



TEK-FLEX 4100A

Explosion Proof Guided Wave Radar Level Transmitter

Instruction Manual

Document Number: IM-4100A



www.tek-trol.com

NOTICE

Read this manual before working with the product. For personal and system safety, and for optimum product performance, make sure you thoroughly understand the contents before installing, using, or maintaining this product.

For technical assistance, contact

Customer Support

796 Tek-Drive

Crystal Lake, IL 60014

USA

Tel: +1 847 857 6076, +1 847 655 7428

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1 Safety Instructions

1.1 Intended Use

This measuring device is intended only for level and interface measurement of liquids. Guided Wave Radar (GWR) transmitters use time domain reflectometry with radar pulses guided by a metal probe and reflected off a product surface to determine levels in tanks.

1.2 Certification

Tek-Flex 4100A has ATEX certifications.

1.3 Safety Instructions from the Manufacturer

1.3.1 Disclaimer

The manufacturer will not be held accountable for any damage that happens by using its product, including, but not limited to direct, indirect, or incidental and consequential damages.

Any product purchased from the manufacturer is warranted in accordance with the relevant product documentation and our Terms and Conditions of Sale.

The manufacturer has the right to modify the content of this document, including the disclaimer, at any time for any reason without prior notice, and will not be answerable in any way for the possible consequence of such changes.

1.3.2 Product Liability and Warranty

The operator shall bear authority for the suitability of the device for the specific application. The manufacturer accepts no liability for the consequences of misuse by the operator. Wrong installation or operation of the devices (systems) will cause the warranty to be void. The respective Terms and Conditions of Sale, which forms the basis for the sales contract shall also apply.

1.3.3 Information concerning the Documentation

To prevent any injury to the operator or damage to the device it is essential to read the information in this document and the applicable national standard safety instructions. This operating manual contain all the information that is required in various stages, such as product identification, incoming acceptance and storage, mounting, connection, operation and commissioning, troubleshooting, maintenance, and disposal.

1.4 Safety Precautions

You must read these instructions carefully prior to installing and commissioning the device. These instructions are an important part of the product and must be kept for future reference. Only by observing these instructions, optimum protection of both personnel and the environment, as well as safe and fault-free operation of the device can be ensured.

For additional information that are not discussed in this manual, contact the manufacturer

Warnings and Symbols Used

The following safety symbol marks are used in this operation manual and on the instrument.



WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury



CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.



NOTE

Indicates that operating the hardware or software in this manner may damage it or lead to system failure.

1.5 Packaging, Transportation and Storage

1.5.1 Packaging

The original package consists of

1. Tek-Flex 4100A Explosion Proof Guided Wave Radar Level Transmitter
2. Documentation



NOTE

Unpack and check the contents for damages or signs of rough handling. Report damage to the manufacturer immediately. Check the contents against the packing list provided.

1.5.2 Transportation

- Avoid impact shocks to the device and prevent it from getting wet during transportation.
- Verify local safety regulations, directives, and company procedures with respect to hoisting, rigging, and transportation of heavy equipment.
- Transport the product to the installation site using the original manufacturer's packing whenever possible.

1.5.3 Storage

If this product is to be stored for a long period of time before installation, take the following precautions:

- Store your product in the manufacturer's original packing used for shipping.
- Storage location should conform to the following requirements:
 - Free from rain and water
 - Free from vibration and impact shock
 - At room temperature with minimal temperature and humidity variation
- Before storing a used flowmeter remove any fluid from the flowmeter line completely. Properties of the instrument can change when stored outdoors.

1.5.4 Name Plate

The nameplate lists the order number and other important information, such as design details and technical data



Note

Check the device nameplate to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate.

2 Product Description

This section covers the reference and specification data, as well as ordering information.

2.1 Introduction

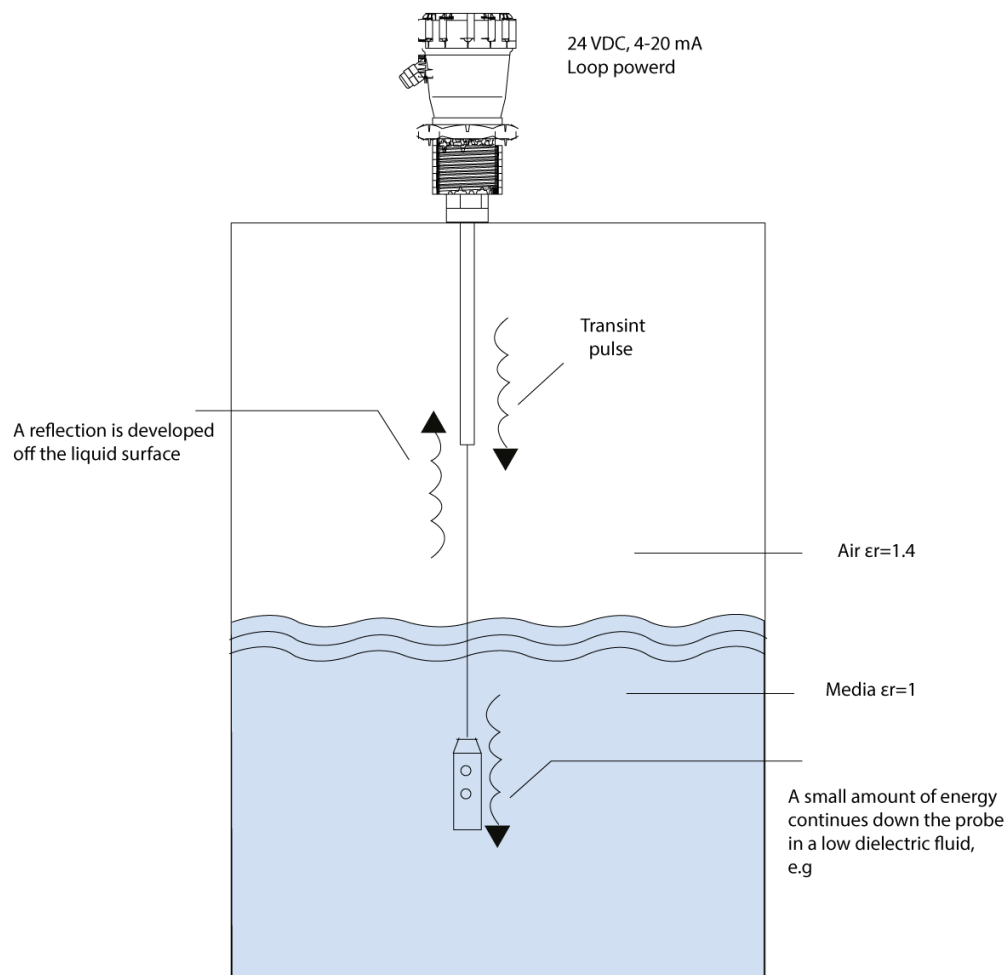
Featuring TDR (Time Domain Reflectometry) technology, the Tek-Flex 4100A Explosion Proof Guided Wave Radar Level Transmitter provides continuous level measurement in liquids, solids, and slurries. This innovative device has almost no installation restrictions in tanks, silos, and bins up to 60 feet. The Tek-Flex 4100A has a fully isolated 4 to 20mA output that can be scaled for tank level or distance. The unit requires 12 to 30 VDC power. The Tek-Flex 4100A ships precisely pre-calibrated for the customers' application for quick installation and setup. TDR technology is not affected by pressure, vacuum, temperature, viscosity, foam, or dust. Changes in dielectric constant or coating of the probe do not affect the level measurement due to the dynamic sensing technology programmed into the artificial intelligence of the Tek-Flex 4100A Guided Wave Radar Level Transmitter.



2.2 Working Principle

Tek-Flex 4100A Guided Wave Radar's principle is solely based on microwave technology. Probe is immersed in the liquid or bulk media. High frequency electromagnetic pulses transmitted down the probe are reflected at the point of discontinuity between the air and the process medium. Reflections are measured by high-speed circuitry in the transmitter and establish the measurement level. Microwaves accuracy are not affected by temperature variations, dust, pressure, and viscosity except materials that are used in the tank or chambers. The device sends a low energy microwave pulse down the probe. When the pulse and media come in contact, a constant amount of energy is reflected back up the probe to the device. The level is directly proportional to Time Domain Reflectometry. The transmitter measures the time delay between the transmitted and received echo signals and the on-board microprocessor in the transmitter calculates the distance to the liquid using the formula:

$$\text{Distance} = (\text{Speed of Light} \times \text{Time Delay})/2$$

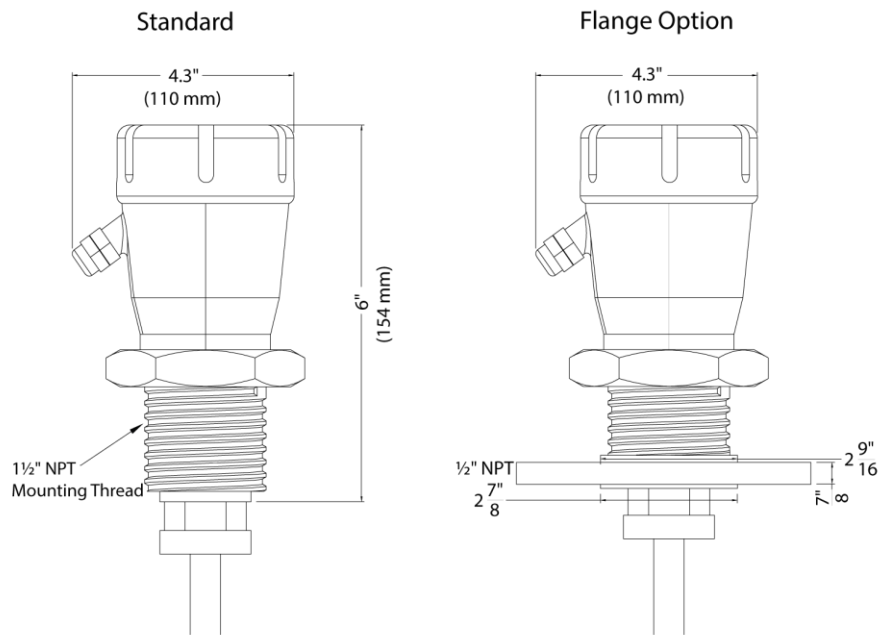


Working of Tek-Flex 4100A

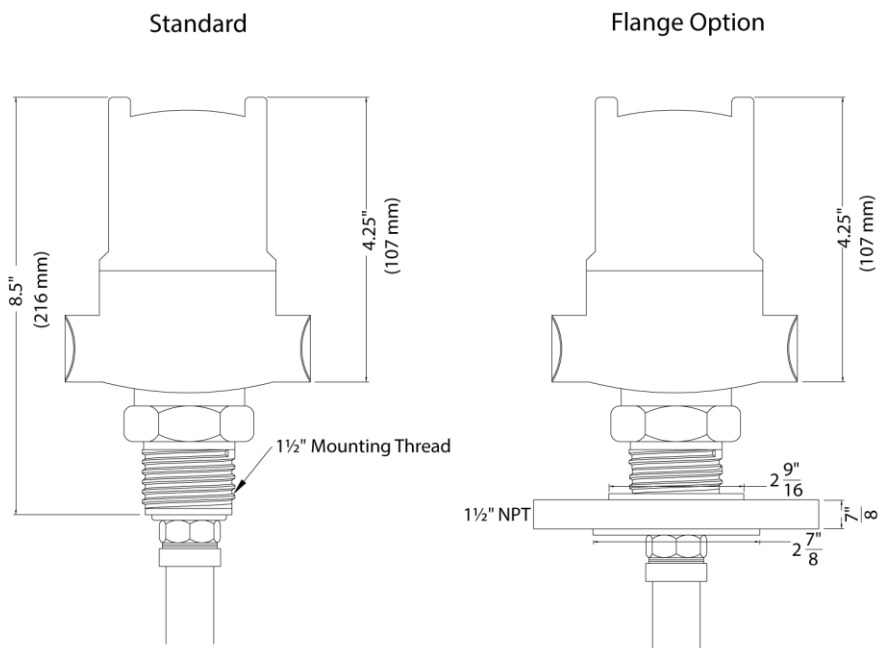
2.3 Specifications

Service	Liquids and Bulk Solids
Wetted Materials	316 SS, PTFE
Ranges	Up to 10' with minimum dielectric constant of 0.3
Accuracy	±0.039" (1 mm) or 0.02% of measured distance, whichever is greatest
Repeatability	±0.02" (0.5 mm)
Resolution	5 Digits
Temperature Limit	Electronics: -40°F to 158°F (-40°C to 70°C) Process/Probe: -40°F to 398°F (-40°C to 203°C)
Pressure Limits	-14.50 PSI to 580 PSI (-1 bar to 40 bar)
Power Requirement	12VDC to 30VDC
Power Consumption	<3W at 24VDC
Output Signal	4 to 20 mA
Process Connection	¾" NPT
Mounting Orientation	Vertical
Fail Safe	User selectable to 3.8 mA, 4 mA, 20 mA, 20.2 mA or last signal
Enclosure Rating	NEMA 6: Coated Epoxy Aluminum with IP67 Sealing NEMA 7: Class 1, Group D Class 2, Group E, F & G Class 3, DIV. 1 & 2
Agency Approvals	Optional ATEX
Cable Entries	Two 1/2" NPT Conduit Entries

2.4 Dimensional Drawing NEMA 4 Enclosure



NEMA 7 Enclosure



2.5 Model Chart

Example	Tek-Flex 4100A	050	W	N6	0	1	048	N	Tek-Flex 4100A-050-W-N6-0-1-048-N
Series	Tek-Flex 4100A								Guided Wave Radar Level Transmitter
Probe Range (Up to 120')		XXX							Probe Range in Inches
Probe Type			R T W X C						316 SS Rod (120" max.) 316 SS PTFE Coated Rod (120" max.) Wire Cable (720" max.) PTFE Coated Wire Cable (720" max.) 316 SS Coaxial (120" max.)
Enclosure Rating				N6 XP					NEMA 6 Explosion Proof
Process Connection					0				¾" NPT
Conduit Entries						1 2 3			Two ½" NPT Two Cable Glands One ½" NPT and One Cable Gland
Probe Length							XXX		Probe Length in Inches
Option								N T	None Extreme Temperature -320 °F to 500 °F

3 Mechanical Installation

This section covers instructions on installation and commissioning. Installation of the device must be carried out by trained, qualified specialists authorized to perform such works.

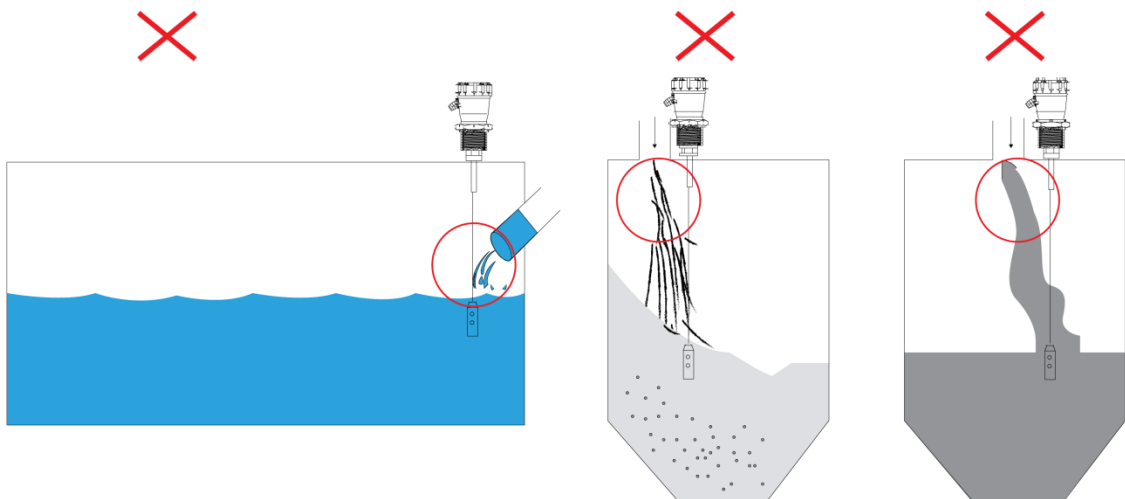


CAUTION

- When removing the instrument from hazardous processes, avoid direct contact with the fluid and the meter
 - All installation must comply with local installation requirements and local electrical code
-

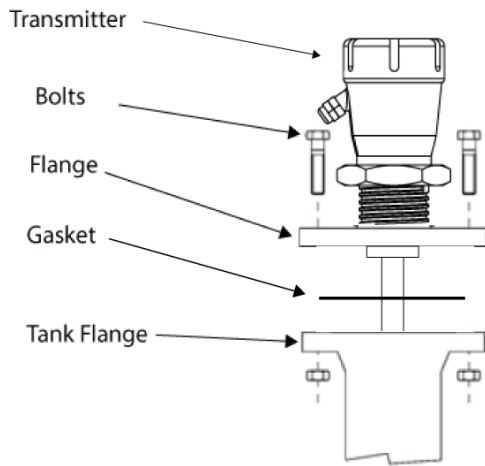
The following guidelines must be followed:

- Minimum nozzle diameter should be 2" from the probe at initial installation.
- Probes should not come in contact with the metallic tank walls, obstructions or structures.
- If using cable probes, take into account the possibility of cable sway encroaching clearance requirements of agitators and augers. If this possibility occurs, secure a ring or mounting connection to the cable weight and to the vessel floor.
- Do not mount the Tek-Flex 4100A in the product fill stream.



3.1 Flange Mount

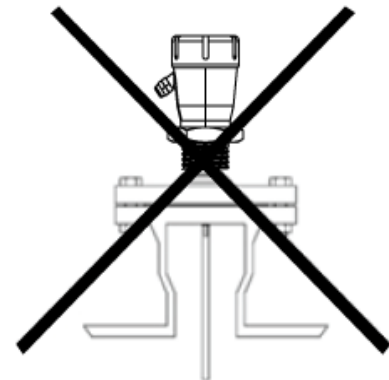
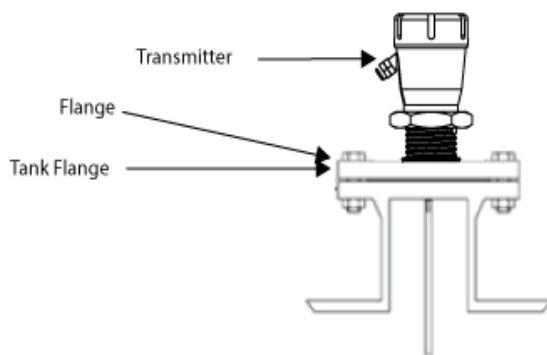
To mount a flanged transmitter, bolt the transmitter's flange to the flange pipe on the wall of the tank.



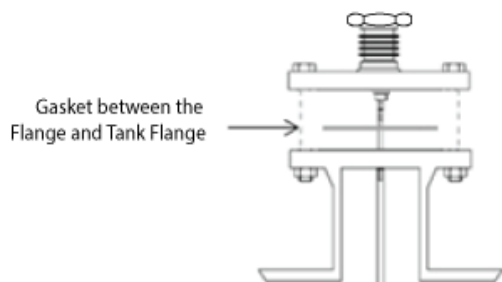
Flanged Tank Connection

3.2 Nozzle Mount

The transmitter can be mounted to a tank nozzle using the appropriate flange.



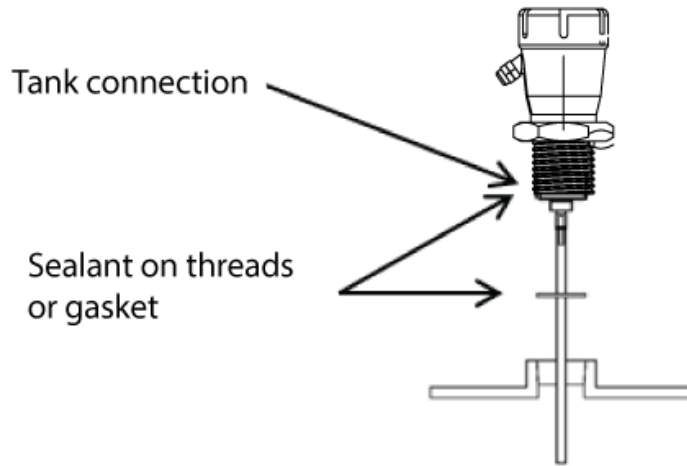
Avoid nozzles with reducer
(unless using coaxial probes)



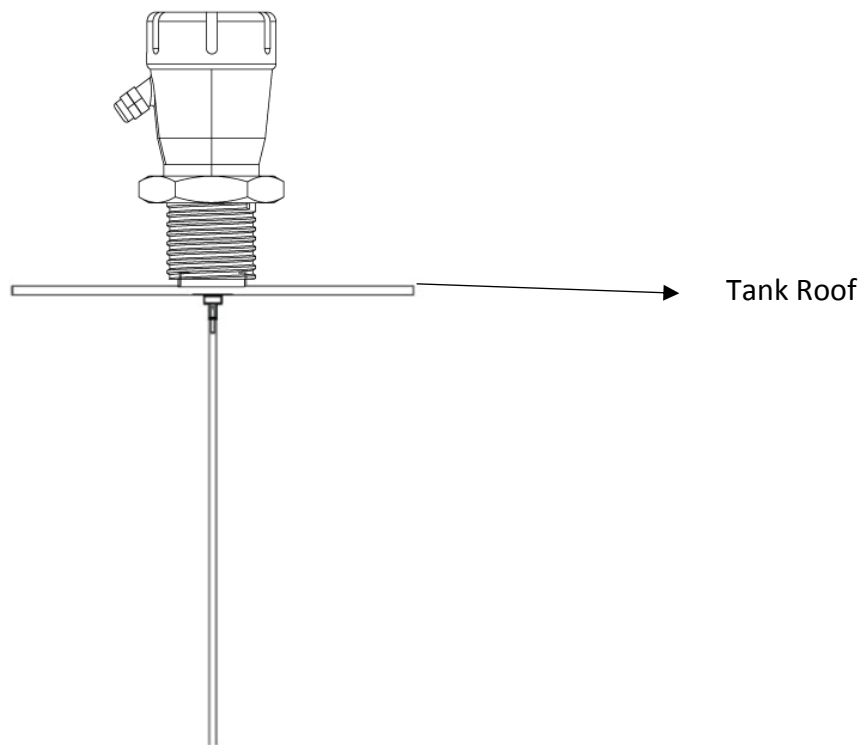
Flange Mounting

3.3 Threaded Mount

Transmitters with threaded process connectors can be screwed to tanks or nozzles with threaded bosses.



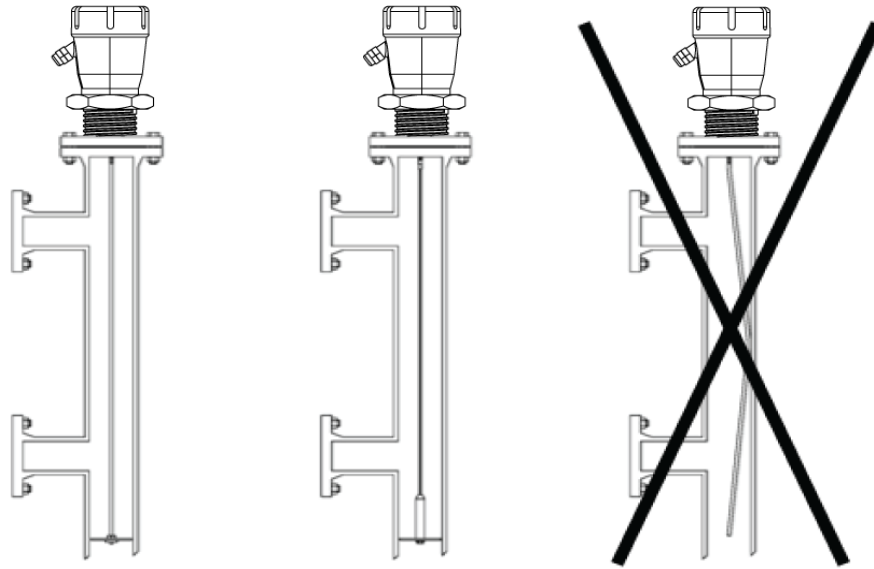
Threaded Tank Connection



Tank roof mounting using a Threaded Connection

3.4 Mounting on a Bypass/Bridle

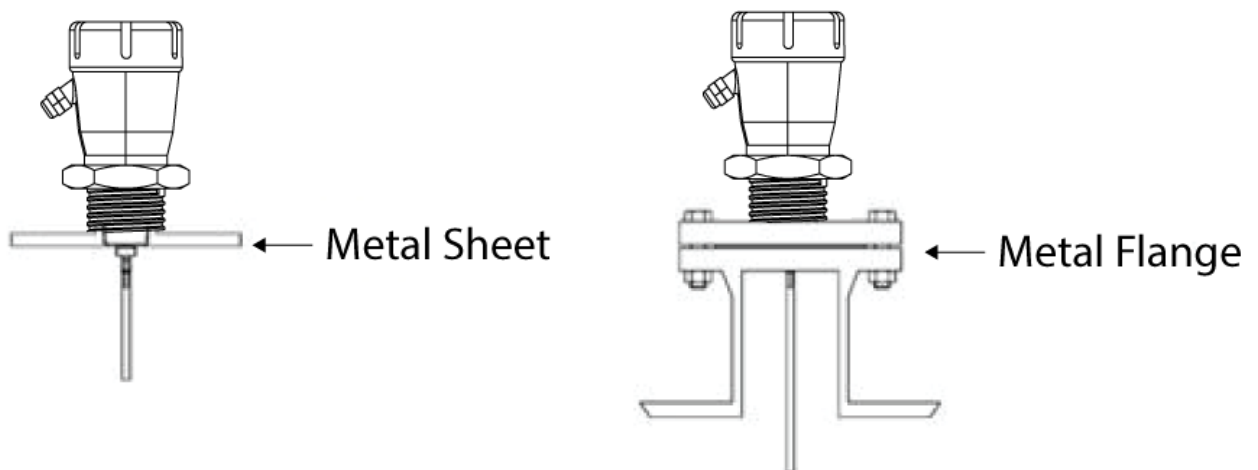
Tek-Flex 4100A transmitter can be successfully installed in a new or existing bypass pipe, bridle, or a side pipe as shown in the figure. This type of installation is often simple and allows the addition of radar level measurement to an otherwise busy installation.



Bypass Installation

3.5 Mounting on a Non-Metallic Container

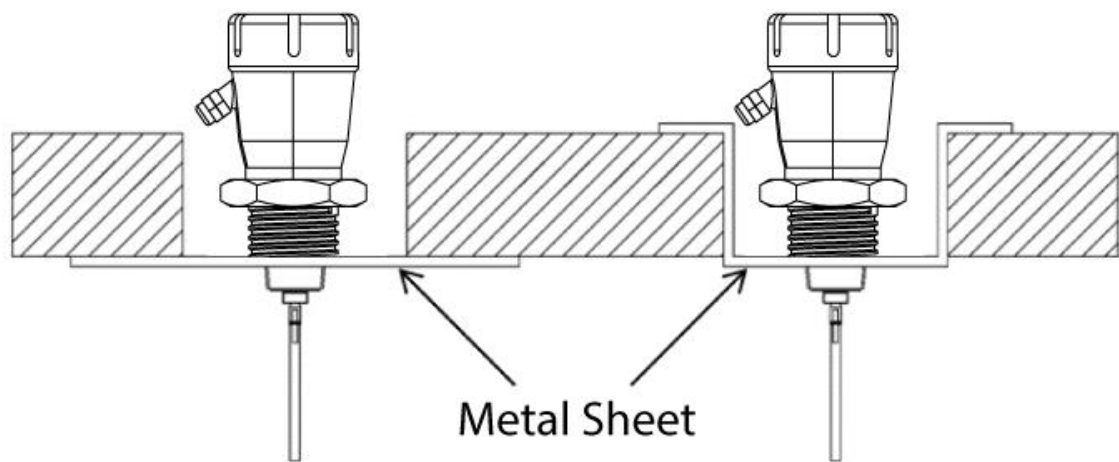
In case of non-metallic container, the Tek-Flex 4100A should be mounted with a metal plate of minimum 8" (200mm) diameter. Use metal shielding for the conduit connections.



Mounting on a non-metallic vessel

3.6 Mounting in Concrete Silos

In case of concrete silos, the Tek-Flex 4100A should be mounted with a metal plate of minimum 8" (200mm) diameter.



Mounting in concrete silos

4 Electrical Installation

This section covers the all electrical connection requirement. Electrical connection of the device must be carried out by trained, qualified specialists authorized to perform such work by the installation site.



WARNING

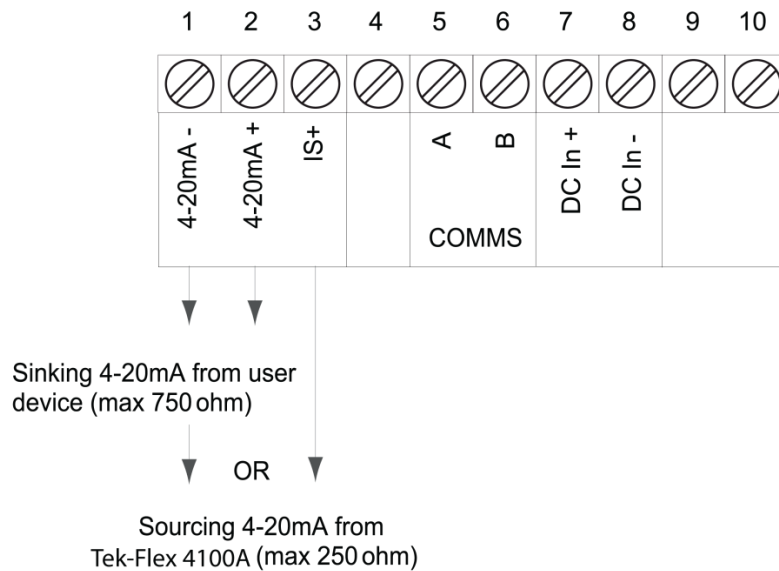
- Connect all electrical cables when the power is switched off. If the device does not have switch-off elements, then, overcurrent protection devices, lightning protection and/or energy isolating devices must be provided by the customer.
 - The device must be grounded to a spot in accordance with regulations in order to protect personnel against electric shocks.
-



NOTE

- When using the measuring device in hazardous areas, installation must comply with the corresponding national standards and regulations and the Safety Instructions or Installation or Control Drawings.
-

4.1 Wiring Terminals



Power Supply	DC In +
	DC In -
Communication	A
	B
Output (Sinking)	4-20mA -
	4-20mA +
Output (Sourcing)	4-20mA -
	IS+

4.2 Powering up the Transmitter

- Confirm whether the Tek-Flex 4100A is mounted within the recommended specifications.
- Confirm the wiring is correct and all connections are as shown in the above figure.
- Apply power to the Tek-Flex 4100A.
- The Tek-Flex 4100A will take up to 30 seconds to warm up and stabilize upon initial start-up. It will then perform a scan to locate the level which will take approximately 1 second or less. Once the load sequence is complete and the Tek-Flex 4100A has taken the first measurement scan, the analog output should indicate the material level (factory default) or distance measurement. If the proper analog output is not achieved please contact your Tek-Trol representative for further instructions.

5 Maintenance

This section covers maintenance techniques and guidelines.

When exterior-cleaning the device, always use cleaning agents that do not attack the surface of the housing and the seals.

The measuring device requires no special maintenance.



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Tek-Trol LLC

796 Tek Drive Crystal Lake, IL 60014 USA

Tel.: +1 847 857 6076 , +1 847 655 7428 Fax: +1 847 655 6147

Email: tektrol@tek-trol.com

www.tek-trol.com