 access. To change P.18 parameter-19 should be entered with the number “32211” .

P.19 Value	Affect
00000	Passcode.

- P.20 Float Effect Correction. (Not exist for some models)

  Parameter-20 is used to make addition (offset value) to the reference position. Offset value can be positive or negative in millimeter. It is limited with +/- 10 mm. This parameter may be necessary when calibration has been done with liquid which density is different from actual measured liquid. Example is water and milk.

P.20 Value	Affect
0000.0	Offset value for reference position.

- **P.20 is under password protection. Write passcode “32211” to P.19 before changing P.20**
- **Reference Level calibration or Zero Level Calibration should be made while P.20 is zero.**

7 Extension Card

Extension card has two output sections:

- Analog output section for transmitting data over analog signal to external equipment,
- Digital outputs as relay contact to signal predefined levels.

7.1 Analog Output Section

Analog signal can be configured as **Voltage** signal or **Current** signal output. Hardware and software settings are required to select correct output type. Analog output signal is generated proportional to liter or level position value. If the parameter P.17 is 0, analog output is proportional to level measurement, otherwise analog output is proportional to liter measurement.

7.1.1 0-10V Voltage Output

Hardware settings,
J5 and J8 : Closed
J6 : Open

Parameter P.17 = 0:
Voltage output is ratio of the measured level value and parameter P.04. When measured level is equal or greater than P.04, output value is 10.00V.

Vout = [10.00 * measured level in millimeter] / P.04 [V]

Parameter P.17 = 1:

i) If P.09 = 0 : Voltage output is ratio of the measured volume value and Table maximum value.
Vout = [10.00 * measured volume in liter] / (Table maximum value)

ii) If P.09 = 3 : Voltage output is ratio of the measured volume and parameter P.13 (Tank capacity)
Vout = [10.00 * measured volume in liter] / P.13 [V]

7.1.2 0-20 mA Current Output

Hardware settings,
J5 and J8 : Open
J6 : Closed

Parameter P.17 = 0:
Current output is ratio of the measured level value and parameter P.04. When measured level is equal or greater than P.04, output value is 20.00 mA.

Iout = [20.00 * measured level in millimeter] / P.04 [mA]

Parameter P.17 = 1:

i) If P.09 = 1 : Current output is ratio of the measured volume value and Table maximum value.
Iout = [20.00 * measured volume in liter] / (Table maximum value) [mA]

ii) If P.09 = 4 : Current output is ratio of the measured volume and parameter P.13 (Tank capacity)
Iout = [20.00 * measured volume in liter] / P.13 [mA]

7.1.3 4 – 20 mA Current Output

Hardware settings,
J5 and J8 : Open
J6 : Closed

Parameter P.17 = 0:
Current output is ratio of the measured level value and parameter P.04. When measured level is equal or greater than P.04, output value is 20.00 mA. When measured level is zero, current output is 4 mA.

Iout = 4.00 + [16.00 * measured level in millimeter] / P.04 [mA]

Parameter P.17 = 1:

i) If P.09 = 2 : Current output is ratio of the measured volume value and Table maximum value.
Iout = 4.00 + [16.00 * measured volume in liter] / (Table maximum value) [mA]

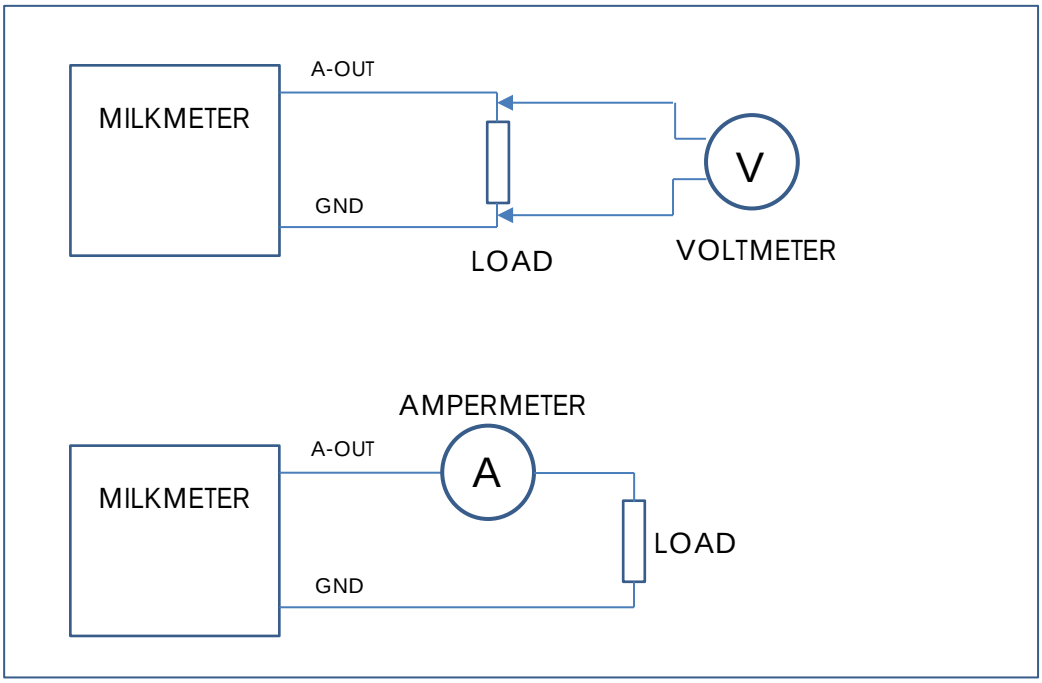
ii) If P.09 = 5 : Current output is ratio of the measured volume and parameter P.13 (Tank capacity)
Iout = 4.00 + [16.00 * measured volume in liter] / P.13 [mA]

7.1.4 Analog Output calibration

Analog signal output must be calibrated to cancel out the errors raising from component's tolerances, load differences, etc. A sufficiently accurate equipment should be used to measure analog signals (voltage or current) during calibration. Analog signal is automatically sourced during P.10, P.11 and P12 parameters are adjusted. Note that the full scale output signal is sourced according to the selected output type and measured unit.

Calibration process

- Set up the measure equipment, load and milkmeter output
  If voltage output is calibrated, connect measurement equipment across to the load,
  If current output is calibrated, connect measurement equipment in the loop of milkmeter and load.



- Enter the parameter entry mode and chose
  i) P.10, if voltage output shall be calibrated. Change value to get 10.00V.
  ii) P.11, if current output shall be calibrated. Change value to get 20 mA.
  iii) P.12, if current 4 mA zero offset shall be calibrated. Change value to get 4 mA.

For current output type 4-20 mA:
Calibrate 4 mA offset value, P.12, before calibration P.11.

- Analog output is automatically sourced as full scale value (or 4 mA offset value).
- Make fine tuning by changing parameter value if the measured value is different from that expected.

7.2 Digital Outputs / Relay Contacts

Digital output (or relay contact output) logic is related with volume. Relay contact is OFF when the volume is smaller than pre-defined limit value. Relay contact is ON when volume is greater than the limit. There is a hysteresis between ON and OFF switching values. This hysteresis value is 5 liter or 0.4% of measured value whichever is greater.

Three limit values are defined.

- P.14 : Limit-1 value for output-1 in liter,
- P.15 : Limit-2 value for output-2 in liter,
- P.16 : Limit-3 value for output-3 in liter.

END OF DOCUMENT.