



FLEX PROBE

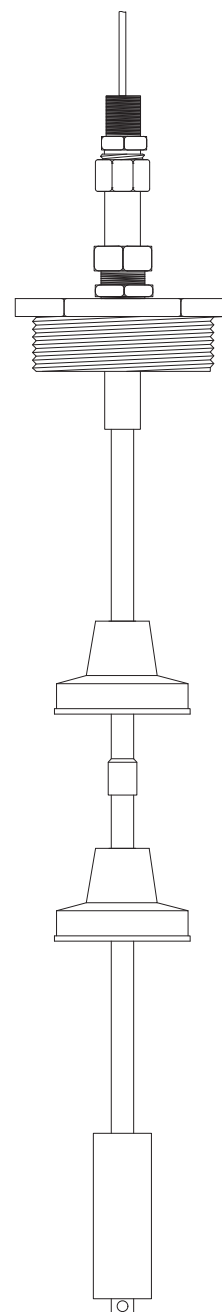
INSTALL AND PROGRAMMING GUIDE

409710001 r4

Flexible
Inventory Probes



SCAN / CLICK



The information in this publication is provided for reference only. While every effort has been made to ensure the reliability and accuracy of the information contained in this document at the time of printing, we recommend that you refer to “franklinfueling.com” for the most current version of this document. All product specifications, as well as the information contained in this publication, are subject to change without notice. Franklin Electric does not assume responsibility and expressly disclaims liability for loss, damage, or expense arising out of, or in any way connected with, installation, operation, use, or maintenance by using this document. Franklin Electric assumes no responsibility for any infringement of patents or other rights of third parties that may result from use of this document or the products. We make no warranty of any kind with regard to this material, including, but not limited to, the implied warranties of merchantability and fitness for a particular purpose.

Copyright © 2024 Franklin Electric Co., Inc., Madison, WI 53718. All world rights reserved. No part of this publication may be stored in a retrieval system, transmitted, or reproduced in any way, including, but not limited to, photocopy, photograph, magnetic, or other record, without the prior written permission of Franklin Electric.

For technical support, please contact:

Franklin Electric Technical Support
Web: franklinfueling.com/support-center
Tel: +1 800 984 6266

For additional questions and concerns, please contact:

Franklin Electric
3760 Marsh Rd
Madison, WI 53718 USA
Web: franklinfueling.com
Tel: USA & Canada +1 800 225 9787 • Tel: UK +44 (0) 1473 243300
Tel: Mex 001 800 738 7610 • Tel: DE +49 6571 105 380 • Tel: CN +86 10 8565 4566

Guardian Series is a trademark of Franklin Electric Company, Inc.
Veeder-Root is a trademark of Danaher Corporation.

409710001 r4

CONVENTIONS USED IN THIS DOCUMENT

This document includes safety precautions and other important information presented in the following format:

NOTE: This provides helpful supplementary information.

IMPORTANT: This provides important supplementary information and instructions to avoid damaging hardware or a potential hazard.

▲ CAUTION: This indicates a potentially hazardous situation that could result in minor or moderate injury if not avoided. This may also be used to alert against unsafe practices.

▲ WARNING: This indicates a potentially hazardous situation that could result in severe injury or death if not avoided.

▲ DANGER: This indicates an imminently hazardous situation that will result in death if not avoided.

OPERATING PRECAUTIONS

Franklin Electric equipment is designed to be installed in areas where volatile liquids such as gasoline and diesel fuel are present. Working in such a hazardous environment presents a risk of severe injury or death if you do not follow standard industry practices and the instructions in this document. Before working with or installing the equipment covered in this document, or any related equipment, read this entire document, particularly the following precautions:

IMPORTANT: To help prevent spillage from an underground storage tank, make sure the delivery equipment is well-maintained, that there is a proper connection, and that the fill adaptor is tight. Delivery personnel should inspect delivery elbows and hoses for damage and missing parts.

▲ CAUTION: Use only original Franklin Electric parts. Substituting non-Franklin Electric parts could cause the device to fail, which could create a hazardous condition and/or harm the environment.

▲ WARNING: Follow all codes that govern the installation and service of this product and the entire system. Always lock out and tag electrical circuit breakers while installing or servicing this equipment and related equipment. A potentially lethal electrical shock hazard and the possibility of an explosion or fire from a spark can result if the electrical circuit breakers are accidentally turned on while installing or servicing this product. Refer to this document (and documentation for related equipment) for complete installation and safety information.

▲ WARNING: Before entering a containment sump, check for the presence of hydrocarbon vapors. Inhaling these vapors may cause dizziness/unconsciousness, and if ignited, can explode causing serious injury or death. Containment sumps are designed to trap hazardous liquid spills and prevent environmental contamination, so they can accumulate dangerous amounts of hydrocarbon vapors. Check the atmosphere in the sump regularly while work is in process. If vapors reach unsafe levels, exit the sump and ventilate it with fresh air before resuming work. Always have another person standing by for assistance.

▲ WARNING: Follow all federal, state, and local laws governing the installation of this product and its associated systems. When no other regulations apply, follow NFPA codes 30, 30A, and 70 from the National Fire Protection Association. Failure to follow these codes could result in severe injury, death, serious property damage, and/or environmental contamination.

▲ WARNING: Always secure the work area from moving vehicles. The equipment in this document is usually mounted underground, so reduced visibility puts service personnel working on it in danger from moving vehicles that enter the work area. To help prevent this safety hazard, secure the area by using a service truck or other vehicle to block access to the work area.

▲ DANGER: Inspect the installation location for potential ignition sources such as flames, sparks, radio waves, ionizing radiation, and ultrasound sonic waves. If any potential ignition sources are identified, implement proper safety measures.

Contents

1	Introduction.....	1
1.1	Documentation.....	1
1.1.1	Symbol Legend	1
2	Safety/Security	2
2.1	General Safety Information.....	2
2.2	Documentation Availability	2
2.2.1	Station Owner or Operator.....	2
2.2.2	Miscellaneous.....	2
2.3	Hazard Assessment	3
2.4	Required Personal Protective Equipment (PPEs)	3
2.5	Cyber Security	3
3	Pre-Installation Overview	4
3.1	Upon Receipt of Item(s)	4
3.1.1	Unpacking & Handling.....	4
3.2	Technical Overview	5
3.2.1	Identifying Components	5
3.2.2	Specifications	6
3.2.3	Dimensions.....	7
3.2.4	Required Tools	7
4	Installation.....	8
4.1	Install Instructions	8
4.2	Flex Probe Wiring.....	10
4.3	Flex Probe Programming.....	12
4.3.1	EVO™ 200/400/600/6000	12
4.3.2	EVO™ 550/5000	13
5	Troubleshooting.....	14
6	Appendix.....	15
6.1	Related Documents	15
6.2	Control Drawing.....	16

1 Introduction

Franklin Electric flex probes are magnetostrictive measuring probes that provide a highly accurate level measurement for tanks up to 70' (21 m) in height. These probes are ideal for tall tanks or tanks with low overhead clearance where conventional magnetostrictive probes are not an option. Flex probes are available in lengths from 2 to 70' (0.6 to 21 m) and can be ordered in 12" (305 mm) increments.

1.1 Documentation

- This document is intended for qualified and certified installation persons.
- Instructions of this document are in English. All other language versions are translations of this original document.
- Illustrations in this document show a typical setup and are for instruction and description purposes only.
- Information given in this document is given as a guide only. It is the installer's responsibility to ensure that correct and safe procedures are followed at all times.
- This document and related documents are available from Franklin Electric at www.franklinfueling.com.

1.1.1 Symbol Legend



Wear Protective Headwear



Wear Eye Protection



Wear Protective Clothing



Wear High-Visibility Clothing



Wear Protective Gloves



Wear Safety Footwear



Refer to instruction guide



Ventilate Before & During Entering



Ensure Continuous Ventilation



Connect an earth terminal to the ground



Lockout/Tagout Electrical Equipment



Disconnect main plug from electrical outlet



Disconnect before carrying out maintenance or repair



General Warning



Warning: Industrial vehicles



Warning: Electricity



Warning: Flammable Material



No open flame; Fire, open ignition source and smoking prohibited

2 Safety/Security

2.1 General Safety Information

- Procedures in this document are only to be performed by people qualified and certified to perform them.
- Personnel working on or with energized equipment must be authorized by relevant regulatory bodies to carry out such work and must have the appropriate training. Check with your employer and relevant regulatory body's rules for working with energized equipment.
- Obey all local laws, rules, regulations, and instructions in this document. In case of inconsistency or contradiction between information contained in this document and any laws, rules and regulations, obey the stricter of the two.
- Keep unqualified personnel at a safe distance during installation.
- If it is necessary to remove safety/security devices, immediately reinstall the safety/security devices after completing the work.

2.2 Documentation Availability

2.2.1 Station Owner or Operator

Save this guide for future use, and make sure to provide it to anyone who services this equipment.

2.2.2 Miscellaneous

Always reference the guide(s) that came with the equipment for the most current and complete list of installation and safety precautions.

2.3 Hazard Assessment

Prior to beginning work and prior to recommencing work after leaving and returning to the worksite, a worksite, *pre-job hazard assessment* must be performed to identify safety and environmental needs. At a minimum, this hazard assessment should:

- Identify possible hazards and risks.
- Identify the safety needs of the job.
- Identify the correct procedures, practices and equipment.
- Eliminate unsafe conditions and actions from the worksite.
- Identify the need for personal protective equipment.
- Inspect equipment before use.
- Confirm sheaths of all cables are secured and undamaged.
- Confirm plugs and connectors are properly connected and serviceable.
- Perform ongoing risk assessment during the project.

2.4 Required Personal Protective Equipment (PPEs)

These PPEs are required during all phases of installation.



Wear Protective Clothing



Wear Eye Protection



Wear High-Visibility Clothing



Wear Protective Gloves



Wear Protective Headwear



Wear Safety Footwear

2.5 Cyber Security

This product is designed to be connected to and to communicate information and data via a network interface. It is solely the owner's responsibility to provide and continuously ensure a secure connection between the product and the Owner's network or any other network (as the case may be).

The Owner shall establish and maintain appropriate measures (such as but not limited to the installation of firewalls, application of authentication measures, encryption of data, installation of anti-virus programs, etc.) to protect the product, the network, its system and the interface against any kind of security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information. ***The Owner shall also ensure that the device and/or any connecting devices have the latest firmware version available to ensure device security features are up to date.***

The manufacturer, Franklin Electric, and its affiliates are not liable for damages and/or losses related to such security breaches, unauthorized access, interference, intrusion, leakage and/or theft of data or information.

3 Pre-Installation Overview

IMPORTANT: Before beginning the installation, make sure to read the following information about proper unpacking, handling, and installation practices. If these precautions are not followed, the probe can be kinked or damaged. *Probes that are damaged by improper unpacking, handling, or installation are not covered under warranty.* For any questions, contact Franklin Electric Technical Support.

3.1 Upon Receipt of Item(s)

- Verify all items are in accordance with the order (see §3.1.1 for special unpacking and handling instructions).
- Check all items for damage.
- If any item shows damage or is not in accordance with the order, inform Franklin Electric *immediately*.
- Remove the packaging material.
 - Follow all local laws, rules and regulations regarding disposal of discarded parts, packaging material or items and any subsequent components.

3.1.1 Unpacking & Handling

Take special care when unpacking and handling the flex probe to avoid damaging it.

Special Attention Items

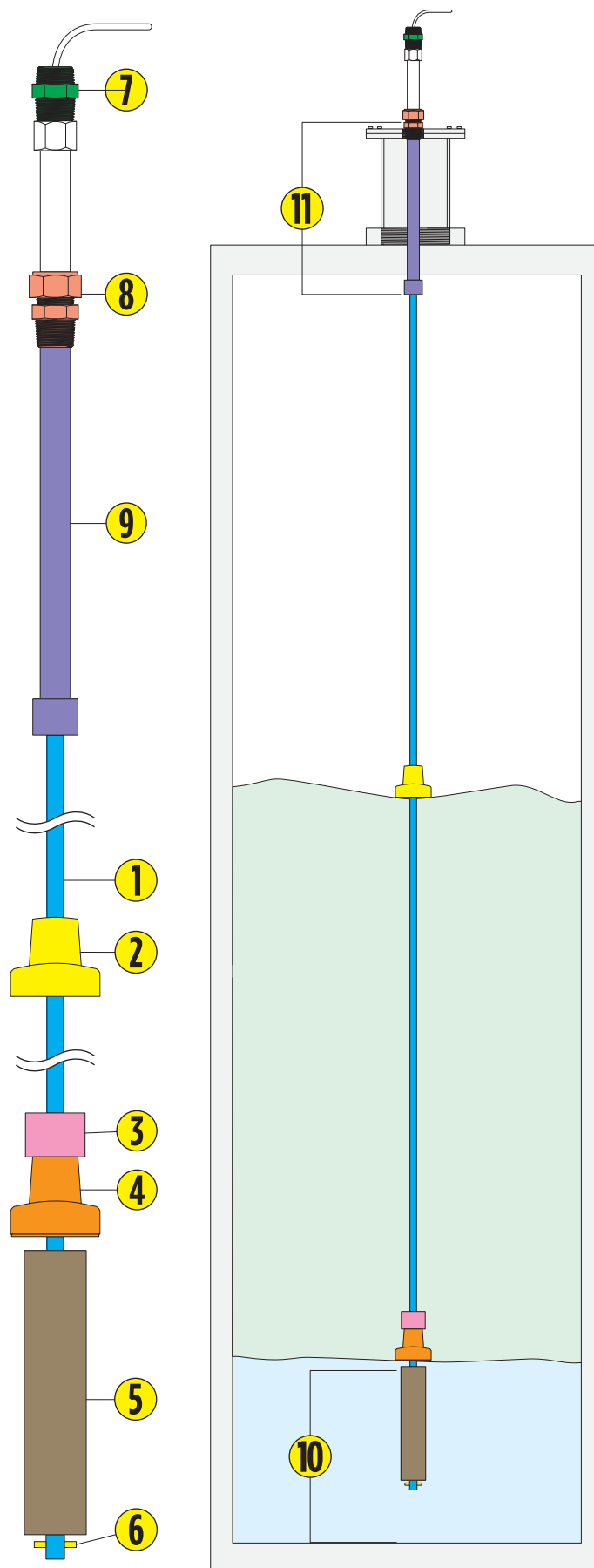
- Two people are required to install the flex probe.
- DO NOT cut the ties that hold the flex probe together before installing the probe.
- DO NOT bend the top 2' (0.61 m) of the probe. *This area contains electronic components that must remain straight.**
- Always keep the coils parallel. When removing the tie wraps, do not lift one coil separately from the other coils. *Never twist a coil 90° from the other coils.***
- Do not assemble the weight and floats on the flex probe until it is ready to be installed. Carry the parts to the top of the tank before assembling them. Do not unwrap the flex probe until it is ready to be installed.
- Do not twist the probe during installation. Always keep the coils of the probe parallel. Unroll it into the tank.
- Do not let the coil become less than 44.5" (1.13 m) in diameter while uncoiling it.



3.2 Technical Overview

3.2.1 Identifying Components

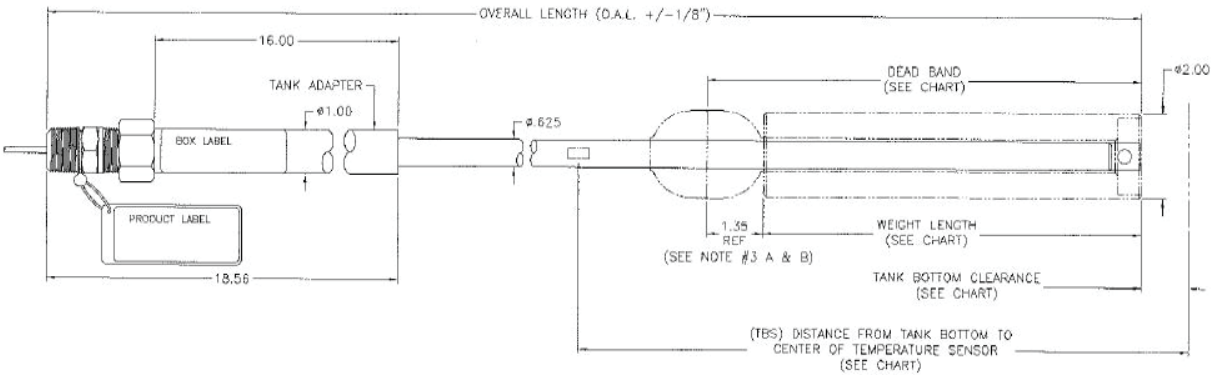
1. Flexible probe shaft
2. Product float
3. Spacer (included in probe models greater than 23')
4. Water float
5. Weight
6. Weight pin
7. Probe head, $\frac{3}{4}$ " NPT
8. Adjustable compression fitting, 1" NPT
9. 16" (610 mm) installation sleeve, $\frac{3}{4}$ " NPT (optional)
10. Dead Band Space (between 6.35" and 19.35")
11. Null Zone (no detection for about 12")



3.2.2 Specifications

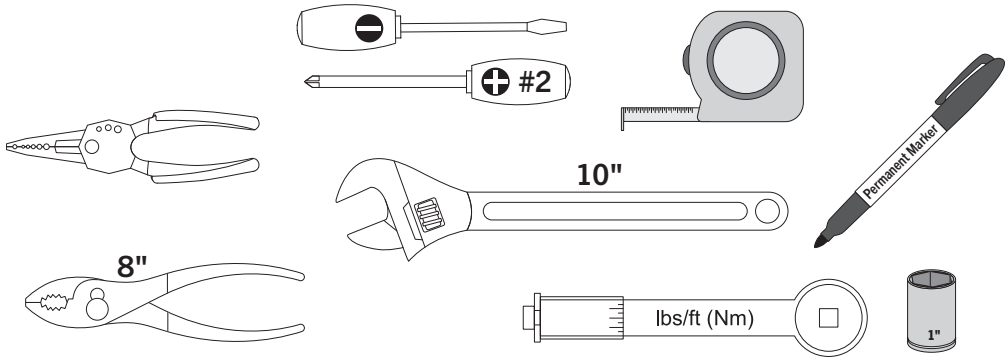
- **Input Voltage:** 16 to 31 VDC
- **Resolution:** 0.010" (0.254 mm)
- **Linearity:** $\pm 0.01\%$ of full scale, $\pm 0.010"$ (.254 mm), whichever is greater
- **Repeatability:** $\pm 0.001\%$ of full scale, $\pm 0.00025"$ (0.0064 mm), whichever is greater
- **Temperature Accuracy:** Absolute $\pm 2^{\circ}\text{F}$ ($\pm 1.11^{\circ}\text{C}$)
- **Temperature Measurement Resolution:** $\pm 0.01^{\circ}\text{F}$ ($\pm 0.02^{\circ}\text{C}$)
- **Temperature Sensing Range:** -40°F to 150°F (-40°C to 66°C)
- **Operating Temperature Range:** -40°F to 158°F (-40°C to 70°C)
- **Maximum Tank Capacity:** 5,875,000 gal (22,200,000 liters)
- **Total Float Capability:** 2 floats
- **Environment:** NEMA 4
- **Probe Material:** PVDF (polyvinylidene fluoride)
- **Weight & Weight Pin Material:** Stainless Steel
- Includes 2' (610 mm) cable.
- Compatible with:
 - EVO™ 200/400/600/6000 consoles with software version 3.3.1 or later
 - EVO™ 550/5000 consoles with software version 2.6.2.8040 or later
 - Colibri® consoles with software version 1.18.16.8543 or later
- Use appropriate flexible probe installation kit for installing flexible probes
- Use appropriate flexible probe float kits only

3.2.3 Dimensions



O.A.L.	DEAD BAND	WEIGHT LENGTH (SEE NOTE #3)	TANK BOTTOM CLEARANCE	TANK BOTTOM TO TEMPERATURE SENSOR (TBS)
47~144	6.35	5.00	1.00	27.00
145~288	8.35	7.00	2.00	30.00
289~432	12.35	11.00	3.00	35.00
433~600	15.35	14.00	4.00	39.00
601~720	17.35	16.00	5.00	42.00
721~840	19.35	18.00	6.00	45.00

3.2.4 Required Tools



4 Installation



IMPORTANT: The customer provides the following process connection:

- Fixed mounting: A bushing, flange, or metal cover adapter appropriate for the riser on site. The probe has a 0.75" NPT connector.
- Adjustable mounting: A bushing, flange, or metal cover adapter appropriate for the riser on site. The compression fitting has a 1" NPT connector.
- The flex probe MUST have both the product float and the water float.
- Make sure you thoroughly clean the stainless steel pin at the tip of the flex probe tip before you use the probe.

NOTE:

- The weight holds the probe straight and functions as a spacer for the water float.
- The water float, product float, and tank mounting components are in a separate box.
- When the installation is complete, make sure this guide is left with the service station owner or operator.

The flex probe must have a specific amount of clearance from the bottom of the tank to allow for expansion. See the following table for clearance measurements:

Overall Length – Inches (Meters)	Tank Bottom Clearance – Inches (Millimeters)
47–144 (1.2–3.7)	1" (25)
145–288 (3.7–7.3)	2" (51)
289–432 (7.3–11)	3" (76)
433–600 (11–15.2)	4" (102)
601–720 (15.3–18.3)	5" (127)
721–840 (18.3–21.3)	6" (152)

4.1 Install Instructions

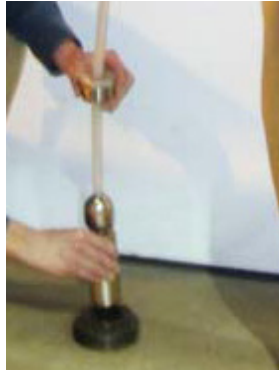
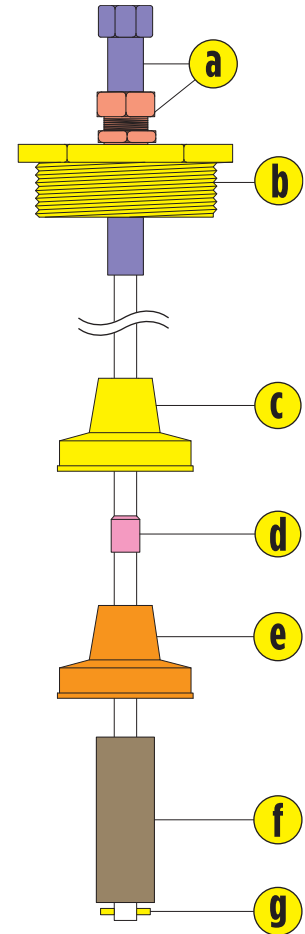
1. Cut the tie wrap, but make sure it is at the end of the tube with a hole in the plug. Leave the other tie wraps intact to prevent the coil from unwrapping before installing it.



- Place the appropriate equipment on the end of the probe in the following order:

- Height adjustment sleeve with compression fitting (if used)
- Thread adapter (1" or 3/4")
- Product float
- Float spacer (for use with FMP-FLX-23 and longer)
- Water float
- Weight (stainless steel)
- Weight pin (stainless steel)

- Hold the weighted end while another person holds the coiled probe. *The weight must always hang straight down. Do not bend it.*

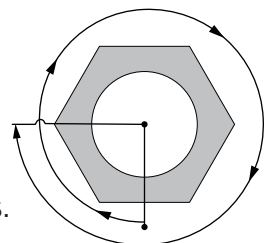


IMPORTANT: Do not drop the probe into the riser or the end of the probe may be damaged.

- Feed the weight slowly into the riser while uncoiling the tube. Cut the remaining tie wraps, one by one, as you go. Do not cut all of the tie wraps at once. They are sequentially marked. Start with number 1 at the end of the probe.

NOTE: For an adjustable mount installation, go to step 13.

- Thread and tighten adapter to the top of the probe and install it in the riser. *Do not lift the probe by the electrical cable.*
- Thread the 1" compression fitting into the adaptor. Make sure to support the probe by its body and not the electrical cable.
- Thread the adjustable sleeve onto the probe.
- Gently lower the probe into the tank until it rests on the bottom.
- Mark the spot where the adjustable sleeve meets the compression fitting.
- Raise the probe and measure from the marked spot in the previous step to the correct clearance distance (from the table at the beginning of this section), and make a second mark.
- Lower the probe until the second mark lines up with the adjustable sleeve, tighten the compression fitting finger tight, and then use a wrench to tighten the nut an additional 1 1/4 turns.

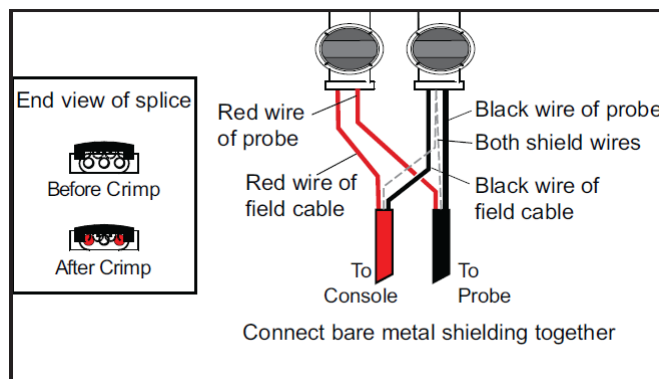


12. Continue to step 15.
13. Use the appropriate riser length to make sure there is the correct clearance according to the table at the beginning of this section.
14. Thread and tighten the adapter to the top of the probe, and mount it in the riser. Do not lift the probe by the electrical cable.
15. Attach a junction box to the top of the probe and proceed to §4.2.

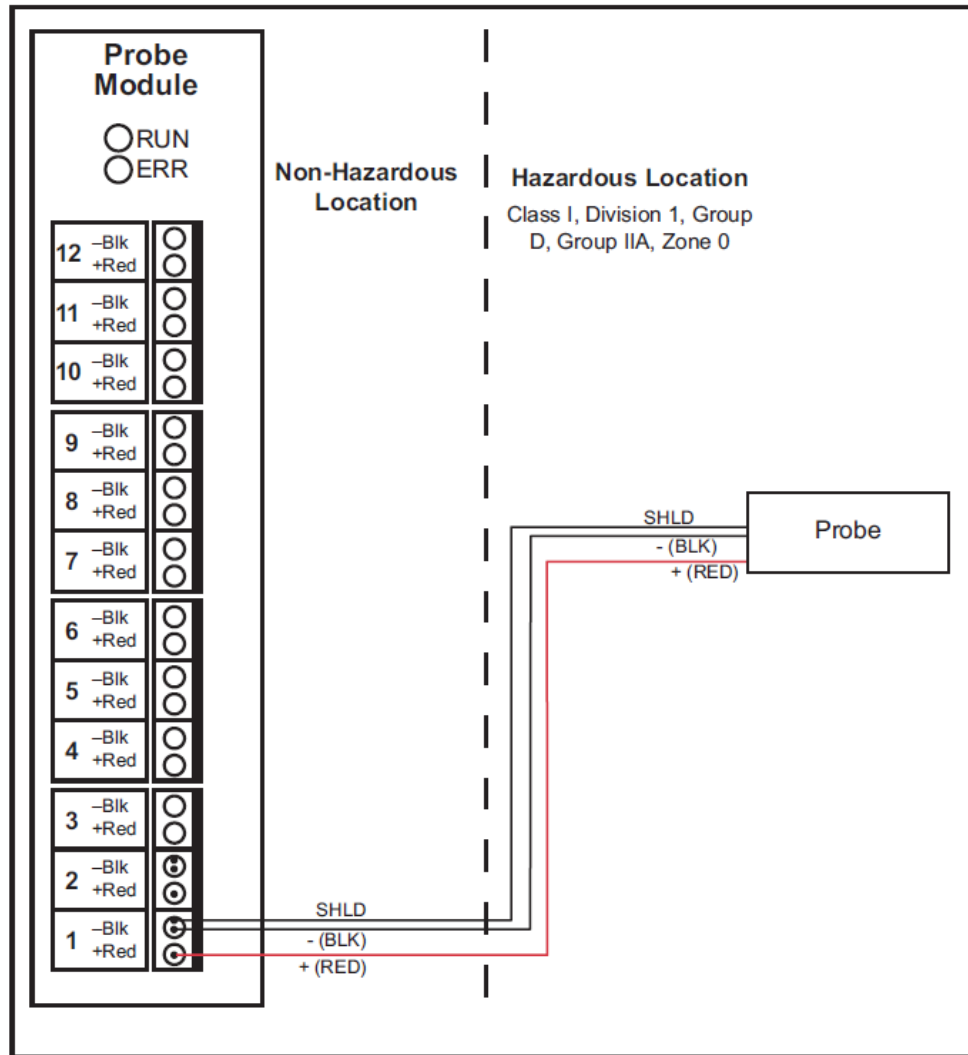
4.2 Flex Probe Wiring

The Flex Probe Splice Kit includes two electrical connectors for installation inside a junction box. The junction box must be connected to the top of the probe to prevent water from entering.

1. Install a junction box to the top of the flex probe.
2. Record the wire speed for programming later. This number is located on a metal tag attached to the probe cable.
3. Use two moisture-resistant connectors (provided) for each probe installation.
IMPORTANT: Do not cut back (strip) the wiring that is inserted into the splices.
4. Insert two RED wires into two separate openings of the first connector. Make sure the wires are fully inserted and seated at the end of the connector.
5. Insert two BLACK wires into two separate openings of the second connector and then insert the two shield wires into the remaining opening of the second connector. Make sure the wires are fully inserted and seated at the end of the connector.
6. Use slip-joint pliers to squeeze each connector together (position the plier's jaws on the connector perpendicular to the wires and drive the black cap down until it is almost flush with the edge of the connector body).



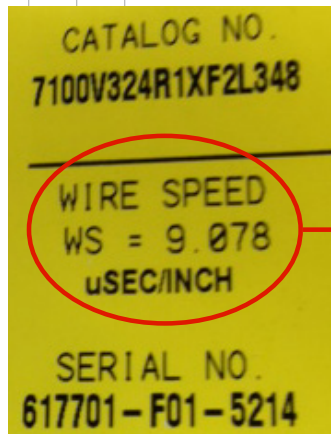
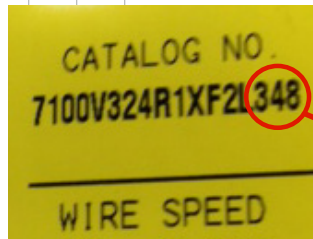
Connecting The Flex Probe To The Console



4.3 Flex Probe Programming

4.3.1 EVO™ 200 / 400 / 600 / 6000

■	Group	Parameter Name	Parameter Value
☐	Fuel Management System		
☐	Tanks		
☐	Tank #		
☐	Probe	Probe Type	FLX
		Connection Type	» Select which the probe connection type. » Internal UDP – for EVO™ 200/400 » Probe Module – for EVO™ 600/6000
		Module	» Select which module the probe is connected to.
		Channel	» Select which channel the probe is connected to.
		Gradient	» Enter wire speed as located on the flex probe label.
		Water Float	Enabled
		Water Float Offset Method	User Specified
		Water Offset	» Enter the value to offset the water level reading by.
		Product Offset	» Enter the value to offset the product level reading by.
		Float Type	» Select the type of float kits are installed on the probe. » 4 in gas » 4 in diesel » 3 in gas » 3 in diesel » 2 in gas » 2 in diesel
		Serial Number	» Enter the serial number as located on the flex probe label.
		Standard Probe	No
		Probe Length	» Enter the length of the probe as the last three digits of the CATALOG NO. located on the flex probe label.
☐	RTD TABLE		
☐	RTD #	Position	» Enter the value of the RTD. <i>For flex probes, this can be half the Probe Length.</i> NOTE: One RTD must be programmed for flex probes to be able to read the temperature.



4.3.2 EVO™ 550 / 5000

Use the following procedure to program the flex probe.

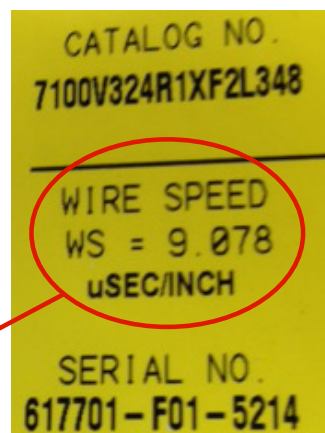
1. Select the FMP-FLX Type for each flex probe in the Probe Module section of the Setup Parameters.

Probe Modules			
Module 1		Channels	3
Channel 1	Name	Probe 101	
	Type	FMP-FLX	
Channel 2	Name	Probe 102	
	Type	FMP-FLX	
Channel 3	Name	Probe 103	
	Type	FMP-FLX	

2. Set the following values in the Fuel Management System/Tanks/Probe section of the Setup Parameters:

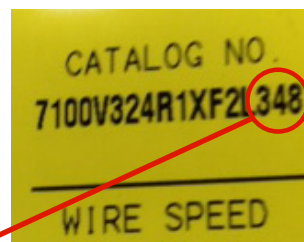
- Select the appropriate probe module and channel. The Type will need to be set to a Special probe (Special 1–48). Each flex probe must be setup up with a unique Special Probe number.
- Obtain the wire speed from the probe label, and then use that number to set the Gradient number.

Tanks		Number of Tanks	3
Tank 1	Name	Tank 1	
	Type	Special 1	
	Manifolded	No	
	Product #	1	
	Delivery Threshold	200.0 gal	
	Theft Threshold	5.0 gal	
	Monthly compliance	Yes	
	Annual compliance	Yes	
Probe	Module	FMS Probe Module	
	Channel	Probe 101	
	Type	Special 1	
	Ratio	1 to 1 tip to head	
	Float Type	4 in gas	
	Water Float	Yes	
	Gradient	9.07800 μ s/in	
	Product Offset	0.00 in	
	Water Offset	0.00 in	



3. Under the Fuel Management System / Special Probes section of the Setup Parameters set the Length for each flex probe.

Fuel Management System		Ullage Percent	95 %
		Delivery Delay	15 min
		Correction Temperature	60.00 °F
		High Product Limit	Level
Static Tank Testing	»	...	...
Tanks	»	...	...
Special Tanks	»	...	...
Special Probes			
Special 1		Length	348 in
RTD Table	+		



4. Program one RTD location to be able to read the temperature. This location can be approximately half of the probe length. (Each flex probe contains one RTD.)

Special Probes			
Special 1		Length	348 in
RTD Table		+	
1	-	Position	174.00 in

5 Troubleshooting

NOTE: Do not start troubleshooting by swapping probes. It may cause confusion in the process of identifying the problem.

When troubleshooting a probe problem, it is important not to presume any particular cause. Follow the steps outlined below to properly and quickly troubleshoot probes:

Float Missing

1. Check programming of probe for the correct number of floats.
2. Look for an active High Water or Float Missing alarm in the run status at the ATG.
3. If possible, have the technician stick the tank and compare the measurement with the level reported by the ATG.
4. Is the level correct? If not, is the ATG measuring in reverse (i.e. the lower the actual product level the higher it reads on the ATG)?
5. Make sure "1 to 1 tip to head" is selected in the Probe Ratio drop-down list. If "1 to 1 tip to head" is selected, the problem may be a probe issue. Proceed to the next step.
6. Check the water level. Does the ATG list it as Float Missing? If it is listed as missing, it could be a probe issue. Proceed to the next step.
7. Turn off the power and then turn it on again. If previously noted, check to see if the High Water or Float Missing alarm changed from "ACTIVE" to "CLEARED." If they clear, this could be a probe issue. Acknowledge and proceed to the next step.
8. If these steps did not solve the problem, contact Franklin Electric Technical Services for assistance.

No Probe, Probe Sync, & Unstable Probe

This process is for a new install or replacement probes.

1. Check the wiring. Make sure the RED, BLACK and shield wires are connected to the correct terminals to the ATG. There should be two connections in the junction box (see §4.2)

Probe Alarms on Multiple Channels or Only One Probe Connected.

2. Check the main board power supply. There should be approximately 21 VDC loaded (probe connected) and 24 VDC unloaded across the RED and BLACK terminals of the probe channel in the ATG.
3. Check the field wiring. Make sure the voltage is getting to the probe by checking at the junction box splice or quick disconnect pigtail. With the pigtail end facing you, keyslot up, there should be 24 VDC across the two bottom pins. Test the field wiring for a short or open.
4. Remake the splice. Use the approved seal pack and connectors to cut back and remake the splice connection in the junction box.
5. Try another probe channel. After checking the field wiring and remaking the junction box connection, move the field wiring to another channel.

Additional Troubleshooting Steps

The following are additional troubleshooting steps for the probe. For missing float or incorrect level problems, consider the following actions:

- Remove the probe from the tank, and manually raise and lower the floats. Check to see if the ATG accurately reports the change in level.
- Is the correct number of floats installed on the probe? (Verify the number of floats that are programmed.)
- Are the floats installed correctly? The product float should be on top, closest to the probe head. Water floats have a weighted ballast ring.
- Is the probe shaft clean? If it is dirty, use an abrasive pad to clean it.
- Make sure the wire connections from the probe cable to the field wiring are secure and dry.

6 Appendix

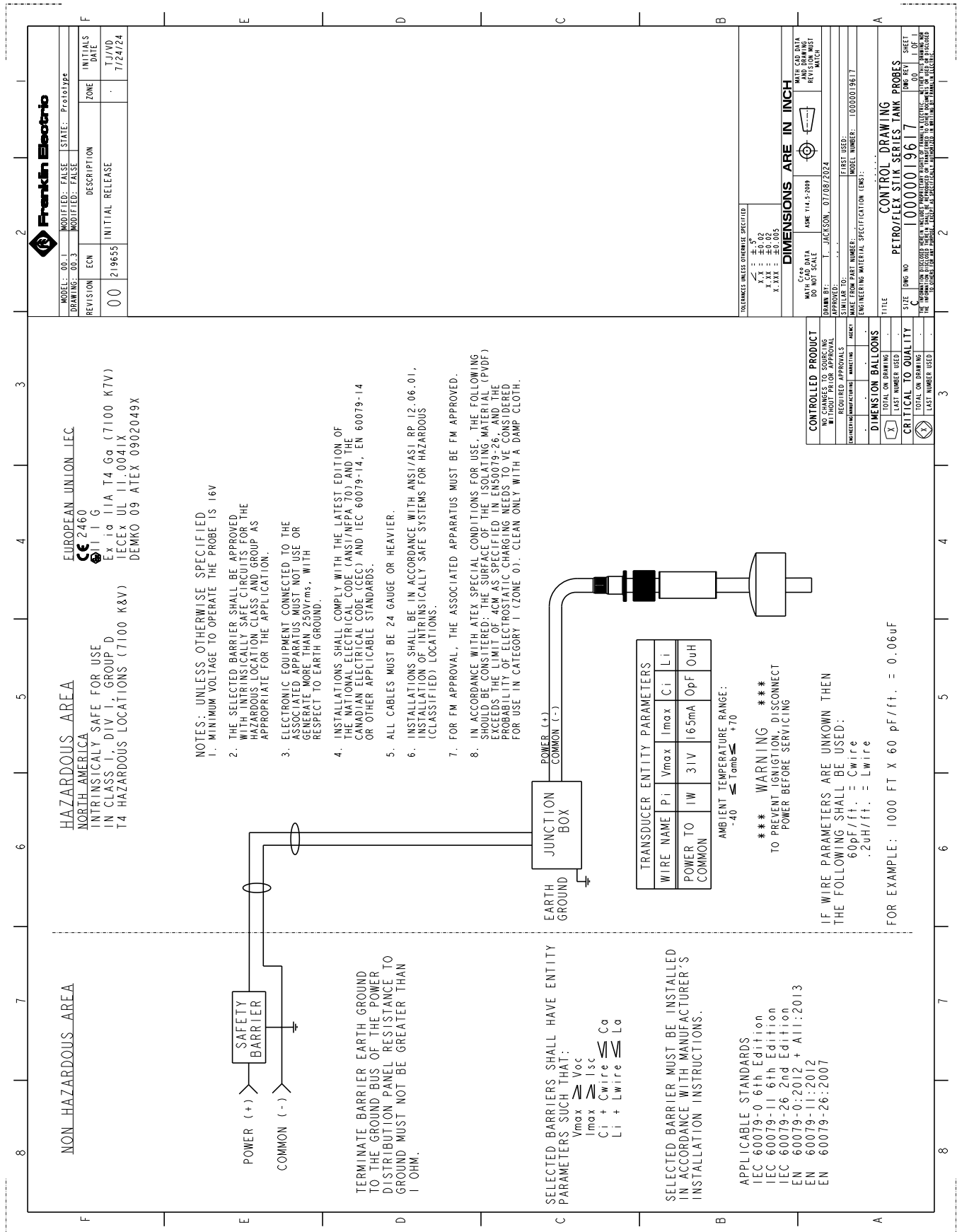
6.1 Related Documents

Documentation can be found online at www.franklinfueling.com.

TABLE 5.1 – Related Documents

Part Number	Description
TB0718-02	Removing The Flexible Probe Safely

6.2 Control Drawing





Franklin Electric

FUELING SYSTEMS