Technical Information Manual

Series 7100 – Tanker Decanting System

Rugged custody transfer system enabled with easy-to-use transmitter for measurement of any liquid

Applications

- Custody Transfer
- Tanker Decanting at unloading bay for fuel oils
- Chemical unloading into tanks
- Low lubricity product unloading from lorries

Device Properties

- Flow range: 3 LPH to 60,000 LPH
- Measured error: 0.1%
- Medium temperature: -45 to 150 deg C
- Nominal Diameter – DN40,50,80,100
- Safety features like automatic pump and valve control
- Backlight display with key and data output protocols
- Explosion-proof electronics

Your benefits

- Industry leading accuracy of 0.1%
- Repeatability of better than 0.01%
- Only one moving part
- Space saving installation – no straight lengths needed
- Unaffected by pulsating flow
- Suitable for measurement of the lowest lubricity liquids
- The lowest pressure drop in a Positive Displacement flowmeter – 0.1 kg/cm^2
- Easy-to-use UI with Backlight enabled LCD
- Process and diagnostic information available for speedy maintenance
- Automatic Pump control with pressure sensing mechanism

FLUIDYNE
S.No. 79/2, Plot No. 12,
Near Agarwal Godown,
Shivane
Pune, Maharashtra 411023.
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1. Revision History

Versions	Release Date	Description	Author	Approver	Remark
1.0	01 August 2022	Operation, spares and service of the tanker decanting system with instructions and do's and don'ts	Shubhankar M	Shivdas M	
2.0	11 April 2023	Addition of CT22 GSM transmitter option	Shubhankar M	Shivdas M	
3.0	12 March 2024	JB wiring with star delta starter, CT22 Modbus data revised	Swapnil G	Shubhankar M	
4.0	04 January 2025	Addition of HOA mode data selection, registers and PM checklist	Ganesh S	Shubhankar M	

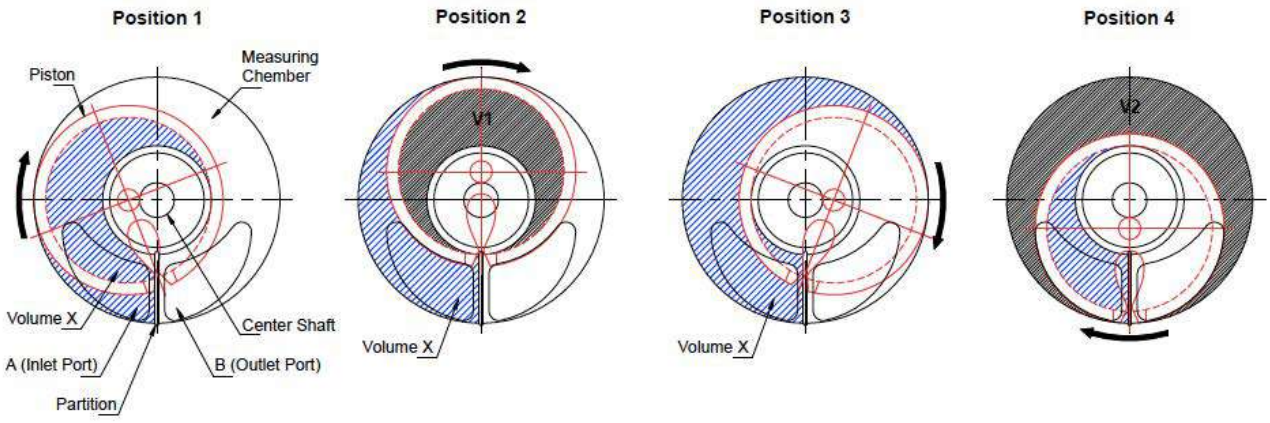
2. Measurement principle

The Positive Displacement principle is the only accurate method of flow measurement due to its direct measurement of volume. Volume is not inferred from velocity of liquid or mass flow rates as in inferential meters.

The Positive Displacement principle works by continuously separating the flow stream into discrete volumetric segments and precisely measuring this volume in a calibrated measurement chamber. The Fluidyne PD meter is based on the time-tested and robust oscillating piston mechanism. In this mechanism, the piston is the only moving part which displaces calibrated volume of liquid from meter inlet to outlet in every rotation. The movement of the piston is recorded by magnetic pickup coils and thus a number of movements are equal to the actual measured volume by multiplying movements with calibrated volume displaced.

The calibrated volume is a nearly constant value for a every size of PD meter Fluidyne manufactures. This correlation of piston movement to the calibrated volume is the calibration factor or 'k factor' which is adjusted as per the liquid to be measured by the flowmeter.

As per below diagram, **k factor = (V1+ V2) ml**
Total volume in flow stream = k factor * number of oscillations of piston



- High Inlet pressure condition fills the Piston Inner cavity V1 which drives the piston in the direction of the arrow
- Volume X outside the Piston starts expanding

- The Piston Inner space V1 is completed filled and sealed off
- Due to the high pressure at the Inlet Piston continues to rotate in the direction of the arrow
- Volume X has further expanded

- Piston continues to move in the direction of the arrow
- Volume X further expands
- Piston inner cavity V1 connects with the Outlet causing the Volume V1 to flow out through the outlet

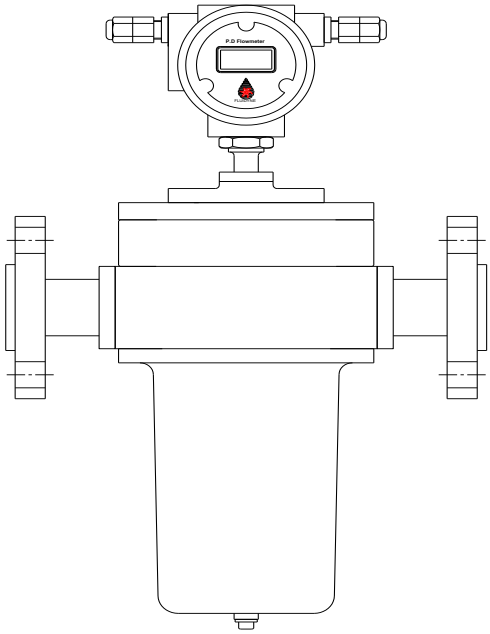
- Volume X fully expands to volume V2 and is sealed
- Liquid filling into the Piston inner cavity rotates the piston in the same direction
- As the Piston moves ahead showed in Position 1, Volume V2 connects with the Outlet
- For One revolution of the piston Volume V1+V2 is displaced from Inlet to the Outlet

3. Measurement System

Every Fluidyne Tanker Unloading System consists of some or all of the following parts
(Check section 7.0 for configuration of product as per your SKU)

- Positive Displacement Flow sensor
- In line air separator
- Vacuum breaker
- Back Pressure Valve
- Pump
- Transmitter and junction box

Positive Displacement Sensor	**Sizes** - DN40 (1.5”) - DN50 (2”) - DN80 (3”) - DN100 (4”) **Flow rates** - DN40 – upto 6000 LPH - DN50 – upto 12,000 LPH - DN80 – upto 35,000 LPH - DN100 – upto 60,000 LPH **Performance** - Measurement accuracy – 0.1% of measured volume - Measurement repeatability – Better than 0.02% - Ultra-low pressure drop – 0.1 kg/cm^2 **Specifications** - MOCs of Aluminium LM04 and SS304/316L available - Piston MOC of PEEK/Ryton/Kynar - Unique single oscillating piston design - In-built 149 micron SS mesh element - No straight lengths required - Unaffected by pulsating flow **Maximum Operating Temperature** - 85 deg C **Process Connections** - ASME B16.5 / ANSI flanges in 150, 300, 400 options - Special connections on request



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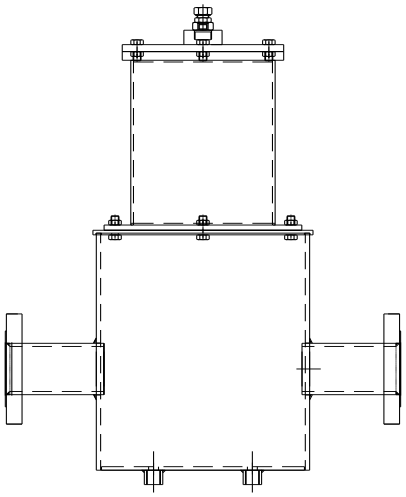
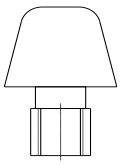
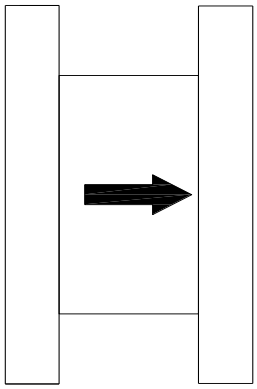
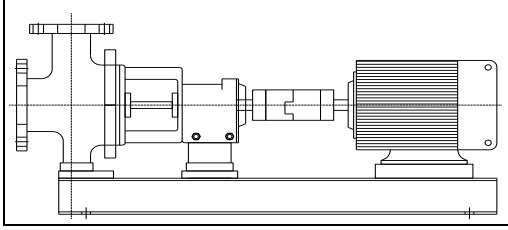
Air separator 	**Sizes** - DN40 (1.5”) – upto 15,000 LPH - DN80 (3”) – upto 80,000 LPH **Specifications** - MOC choice between MS IS 3589, SS304, SS316L - Fabricated vessel with baffles and air release valve - Ball float actuated - ½” air release valve for 100% air elimination **Process Connections** - ASME B16.5 / ANSI flanges in 150, 300, 400 options - Special connections on request
Vacuum Breaker 	**Sizes** - DN15 (1/2”) **Specifications** - MOC choice between 304 SS, 316L SS - Poppet type, spring loaded construction - Mounted on downstream side of the PD meter - **Used in underground tank unloading configurations only**
Back pressure valve 	**Sizes** - DN40 (1.5”) - DN80 (3”) **Specifications** - MOC choice between SS304/316L - Soft-seated NRV construction with standard elastomers - Poppet type, spring loaded, non-return - Mounted on upstream side of the PD meter - Used in underground tank and above ground tank unloading configurations
Unloading Pump 	**Variants** - Centrifugal - Positive Displacement **MOC** - Cast Iron - SS316 **Specifications**

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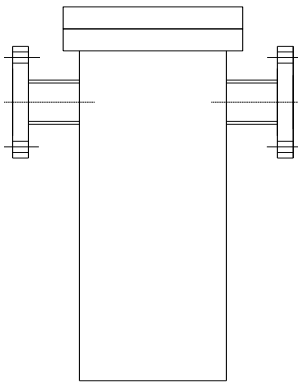
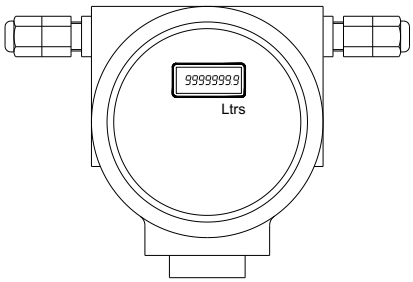
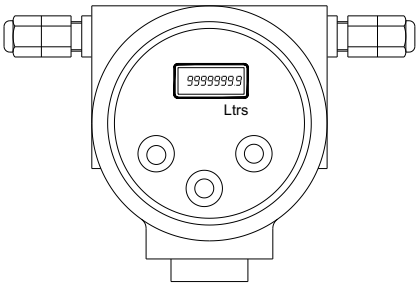
	- Discharge rates of upto 60,000 LPH - Discharge pressure as per customer specification - Explosion proof motor available - DOL starter/Star-delta starter option per motor size
Pre-filter 	**Sizes** - DN40 – upto 15,000 LPH - DN80 – upto 40,000 LPH - DN100 – upto 80,000 LPH **MOC** - MS/Aluminium - SS304/316 **Specifications** - SS Mesh – 100/50/25 micron - Rated to 15 bar - Washable and reusable SS mesh

Transmitter

Standard 	**MOC** - Die cast Aluminium, powder coated: AlSi10Mg **Window material** - Cast, stainless: glass **Specifications** - Cable entries – 2 nos – M20x1.5 - ATEX type – Ex-d IIC Gb T6, Zone 1, Zone 2 - PESO approved - Capacitive touch keys (post October 2023) - Dual compartment with terminal box - 4-20 mA, Modbus/RTU, Pulse output - LCD with backlight - AC supply – 86-260 VAC 50 Hz/60 Hz, DC supply – 18-40 VDC
CT 22	**Device materials** - Die cast Aluminium, powder coated: AlSi10Mg **Window material** - Cast, stainless: glass **Specifications** - Cable entries – 2 nos – M20x1.5

	- ATEX type – Ex-d IIC Gb T6, Zone 1, Zone 2 - PESO approved - Dual compartment with terminal box - 4-20 mA, Modbus/RTU, Pulse output (All isolated) - 1x DI (isolated) - Capacitive touch keys (post October 2023) - 2x Relays for pump control - 1x Relay pulse output - LCD with backlight - AC supply – 86-260 VAC 50 Hz/60 Hz, DC supply – 18-40 VDC - **Empty pipe detection** - **Automatic pump control** - **Manual pump control**
CT 22 with GSM	**Device materials** - Aluminum coated: AlSi10Mg **Window material** - Cast, stainless: glass **Specifications** - Cable entries – 2 nos - ATEX type – Ex-d 2G, Zone 1, Zone 2 - PESO approved - Outputs – Direct GSM output to FlowLog via SIM card with enabled internet services (2G sims only) - Dual compartment with terminal box - 2x Relays for pump control - LCD with backlight - AC supply – 86-260 VAC 50 Hz/60 Hz - **Empty pipe detection** - **Automatic pump control** - **Manual pump control**

4. Input

4.1 Measured variables - Direct

- Instantaneous volume
- Totalized volume

4.2 Measured variables – Calculated

- Instantaneous volume flow
- Instantaneous mass flow
- Instantaneous mass
- Totalized mass

4.3 Measuring Range

Pipe size (mm)	Pipe size (inch)	Calibrated flow range (LPH)
40	1.5	600 – 6,000
50	2	1200 – 18,000
80	3	2400 – 36,000
100	4	3600 – 72,000

4.4 Digital Inputs

4.4.1 DI 1 (For CT22 only)

Function	Empty pipe signal
Max input value	12 VDC
Voltage drop	<= 1VDC

4.5 Capacitive touch keys

Function	Accepting user input
Precaution	Do not use with wet hands as sensitivity is compromised. Touch gently on glass

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5. Outputs

5.1 Relay Output type DO (For CT22 only)

Function	Digital output via Relay (signal isolated)
Max output value	12 VDC pulse (86-230 VAC supply) 24 VDC pulse (24-40 VDC supply)
Open Circuit voltage	0 VDC (potential free)
Voltage drop	<= 2VDC
Output frequency	Upto 100 Hz

5.2 4-20 mA (For standard and CT22)

Signal Mode	Standard 4-20 mA
Signal translation	See min-max measuring range in section 4.3
Maximum output value	22 mA (alarm condition)
Open circuit voltage	12 VDC
Load	0 to 500 ohm
Resolution	0.01 mA
Assigned variables	Volume flow, mass flow (dependent on selected mode)

5.3 MODBUS with RS485 (For Standard and CT22)

Protocol	Modbus Applications Protocol Specification V1.1
Mode	32-bit mode Floating point type
Response times	Direct data access: typically 20-50 ms
Device type	Slave
Slave Address Range	1 - 255
Baud rates supported	9600 BAUD 19200 BAUD 38400 BAUD 57600 BAUD 115200 BAUD
Data Transfer mode	RTU
Compatibility with earlier model	Fluidyne devices prior to 2021 have older version protocol with data distributed into 3 registers. Please check section 11 for more information on past Modbus implementation

5.5 CT22 with GSM

SIM card compatibility	2G services only of any make
Device ID	Upto 255 (matched with ID on FlowLog set value)
GSM Transmit time	5 mins and greater

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6. Power Supply and Connection Diagrams

6.1 Supply Voltage

Terminal Voltage	Frequency (Hz)
100 – 240 VAC ±20%	50/60 Hz
DC 24 V +-20%	-
AC 415 3 phase ±20%	50/60 Hz

6.2 Power Consumption

Transmitter – Max 3.5 W

6.3 Current Consumption

Max – 180 mA (24 VDC)
Max – 150 mA (110 VAC 50/60 Hz, 230 VAC 50/60 Hz)

6.4 Power supply failure

- Totalizers stop at last value measured
- Data is maintained in NV memory

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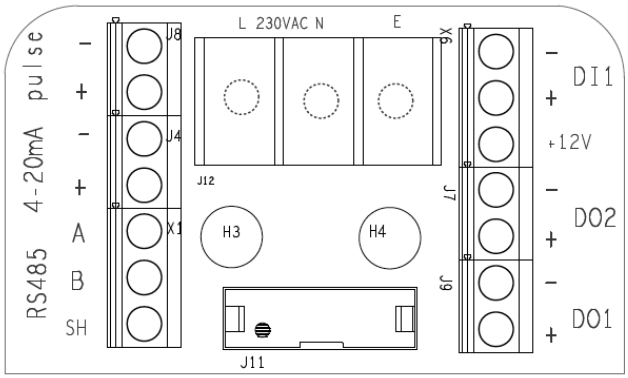
6.5 Connecting the transmitter terminals

For 4-20 mA, RS485 and Pulse connectors please use shielded twisted pair with earthing shield cable. 18 AWG or 0.82 mm^2 cable is preferred.

For Supply and Relay connections please use 14 AWG or 2.1 mm^2 type cable.

6.5.1 Standard Transmitter

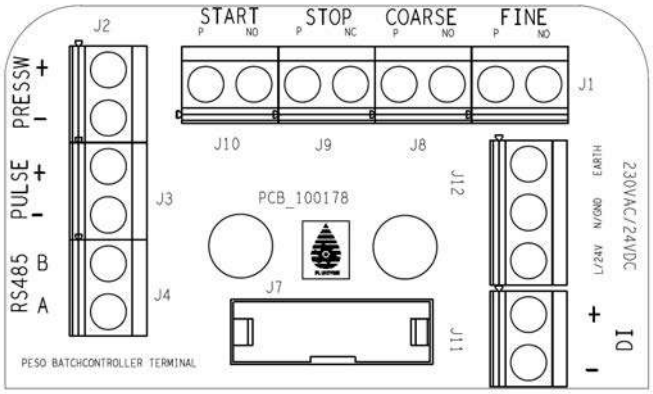


For 4-20 mA, RS485 and Pulse connectors please use shielded twisted pair with earthing shield cable. 18 AWG or 0.82 mm^2 cable is preferred.

For Supply and Relay connections please use 14 AWG or 2.1 mm^2 type cable.

Do not disconnect FRC connector.

6.5.2 CT22 terminal card

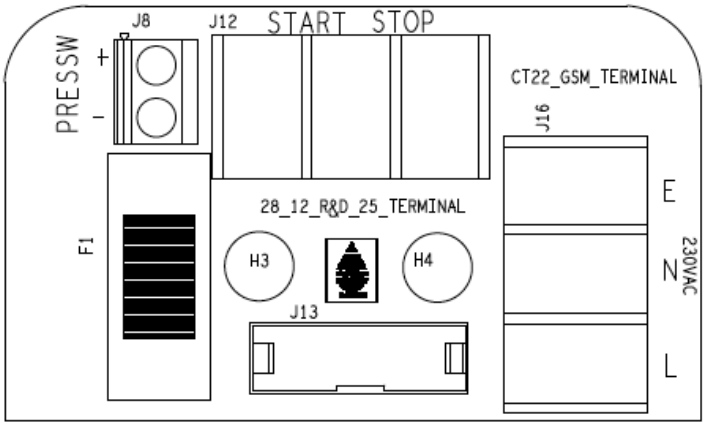


For 4-20 mA, RS485/4-20 mA and Pulse connectors please use shielded twisted pair with earthing shield cable. 18 AWG or 0.82 mm^2 cable is preferred.

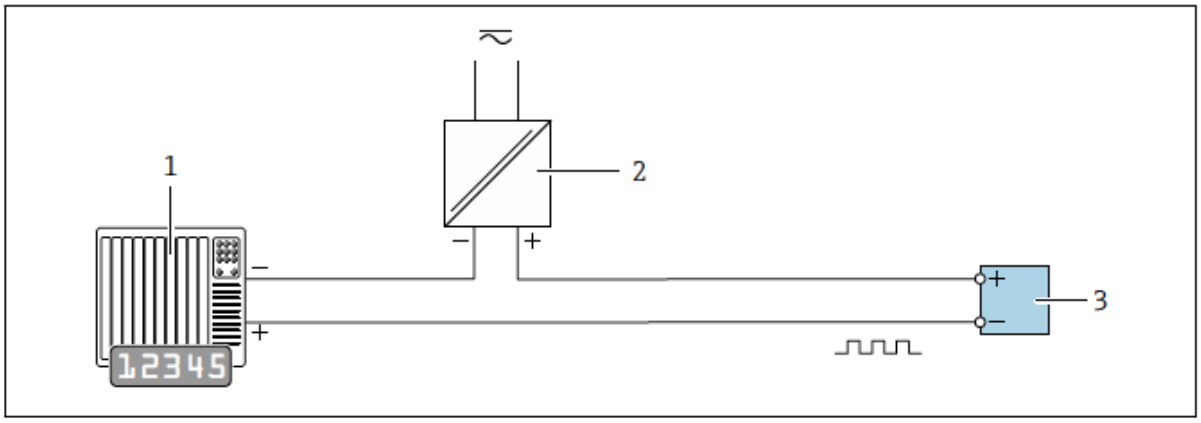
For Supply and Relay connections please use 14 AWG or 2.1 mm^2 type cable.

Do not disconnect FRC connector.

6.5.3 CT22 with GSM

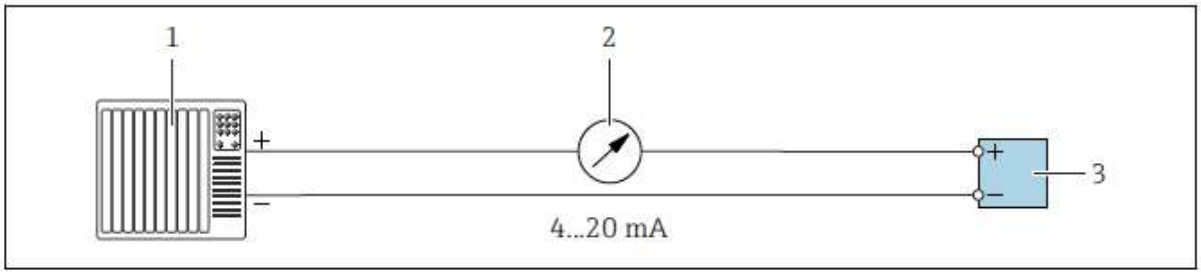


6.6 Connection for pulse output



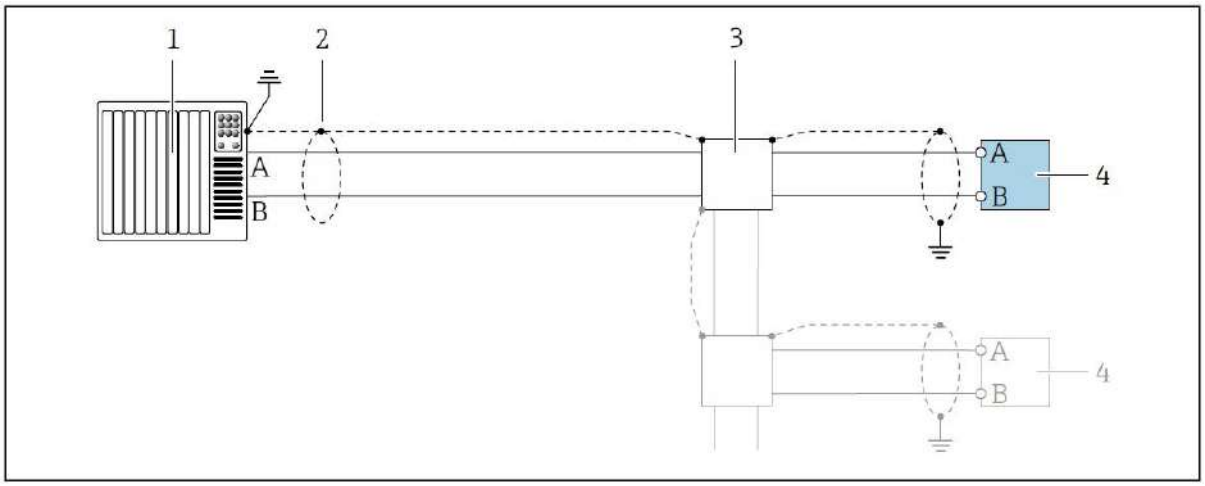
1 – Automation system with pulse input with suitable frequency card (eg PLC/DCS)
2 – Power supply
3 – Transmitter

6.7 Connection for 4-20 mA loop



1 – Automation system with current input (eg PLC/DCS)
2 – Analog display unit
3 – Transmitter

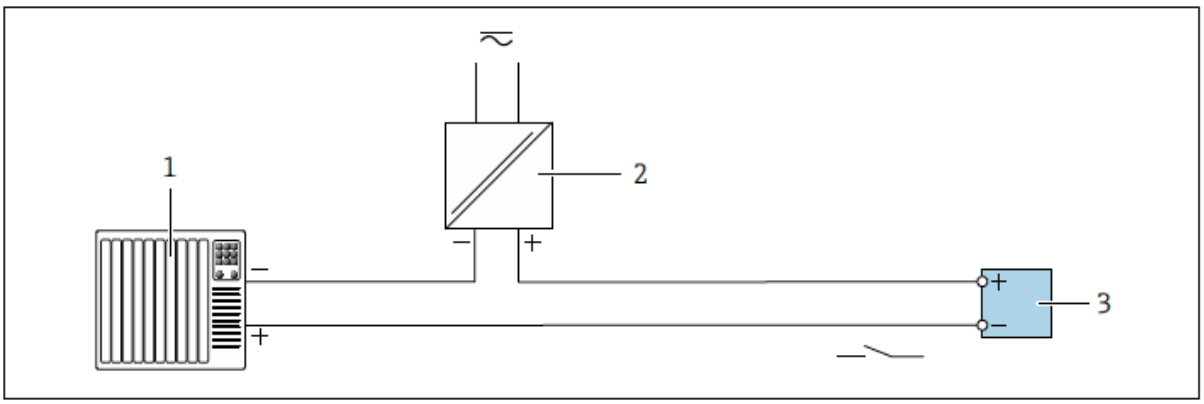
6.8 Connection for RS485-Modbus



Connection example for Modbus RS485 in non-hazardous area and Zone 2

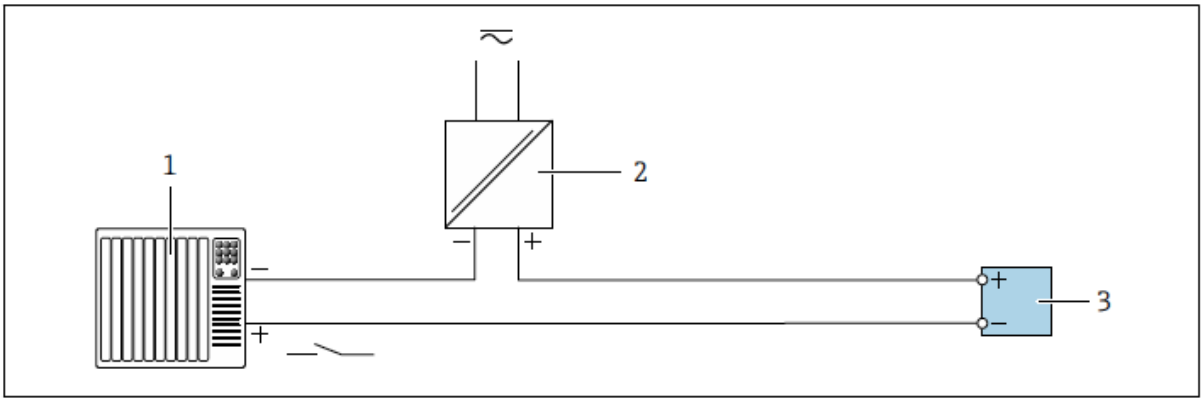
1 – Automation system (eg PLC/DCS)
2 – Cable shield provided. The cable shield must be grounded at both ends to comply with EMC requirements; observe cable specifications
3 – Distribution box
4 – Transmitter

6.9 Connection for Digital Output(s) and Relay output



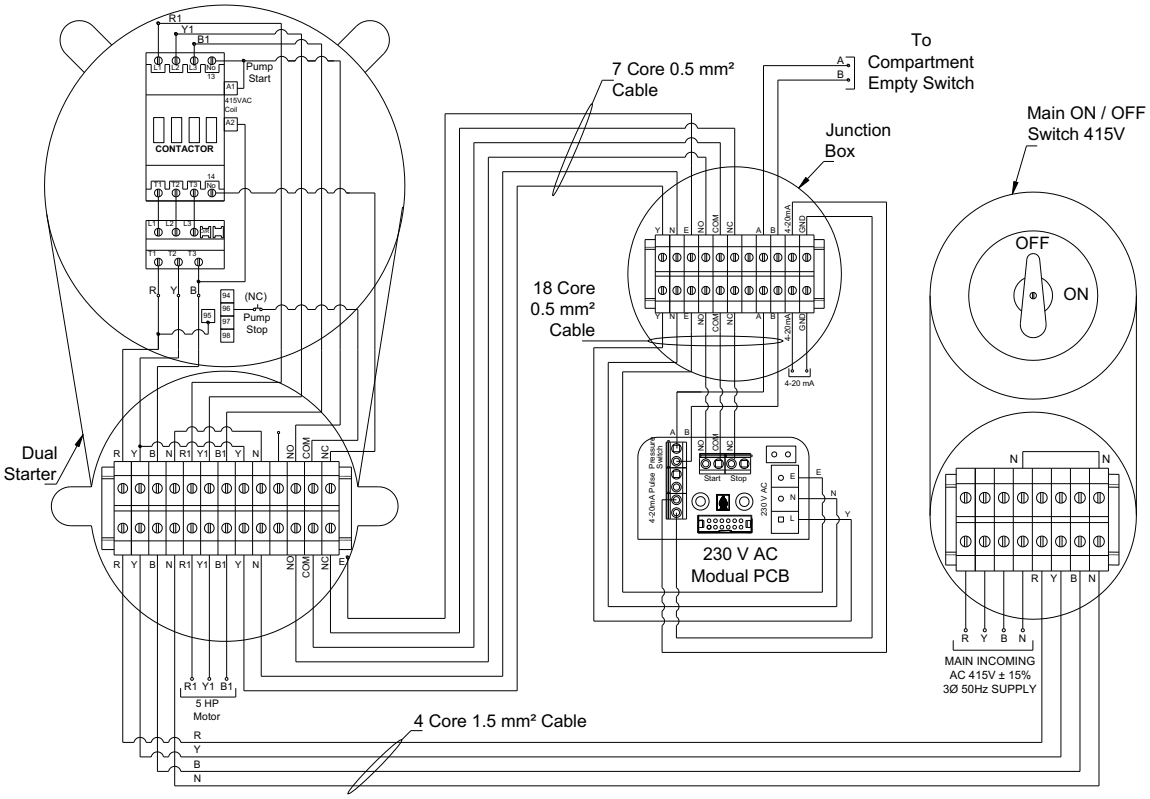
1 – Automation system with switch input (eg PLC/DCS)
2 – Power supply
3 – Transmitter (Values given in 5.2)

6.10 Connection for Digital Input(s)

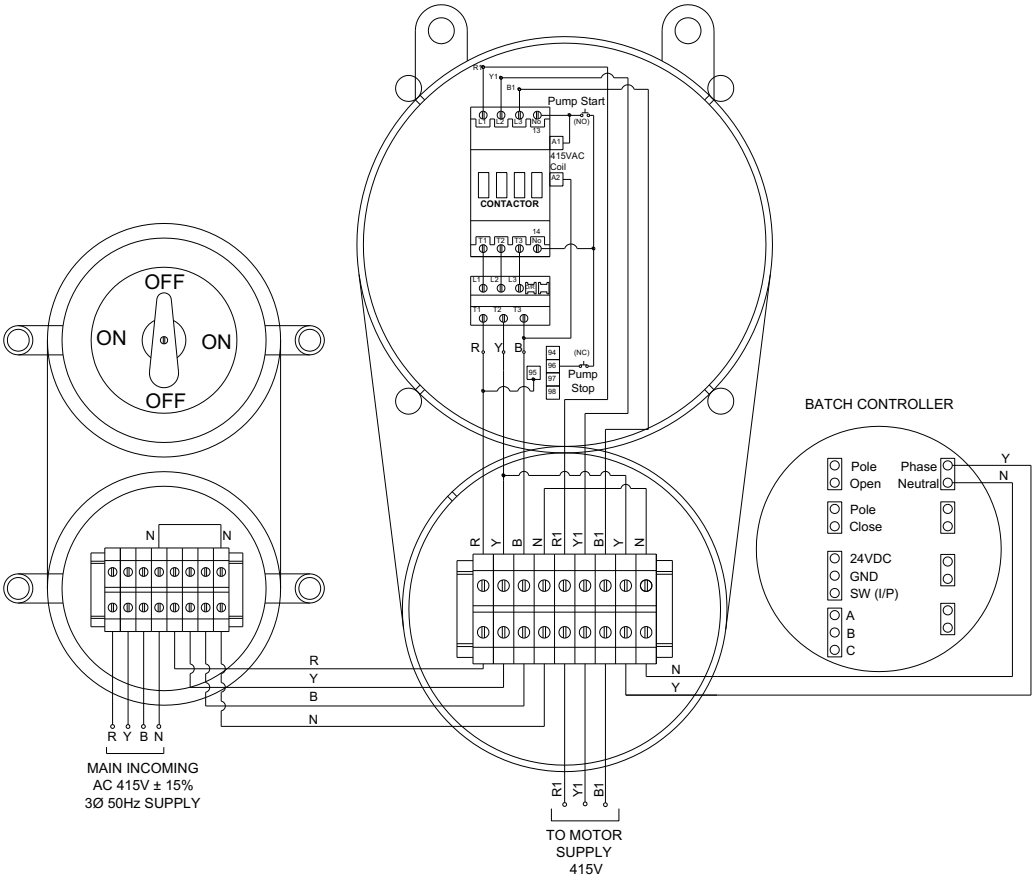


1 – Automation system with digital output (eg PLC/DCS)
2 – Power supply
3 – Transmitter (Values given in 4.3)

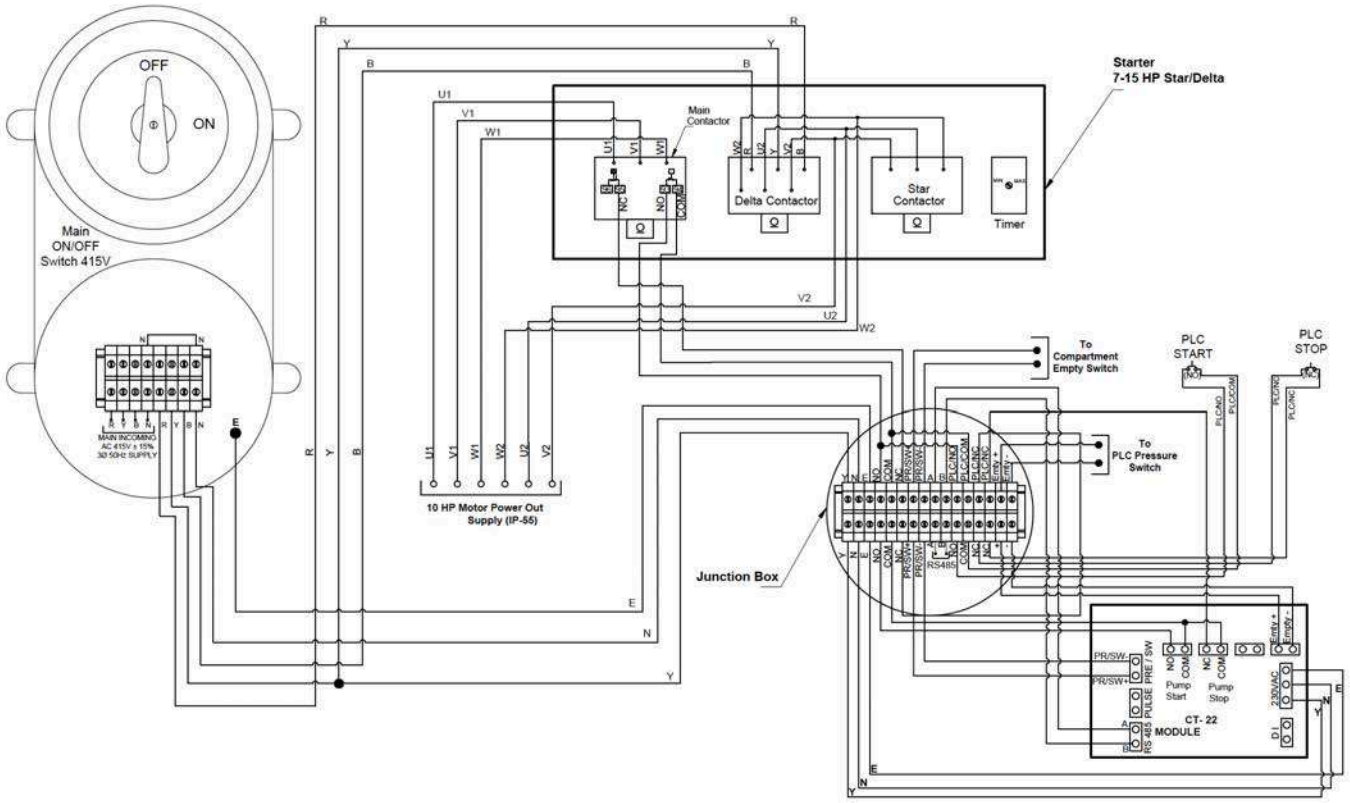
6.11 Junction Box wiring connection for CT22 and CT22 GSM with DOL starter



6.12 Junction Box wiring connection for Standard Transmitter



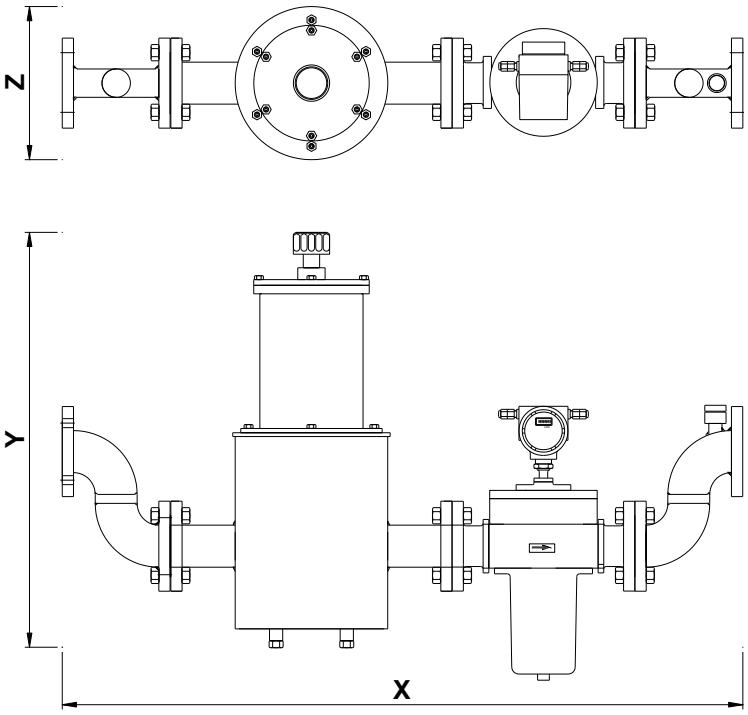
6.13 Junction Box wiring connection for CT22 with Star-Delta starter (PD pump/Gear pumps)



Empty+ and Empty- is a relay type output given as an extra output to mimic the behavior of the compartment empty switch in the OFF mode as CT22 is inoperable in OFF mode.

7. 7100 Configurations with dimensions

7.1 Tanker Unloading System Gravity Based



System Size	X (mm)	Y (mm)	Z (mm)
DN40	600	600	200
DN50	1250	950	330
DN80	1450	950	330
DN100	1550	950	330

**At least 300 mm of distance to be maintained from ground for removal of filter element*

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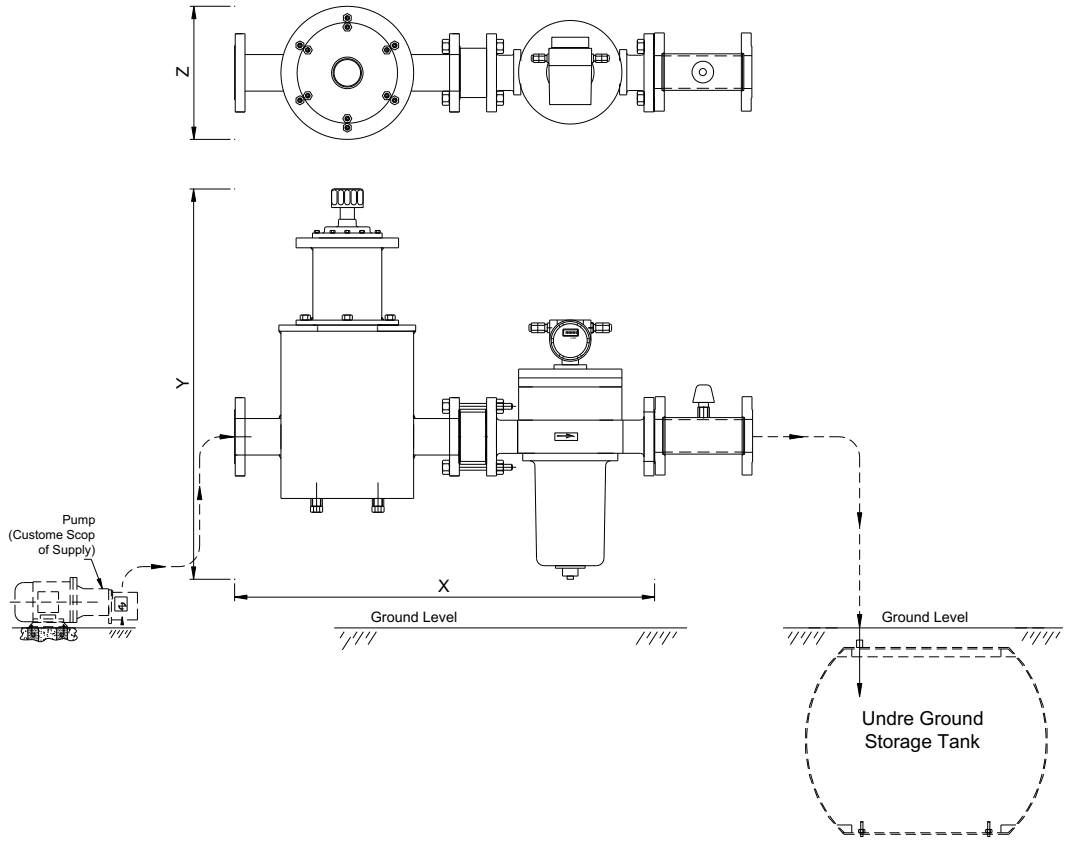
7.2 Tanker Decanting System with customer Pump

7.2.1 7100-40-UG-CP- AC/DC or 7100-50/80-UG-CP- AC/DC or 7100-100-UG-CP- AC/DC

7100 – Tanker Decanting System Product Code
40 – Size 1.5”
50/80 – Size 2” or 3”
100 – Size 4”
UG – Decanting to Underground tanks
CP – Customer pump
AC/DC – Power supply configuration



System Size	X (mm)	Y (mm)	Z (mm)
DN40	600	600	200
DN50	1050	950	330
DN80	1100	950	330
DN100	1200	950	330

**At least 300 mm of distance to be maintained from ground for removal of filter element*

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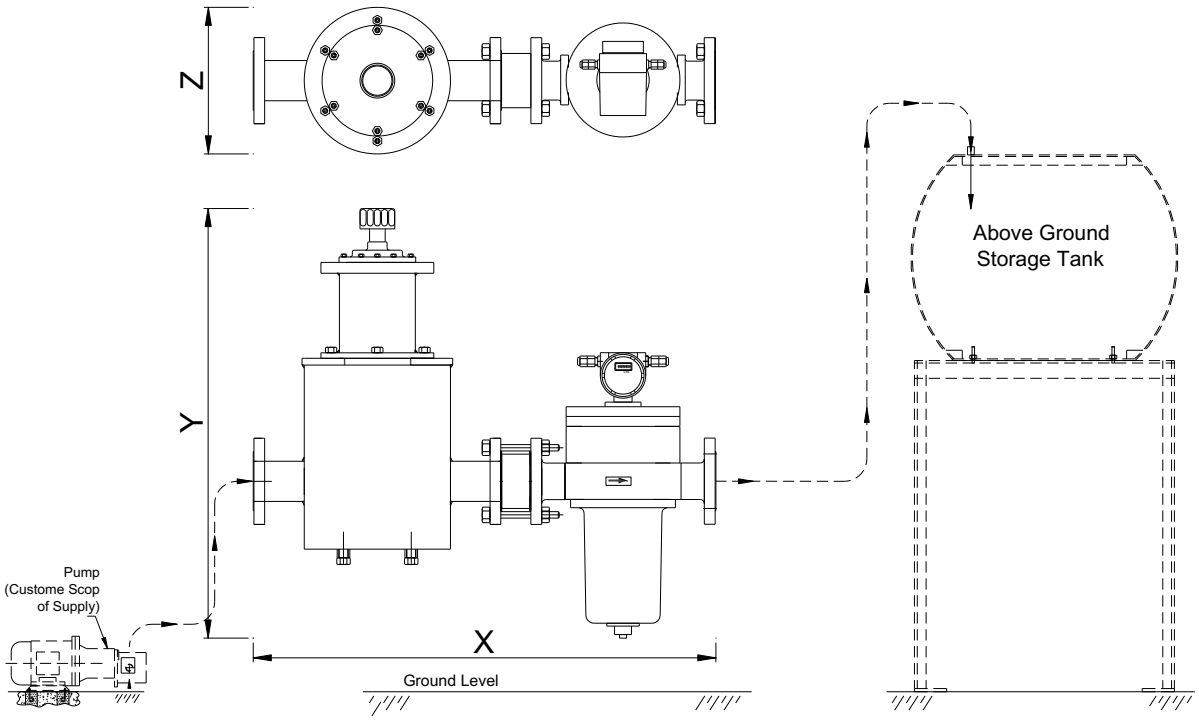
7.2.2 7100-40-AG-CP- AC/DC or 7100-50/80-AG-CP- AC/DC or 7100-100-AG-CP- AC/DC

7100 – Tanker Decanting System Product Code
40 – Size 1.5”
50/80 – Size 2” or 3”
100 – Size 4”
AG – Decanting to Above ground tanks
CP – Customer pump
AC/DC – Power supply configuration



System Size	X (mm)	Y (mm)	Z (mm)
DN40	600	600	200
DN50	1050	950	330
DN80	1100	950	330
DN100	1200	950	330

**At least 300 mm of distance to be maintained from ground for removal of filter element*

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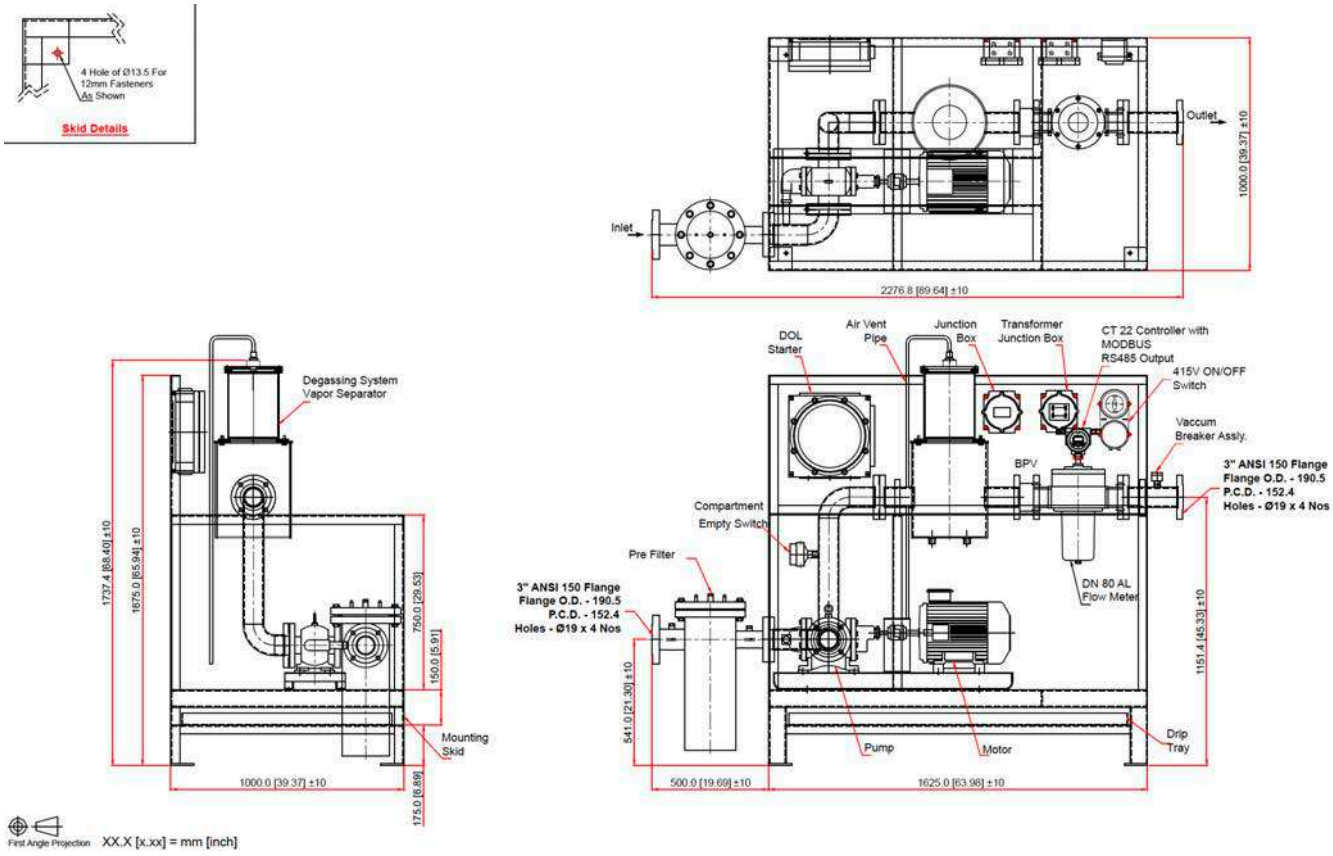
7.3 Tanker Decanting System with Fluidyne Pump

7.3.1 Helical Gear Pump (10/20/30 m3/hr)



The above sizes are representative and actual dimensions may vary with size and dimensions of filter, pump and overall skid. Head and flow calculations may vary order to order.

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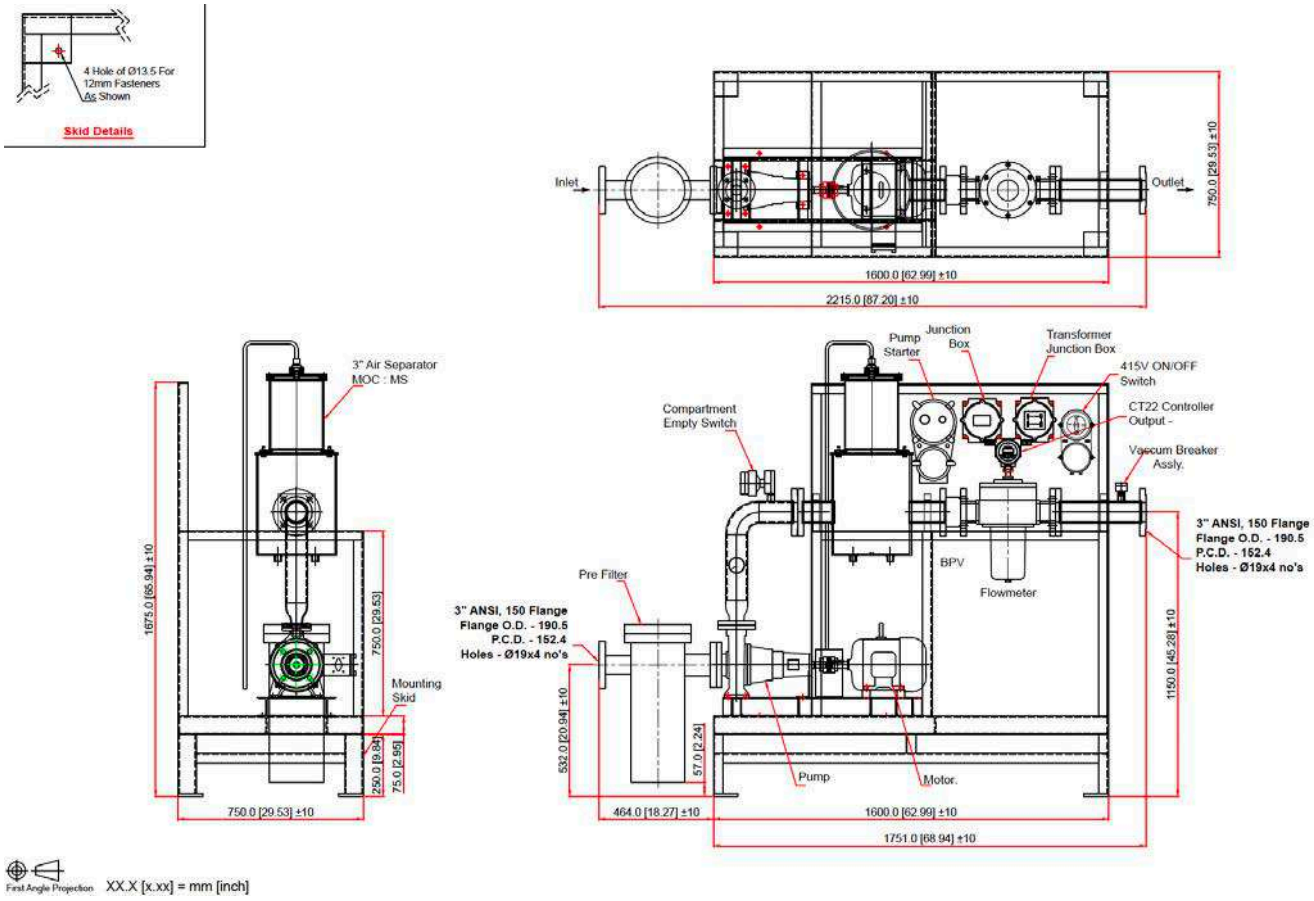
7.3.2 Centrifugal Pump (10/20/30 m3/hr)



The above sizes are representative and actual dimensions may vary with size and dimensions of filter, pump and overall skid. Head and flow calculations may vary order to order.

8. Standard Transmitter Parameters

The transmitter displays the following parameters on the 8X2 dot-matrix LCD display provided.

- The above display shows the Current Totalizer in Litres. This Totalizer can be reset to zero by long pressing the scroll Key. This totalizer will automatically reset to 0.0 after completion of 9,99,999 lits. The rate side depends on values set in Mode and Units. The second display shows the flowrate in Litres. This is a dynamic value which will change according to the flow of the fluid. This totalizer will automatically reset to 0.0 after completion of 9,99,999 lits. The rate side depends on values set in Mode and Units. Please view section 8.3 for more information

xxxxxx LT/UG/KG/LB/M3/TN/IG xxxxx LPH/UGH/LBH/M3H/TPH/IGH

- Press 'Scroll' Switch once to display the next parameter. This above display shows the Cumulative Totalizer in litres. This Totalizer cannot be reset to zero. Press 'Scroll Switch once to display the next parameter. This totalizer will automatically reset to 0 after 9,99,999.99 lits. The rate screen depends on values set in Mode and Units. Please view section 8.3 for more information

TT.LTR / TT GAL/ TT KGS/TT LBS/m3 xxxx

- This display shows the instantaneous flowrate through the meter. If the flow through the meter stops, the instantaneous flowrate will be zero. The rate screen depends on values set in Mode and Units. Please view section 8.3 for more information.

RATE LPH/LPM/KGPH/KGPM/LBPH/LBPM/m3/h

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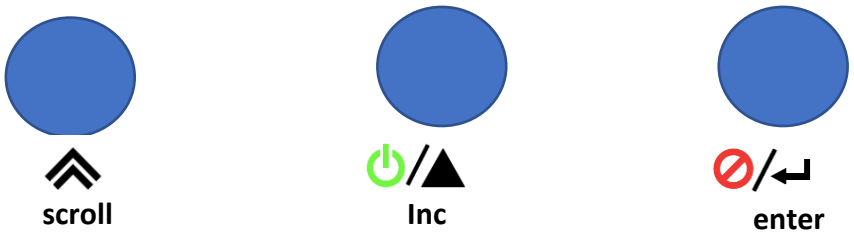
9. Internal Device Settings (Standard Transmitter)

9.1 Precautions prior to accessing settings

- Isolate power for at least 10 minutes before opening cover
- Ensure safe environment before opening cover
- Ensure that no liquid is being passed through flowmeter by stopping pump or isolation valve

9.2 Internal settings in transmitter device

- Keys are capacitive touch for products procured after October 2023. Hence use dry fingers to touch the key on the glass.



- Long press enter key for 5 seconds, the password screen comes up as below

PASSWORD
xxxx

- Use Scroll key to scroll between digits and INC key to set the digit. Enter the passkey as (1105) and press ENTER key to confirm the passkey.

9.3 General settings in device

- The first configurable parameter shown is the **Mode**. The mode has selection choice of VolFlow or MassFlow. The Fluidyne meter is capable of measuring values in terms of mass as well. For this, specific gravity of the liquid must be set in the following screens as well. Use the INC key to select VolFlow or MassFlow. The default value is VolFlow.

Use the enter key to scroll to the next screen.

- The next configurable parameter shown is the **Unit**. The mode has selection choice of Liter and Gallon for VolFlow mode. When mode is set to MassFlow, customer can select between Kilograms and Pounds. Use the INC key to select desired unit.

UNIT LITER/GALLON/KILOGRAM/POUNDS/M3

Use the enter key to scroll to the next screen.

- The next configurable parameter shown is the **Flow Rate.** This setting takes predecessor values of Mode as well as Unit to provide options of per minute or per hour readings. Hence, please select appropriate Mode and Unit prior to selection of flow rate units.

FLOW RATE LPH/LPM/KGPH/KGPM/LBPH/LBPM/m3h

Use the enter key to scroll to the next screen.

9.4 4-20 mA settings in device

- The next configurable parameter shown is the **Analog 4-20 mA.** This setting should be enabled to select max and min values in 4-20 mA limits or disabled if not required. Use the Scroll key to scroll between Once enabled, please check next parameter for setting the flowrate limits of 4-20 mA signal.

4-20 mA ENABLED/DISABLED

Use the enter key to scroll to the next screen.

- The next configurable parameter shown is the **4 mA flow rate.** This setting takes predecessor values of 4-20 mA to allow value setting. Enter the flowrate that is required for the transmitter to provide value of 4 mA.

4 mA F/R xxxx

Use the enter key to scroll to the next screen.

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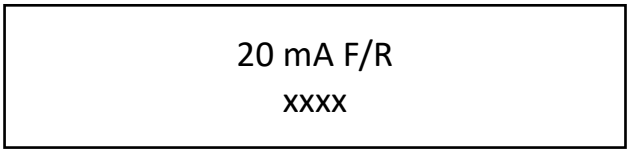
- The next configurable parameter shown is the **20 mA flow rate.** This setting takes predecessor values of 4-20 mA to allow value setting. Enter the flowrate that is required for the transmitter to provide value of 20 mA.



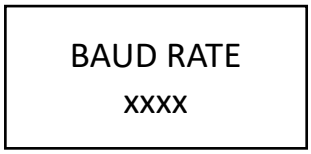
Use the enter key to scroll to the next screen.

9.5 MODBUS settings in device

- The next configurable parameter shown is **Slave ID**. There are maximum sixteen slave addresses that can be set from 01 to 255. Use Scroll key to select any required address. Press 'ENTER' key to confirm the settings.

Use the enter key to scroll to the next screen.

- The next configurable parameter is **Baud Rate**. There are five Baud Rate that can be set. They are 9600 B/S, 19,200 B/S and 38,400 B/S and 57,600 B/S & 115200 B/S. Use the Scroll key to select any of the above Baud Rates. Press 'ENTER' key to confirm the setting.



Use the enter key to scroll to the next screen.

- The next configurable parameter shown is **Parity**. Three options are available for this parameter. These are ODD Parity, EVEN parity and NONE Parity. Use 'ENTER key to confirm the settings.

Use the enter key to scroll to the next screen.

9.6 Density

- The next configurable parameter shown is **Density**. In case data is required in terms of mass flow, this parameter must be set to desired value. The units of this density screen are fixed to kg/l or $g/cm^{3.}$ Use the Scroll key to move between digits and the INC key to change digit values. Press the ENTER key to confirm value.

Density
xxxx

Use the enter key to scroll to the next screen.

9.7 Resolution Setting

- Long press enter key for 5 seconds, the password screen comes up as below

PASSWORD
xxxx

- Use Scroll key to scroll between digits and INC key to set the digit. Enter the passkey as (2222) and press ENTER key to confirm the passkey.

- The configurable parameter shown is **CT RES**. It is the resolution in the CT22. Three options are available for this parameter. These are 1, 2 and 3. Use Scroll key to set the resolution. Press 'ENTER' key to confirm the settings.

CT RES
1/2/3

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9.8 K-Factor

- Long press enter key for 5 seconds, the password screen comes up as below

PASSWORD
xxxx

- Use Scroll key to scroll between digits and INC key to set the digit. Enter the passkey as (1111) and press ENTER key to confirm the passkey.

- The configurable parameter shown is **K-Factor**. The maximum setting for the k-factor is 999.9999 ml/s. Use Scroll and Inc key to set the k-factor. Press 'ENTER' key to confirm the settings.

K-Factor
xxx.xxxx

The above screen can only be accessed via turning the slider switch position in the presence of authorized weights and measures inspector or Fluidyne personnel. Fluidyne does not recommend accessing this setting and it is forbidden to change meter factor without Fluidyne approval. Warranty will be void if this is discovered.

10. Internal Device Settings (CT22 transmitter)

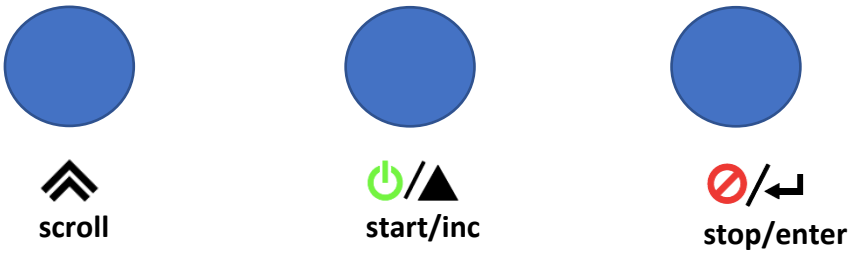
10.1 CT22 transmitter without GSM

10.1.1 Precautions prior to accessing settings

- Ensure that no liquid is being passed through flowmeter by stopping pump or isolation valve
- If cover is being opened, ensure complete isolation of power for 10 minutes before opening cover

10.1.2 Keys in CT22 device

- The front keys on the transmitter are labeled as scroll, start/increment and stop/enter respectively



10.1.3 Standard functions of keys

- The scroll key is used to scroll between the parameters on the main screen i.e. CT, TT and Rate.

- The start/inc key is used to start the pump and increment the digit values in settings. The CT22 however must be interfaced with the pump starter in order to derive the pump start function. Jump to section 6 to know more about starter wiring from CT22

- The stop/enter key is used to stop the pump and confirm a value or setting. The CT22 however must be interfaced with the pump starter in order to derive the pump start function. Jump to section 6 to know more about starter wiring from CT22

- **Do not press start key more than 2-3 times when empty pipe condition is detected**

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10.1.4 Internal settings in the transmitter

- Long press enter key for 5 seconds, the password screen comes up as below

PASSWORD xxxx

- Use Scroll key to scroll between digits and INC key to set the digit. Enter the passkey as (1105) and press ENTER key to confirm the passkey.

10.1.5 General settings in device

- The first configurable parameter shown is the **Mode**. The mode has selection choice of VolFlow or MassFlow. The Fluidyne meter is capable of measuring values in terms of mass as well. For this, specific gravity of the liquid must be set in the following screens as well. Use the INC key to select VolFlow or MassFlow. The default value is VolFlow.

MODE VOLFLOW/MASSFLOW

Use the enter key to scroll to the next screen.

- The next configurable parameter shown is the **Unit**. The mode has selection choice of Liter, USGallon, Imperial Gallon and m3 for VolFlow mode. When mode is set to MassFlow, customer can select between Kilograms, Tonns and Pounds. Use the INC key to select desired unit.

UNIT LITER/USGALLON/IMPGALLON/KILOGRAM/POUNDS/TONN/M3

Use the enter key to scroll to the next screen.

- The next configurable parameter shown is the **Flow Rate.** This setting takes predecessor values of Mode as well as Unit to provide options of per minute or per hour readings. Hence, please select appropriate Mode and Unit prior to selection of flow rate units.

FLOW RATE LPH/LPM/UGH/UGM/IGH/IGM/KGPH/KGPM/TNH/THM/LBPH/LBPM/m3h

In case CT22 with 4-20 mA is procured, the next settings are as follows. Otherwise, jump to section 10.1.7.

10.1.6 4-20 mA settings in device (for CT22 4-20mA)

- The next configurable parameter shown is the **Analog 4-20 mA.** This setting should be enabled to select max and min values in 4-20 mA limits or disabled if not required. Use the Scroll key to scroll between Once enabled, please check next parameter for setting the flowrate limits of 4-20 mA signal.

4-20 mA ENABLED/DISABLED

Use the enter key to scroll to the next screen.

- The next configurable parameter shown is the **4 mA flow rate.** This setting takes predecessor values of 4-20 mA to allow value setting. Enter the flowrate that is required for the transmitter to provide value of 4 mA.

4 mA F/R xxxx

Use the enter key to scroll to the next screen.

- The next configurable parameter shown is the **20 mA flow rate.** This setting takes predecessor values of 4-20 mA to allow value setting. Enter the flowrate that is required for the transmitter to provide value of 20 mA.

20 mA F/R xxxx

Use the enter key to scroll to the next screen.

10.1.7 Density

- The next configurable parameter shown is **Density**. In case data is required in terms of mass flow, this parameter must be set to desired value. The units of this density screen are fixed to kg/l or $g/cm^{3.}$ Use the Scroll key to move between digits and the INC key to change digit values. Press the ENTER key to confirm value.

Density
xxxx

Use the enter key to scroll to the next screen

10.1.8 Pressure Switch

- The next configurable parameter shown is **PRE SWCH**. In case pump start stop conditions are desired with the pressure this is to be used. Use Scroll key to Enable or Disable the setting.

PRE SWCH
ENABLE/DISABLE

Use the enter key to scroll to the next screen.

- The next configurable parameter shown is **PM OFFTM**. Time is set in seconds for the pump to stop after pressure switch is detected off. The maximum set time can be 100 secs. Use Scroll key to set the time. Press 'ENTER' key to confirm the settings.

PM OFFTM
xxx

Use the enter key to scroll to the next screen.

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10.1.10 MODBUS settings in device

- The next configurable parameter is **Baud Rate**. There are five Baud Rate that can be set. They are 9600 B/S, 19,200 B/S and 38,400 B/S and 57,600 B/S & 115200 B/S. Use the'Scroll' key to select any of the above Baud Rates. Press 'ENTER' key to confirm the setting.

BAUD RATE
xxxx

Use the enter key to scroll to the next screen.

- The next configurable parameter shown is **Parity**. Three options are available for this parameter. These are ODD Parity, EVEN parity and NONE Parity. Use 'ENTER key to confirm the settings.

PARITY
xxxx

Use the enter key to scroll to the next screen.

- The next configurable parameter shown is **Slave ID**. There are maximum sixteen slave addresses that can be set from 01 to 255. Use Scroll key to select any required address. Press 'ENTER' key to confirm the settings.

SLAVE ID
xxxx

Use the enter key to scroll to the next screen.

10.1.11 Pulse Output

- The next configurable parameter shown is **Pulse OP**. In case Pulse Set time and Pulse Units are desired this is to be used. Use Inc key to Enable or Disable the setting.

Pulse OP
ENABLE/DISABLE

Use the enter key to scroll to the next screen.

10.1.12 Pulse Output ON time

- The next configurable parameter shown is **Pulse Time**. It is the time, set in milliseconds for Pulse output to remain on. The maximum set time can be 99999 milliseconds. Use Scroll key to set the time. Press 'ENTER' key to confirm the settings.

PULSE TM
xxxxxx ms

Use the enter key to scroll to the next screen.

10.1.13 Pulse Output set point

- The next configurable parameter shown is **Pulse-Unit**. It is the quantity/amount set for the extra relay to start. Use Scroll key to set the pulse. Press 'ENTER' key to confirm the settings. The Unit side display depends on values set in Mode and Units.

Pulse-Unit
xxxxx.xx

Use the enter key to scroll to the next screen.

10.1.14 Velocity unit

- The next configurable parameter shown is Velocity. . Two options are available for this parameter. These are ft/s and m/s. Use Scroll key to set the velocity. Use 'ENTER key to confirm the settings.

VEL Unit
ft/s / m/s

Use the enter key to scroll to the next screen.

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10.1.15 Diameter (LSIZE)

- The next configurable parameter shown is **LSIZE MM**. It is the diameter of the pipe in use with the CT22. The maximum set diameter can be 999 mm. Use Scroll key to set the diameter. Press 'ENTER' key to confirm the settings.

LSIZE MM xxx

Use the enter key to scroll to the next screen.

10.1.16 Pump Control

- The next configurable parameter shown is **PMP CTRL.** It will help to Enable or Disable the Pump Start and Pump. Use Inc key to set the diameter. Press 'ENTER' key to confirm the settings.

PMP CTRL ENABLED/DISABLED

Use the enter key to scroll to the next screen

10.1.17 Resolution

- The next configurable parameter shown is **CT**. **RESL.** This setting is used to set the resolution as 1,2,3 (no. of digits after decimal). Press 'ENTER' key to confirm the settings.

CT. RESL 1/2/3

Use the enter key to scroll to the next screen

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10.1.18 HOA Mode

- The next configurable parameter shown is **HOA Mode.** This setting is used to set the controlling mode as Hand, Off or Auto.

HOA_Mode HAND/AUTO/OFF

Use the enter key to scroll to the next screen.

HAND Mode – To operate the unit via on-off buttons on CT22. Modbus data output is also activated

AUTO Mode – To operate the unit remotely via Modbus registers

OFF Mode – To bypass CT22 unit (buttons remain disabled) and system is controlled remotely by PLC via Start and Stop relay output wiring. Modbus data output is activated for read only purposes

10.1.19 Resolution Setting (CT22 controllers prior to Jan-2025

- Long press enter key for 5 seconds, the password screen comes up as below

PASSWORD xxxx

- Use Scroll key to scroll between digits and INC key to set the digit. Enter the passkey as (2222) and press ENTER key to confirm the passkey.

- The configurable parameter shown is **CT RES**. It is the resolution in the CT22. Three options are available for this parameter. These are 1, 2 and 3. Use Scroll key to set the resolution. Press ‘ENTER’ key to confirm the settings.

CT RES 1/2/3

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10.1.20 K-Factor

- Long press enter key for 5 seconds, the password screen comes up as below

PASSWORD
xxxx

- Use Scroll key to scroll between digits and INC key to set the digit. Enter the passkey as (1111) and press ENTER key to confirm the passkey.

- The configurable parameter shown is **K-Factor**. The maximum setting for the k-factor is 999.9999 ml/s. Use Scroll key to set the k-factor. Press 'ENTER' key to confirm the settings.

K-Factor
xxx.xxxx

Note - It is not advisable to change or access the meter factor without supervision or prior authorization of Fluidyne personnel or Weights and Measures inspector. Warranty will be void if basic meter factors are tampered or changed.

11. MODBUS RTU protocol in Fluidyne devices

The flowmeter always acts as a Modbus slave device and supports the following function codes only

Sr. No.	Functions	Function Code
1	Read Input Register	04
2	Read Holding Register	03
3	Write Multiple Holding Register	10

The Flow Transmitter/CT22 transmitter Modbus Module receives the frequency input from the Flow sensor, calibrates the signal based on the calibration factor programmed and transmits the following data to the Master.

1. Cumulative Totaliser : This is a non-resettable totaliser whose range is from 0 to 9999 9999 lits
2. Current Totaliser : This is a resettable totaliser whose range is from 0 to 999,999.9 lits
3. Instantaneous Flowrate in LPH or LPM. This depends on the setting in the parameter settings made by customer.
4. Density
5. Velocity
6. Empty pipe/pressure switch condition
7. Pump start stop condition
8. Pulse setpoint
9. Pulse On time
10. HOA Mode set

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11.1 Free and Open source Modscan software settings

1. To utilize these features effectively, follow these steps for setting up Modscan:
2. Install the Silicon Labs CP210x USB to UART Bridge drivers from Silicon Labswebsite. https://www.silabs.com/developers/usb-to-uart-bridge-vcp- drivers?tab=downloads
3. Install Modscan software on your system.
4. Launch Modscan.exe.
5. Navigate to Connection -> Connect.
6. Select the appropriate Port (Silicon Labs CP210x USB to UART Bridge) in the'Connect Using' option.
7. Adjust the Baud rate according to your configuration.
8. Confirm the settings by clicking OK.
9. Set the Length to 20.
10. In the Drop-Down menu, select Holding Register/Input Register.
11. Customize the Slave ID to match your code requirements.

11.2 Input read-only register map

Sr. No	Modbus Register	Represented Dataset	Description
1	30001 - 30002	Cumulative totalizer	Provides cumulative totalizer as per selected unit
2	30003 - 30004	Flowrate	Rate of flow
3	30005 - 30006	Density	Density defined by user in g/cm3 unit
4	30007 - 30008	Velocity	User-settable velocity in m/s or ft/s
5	30009 - 30010	Empty pipe signal	0: Idle state, 1: Signal ON, 2:Signal OFF
6	30011 - 30012	Pump Start/Stop	0: Idle state, 1: Pump ON, 2: Pump OFF
7	30013 - 30014	Pulse Time	Duration for spare relay activation (ms)
8	30015 - 30016	Pulse Unit	Unit value at which pulse is triggered
9	30017-30018	HOA mode	01: Hand operation 02: OFF (pump not operable via CT22) 03: Auto mode (PLC to control pump over Modbus
10	30019-30020	HOA Status	01: Fault condition 02: Okay condition

11.3 Holding read-write register map

Sr. No	Modbus Register	Represented Dataset	Description
1	40001 - 40002	Current totalizer	To reset, double click and set =0 or follow modbus query in below section
2	40005 - 40006	Pump Start/Stop	01 starts the pump. 02 stops the pump

11.4 Sample query and response 1 - Pump ON command

All sample queries are based in hexadecimal type mode.

Query

Modbus Query Positions	Position Value	Description
1	01	Slave Id
2	10	Function code
3	00	Data Address of Register (High)
4	04	Data Address of Register (LOW)
5	00	No of register requested (High)
6	02	No of register requested (LOW)
7	04	Byte Count
8	3F	Register Value (high)
9	80	Register Value (low)
10	00	Register Value (high)
11	00	Register Value (low)
12	CRC	Error Check
13	CRC	Error Check

Response by Fluidyne device (slave)

Response	Description
1	Slave Id
10	Function code
00	Data Address of Register (High)
04	Data Address of Register (LOW)
00	No of registers (High)
02	No of registers (LOW)
CRC	Error Check
CRC	Error Check

11.5 Sample query and response 2 - Pump OFF command

All sample queries are based in hexadecimal type mode.

Query - Master

Modbus Query Positions	Position Value	Description
1	01	Slave Id
2	10	Function code
3	00	Data Address of Register (High)
4	04	Data Address of Register (LOW)
5	00	No of register requested (High)
6	02	No of register requested (LOW)
7	04	Byte Count
8	40	Register Value (high)
9	00	Register Value (low)
10	00	Register Value (high)
11	00	Register Value (low)
12	CRC	Error Check
13	CRC	Error Check

Response by Fluidyne device (slave)

Response	Description
1	Slave Id
10	Function code
00	Data Address of Register (High)
04	Data Address of Register (LOW)
00	No of registers (High)
02	No of registers (LOW)
CRC	Error Check
CRC	Error Check

11.6 Sample query and response 3 - Reading main data registers

All sample queries are based in hexadecimal type mode.

Query - Master

Modbus Query Positions	Position Value	Description
1	01	Slave Id
2	04	Function code
3	00	Data Address of Register (High)
4	00	Data Address of Register (LOW)
5	00	No of register requested (High)
6	10	No of register requested (LOW)
7	CRC	Error Check
8	CRC	Error Check

Response by Fluidyne device (slave)

Modbus Register	Description
30001	CUMULATIVE.LTR (XXXXXXX.XXXXX)
30002	
30003	Flow Rate (LPH/LPM)
30004	
30005	Density (g/cm3)
30006	
30007	Velocity (ft/s or m/s)
30008	
30009	Empty pipe signal
30010	
30011	Pump status
30012	
30013	Pulse ON time
30014	
30015	Pulse Unit
30016	

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11.7 To reset the value of the Current LTR using Function code (0x10) preset multiple registers

All sample queries are based in hexadecimal type mode.

Query

Modbus Query Positions	Position Value	Description
1	1	Slave Id
2	10	Function code
3	00	Data Address of Register (High)
4	00	Data Address of Register (LOW)
5	00	No of registers (High)
6	02	No of registers (LOW)
7	04	The number of bytes to write
8	00 00	Value write at 400001(High)
9	00 00	Value write at 400001(LOW)
10	CRC	Error Check
11	CRC	Error Check

Response by Fluidyne device (slave)

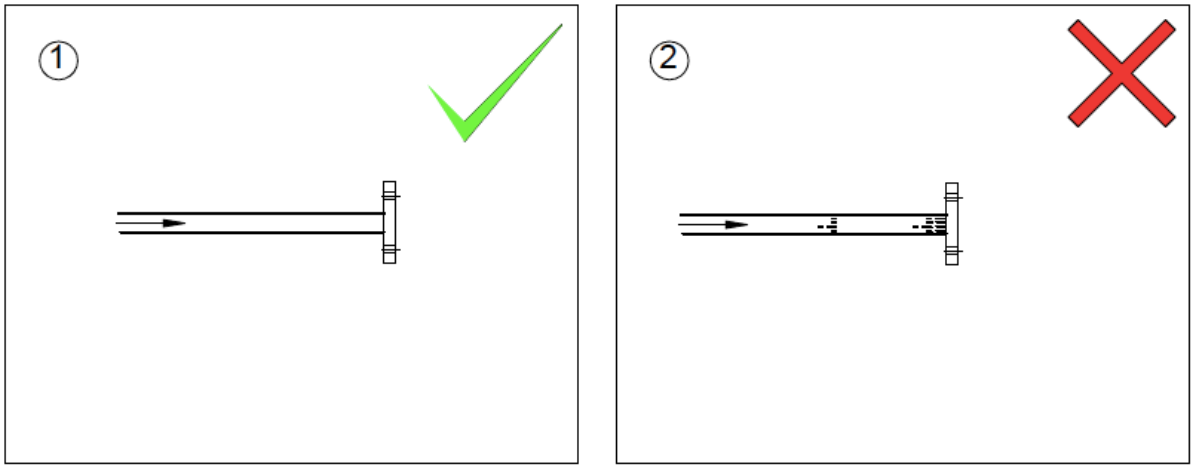
Response	Description
1	Slave Id
10	Function code
00	Data Address of Register (High)
00	Data Address of Register (LOW)
00	No of registers (High)
02	No of registers (LOW)
CRC	Error Check
CRC	Error Check

12. System Installation Guidelines

12.1 Prior to installation of system

Review the system installation to ensure all components are in proper sequence, all isolation valves must be closed and all electrical connections are complete.

Before the system is installed in line ensure that the line is sufficiently flushed with water or required liquid service in order to remove any debris like burr, soil particles and other dirt, rust, welding slag. This is observed usually when new pipelines are built and flowmeters are used to measure flow in pipeline. This flushing process can be done by installing a spool piece of the same length as the system to connect two parts of the pipework where the flowmeter would originally be installed.



1- Ensure that piping is free of burr, particles and other material before flowmeter installation
2 – Particles left behind might jam the internal measurement chamber or cause filter choke. It is recommended to take a few runs of liquid and collect the same into a storage tank until the service at the installation point appears clean and devoid of solid matter

12.2 Air elimination

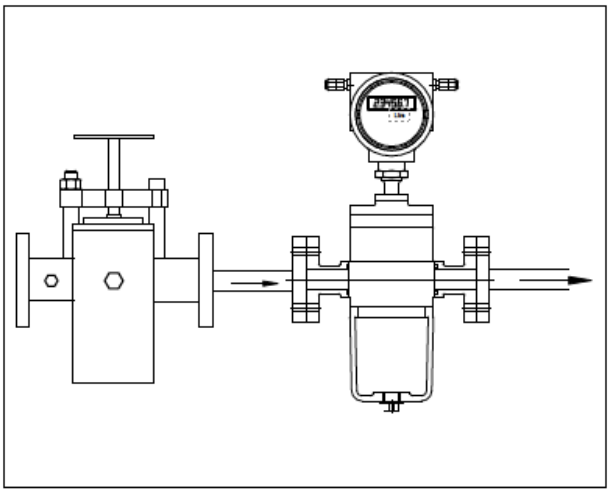
The Fluidyne 7100 comes with inbuilt air separation mechanism. Air eliminator must be mounted in horizontal position only

12.3 Empty Pipe Condition

The CT22 controller detects empty pipe condition automatically. This feature is not available in standard transmitter. After empty pipe is detected, start key must be pressed only 1-2 times to remove product from the system. Dry running of pump repeatedly after empty pipe condition will result in permanent damage to mechanical seal.

12.4 Continuous Operation - Clean Filtered Liquid Service

The tanker unloading system is suited for for clean service applications. The flowmeter is not suitable for liquids with greater than 149 micron particle sizes because the internal piston will not be able to move smoothly and will soon not move at all due to build-up of debris and solid sludge inside the meter.



Strainers are installed in pipelines ahead of pumps, meters, valves etc to protect such equipment from intrusion of pipe scale, welding splatter and other foreign material.
The use of proper size strainer together with a basket of suitable mesh pays dividends in reduced maintenance on mechanisms which are in contact with flowing liquids. When it is known that comparatively large amounts of lint or iron oxide are present in stream, a large strainer must be used as these materials clog up basket screens rapidly-especially if resins, gums or varnishes are also present.

Larger size foreign matter like pebbles, welding beads etc should be removed at frequent intervals to prevent their abrasive action from damaging the basket screen.

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Fluidyne 7100 series features the PD meter with equipped with 149 micron reusable strainer. However, it is recommended that the customer installs additional 100/50 micron (minimum) strainer upstream in the inlet run of the air separator in the pipework.

This enables all filter cleaning service to be localized at large strainer location and the larger strainer will also take longer for dirt deposits to eventually reduce flowrate to a certain threshold due to large surface area.
Fluidyne 7100 series with complete skid features the 100 micron strainer in the suction of the pump.

12.5 Normal startup

1 - To pressurize system, slowly open the inlet valve so as to prevent system shock. Slowly allow the product to enter the system whilst keeping the downstream isolation valve closed

2 – Open the downstream valve by 10% to allow any air to be flushed out from the system. Do not overspeed the flowmeter

3 – Once the air has been flushed from the system, close the downstream isolation valve and check for leaks. If leaks are found, ensure all seals and retighten the connections

4 – Fully open the upstream isolation valve to pressurize the system

Flow start up can commence once the system has been pressurized.

1. Turn on all electronic circuits and check for proper function

2. Open flow control valves and allow the instrument to run at 20% of its rated flow for 5 minutes

3. During this initial run, check all other components in the system for functionality

4. Once this run is complete, set the flow control valve to the required flow and ensure that the maximum flow for the instrument is not exceeded

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12.6 High temperature startup

On higher temperature start up above 212 F (100 C) based on an ambient temperature of 25 C, special start up procedures are required to prevent damage to the system components. A similar procedure should be followed on any thermal shock in excess of 80 C. The following equation may be used to determine approximate flowmeter warm up time.

$T_h = ((C_{nom}) * (OT_F-212)) / 100$

T_h – warm up time in hours
C_{nom} – Nominal connection size
O_T – Operating Temperature in F

During this warm-up time the meter should be operated at approximately 5% of maximum flow so that temperature stabilizes slowly.

12.7 Control Valves

Safety and isolation valves must be used throughout the system. In any pumping system where there is one pump and multiple flowmeters, digital or hydro-mechanical rate-of-flow control valve must be used for each flowmeter to prevent the meter from operating above maximum flow rating

12.8 Best plumbing configuration

1. Systems without skids must have secure mounting to a riser stand or foundation
2. Inlet and outlet must be secured and weight of system must be supported
3. The pipe must be installed as straight as possible to prevent pressure drop due to flow restrictions
4. The metering system must include a means for onsite calibration with two parallel isolation valves in a T joint installed immediately at outlet of flowmeter

12.9 Hydraulic Shock (Water-hammer effect)

Hydraulic shock is the rise in pressure that occurs when an operating system has a sudden and immediate change in direction of flow. This can be due to valve closure while the system is operating at high flow rates. Hydraulic shock can damage the meter piston and other components and also valves and pumps. The use of 2 stage preset control valves or surge suppressing bladders or risers help reduce or eliminate this problem.

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12.10 Products that dry/crystallize or polymerize

There are many liquids that crystallize, harden or polymerize on contact with air or decreased temperature. A proper system design and a good understanding of the product being measured will help avoid the possibility of air entering the system and product to be affected.

In applicable cases, customers must ensure heating or insulation of pipelines near to the point of flowmeter installation or continuous circulation of the product so that it does not solidify upon staying stationary or even flushing the lines with DM water to remove all traces of the product.

12.11 Custody transfer

A right k factor will need to be established under actual operating conditions if the instrument is to be used in custody transfer applications. This initial proving run should be carried our following the completion of above startup procedure and in accordance with local regulations.

NOTE – There are no user adjustable parts in the flowmeter. However, the meter cover and transmitter are provided with two cross-drilled bolts to facilitate sealing if required by local weights and measurements regulations.

To reach the k factor setting in flowmeter, the DIP switch contact at the bottom right of the meter must be moved to unlock position. This should only be done in the presence of a local Weights and Measures inspector or Fluidyne authorized serviced person.

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12.12 Strainer Baskets

To be efficient, strainer baskets must be kept clean. A buildup of sediment increases pressure drop and decreases flow. If a basket is allowed to become completely clogged, damage will result. A regular procedure should be set up for cleaning the strainer baskets – the frequency depending on amount and character of foreign material in stream. It is advisable to keep a spare basket on hand.

Recommended screen mesh for various liquids

Liquid types	US Mesh
Gasoline/Diesel or similar liquids	60 to 100
Aviation fuels	80
Solvents, chemicals	100
Mineral spirits, heating oils	100

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13. Maintenance

The Fluidyne 7100 tanker decanting system will give many years of consistent performance with little need for maintenance or service. There are, however, several recommendations which if followed, will further extend the instrument's service life.

The instrument should be kept filled with the process fluid it is measuring. This prevents the exposure to any product vapors which, in the case of many products, are more corrosive than their liquids. In addition, this also prevents formation and build-up of deposits or gums which would cause increased mechanical friction. The instrument should be kept free of air, the Fluidyne air separator with back pressure valve device helps to achieve this

Filter and strainer baskets should be cleaned frequently. Debris and foreign matter are the biggest cause of meter wear and damage.

All other associated equipment within the system should be regularly maintained and checked for functionality.

NOTE – If instrument is being used in hazardous area, all instructions on the label and in this manual must be followed before the start of any maintenance.

If the instrument is removed from the process line, the line should be sealed with suitable blanking flanges to prevent any possible leakage of product.

13.1 Performance Considerations

The amount of maintenance necessary for efficient instrument performance is dependent on many factors and some are listed below –

Continuity of Operation – An instrument that operates continuously will require more attention than one used intermittently.

Working Flow Rate – The life of the instrument is proportional to the speed of its operation. If the instrument is operating at near or above maximum flow rate it will have a shorter life expectancy than if it were operating at its minimum flow rate.

Lubricity – The lower the lubrication properties of a process fluid being measured, the lower the life expectancy of the instrument.

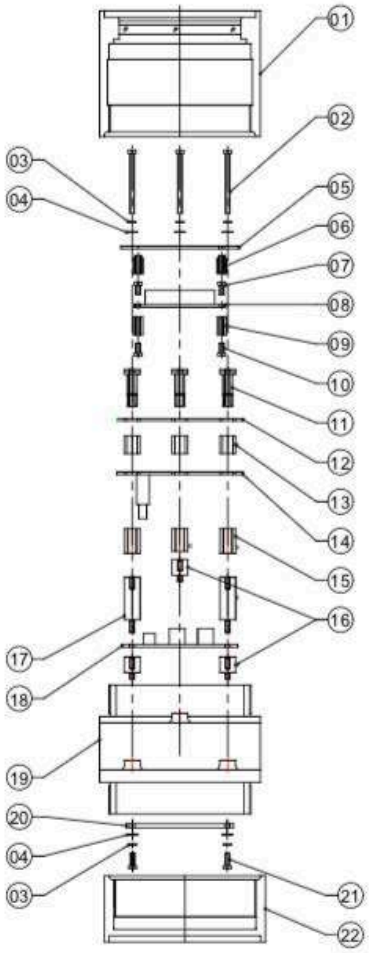
Cleanliness – A product contaminated with abrasive particulate will accelerate the wear of the instrument.

13.2 Electronics

This instrument can be provided with up to five magnetic pickup sensors and a common pre-amplifier. Maintenance of the electronics does not require system line pressure to be drained or the instrument to be removed from the system.

ESD precautions must be followed.

13.3 Removal/Replacement of the electronic cards



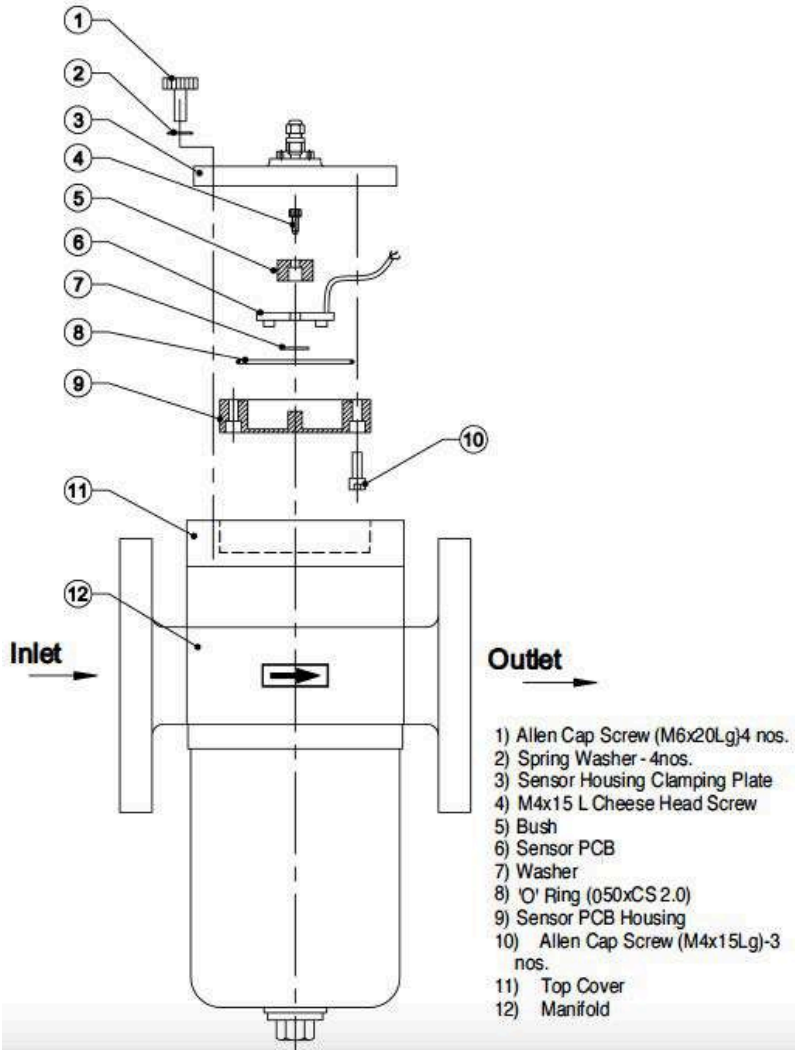
01) Front Cover
02) Ch Head Screw(M3×40) - 03 Nos
03) Spring Washer
04) Plain Washer
05) Facia PCB
06) Display PCB Rivet - 02 Nos
07) Ch Head Screw (M3×6)- 03 Nos
08) Display PCB
09) Display PCB Spacer-1 - 04 Nos
10) Ch Head Screw (M3×20)- 02 Nos
11) Stud For Spacer Clamping - 3nos
12) CPU PCB
13) Sleeve Spacer - 3 Nos
14) Power Supply PCB
15) Stud Clamp Spacer - 3 Nos
16) Bottom Spacer 2 - 3 Nos
17) Bottom Spacer 1 - 2nos
18) Mother Board PCB
19) Housing
20) Rear Terminal PCB
21) Ch Head Screw (M3×8)- 02 Nos
22) Rear Cover

Caution – Isolate power before removing front cover. Do not open when module is energized.

The front cover has to be screwed out to access the electronic card stack. The stack must first be disassembled by removing the screws, spacers and washers. may be removed from. Gently disassemble the relevant card by opening the FRC connectors of burge strip connection if any.

New card supplied must be placed and care must be taken to ensure correct matching of the connectors. After this is complete, reassemble the stack by inserting the screws, spacers and washers in the same correct order. The cover can then be screwed shut.

13.4 Removal/Replacement of the sensor card

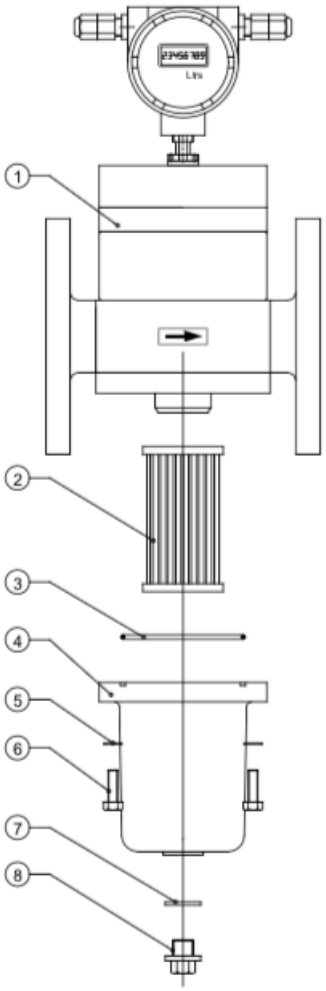


Caution: Ensure no flow in pipeline. Isolate the flowmeter on upstream and downstream ends. Ensure isolation of power before opening cover.

At times it may be necessary to change the flow transducer board. This can be done by unscrewing the allen cap screws 1 and then reaching the sensor PCB 6. The sensor PCB must be removed from position by loosening the screw 4. Remove the PCB and discard it.

Place new sensor PCB in housing, insert screw 4 and bush 5 and tighten to secure the flow sensor PCB. The orientation of the PCB does not matter. Ensure that the PCB fits with sensor side facing downward.

13.5 Removal/Replacement of the meter filter



1) Flow Sensor Assembly
2) Filter Element *
3) `O' Ring Seal (Ø87.7×Ø2.62) *
4) Filter Housing
5) Spring Washer - 4 nos.
6) Hex Bolts (M6×25Lg) - 4 nos.
7) Dowty Washer *
8) Drain Plug

* Denote Recommended Spares

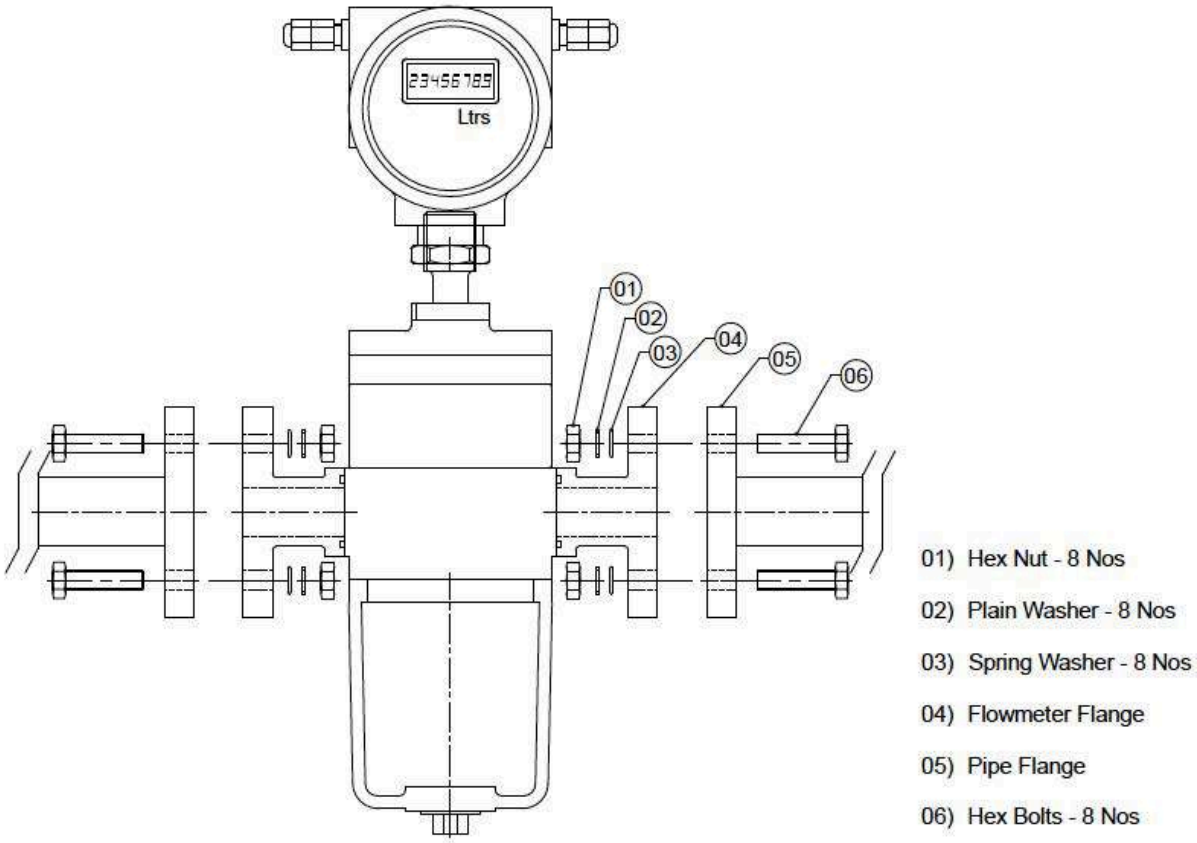
Caution: Ensure no flow in pipeline. Isolate the flowmeter on upstream and downstream ends.

To remove the filter, loosen the bolts shown in 6 and remove the filter housing 4. Then gently remove the filter element 2 from its position. Examine the filter element for debris, weld splatter and other foreign particles.

Clean the filter in a jet of debris-free clear DM water. Ensure all debris is washed away and filter is free of contaminants. Check the filter again for any damages to the mesh. If the mesh appears damaged, contact your local Fluidyne representative for replacement.

If filter is not damaged, dry the filter with compressed air at 2-3 bar. Fit the filter back into the flowmeter, change the O Ring seal 3 and with the help of original bolts, screw the filter housing back on the filter.

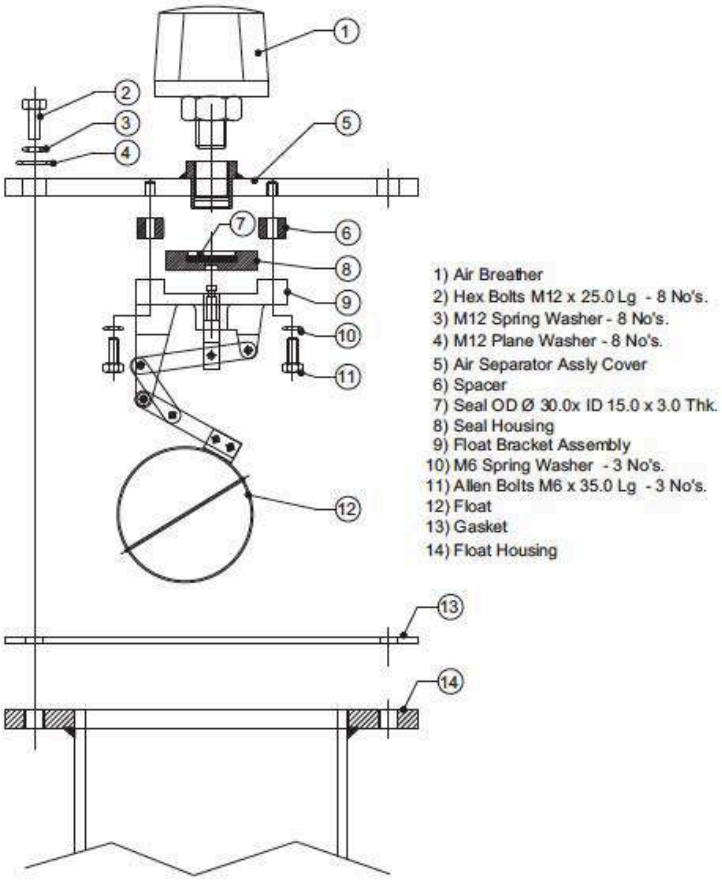
13.6 Removal/Replacement of the flowmeter from the process line



Caution – Isolate power before removing front cover. Do not open when module is energized.
Ensure all liquid is drained from the flowmeter and isolate the flowmeter on upstream and downstream ends.

Unbolt the pipe flange from the flowmeter flanges and support the weight of the flowmeter while it is being removed.

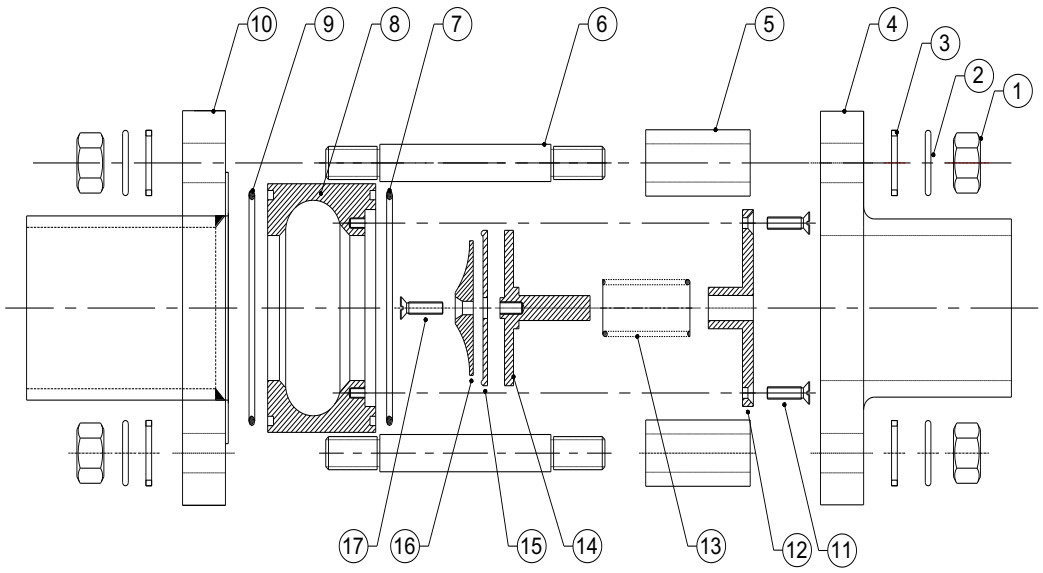
13.7 Air separator internal assembly



At times, the air separator might not function as expected and might release liquid in small amounts along with vapor or might not separate air efficiently leading to inaccuracy in measurement.

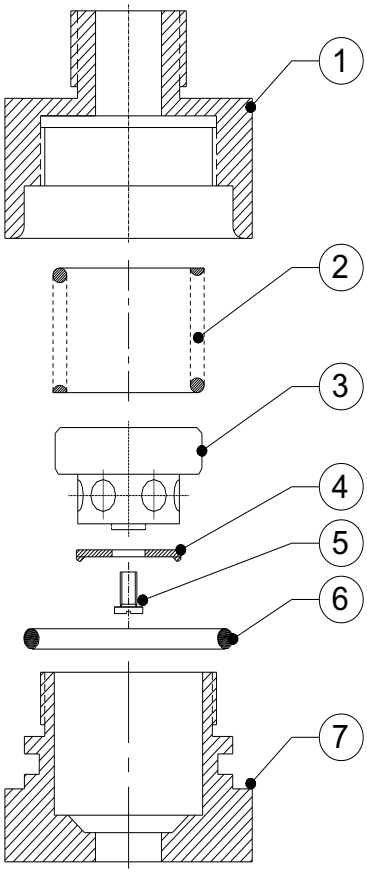
In this case it is recommended that the customer purchase spares of all parts and replace them with the technical support of a Fluidyne representative.

13.8 Removal of the Back Pressure Valve Assembly



1) Nut - M16 - Nos4
2) Spring Washer - M16 -Nos 4
3) Plain Washer - M16 - Nos 4
4) Meter Flange
5) NRV Reasting Bush
6) NRV Reasting Stud
7) O' Ring ID Ø105 × 4.0 mm C/S
8) Valve Body
9) O' Ring ID Ø105 × 4.0 mm C/S
10) Air Separator Flange
11) CSK Screw - M5 × 12 - Nos 4
12) Valve Guide Plate
13) Spring for Centrifugal Pump
14) Seal Reasting Plunger
15) Back Pressure Valve Seal
16) NRV Washer
17) Allen CSK Screw - M5 × 15 - No 1

13.9 Removal of the Vacuum Breaker Assembly



1) Vaccum Breaker Valve Body
2) Check Valve Spring
3) Liquid Valve
4) Liquid Valve Seal
5) CH Head Screw M3×6
6) "O" RING Ø32.0×3.0
7) Vaccum Breaker Valve Cap

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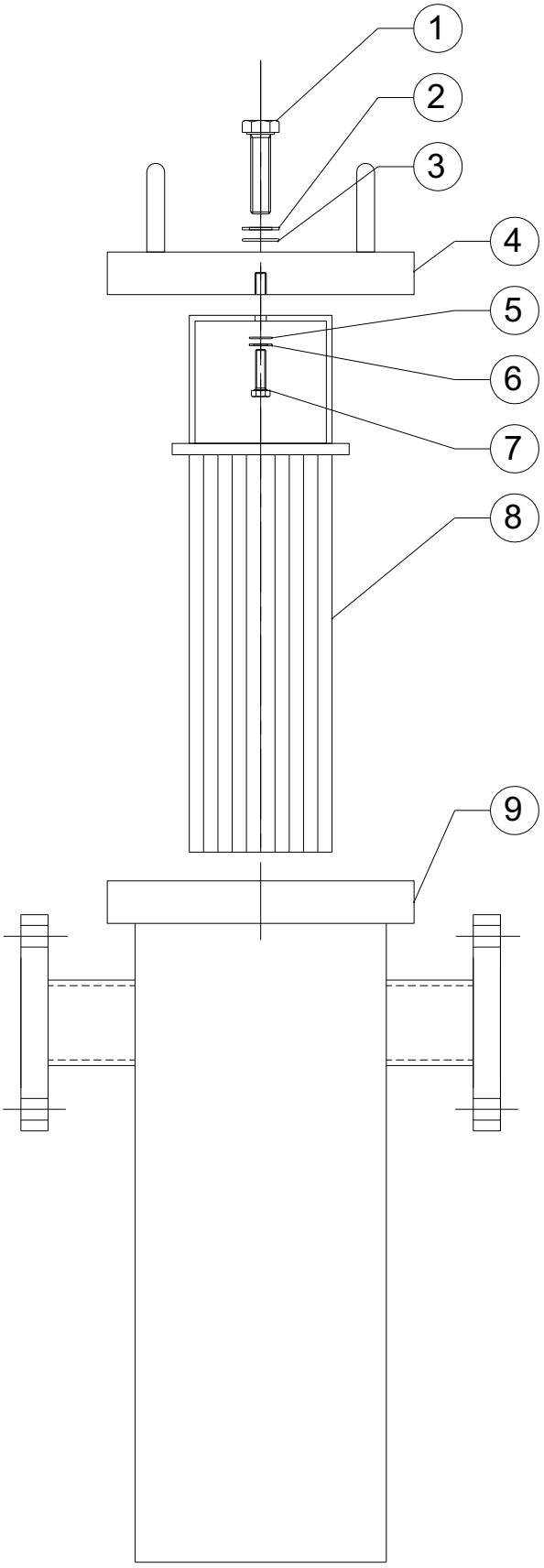
13.10 Removal and service of the 100 micron pre-filter assembly



1) Hex Bolt
2) Spring Washer
3) Plain Washer
4) Cover
5) Plain Washer
6) Spring Washer
7) Hex Bolt
8) Filter Element
9) Housing

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13.11 Preventive Maintenance checklist

Sr No	Part	Maintenance	Description	Recommended Period	Priority
1	Pre-filter/Duplex filter	Cleaning	Wash filter mesh with solvent or diesel. Air dry with compressed air	After decanting tanker	High
2	Pump	Oil	If color of oil becomes amber, oil must be changed	Quarterly	Medium
		Mechanical seal	Replacement In case of leak	When leakage is observed	Medium
		Motor+Pump alignment	Run-out within 0.1 mm	Prior to decanting tanker	Medium
		Vibration	Check for unusual vibration	As and when required	Medium
		Gaskets	Inspect to ensure no leak	Once a month	Medium
3	Flowmeter	Calibration	Send to Fluidyne factory for maintenance and recalibration	Once a year	Medium
		Filter element	Wash filter mesh with solvent or diesel. Air dry with compressed air	After decanting tanker	High
4	Bolts	Checking tightness	Tighten all flange joints, bolts periodically	Prior to decanting tanker	Medium

14. Troubleshooting

The information on this section has been provided as an aid for basic troubleshooting. Disassembly procedures have been outlined in chapter 12. If the 6600 has been found to be in need of repair, it is recommended the user contact the nearest Fluidyne service office or representative. It is important that servicing is performed by trained and qualified personnel.

Condition	Probable Cause	Corrective Actions
No change in flow parameter/pulse output not present	No flow through meter	Ensuring the pipeline has requisite flow
	Improper electrical connection	Ensure proper wiring connections have been made
	Insufficient input voltage	Supply sufficient voltage as per spec
	Power failure	Ensure power is connected to device and all associated accessories
	Piston jammed with debris	Open meter, clean the internal measurement chamber. Check for damages to internal parts
	Flow transducer failure	Replace flow sensor PCB
	Filter element choked (Flowmeter / Pre-Filter)	Remove filter element and clean with clear DM water and air dry with 4 kg/cm^2 compressed air
Erratic/Non-uniform pulse output	Improper electrical connection	Ensure proper wiring connections have been made
	Insufficient or fluctuating supply voltage	Supply sufficient voltage as per spec
	Piston movement impaired due to debris/solid matter	Open meter, clean the internal measurement chamber. Check for damages to internal parts
	Piston magnet insensitive	Send flowmeter to Fluidyne lab for checking
	Flow transducer failure	Replace flow sensor PCB
	Filter element choked	Remove filter element and clean with clear DM water and air dry with 4 kg air
Modbus data not showing	Improper connection	Connection with A, B and termination must be checked

	Breakage in wiring	Check wiring line for any damages or breakages. Isolate flowmeter before repair
	Wrong polling of registers or wrong slave settings	Read section 11 and 8.5 for correct settings on device
	Module damaged	Connect with Fluidyne representative for card change
4-20 mA data not showing	Improper connection	Please check the connections at system and flowmeter end
	Damage to module due to swapped connections	Connect with Fluidyne representative for card change
	4-20 mA mode not enabled	Please read section 8.3 for enabling signal output
Meter counting when tanker delivery is complete	Air separator not removing air	Remove air separator float assembly and send to Fluidyne for QC and replacement if required
	Back pressure valve is choked and has not closed fully	Uninstall back pressure valve and send to Fluidyne for QC, cleaning and replacement. Check section 13.8
Pump not switching ON	Motor damaged	Replacement of motor required
	3 phase supply hampered	Ensure all three phases are connected with recommended voltage
Leakage from pump assembly	Mechanical seal damaged	Replace mechanical seal
	Pump oil level above desired limit	Let oil drain upto maximum level in trap. Wipe of excess spilt oil and do not fill the oil beyond the max level
Vacuum breaker leakage	Tank is located above ground/overhead	Vacuum breaker is given only for underground tanks and is not to be used for above ground tank transfer
	Vacuum breaker seal damaged	Replace seal of vacuum breaker. Check section 13.9

15. Contact personnel

Original Equipment Manufacturer

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