

USER'S GUIDE

Installation & Operation
Instructions

Tank Farm Transmitter
Model TFT32
Series 2.0

Ultrasonic Sensor Input (-A-)

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IMPORTANT NOTE: *This instrument is manufactured and calibrated to meet product specifications. Please read this manual carefully before installation and operation. Any unauthorized repairs or modifications may result in a suspension of the warranty.*

Available in Adobe Acrobat pdf format

QUICK BENCH TEST:

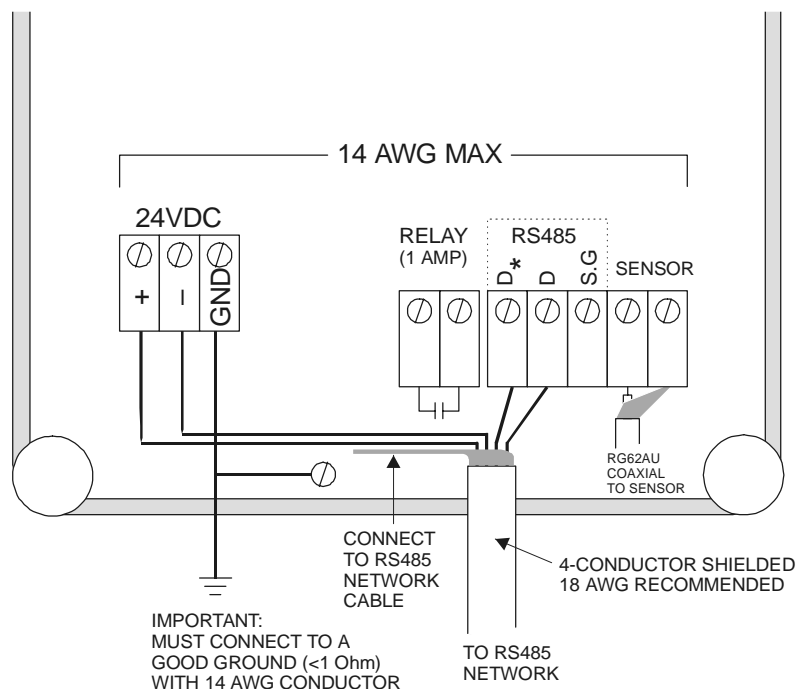
Connect the Ultrasonic Sensor as shown below, then apply Power. When properly connected a soft clicking can be heard from the sensor and figures will show on the LCD display. Test operation of the TFT32 by holding the sensor steadily and aiming at a flat, stable target 12 to 28" (305 to 711 mm) away from the end of the sensor. Allow a few seconds for the TFT32 to lock onto the target before displaying its distance. The TFT32 will now display range in inches or cm.

CONNECTIONS (ULTRASONIC):

POWER INPUT: The standard model requires DC power input between 15 to 24VDC with current consumption of 120mA maximum. Power GND must be connected to a good "earth" ground for surge protection.

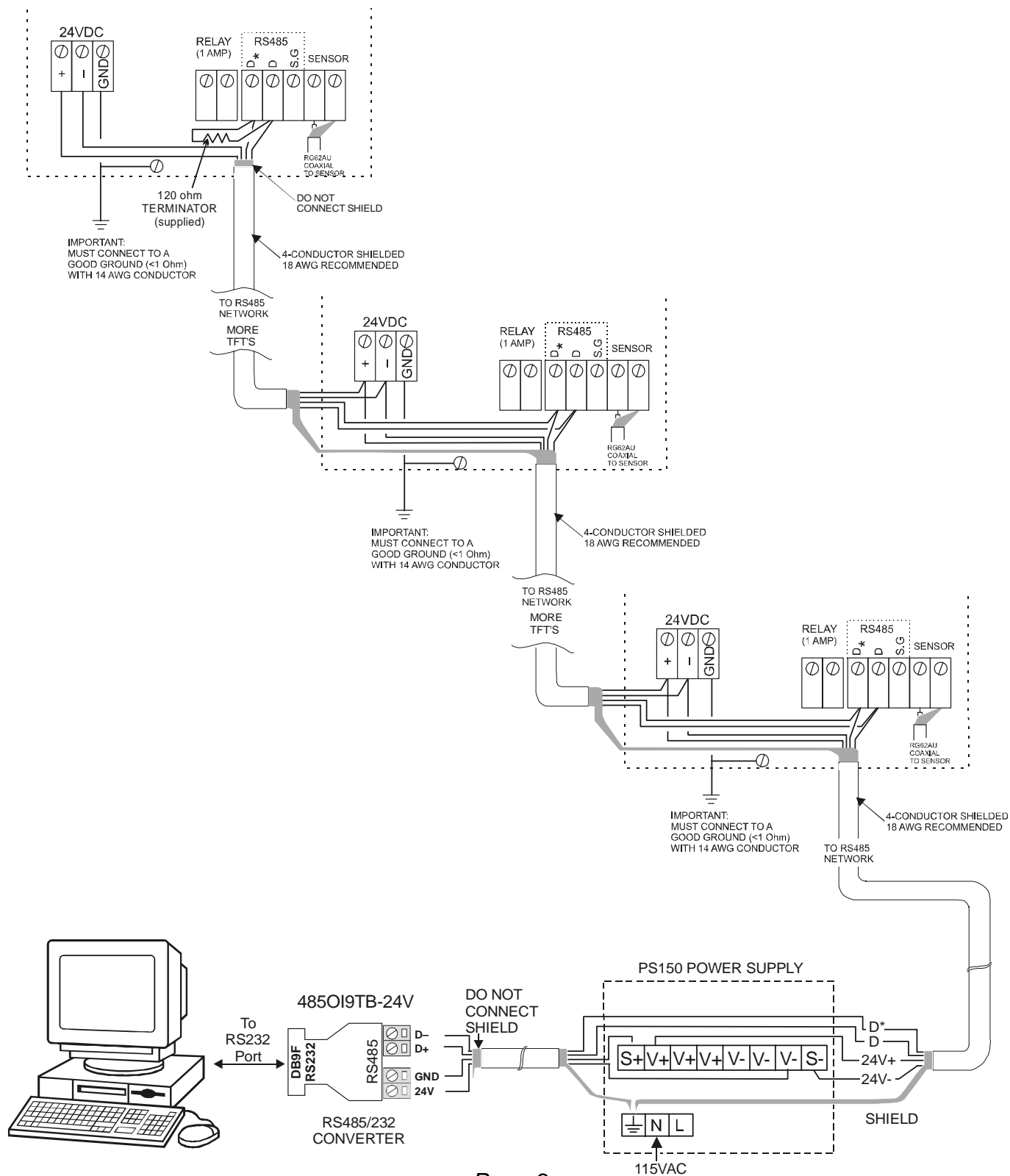
RS485 NETWORK: Connections from the RS485 network (other TFT32's and the PC computer) are: Data -(D*), Data +(D) and signal/shield ground (S.G.)

IMPORTANT NOTE: To comply with CSA/NRTL standards, power input and relay connection wires must have a water tight fitting conduit entry to the instrument enclosure.



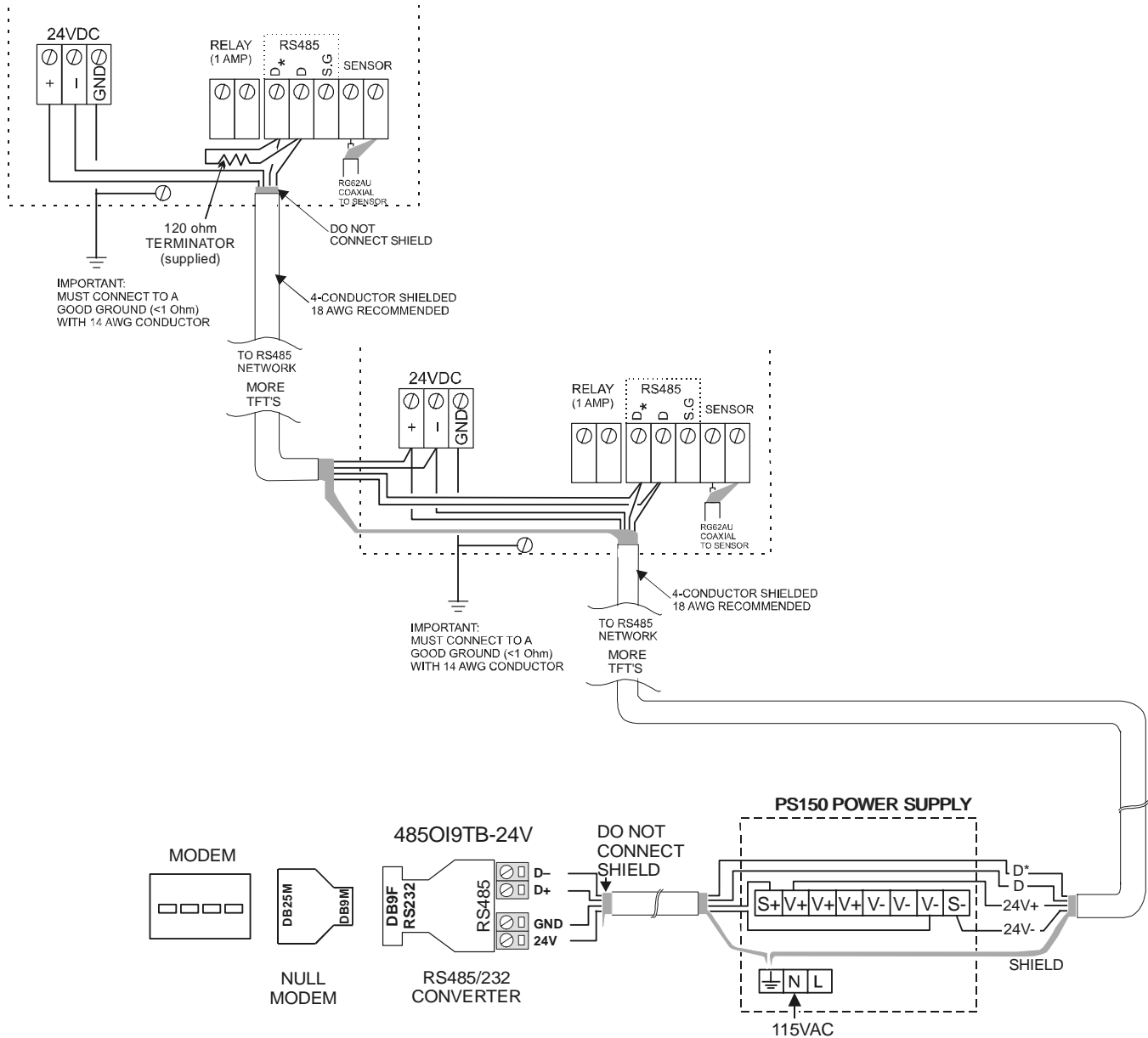
LOCAL NETWORK CONNECTIONS

LAST (FURTHEST) TFT IN THE NETWORK



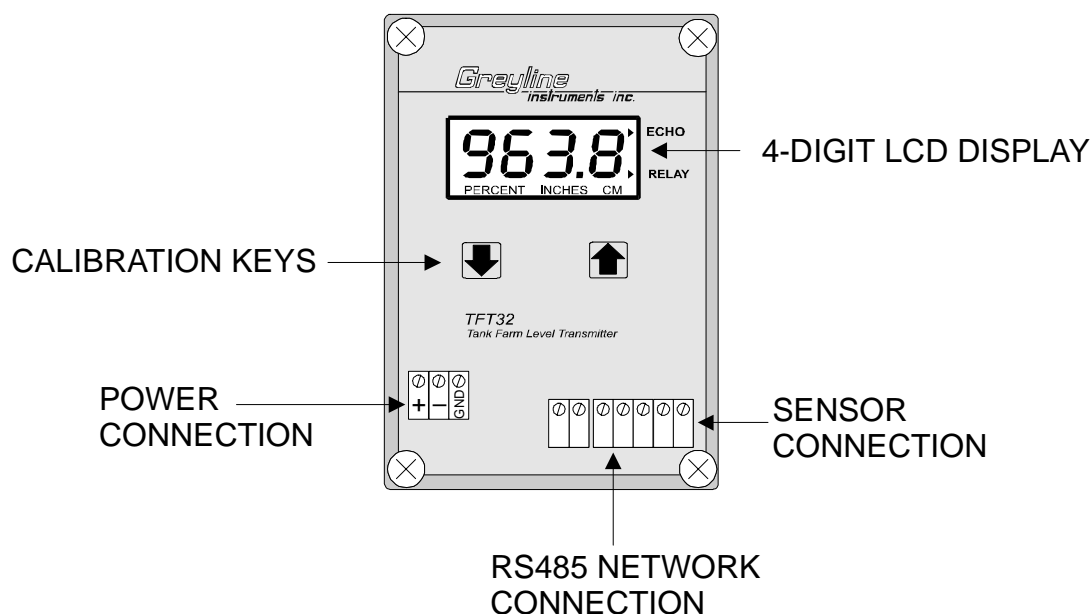
DIAL-UP LOCATION CONNECTIONS

LAST (FURTHEST) TFT IN THE NETWORK



KEYPAD SYSTEM

The TFT32 has a simple 2-key calibration system. Operating and calibration modes are shown on the 4 digit display. The keys are used to calibrate the TFT32, and to view operating mode and functions. If the keys are not used for 10 minutes, the TFT32 will automatically go to **NORMAL MODE**. Except in **OUTPUT SIMULATION** mode, the Relay and RS485 serial output are not affected by use of the keys until your calibration is stored

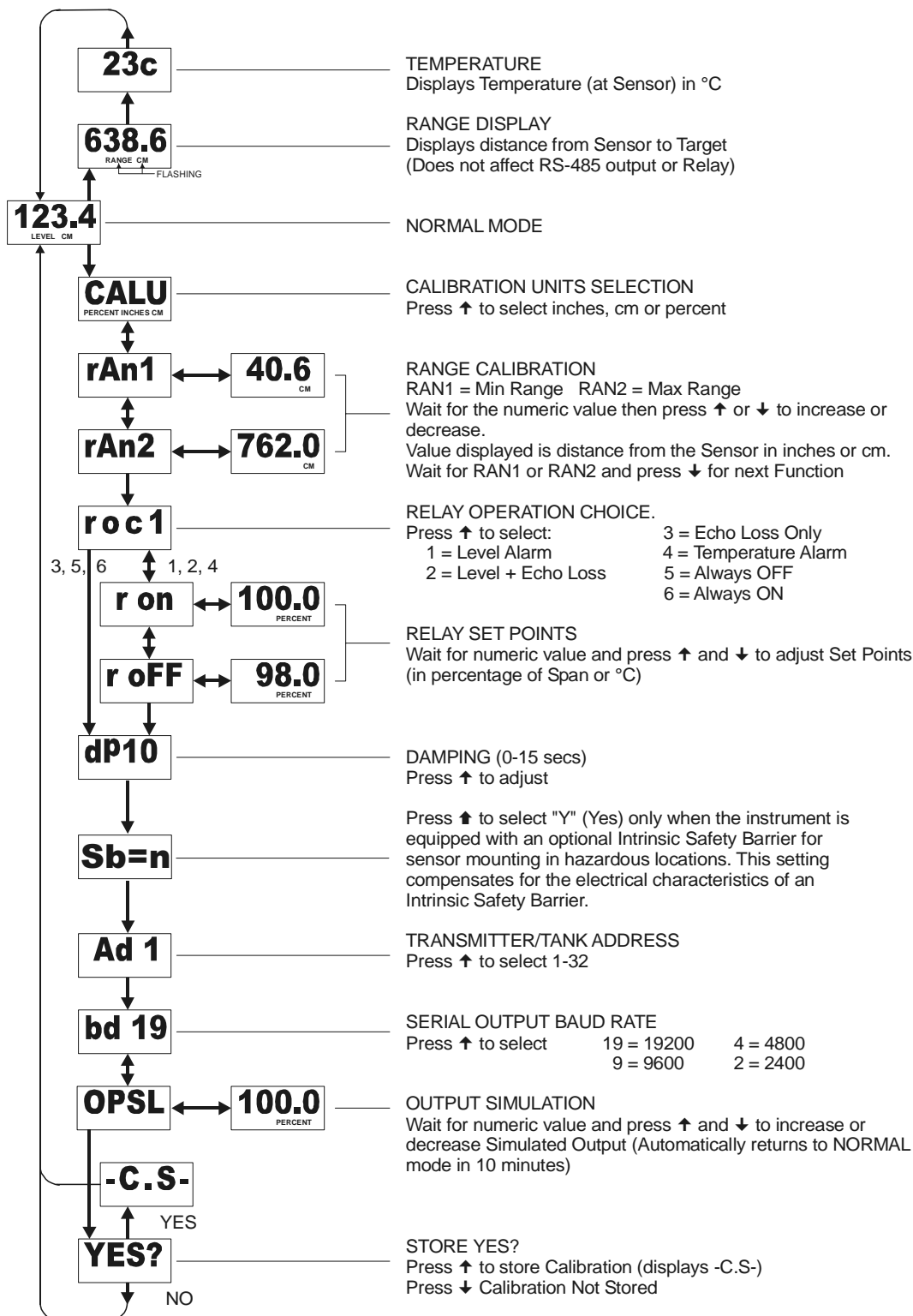


MENU - FLOW CHART

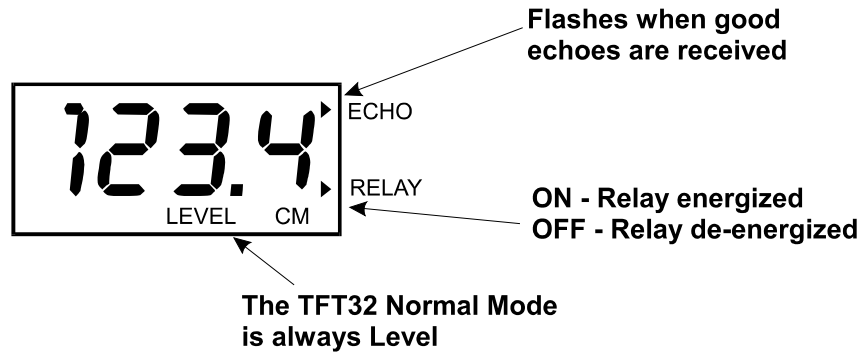
The following diagram shows the TFT32 Menu system. Arrows show the directions to leave a box. Pressing a corresponding key will move to the next box in the direction shown. Numeric values are changed by pressing and holding the **↑** or **↓** keys.

At the bottom of Menu is a **YES?** prompt. To store the calibration values permanently (even through power failure), press the **↑** key. If the **↓** key is pressed from the **YES?** prompt no changes will be stored and the system will return to NORMAL mode.

TFT32 CALIBRATION MENU ULTRASONIC SENSOR INPUT

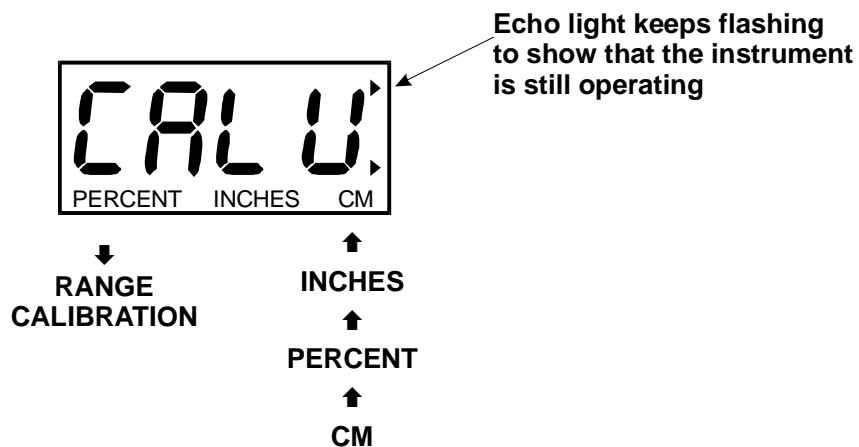


NORMAL MODE



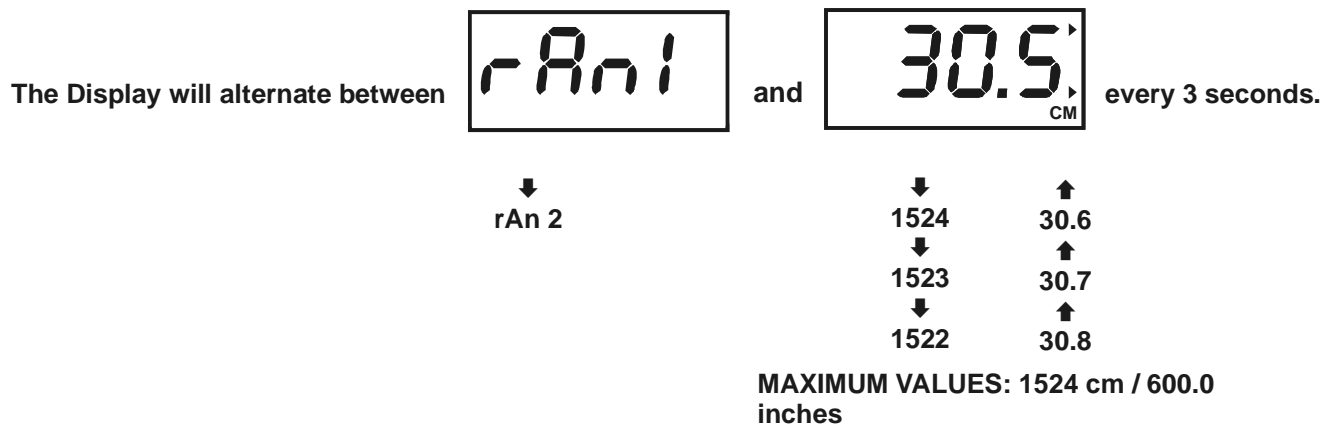
CALIBRATION UNITS SELECTION

Press ↓ from NORMAL mode, Display will show:



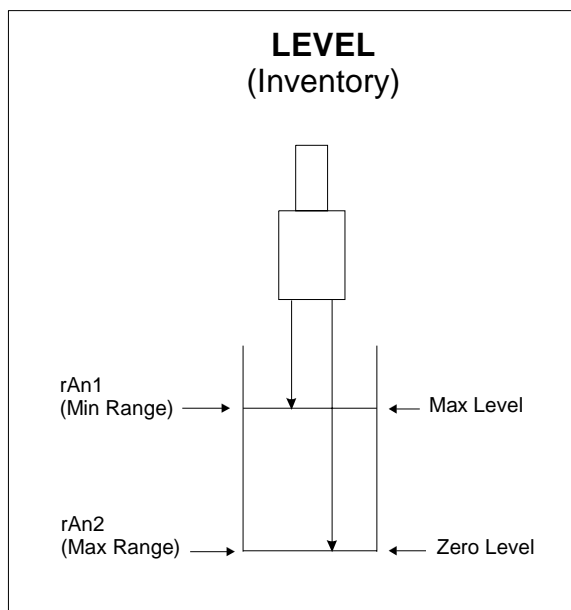
rAn1 = MIN RANGE CALIBRATION

Calibrate the distance between the sensor and maximum level.



rAn2 = MAX RANGE CALIBRATION

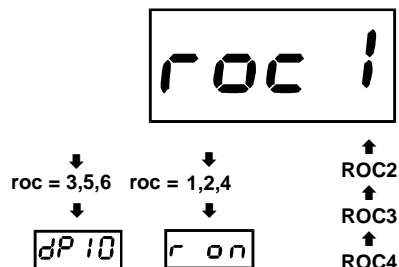
Wait for rAn1 and press ↓ to display rAn2. Now follow the same procedure to calibrate the distance from the Sensor to zero level (Max. Range).



RELAY OPERATION CHOICE

The TFT32's Signal Relay can be configured to operate as:

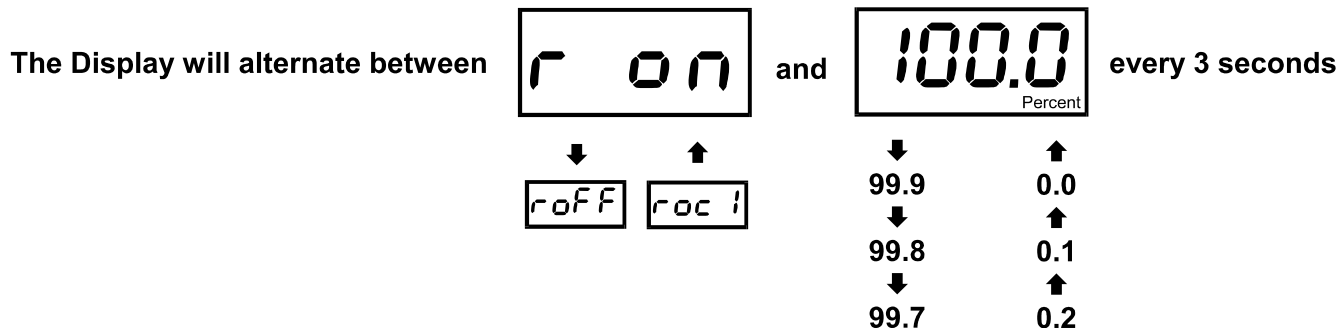
- ROC1 = Level Alarm
- ROC2 = Level + Echo Loss Alarm
- ROC3 = Echo Loss Alarm only
- ROC4 = Temperature Alarm (measured at the Sensor)
- ROC5 = OFF (de-energized) at all times
- ROC6 = ON (energized) at all times



Press **↑** to select the ROC.

RELAY CALIBRATION

ROC1 (Level Alarm)



ROC2 (Level + Echo Loss Alarm) - Relay will be energized when the Relay ON set point is reached.
or if the echo is lost (no echoes for more than 20 seconds).

ROC4 (Temperature Alarm) - Minimum Set Point -40°C (= -40°F)
- Maximum Set Point 100°C (= 212°F)

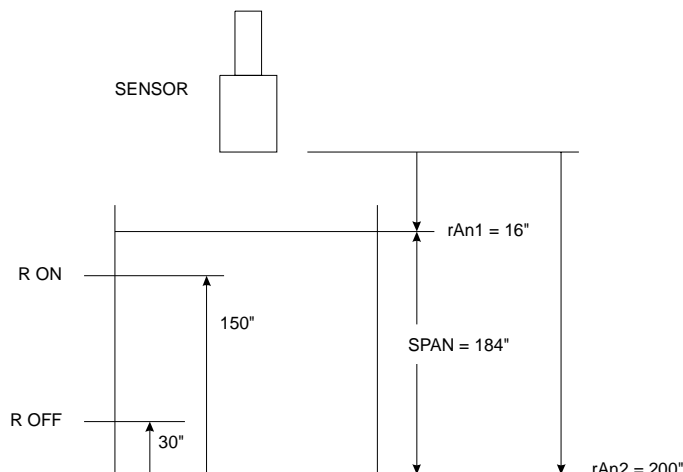
NOTE: The Set Points are displayed in percentage of span (LEVEL). Two different Set Points (r ON and rOFF) allows a Relay “deadband” for Pump Control and to avoid Relay chatter.

Example of Relay Calibration

Span (Max Level) = 184 inches

RON in percent = $150/184 = 81.5\%$

ROFF in percent = $30/184 = 16.3\%$

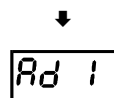
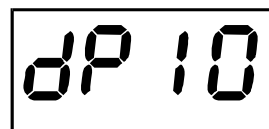


DAMPING

Normal Setting: **DP10**

Fast Response (up to ½ inch /13 mm level change per second): **DP5** or less

Slow Response (turbulence) **DP15**



DP11
↑
DP12

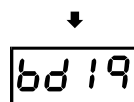
15 SECS.
MAXIMUM

NOTE: Damping Time (in seconds) is the response time to indicate a new target. Longer Damping Times also reject false targets like agitators, splashing etc.

TRANSMITTER/TANK ADDRESS

Select transmitter address 1 to 32 taking into consideration the following:

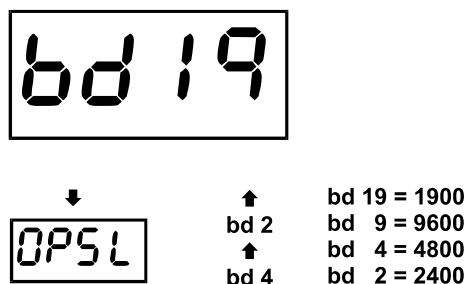
- 1) Each transmitter must have a different address.
- 2) The address number is also the tank position on the page when running the **TFS** PC software.



Ad 2
↑
Ad 3
⋮
Ad 32

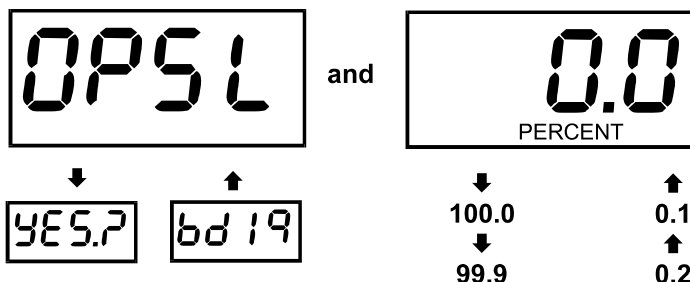
BAUD RATE

Select the highest Baud Rate whenever possible. All Transmitters connected to the network must have the same Baud Rate.



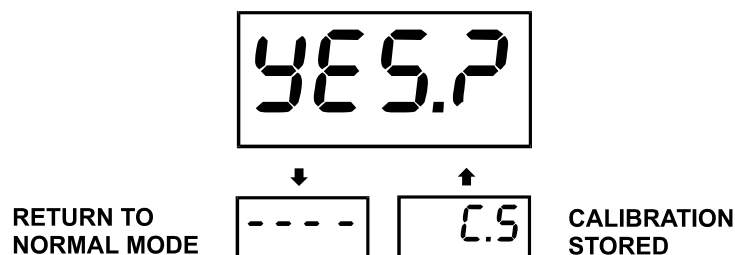
OUTPUT SIMULATION MODE

The Display will alternate between



The Output Simulation controls the RS485 serial output, digital display and signal relay. Use it to test Transmitter Communication to the remote PC running TFS software and to test Relay set-points. Simulation values are in percentage of Span.

TO STORE (SAVE) CALIBRATION



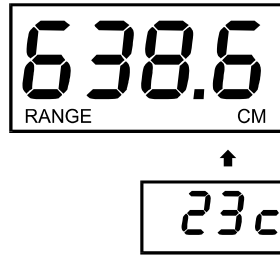
Press ↑ to Store calibration (TFT will display -C.S-). Calibration is stored in non-volatile memory (even through power interruptions).

Press ↓ to return to NORMAL mode *without* storing any changes.

RANGE DISPLAY

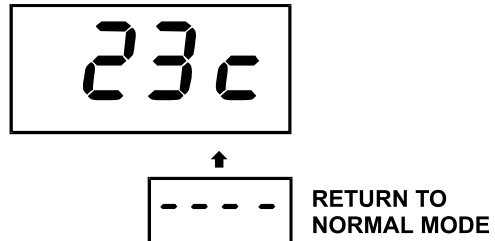
From Normal Mode press **↑**
Displays distance from the Sensor to Target.
Use to check measurements during calibration.

(RANGE and UNITS flash.)



TEMPERATURE DISPLAY

Displays temperature in degrees Centigrade
measured at the Sensor.



TEMPERATURE LOG

Displays maximum temperature in degrees
Centigrade measured at the Sensor.

From normal Temperature display, Press **↓** then **↑**.



COMMAND SET

COMMAND	DEFINITION	COMMAND MESSAGE (Address 1)	TYPICAL RESPONSE
RA	Read all parameters	##%1RA<CR>	*%1RA+959.3000210AA<CR>
RS	Read Span (Max Level)	##%1RS<CR>	*%1RS+999.9000210BF<CR>
NBxx	New Baud Rate xx = 00 = 38400 01 = 19200 02 = 9600 03 = 4800 04 = 2400	##%1NBxx<CR> (TFT will change to new Baud Rate only after reset)	*%1NB02
RR	Remote Reset	##%1RR<CR>	*1RR
!RR	Broadcast Reset	##%!RR<CR> (All units in the Network will reset)	(No Response)

TFT RESPONSE:

TFT Data: Valid analog Data Range is + 000.0 to + 6550.

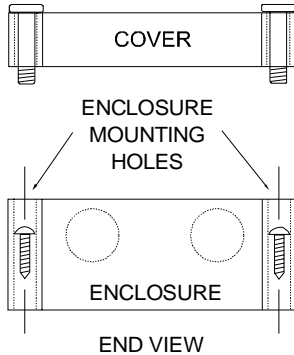
Values with (-) sign represent error messages

- 100.0 = "Not Ready Please Wait"
- 101.0 = "Echo Loss"
- 102.0 = "Sensor Short"
- 103.0 = "Losing Echo"
- 104.0 = "Sensor Open"
- 105.0 = "Bad/Weak Echo"
- 106.0 = "No Echo in Range"
- 107.0 = "Echo in Deadband"

Units and mode: Always cm and Level.

ENCLOSURE INSTALLATION

Locate the enclosure within 500 ft (150 m) of the ultrasonic sensor. It can be wall mounted with four mounting screws (supplied) or panel mounted with Option PM Panel Mounting Kit from Greyline Instruments. Avoid mounting the enclosure in direct sunlight to protect the electronics from damage due to overheating and condensation. Seal conduit entries to prevent moisture from entering enclosure.



NEMA4X (IP67) WITH CLEAR COVER

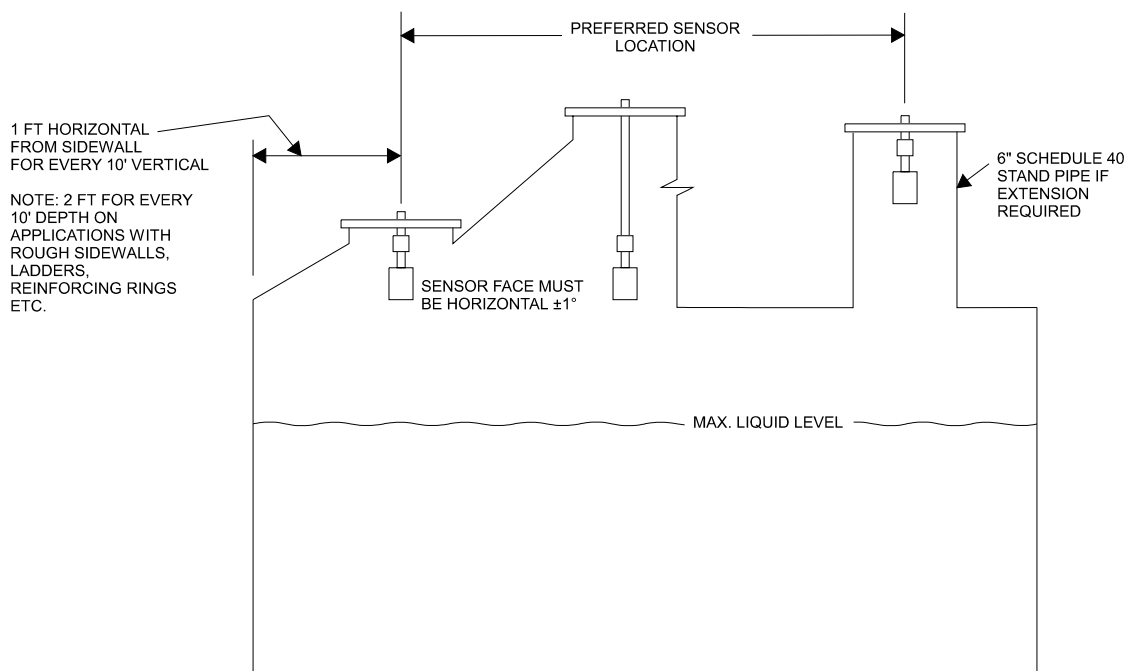
1. Remove enclosure cover.
2. Insert #6 screws through the four enclosure mounting holes to secure enclosure to wall or mounting stand.
3. Replace Cover

An additional conduit hole can be cut in the end of the enclosure if required. Use a hole saw or Greenlee-type hole cutter to cut the required holes.

Note:

1. This non-metallic enclosure does not automatically provide grounding between conduit connections. Grounding must be provided as part of the installation. Ground in accordance with the requirements of the National Electrical Code. System grounding is provided by connecting grounding wires from all conduit entries to the steel mounting plate or another point which provides continuity.
2. Water tight “O” ring seals must be used if cable strain-reliefs are used.

SENSOR MOUNTING LOCATION



SENSOR MOUNTING

Each sensor is equipped with a $\frac{3}{4}$ inch “isolation coupling” which **MUST** be used in your installation. A threaded nipple or length of conduit may be used to position the sensor at the desired height.

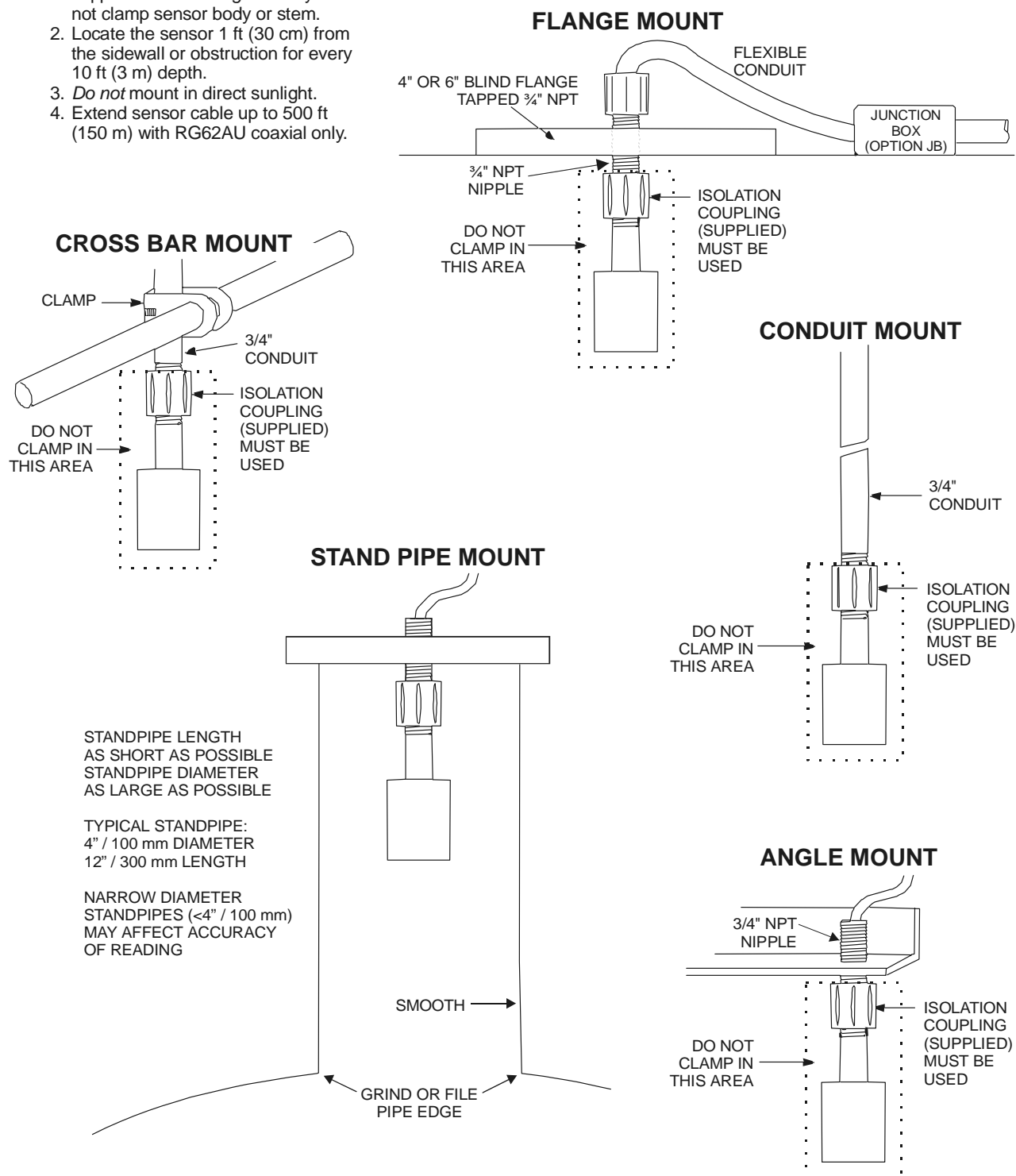
The sensor should be hand-tightened (like a light bulb) by turning the sensor stem only. **DO NOT** use a wrench and do not over tighten. **DO NOT** clamp the sensor below the isolation coupling.

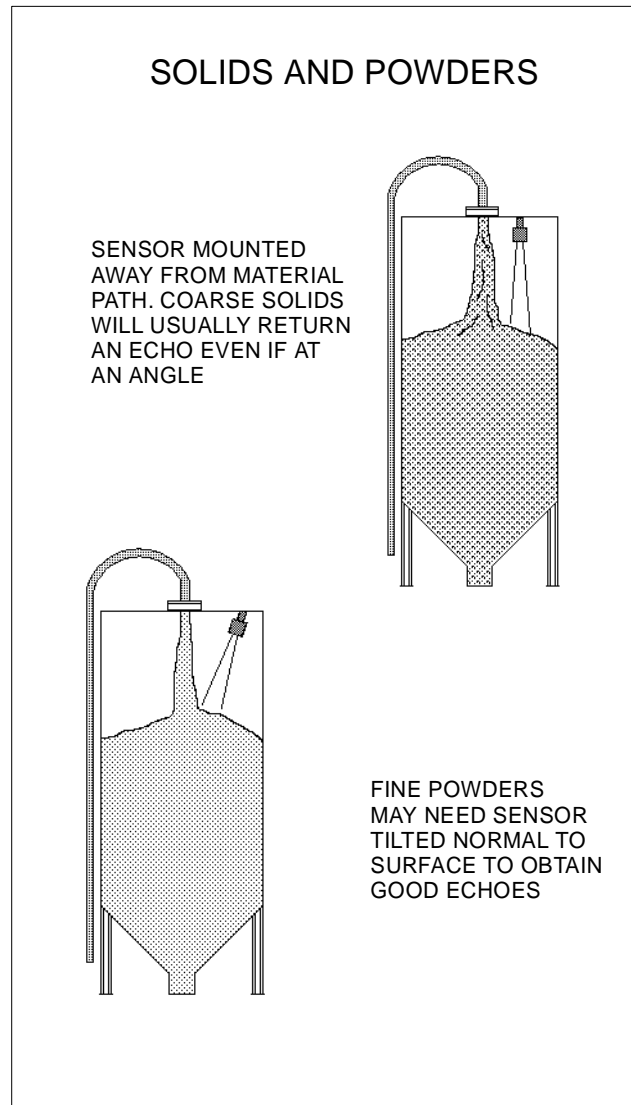
The standard PZ32T Sensor must be mounted 12" / 30.48 cm or more above the maximum liquid level. (Optional PZ12 sensor must be 8" / 20.3 cm above maximum level and optional PZ52T sensor must be 24" / 610 mm above maximum level.)

SENSOR MOUNTING

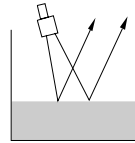
Notes:

1. Use the 3/4" NPT "Isolation Coupling" supplied and *hand tighten* only. Do not clamp sensor body or stem.
2. Locate the sensor 1 ft (30 cm) from the sidewall or obstruction for every 10 ft (3 m) depth.
3. *Do not* mount in direct sunlight.
4. Extend sensor cable up to 500 ft (150 m) with RG62AU coaxial only.

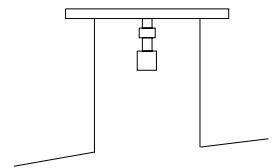
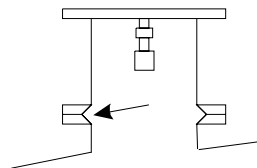
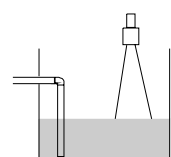
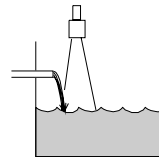
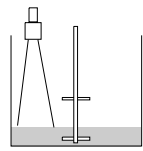
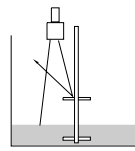
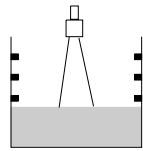
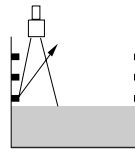
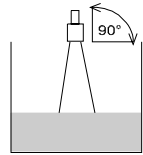




BAD



GOOD



ERROR/WARNING MESSAGES

SEnS ↔ OPEn

Instrument has detected Sensor connections/cable open.

SEnS ↔ SHrt

Instrument has detected Sensor connections/cable short.

23.C

The dot before the C in temperature reading indicates temperature compensation fault. Check sensor connections.

no ↔ ECHO

No valid echoes for 10 seconds.

ECHO ↔ LOSS

No valid echoes for 20 seconds. See Troubleshooting (F).

bAdE or nEor or 123.4

ECHO INDICATOR
INTERMITTANT

Indicates that echoes from the target are weak or liquid surface is highly turbulent. See Troubleshooting (A,C,F)

Err. → bAd → SPAn

Illegal Span. Distance between rAn1 and rAn2 must be greater than 2"(5cm). Also distance for rAn2 (Max Range) must be greater than rAn1 (Min range).

ECHO → in → dEAd → bAnd

Indicates that the target is above the calibrated maximum level (too close to the Sensor).

-or-

Over Range indicates target is further than the calibrated Maximum Range.

EEEE

Indicates that the TFT32 has experienced electrical interference strong enough to corrupt the memory. The TFT32 must be reset and recalibrated.

Reset Procedure 1: Reset will clear all memory. TFT32 will need recalibration after this procedure: Press and Hold ↓ and ↑ until the TFT32 displays - - - -.

SF_{x.x}

Always displayed at power-up (x.x indicates Software version).

Otherwise indicates instrument has reset automatically. See Troubleshooting (C,D,E).

FIELD TROUBLESHOOTING

<u>SYMPTOMS</u>	<u>CHECK</u>
Level Display	
- full scale	A
- zero	B
- erratic - random	C
- higher than actual	D
- fluctuating	E
ECHO LOSS prompt - flashing	F
Calibration Non-Linear	H
EEEE - memory corruption	I

SYMPTOMS	FAULTS	SOLUTIONS
<i>Unit "See's Wrong Target Due To:</i>		
A,C,D,F	- sensor not aimed correctly	- Clean <i>carefully</i> (do not scratch sensor face)
A,D,F	- dust/dirt buildup on sensor	- Lower sensor
A,D,F	- condensation on sensor	- insulate sensor mounting location
		- increase MinRg (CALIBRATION menu) by 1-3" / 2.5-7.5 cm
		- wipe sensor face and body with Rain-X
A,D	- sensor mounting stand pipe	- Lower Sensor below stand pipe intrusion
	- too long/ - too narrow	
	- dirty/ - gasket intruding	
D,E	- agitator, strong turbulence	- Increase Damping
C	- material filling through sensor beam	- Increase Damping
<i>Unit Picks-Up Acoustic Interference Due To:</i>		
A,C	- noise from high pressure fill	- Install submerged fill pipe
A,D	- sensor coupling over tightened	- Hand tighten only (like a light bulb)
A,D	- sensor coupling not used	- Use isolation coupling supplied
C	- other ultrasonic sensor in close proximity	- Separate Sensors
<i>Electrical Interference:</i>		
C	- Sensor cable connections reversed	
C,D	- through Sensor cable	- Use properly <i>grounded</i> metal conduit
C	- Sensor cable and/or junction not insulated	- Use metal Junction Box
C,D	- through RS485 network cable	- Use shielded twisted pair

- | | | |
|-------|---|---|
| C,D | - wiring or installation close to variable speed drive or inverter | - Follow VSD manufacturer's instructions for Drive grounding wiring and shielding |
| C,D,E | - AC/Chassis Ground missing on instrument power connections | - Install adequate Ground |
| I | - Relay sparking produces EMI interference | - Use snubber across secondary Relay contacts
Do not exceed 1 ampere load |
| I | - Instrument installed in the same panel with high voltage/large motor controls | - relocate or use metal enclosure |

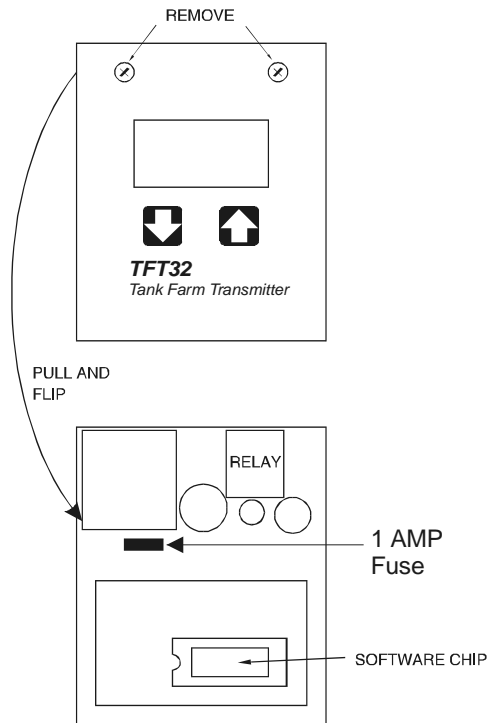
Wiring Problems Due to Sensor Cable:

- | | | |
|-----|--|---|
| C,F | - open circuit | - check connections/continuity (5K Ohms max.) |
| F | - short circuit | - check connections/continuity (5K Ohms min.) |
| F | - too long (max. 500 ft, 150 m) | |
| C | - bundled/run in conduit with power cable | |
| C | - Sensor ground shorted to conduit/enclosure | - insulate |
| A | - extended with wrong type of wire | - Use only RG62AU coaxial |
| C | - close to high voltage/large motors | |

Non-Linearity Due To:

- | | | |
|-----|---------------------------------|--|
| H | - Vapour | - calibrate in-situ |
| B,H | - zero not set accurately | - recalibrate |
| H | - full scale not set accurately | - Note: Minimum Range must be $\geq 12''$ (30.5cm) |

FUSE REPLACEMENT



1. Disconnect Power
2. Remove 2 top screws
3. Pull and flip chassis
4. Remove 1 amp fuse with long nose pliers
5. Install new fuse (Replacement Greyline Part #740-5068)

APPLICATIONS HOTLINE

For applications assistance, advice or information on any Greyline Instrument contact your Sales Representative, write to Greyline or phone the Applications Hotline below:

United States: Tel: 315-788-9500 Fax: 315-764-0419
Canada: Tel: 613-938-8956 Fax: 613-938-4857
Toll Free: 888-473-9546
Email: info@greyline.com
Web Site: www.greyline.com

Greyline Instruments Inc.

Canada
16456 Sixsmith Drive
Long Sault, Ont. K0C 1P0

USA:
407 County Route 46
Massena, NY 13662

PRODUCT RETURN PROCEDURE

Instruments may be returned to Greyline for service or warranty repair. Before shipping a product to the factory please contact Greyline by telephone or Fax to obtain an RMA number (Returned Merchandise Authorization). This ensures fast service and correct billing or credit.

When you contact Greyline please have the following information available:

1. Model number / Software Version
2. Serial number
3. Date of Purchase
4. Reason for return (description of fault or modification required)
5. Your name, company name, address and phone number

After obtaining an RMA number please ship the product to the appropriate address below:

*Canadian and International
Customers:*

Greyline Instruments Inc.
16456 Sixsmith Drive
Long Sault, Ont. K0C 1P0

RMA#

*USA
Customers:*

Greyline Instruments Inc.
407 County Route 46
Massena, NY 13662

RMA#

Limited Warranty

Greyline Instruments warrants, to the original purchaser, its products to be free from defects in material and workmanship for a period of one year from date of invoice. Greyline will replace or repair, free of charge, any Greyline product if it has been proven to be defective within the warranty period. This warranty does not cover any expenses incurred in the removal and re-installation of the product.

If a product manufactured by Greyline should prove defective within the first year, return it freight prepaid to Greyline Instruments along with a copy of your invoice.

This warranty does not cover damages due to improper installation or handling, acts of nature, or unauthorized service. Modifications to or tampering with any part shall void this warranty. This warranty does not cover any equipment used in connection with the product or consequential damages due to a defect in the product.

All implied warranties are limited to the duration of this warranty. This is the complete warranty by Greyline and no other warranty is valid against Greyline. Some states do not allow limitations on how long an implied warranty lasts or limitation of incidental or consequential damages, so the above limitations or exclusions may not apply to you.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

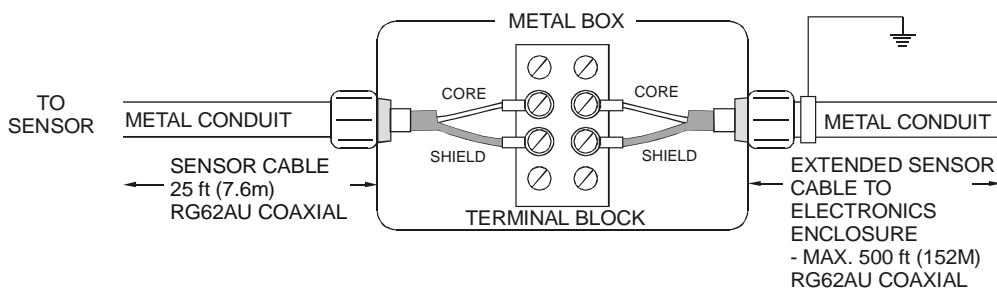
APPENDIX A - OPTIONS and ACCESSORIES

XC	- Extra Sensor Cable up to 500 ft (152 m) length
JB	- Sensor Cable Junction Box
ISB	- Intrinsic Safety Barrier for Sensor and Cable installation in hazardous-rated locations (factory-installed option/larger enclosure used)
12VDC	- 12VDC Power Input (factory-installed option)
PM2	- Enclosure Panel Mount
PS150	- Network Power Supply
485OICR	- RS232/485 Converter

EXTRA SENSOR CABLE (ACCESSORY XC)

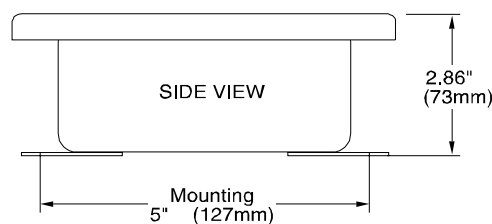
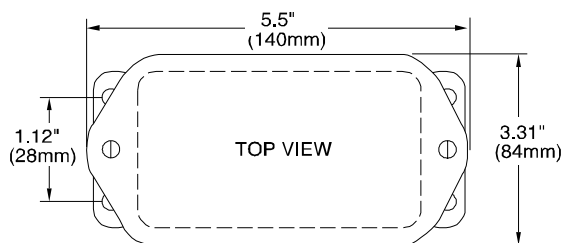
Each Greyline TFT32 includes 25 ft. (7.6 m) or 50 ft. (15 m) continuous RG62AU coaxial Sensor Cable. Additional RG62AU coaxial cable and Cable Junction Box (Option JB) may be spliced and extended up to 500 ft (152 m) as required during installation. No adjustment is required when the sensor cable is extended or shortened. Use only RG62AU (or RG62U) coaxial cable which is available from Greyline Instruments or your local distributor. Nominal impedance of RG62AU cable is 93 ohms.

Extended sensor cable must be installed in metal conduit to prevent interference. Do not use BNC coaxial connectors (TV cable type). Recommended installation with a metal junction box is illustrated below:



SENSOR CABLE JUNCTION BOX (ACCESSORY JB)

DIMENSIONS OPTION JB - JUNCTION BOX



SENSOR INTRINSIC SAFETY - OPTION ISB

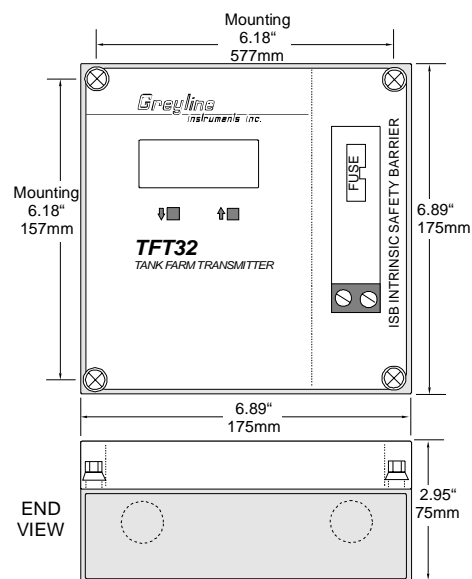
When connected through an Intrinsic Safety Barrier, the Greyline PZ32T-A and PZ32TE-A and PZ52T sensors are CSA certified for installation in a hazardous location rated:

Class I, Groups C,D
Class II, Groups E,F and G
Class III

Intrinsic Safety Barriers must be ordered with the Greyline instrument and are supplied mounted in the Greyline instrument enclosure. A larger enclosure is used.

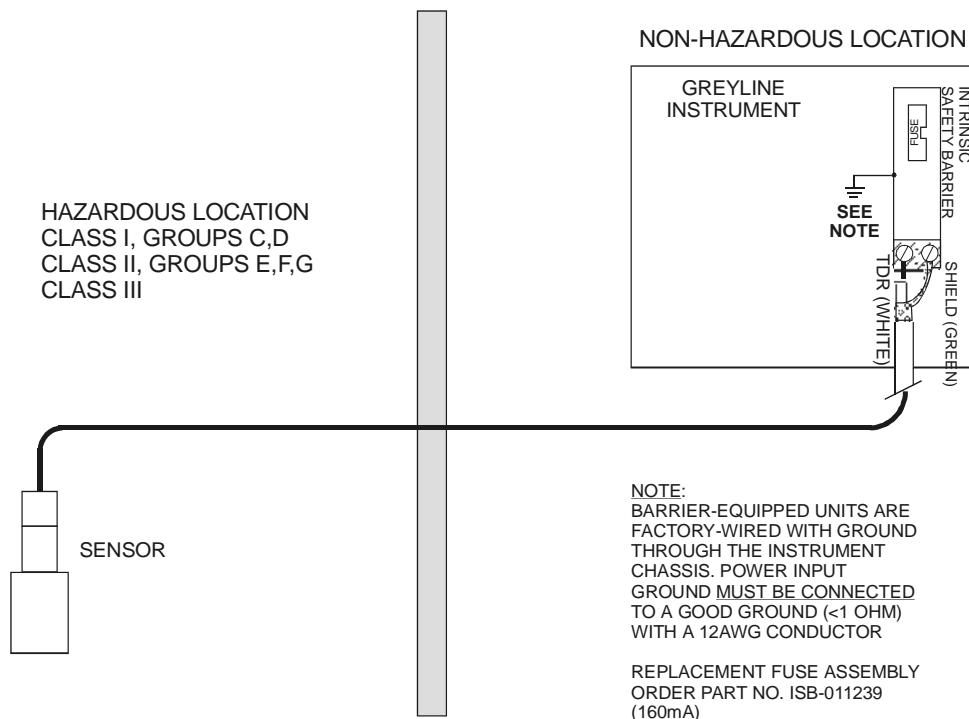
Replacement barrier fuses (Part No. ISB-011239 may be purchased separately.

Intrinsic Safety Barrier Specifications: Certified, rated 13.8V max, 95ohms min (Stahl Model 9001/02-133-150-10)

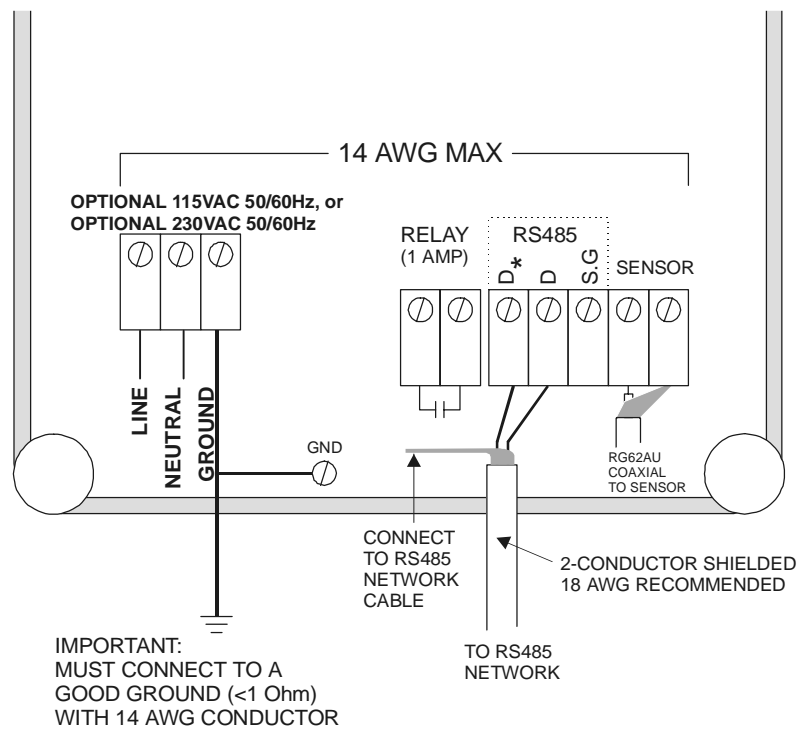


ELECTRONICS ENCLOSURE

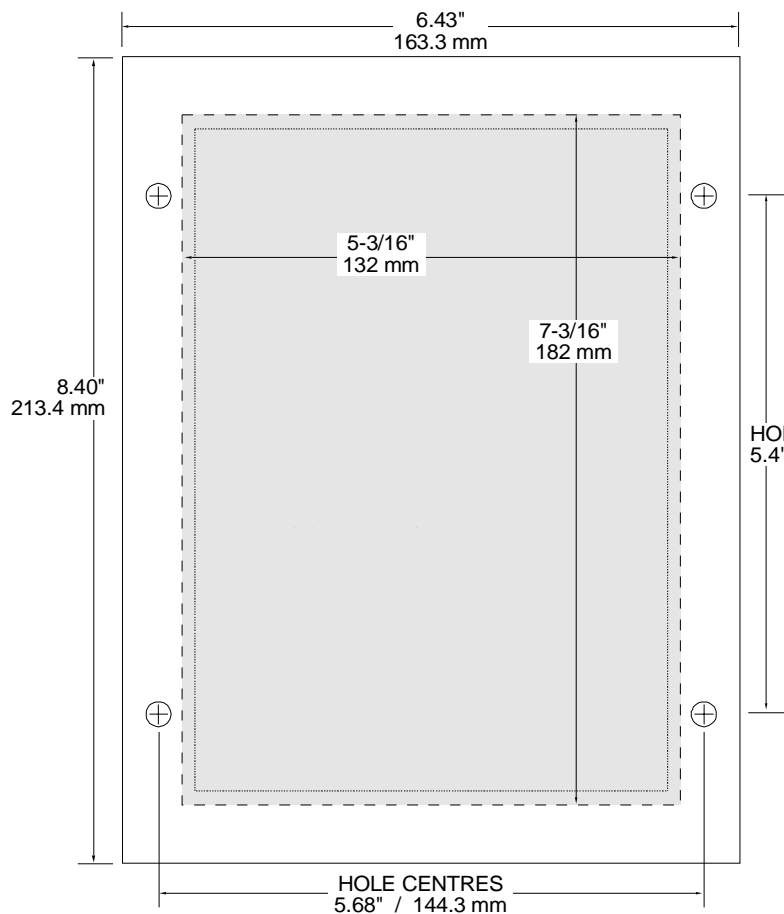
CONNECTIONS (Stahl Model 9001/02-133-150-10)



CONNECTIONS - OPTIONAL 115VAC or 230VAC Power Input

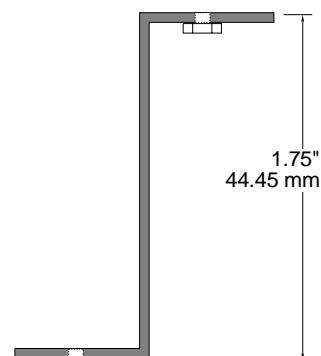


Option PM2 Enclosure Panel Mount



INSTRUCTIONS

Mark Panel using Flange
as a Template.
Cut Panel outside the line.



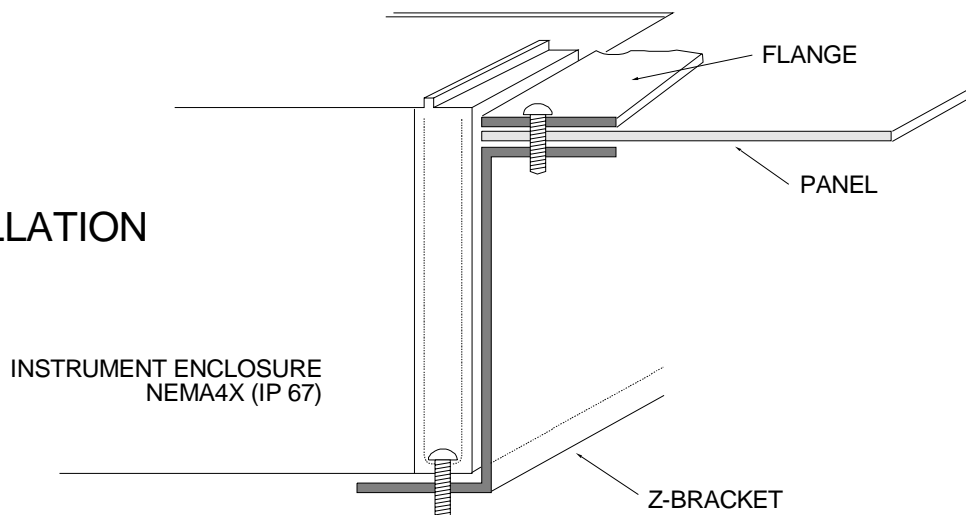
Z-BRACKET

QTY 2 INCLUDED WITH
MOUNTING SCREWS

FLANGE

QTY 1 INCLUDED
MATERIAL: 0.062 ALUMINUM
FINISH: CLEAR IRIDITE

INSTALLATION



ENCLOSURE SUNSCREEN – OPTION SCR

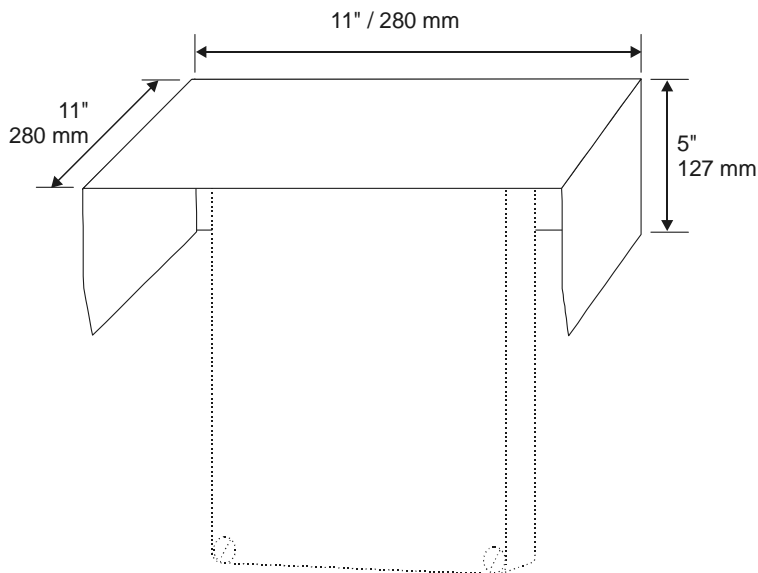
Do not mount instrument electronics in direct sunlight. Overheating will reduce the life of electronic components and condensate may form during the heat/cool cycles and cause electrical shorts.

Note:

Exposure to direct sunlight can cause overheating and moisture condensation which will reduce the operating life of electronics.

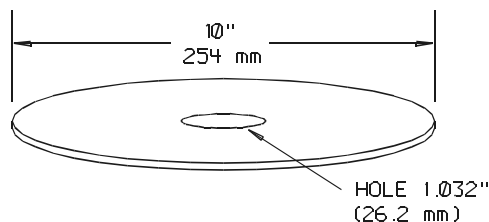
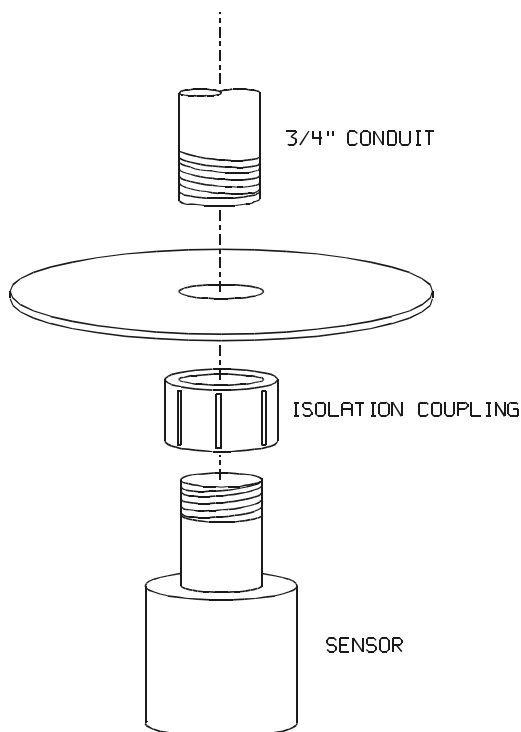
Protect Instruments from direct sunlight with this iridite finished aluminum sun screen (Greyline Option SCR).

Seal conduit entries with caulking compound to further reduce moisture condensation.



SENSOR SUNSCREEN – OPTION PZS

INSTALLATION



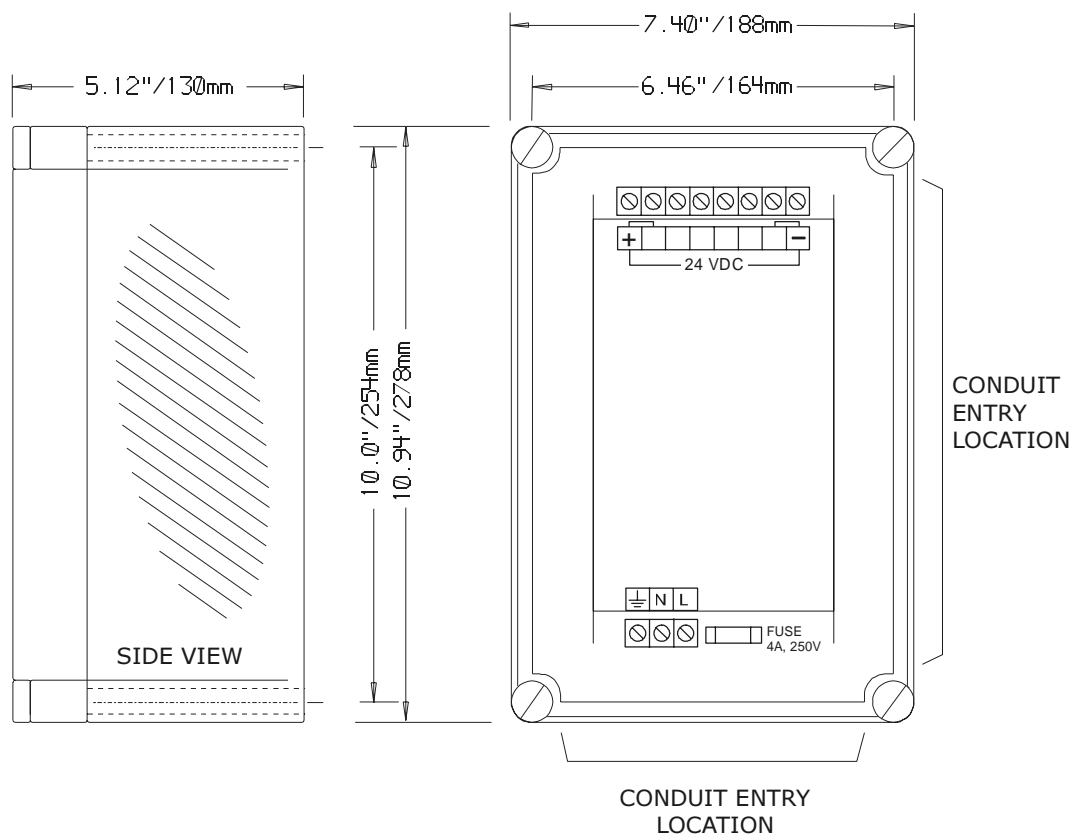
MATERIAL:
1/16" ANODIZED ALUMINUM

NOTE:
USE WHEN SENSOR IS INSTALLED IN
DIRECT SUNLIGHT.

PS150 POWER SUPPLY

150 Watt Power Supply for TFT32 Tank Farm System

Powers up to 32 Greyline TFT32 Transmitters + 6 RB12 Relay Boards



SPECIFICATIONS PS150 POWER SUPPLY

Power Input: PS150-AI: 90-132VAC, 47-63Hz
PS150-EI: 180-264VAC, 47-63Hz

AC Input Current: PS150-AI: 4A maximum
PS150-EI: 2A maximum

Fuse: 4A, 250V

Operating Temperature: 32 to 122°F (0 to 50°C)

Storage Temperature: -13 to 185°F (-25 to 85°C)

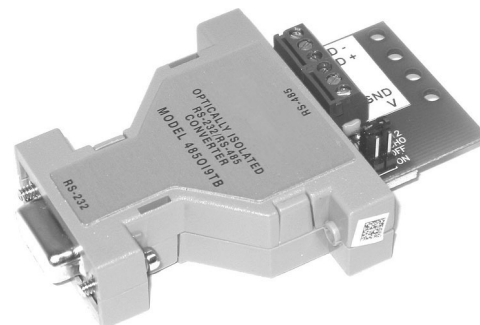
Enclosure: Watertight, dust tight NEMA4X (IP 66) fiberglass

Safety Approvals: UL 1950
CSA 22.2 1402C Level 3
TUV EN 60950 (IEC 950)

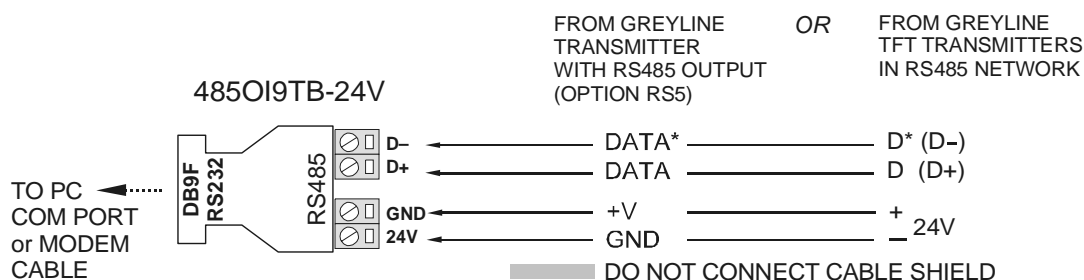
MODEL 485OICR RS232/RS485 Converter

Converts RS485 signals from Greyline Transmitters to RS232 for connection to a PC Computer or Modem.

- DB25 RS232 Connector plugs directly into your computer's COM port
- Optically isolates and protects your computer's RS232 port
- Terminal block for RS485 connections
- Operates from 2400 up to 38.4 K baud



Terminal connections are provided for RS485 Data – (D*), Data + (D), and RS485 power and ground. The RS485 side of the converter is internally biased and terminated to operate with a RS485 network of up to 32 devices.



APPENDIX B - APPLICATIONS BACKGROUND

Conditions in the tank where the ultrasonic sensor is installed can affect the performance, range and accuracy of the system. The following notes are for general reference. Contact Greyline Instruments or your local representative for specific information on your application.

FOAM - Solid or dense surfaces such as a smooth liquid surface will give the best echoes in an ultrasonic level measuring system. Foam acts as a sound insulator and may eliminate, or reduce the strength of an echo. Measurement range may be reduced in a system where foam is present. Ultrasonics are not recommended where thick dense foam is continually present. Intermittent thin layers of light foam (1/8 in. or less) can generally be disregarded. Use a stilling well in open channel applications.

LIQUIDS - The TFT32 is ideal to monitor tank liquid level or inventory. Caustic, corrosive or very viscous liquids can be monitored without contacting the liquid.

SOLIDS - The TFT32 will measure most granular material and powders as well as liquids. Powders will not generally provide the same echo strength as liquids. Therefore maximum expected range should be reduced to approximately 20 feet (6 m) for powders. There are many exceptions to this rule and installation of a test system is recommended when in doubt.

DUST - Any obstructions to the sound will affect performance of the system. In silo's where heavy concentrations of dust are expected ultrasonics may not work. Where moderate dust is encountered care should be taken to mount the sensor in a position where dust accumulation will be minimized and where the sensor can be cleaned if necessary. You can use alternate sensors for high dust applications and order the TFT32 configured for 4-20mA signal input.

SENSOR TEMPERATURE - The standard sensor model PZ32T supplied with each Level Indicating Transmitter includes a built-in temperature sensor. The TFT32 automatically compensates for temperature fluctuations to retain high accuracy. Note the operating temperature ranges listed in the product specifications section. Do not exceed the sensor temperature ratings or damage may occur.

ELECTRONICS TEMPERATURE - Note operating temperature ranges listed in the product specifications. Temperatures higher than the maximum shown can reduce the operating life of the electronics. Moisture condensation from those temperatures below the range shown can also damage electronics components. **DO NOT** mount in direct sunlight.

NOISE - Because the TFT32 sensor operates at high sound frequency, regular process noise or vibration will not affect the system. Ultrasonic Sensors installed in close proximity to one another in the same tank may "cross-talk" and should be relocated.

VAPOUR - May affect operation. Severe vapour stratification can cause false echoes. Variable vapour cannot be compensated. Consult Greyline Instruments for recommendations.

CHEMICAL COMPATIBILITY - The TFT32 Ultrasonic Sensor is constructed of very durable materials with broad compatibilities. Tank contents should be checked for their compatibility with PVC. An all-teflon sensor is available for corrosive applications.

CONVERSION GUIDE		
FROM	TO	MULTIPLY BY
US GALLONS	CUBIC FEET	0.1337
US GALLONS	IMPERIAL GALS	0.8327
US GALLONS	LITRES	3.785
US GALLONS	CUBIC METERS	0.003785
LITRES/SEC	GPM	15.85
LITRES	CUBIC METERS	0.001
BARRELS	US GALLONS	42
BARRELS	IMPERIAL GALS	34.9726
BARRELS	LITRES	158.9886
INCHES	MM	25.4
DEGREES F	DEGREES C	(°F-32) x 0.556
POUNDS	KILOGRAMS	0.453
PSI	BAR	0.0676
FOOT ²	METER ²	0.0929

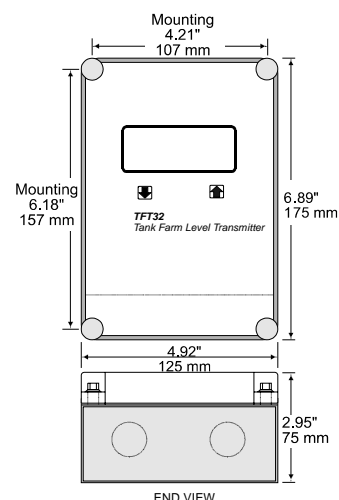
VOLUME CALCULATION FOR ROUND TANKS: $3.142 \times R^2 \times H$

R = TANK RADIUS (1/2 TANK DIAMETER)

H = TANK HEIGHT

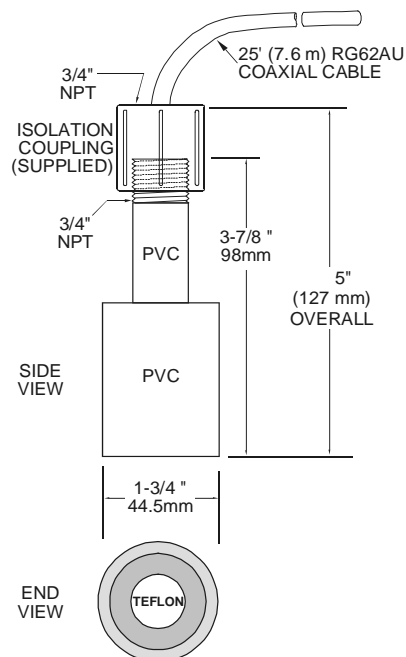
SPECIFICATIONS

Electronics Enclosure:	NEMA4X (IP 67), watertight and dust tight, fiberglass with clear, shatterproof Lexan cover
Accuracy:	0.25% F.S., Repeatability: 0.1% F.S., Linearity: 0.1%F.S.
Display:	3/4" / 19mm high, 4 digit LCD
Programming:	2-button Menu selection. Calibration parameters are permanent when Stored (even through power interruptions)
Power Input:	24VDC, 120mA max., (2.9 W max.) Optional: 100-130VAC 50/60 Hz, (4.2 W max.) Optional: 200-260VAC 50/60 Hz, (4.8 W max.) Fuse: internal, rated 1A
Output:	RS485
Signal Relay:	Qty 1, rated 120/240 VAC or 24VDC, 1 ampere
Temperature Compensation:	Automatic, temperature probe built in to level Sensor
Electrical/Surge Protection:	Sensor, RS485 and power input
Operating Temperature: (Electronics)	-13 to 140°F (-25 to 60°C)



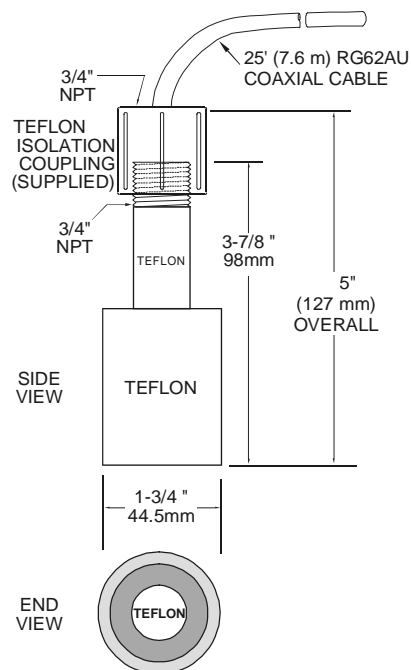
Standard Sensor PZ32T

Maximum Range:	32 ft. (10 m)
Deadband (blanking):	Programmable, minimum 12" (305mm)
Beam Angle:	8°
Operating Frequency:	42 KHz
Exposed Materials:	PVC and Teflon
Operating Temperature:	- 40° to 150°F (-40° to 65°C)
Operating Pressure:	20 psi (1.35 Bar) maximum
Mounting:	3/4" NPT (PVC isolation coupling supplied)
Sensor Cable:	RG62AU coaxial, 25 ft. (7.6 m) standard length
Maximum Cable Length:	500 ft. (152 m) RG62AU coaxial
Hazardous Rating:	with optional Intrinsic Safety Barrier: CSA, Class I,II,III, Div. I,II, Groups C,D,E,F,G



Optional Sensor PZ32TE

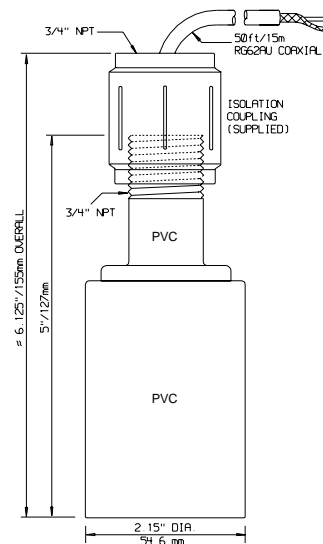
Maximum Range:	32 ft. (10m)
Deadband (blanking):	Programmable, minimum 12" (305 mm)
Beam Angle:	8°
Operating Frequency:	42 KHz
Exposed Materials:	Teflon
Operating Temperature:	-40° to 170°F (-40° to 76°C)
Operating Pressure:	20 psi (1.35 Bar) maximum
Mounting:	¾" NPT (Teflon or Polypropylene isolation coupling supplied)
Sensor Cable:	RG62AU coaxial, 25 ft. (7.6 m) standard length
Maximum Cable Length:	500 ft. (152 m) RG62AU coaxial
Hazardous Rating:	with optional Intrinsic Safety Barrier: CSA, Class I,II,III, Div. I,II, Groups C,D,E,F,G,



Optional PZ52T

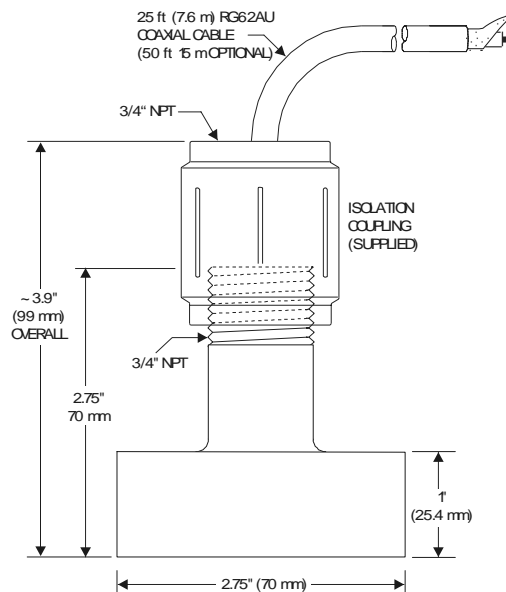
Maximum Range:	50 ft. (15.6 m)
Minimum Range (Deadband):	16 in. (406 mm)
Operating Frequency:	40 KHz
Beam Angle:	8°
Temperature Compensation:	Automatic, continuous
Operating Temperature:	-40 to 150°F (-40 to 65°C)
Max. Operating Pressure:	20 psi (1.35 Bar)
Sensor Face:	Teflon
Sensor Housing:	PVC
Sensor Mounting:	¾" NPT (Isolation Coupling supplied)
Sensor Cable:	50 ft. (15 m) continuous
Maximum Cable Length:	500 ft. (150 m)
Hazardous Rating:	CSA rated Intrinsically Safe Class I, Groups C,D, Class II, Groups E,F,G with Optional Intrinsic Safety Barrier.

Note: Max Range reduced to 32 ft (10 m) with ISB option



Optional PZ12

Maximum Range: 12 ft (3.66 m)
Minimum Range (Deadband): 8" (203.2 mm)
Operating Frequency: 92 KHz
Beam Angle: 8°
Operating Temperature: -40° to 150° (-40° to 65°C)
Temperature Compensation: Automatic, continuous
Max. Operating Pressure: 20 psi (1.35 bar)
Sensor Face: PVC
Sensor Body: PVC
Mounting: 3/4" NPT
Cable Length: 25 ft. (7.6 m) continuous RG62AU coaxial. Optional 50 ft. (15 m) continuous
Max. Cable Length: 500 ft. (152 m) RG62AU coaxial (splice)
Hazardous Rating: CSA rated Intrinsically Safe Class I, Groups C,D, Class II, Groups E,F,G with Optional Intrinsic Safety Barrier.



Optional PZ12TF

Maximum Range: 12 ft (3.66 m)
Minimum Range (Deadband): 8" (203.2 mm)
Operating Frequency: 92 KHz
Beam Angle: 8°
Operating Temperature: -40° to 150° (-40° to 65°C)
Temperature Compensation: Automatic, continuous
Max. Operating Pressure: 20 psi (1.35 bar)
Sensor Face: Teflon
Sensor Body: CPVC
Mounting: 3/4" NPT
Cable Length: 25 ft. (7.6 m) continuous RG62AU coaxial. Optional 50 ft. (15 m) continuous
Max. Cable Length: 500 ft. (152 m) RG62AU coaxial (splice)
Hazardous Rating: CSA rated Intrinsically Safe Class I, Groups C,D, Class II, Groups E,F,G with optional Intrinsic Safety Barrier.

