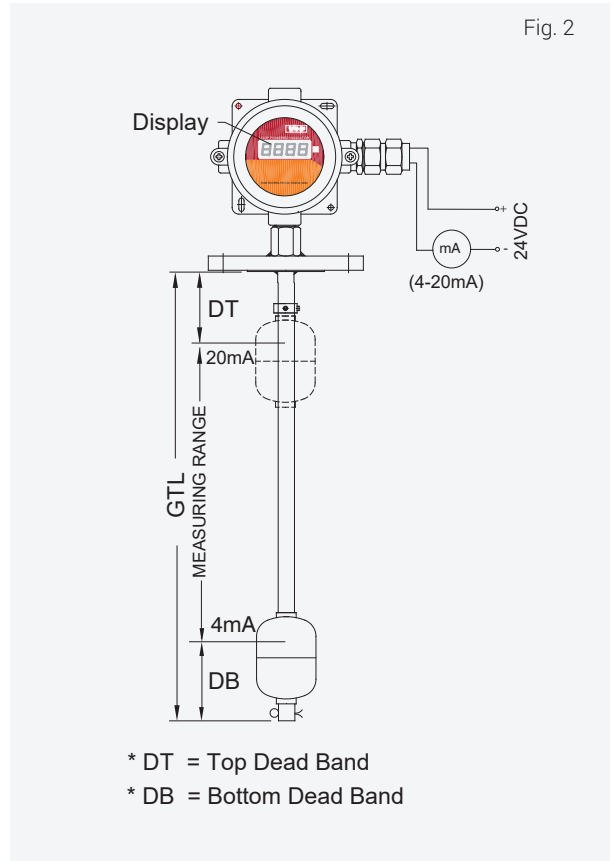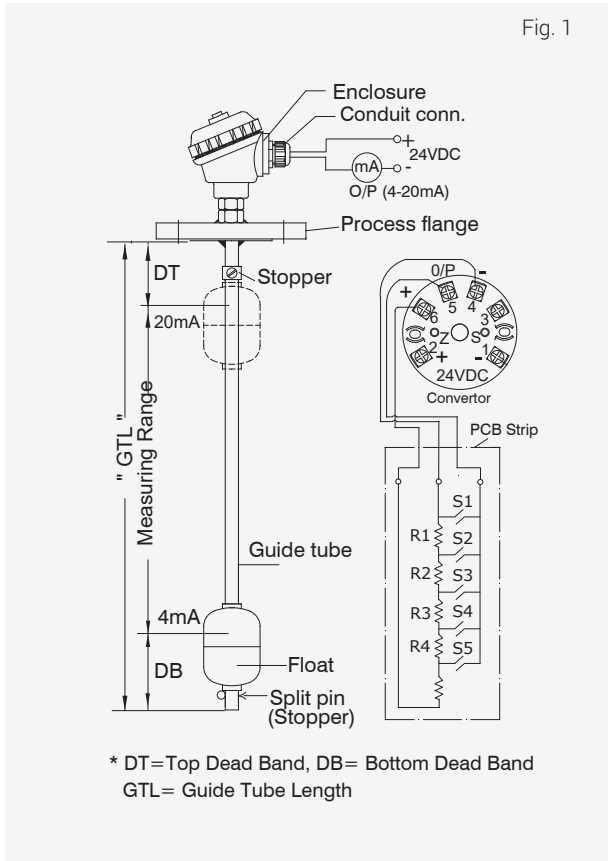Techtrol
Innovating Level Controls Since 1984

Float Guided Transmitter
- FGT

INSTRUCTION AND MAINTENANCE MANUAL

Every Techtrol product should be installed properly, maintained regularly and used within its specified limits to ensure accurate & troublefree performance with extended working life.

'FGT' is used for continuous level indication. It is available in two configurations.

1. FGT (fig 1) provides variable o/p viz . 4-20 mA, 4-20mA with HART, 1 - 5 VDC or RS485. There outputs can be wired to any remote display unit viz. TLPI, TLIC or TUIC to indicate level and control or PLC/DCS.

2. FGT with integral display (fig 2) provides 4-20mA output and in addition, indicates liquid level in mm or % or mtrs on display

Fig. 1

* DT=Top Dead Band, DB= Bottom Dead Band
  GTL= Guide Tube Length

Fig. 2

* DT = Top Dead Band
* DB = Bottom Dead Band

1. PRE-INSTALLATION CHECK

- Ensure supplied goods are in accordance to required specification.

- Ensure FGT is not physically damaged & stoppers have not loosened in transit.

- FGT is **pre calibrated** by setting trim pot on convertor and should be installed **without disturbing** it.

- Follow the steps below to check with 4 to 20 mA output.

  ☺ Connect -ve of 24VDC supply −ve (1) terminal of x'mitter. Connect +ve of 24VDC to +ve terminal (2) of x'mitter through a multimeter in current mode such that it is in series, as shown in fig 3

  ☺ Move the float manually over the guide tube gradually from bottom to top end and observe change in current readings in an ascending order.

  ☺ The multimeter will indicate 4mA, when float is in bottom position and 20mA in top position.
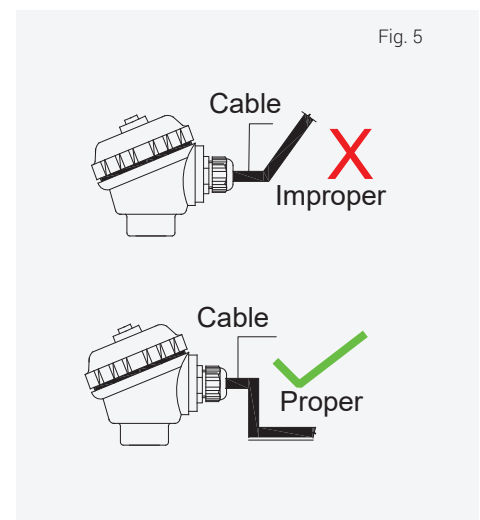

Fig. 3
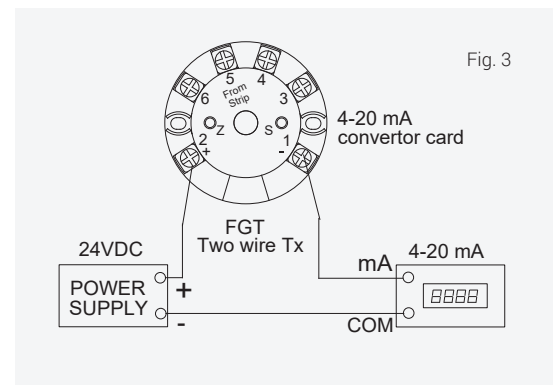
2. INSTALLATION

- FGT is top mounted transmitter. It can be installed internally or externally through external chamber.
- Select suitable location for transmitter on tank where vibrations are minimum. Perforated still well is recommended for tanks with excessive turbulence.
- Ensure process connection of transmitter should match with counter connection provided on tank.
- Ensure ID (d) of nozzle is greater than float OD to enable insertion of transmitter through the nozzle. In case d< float OD, remove the float and re- insert on guide tube from below after installing transmitter without float.
- In case of external mounting, provide separate isolation valve on the tank for safety and removal of level transmitter for repairs and maintenance.
- Ensure that there is no leakage at process connection by providing gasket / tape for flanged / threaded connections respectively.
- In case of outdoor location, electronics should be protected from severe weather conditions by using canopy.

Fig. 4

Internal Mounting   External Mounting
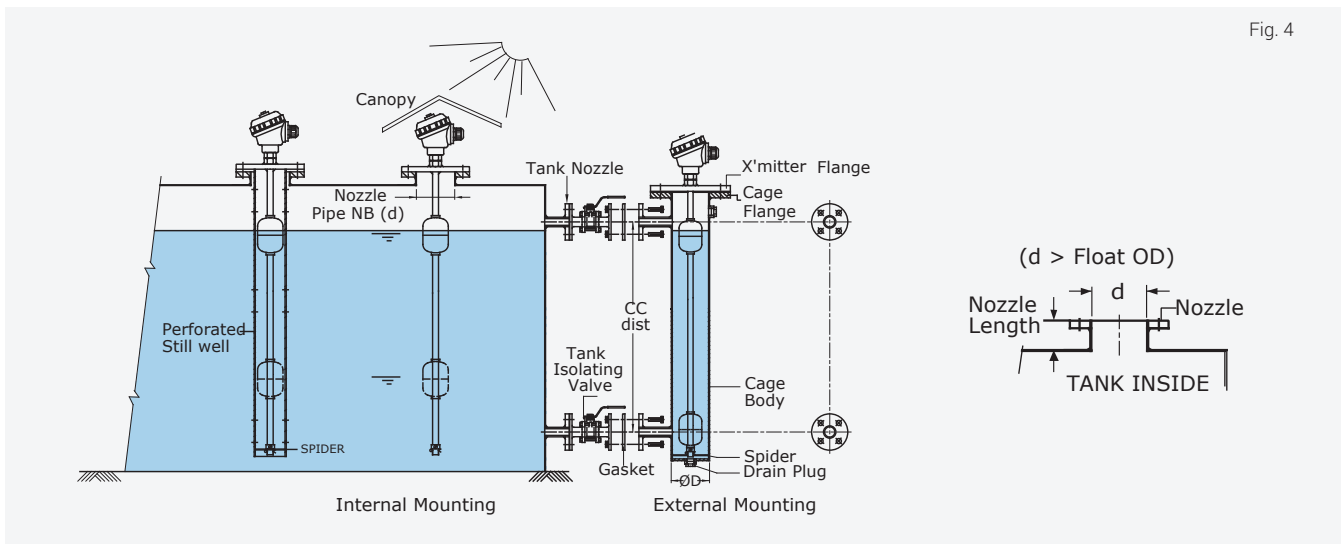
3. TERMINATION & WIRING

- While wiring, power supply should be strictly **off.**
- Ensure the distance between transmitter and controller should not exceed 3000 mtrs. ('Max load' = 600 Ohm)
- Wires/cables from enclosures are routed down to avoid seepage of water inside the enclosure. Fig 5
- Follow the diagrams showing 'Termination & Wiring' of FGT with other instruments.
- In case of FGT with RS485 output, refer protocol document for DIP switch setting.
- FGT with intrinsic safety is supplied with zener barrier. Refer for wiring while ensuring **that zener barrier is installed in safe area.**
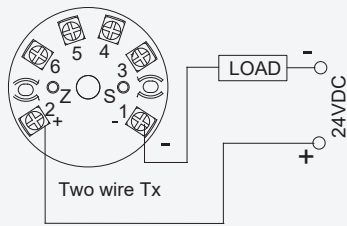

Fig. 5

Cable — X Improper

Cable — ✓ Proper

FGT with 4-20mA O/P

Two wire Tx

LOAD

24VDC

FGT with Intrgral Display

24VDC

Fig. 6

FGT with 1-5 VDC O/P

24VDC Supply   1- 5 VDC O/P
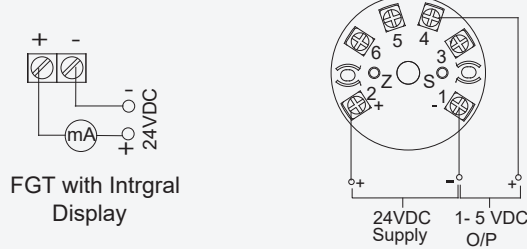
Fig. 7

FGT with RS485 O/P

+ - + - S

RS 485

24VDC

Fig. 8

FGT with LP- Cator

FGT Termination

LP- Cator

To X'mitter   24 VDC Loop Powered
+   -   +   -

Two wire Tx

24VDC

Fig.9

FGT with TUIC/TLIC

FGT Termination

TUIC/TLIC

Output 24V DC   Input 4-20mA

Two wire Tx
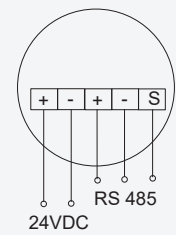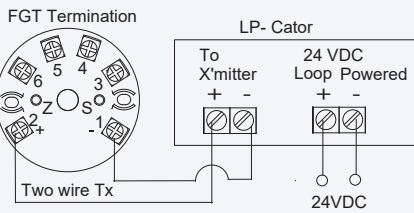
Fig. 10

FGT Intrinsically Safe

FGT Termination   Zener Barrier
O/P   I/P

From Strip

24VDC

Hazardous   Area   Safe Area

4-20mA

24VDC
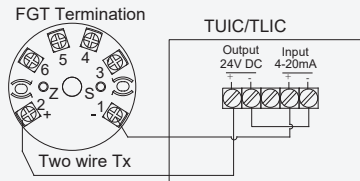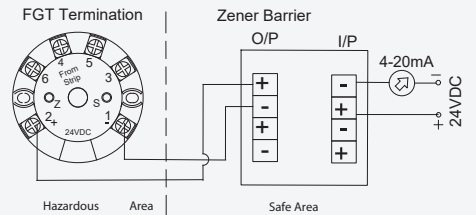
Fig. 11

4. PRECAUTIONS

- Guide tube should not be subjected to mechanical shock as the reed switch assembly inside is glass encapsulated.
- Ensure transmitter is duly earthed.
- Level transmitter should not be used in liquids containing iron particles/ burrs
- Ensure that the liquid does not have excessive contaminants which may inhibit float operation.
- Do not disturb trim pots on convertor card, as they are set for calibrated range & will result in faulty readings.
- In **hazardous** locations, open enclosure only after disconnecting transmitter from supply to prevent explosion
- Ensure IP 66 weather proofness by closing enclosure with its gasket and, cable should be full tight in cable gland ensuring no gap.
- Wiring should run away from high voltage cables, contactor and drive controls.
- Ensure that operating temperature and pressure does not exceed the specified limit.
- Before turning on power supply, ensure all wiring is correct.

5. PERIODIC MAINTENANCE

- During maintenance switch **off** the supply. Ensure that all terminal screws are properly tightened and not loose.
- Wipe the float /guide tube to remove sediment particles.Visually examine float for any puncture and bent in guide tube.
- After maintenance, ensure IP66 weather proofness by closing enclosure cover with its gasket and, cable should be full tight in cable gland ensuring no gap.
- In **hazardous locations** do not open the enclosure cover before disconnecting switch from supply and carry out maintenance then after to prevent ignition / explosion.

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6. TROUBLESHOOTING

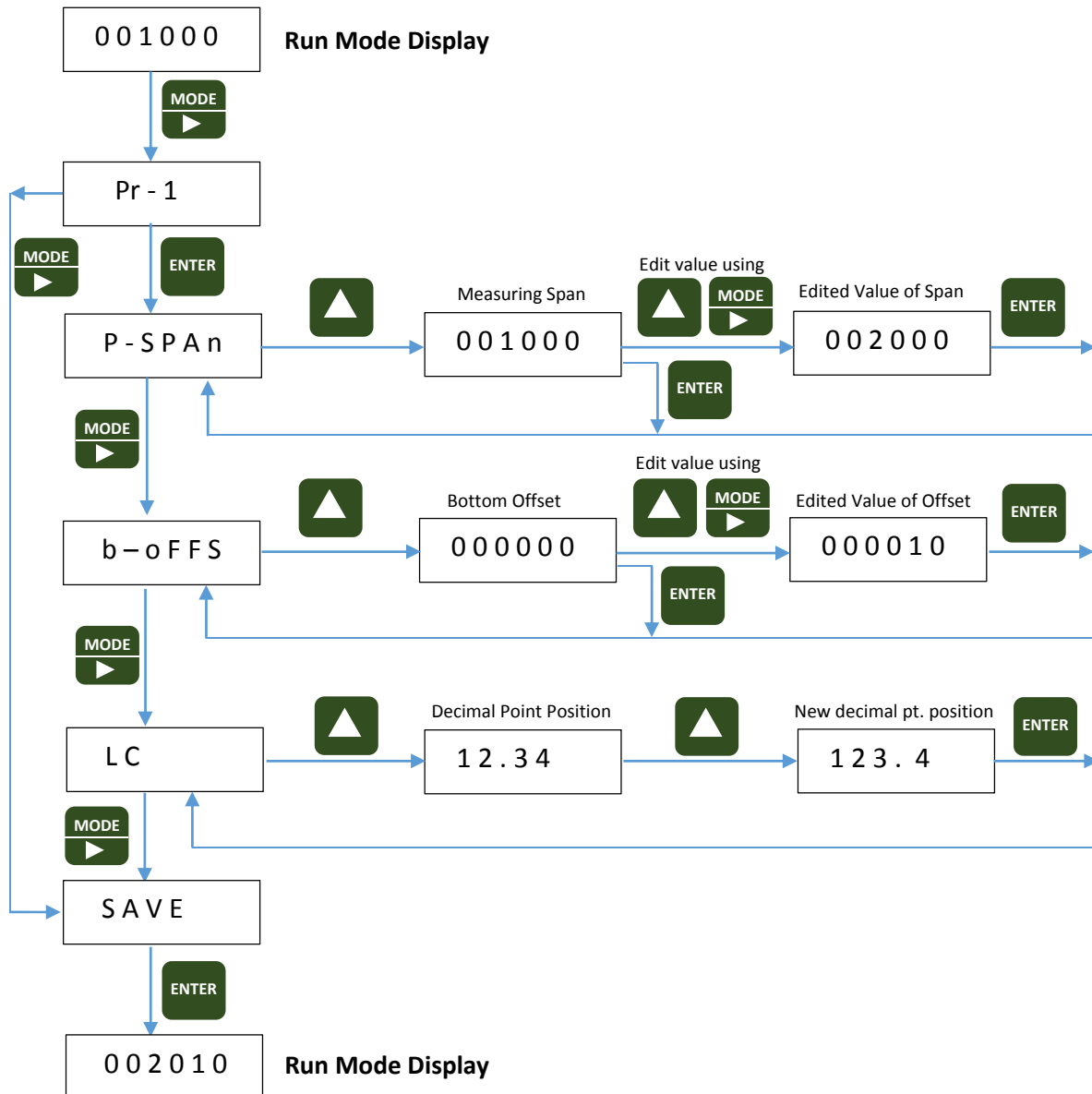| SL	Faults	Probable Causes	Solution
1	No variation in output or no output.	• Loose terminal wiring • Incorrect wiring • Incorrect supply voltage. • Loose connection from PCB strip to x'mitter card. • Damage in PCB strip. • Float punctured or not suitable for liquid Sp.Gr. • X'mitter card faulty	• Tighten loose screws. • Refer 'Termination & Wiring' diagram & ensure correct polarity • Check and ensure correct supply (24VDC, ±10%) • Tighten loose connections. • Consult factory • Replace float with correct sp.gr or consult factory (op.pr should be within specs.) • Consult factory
2	Float does not rise or fall with liquid level	• Sediment/ particles settled on guide tube or float. • Float not suitable for liquid Sp.gr. • Float punctured. (Check Op.pr.) • Float stuck in still well	• Wipe off deposition on float / guide tube and clean periodically. • Replace float / consult factory with revised sp.gr for correct float. • Replace float. Ensure op.pr is within specified limits/ Consult factory • Use spider to bring guide tube in plumb
3	Fluctuation in current o/p	• Turbulence in liquid	• Use still well or external cage
4	Improper output	• Incorrect supply voltage • Fault in reed switch serie • X'mitter Convertor card faulty • X'mitter Convertor card faulty due to ingress of water in enclosure • Incorrect programming in case of Integral FGT	• Check & ensure supply voltage is rated. (16 to 30 VDC) • Consult factory (Handle FGT carefully) • Consult factory. • Remove water and change the card. Close enclosure properly with gasket In addition, prevent ingress of water by using canopy. • Re-program with correct values.
5	Communication failure in RS485	• Incorrect or loose wiring • Incorrect DIP s/w setting	• Tighten loose connections. • Ensure correct polarity. • Refer Protocol Doc. for DIP s/w setting.

PROGRAMMING - FGT with INTEGRAL DISPLAY

Key Functions

MODE ▶ MODE/DEC Key - To enter in the program menu to configure data or decrement digit value when in sub menu. Also to enter in next menu

▲ UP/ SHIFT Key - To enter in submenu to increment the digit value. Also to shift decimal point.

ENTER ENT Key - To enter or save parameter

Run Mode – Data viewed on display is operating value

Programming Mode – Operator should use keypad in conjunction with display to set parameter

Programming Flow Chart

| 0 0 1 0 0 0 | **Run Mode Display** |

↓ **MODE ▶**

Pr - 1

MODE ▶ / **ENTER**

P - S P A n → **▲** → Measuring Span **0 0 1 0 0 0** → **▲** **MODE ▶** Edit value using → Edited Value of Span **0 0 2 0 0 0** → **ENTER**
ENTER

↓ **MODE ▶**

b – o F F S → **▲** → Bottom Offset **0 0 0 0 0 0** → **▲** **MODE ▶** Edit value using → Edited Value of Offset **0 0 0 0 1 0** → **ENTER**
ENTER

↓ **MODE ▶**

L C → **▲** → Decimal Point Position **1 2 . 3 4** → **▲** → New decimal pt. position **1 2 3 . 4** → **ENTER**

↓ **MODE ▶**

S A V E

↓ **ENTER**

| 0 0 2 0 1 0 | **Run Mode Display** |

PROTOCOL DOCUMENT
Float Guided Transmitter 'FGT with RS-485'

1. INTRODUCTION

The communication between Host & FGT with RS-485 is done on a standard RS-485 as a physical layer. The data link layer is Modbus – RTU and the function code implemented is – Function Code 03: Read Input Register.

2. QUERY AND RESPONSE FORMAT

Query Byte No.	Query	Response Byte No.	Response
1	Slave Address (AA)	1	Slave Address (AA)
2	Function Code (03)	2	Function Code (03)
3	HO Start Address (00)	3	Byte Count (02)
4	LO Start Address (00)	4	HO First Register Data (DD)
5	HO No. of Registers (00)	5	LO First Register Data (EE)
6	LO No. of Registers (01)	6	HO CRC-16 (FF)
7	HO CRC-16 (BB)	7	LO CRC-16 (GG)
8	LO CRC - 16 (CC)		

REMARKS :

- 'AA' is single byte slave address, which is variable from 1 to 7 depending upon DIP switch position as given below.
- 'BBCC' are two byte CRC on Query side. It is variable upon Query bytes 1 to 6.
- 'DDEE' are two byte sensor data on response side which is variable from 0 to 4095 proportionally to the float position of FGT.
- 'FFGG' are two byte CRC on Response side, it is variable depending upon Response bytes 1 to 5.

3. DIP SWITCH SETTING

DIP Switch Number	Function
1	Baud rate Selection
2	
3	
4	Slave Selection
5	
6	
7	NA
8	

A) Baud rate

DIP Switch Number	Baud Rate
1	9600
2	19200
3	38400

B) Slave Address

DIP Switch No. Configuration 4,5,6	Slave Address (In Decimal Number)
0, 0, 1	1
0, 1, 0	2
0, 1, 1	3
1, 0, 0	4
1, 0, 1	5
1, 1, 0	6
1, 1, 1	7

1= ON, 0= OFF

NOTE :

- Total 7 nos. combinations of slave address are possible.
- DIP1 switch should be ON for enabling 120 ohm termination resistor in daisy chain of RS-485
- To change the slave ID or Baud rate –
  - First turn OFF the unit and then push the appropriate DIP switches to ON state.
  - Now turn ON the unit and new setting will be implemented.

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