INSTALLATION, OPERATION, AND MAINTENANCE MANUAL
WELKER® FLARE STACK SAMPLING SYSTEM

MODEL
FSS

DRAWING NUMBER
LS3075.1

MANUAL NUMBER
IOM-150

REVISION
Rev. A, 11/17/2014

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IMPORTANT SAFETY INFORMATION
READ ALL INSTRUCTIONS

Notes emphasize information and / or provide additional information to assist the user.

Caution messages appear before procedures that, if not observed, could result in damage to equipment.

Warning messages appear before procedures that, if not observed, could result in personal injury.

This manual is intended to be used as a basic installation and operation guide for the Welker® Flare Stack Sampling System, FSS. For comprehensive instructions, please refer to the IOM Manuals for each individual component. A list of relevant component IOM Manuals is provided in the Appendix section of this manual.

BEFORE YOU BEGIN

Read these instructions completely and carefully.

IMPORTANT – Save these instructions for local inspector's use.

IMPORTANT – Observe all governing codes and ordinances.

Note to Installer – Leave these instructions with the consumer.

Note to Consumer – Keep these instructions for future reference.

Skill Level – Installation of this Flare Stack Sampling System requires basic mechanical and electrical skills.

Proper installation is the responsibility of the installer. Product failure due to improper installation is not covered under the warranty.

If you received a damaged Flare Stack Sampling System, you should immediately contact a Welker® representative.

Phone: 281.491.2331
Address: 13839 West Bellfort Street
Sugar Land, TX 77498

SECTION 1: PRODUCT INFORMATION

1.1 Introduction

We appreciate your business and your choice of Welker® products. The installation, operation, and maintenance liability for this product becomes that of the purchaser at the time of receipt. Reading the applicable *Installation, Operation, and Maintenance* (IOM) *Manual* prior to installation and operation of this equipment is required for a full understanding of its application and performance prior to use.*

If you have any questions, please call 1-281-491-2331.

**The following procedures have been written for use with standard Welker® parts and equipment. Assemblies that have been modified may have additional requirements and specifications that are not listed in this manual.*

1.2 Product Description

The Welker® *FSS* Flare Stack Sampling System utilizes an auxiliary gas supply, an eductor, and a Welker® LSS-1 Liquid Stainless Sampler to collect samples from a non-pressurized or vacuum source. The FSS is electronically controlled from a Programmable Logic Controller (PLC) and can be set to sample proportional to flow.

The eductor and auxiliary gas are used to create a flow loop that continually presents fresh product to the LSS-1, allowing for collection of accurate, representative samples. The LSS-1 collects sample from the flowing stream and deposits the sample into a sample container for laboratory analysis.

An optional Welker® *Gas Heating Panel* can be used with the FSS. The gas heating panel provides a simple and convenient way to heat sample gas before it is supplied to the FSS.

The thermostat dial on the gas heating panel allows the user to determine to which temperature the sample gas will be heated. The temperature transmitter sends analog signals to the PLC, allowing the operator to remotely monitor the temperature of the gas as it is being supplied to the FSS.

For this manual, the term "PLC," or Programmable Logic Controller, will be used to refer to the PLC, DCS, or other signal control system used by the customer to activate and operate the solenoid.

Welker® may custom design the Flare Stack Sampling System to suit the particular application and specifications of each customer.

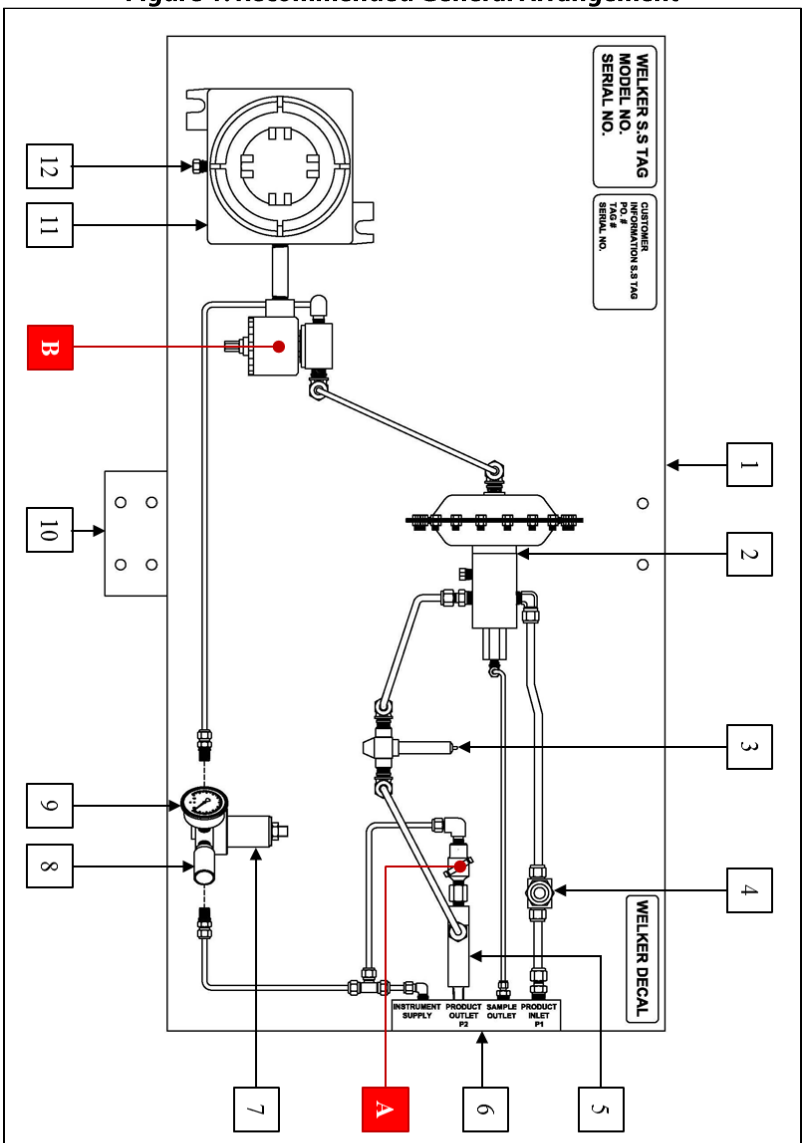
1.3 Specifications

The specifications listed in this section are generalized for this equipment. Welker® can modify the equipment according to your company's needs. However, **please note that the specifications may vary depending on the customization of your product.**

Table 1: Flare Stack Sampling System Specifications	
Products Sampled	Gas or Liquid
Materials of Construction	316 / 316L Stainless Steel, Aluminum, PTFE, Viton®
Panel Dimensions	48" x 24" x 1/4"
Panel Weight	Approx. 90 lbs.
Maximum Allowable Operating Pressure	120 psig @ -20°F to 100°F (*8 barg @ -28° C to 37°C*)
Instrument Regulator Maximum Inlet Pressure	3600 psig @ -20°F to 120°F (*248 barg @ -28° C to 48°C*)
Instrument Regulator Output Range	20 to 100 psig @ -20°F to 100°F (*1 to 6 barg @ -28° C to 37°C*)
Connections	1/4" NPT
Sample Volume	0.5cc Others Available
Features	Eductor Electronic Digital Counter in Explosion-Proof Box Filter on Product Inlet Flow Meter Instrument Regulator With Pressure Gauge and Relief Valve Panel-Mounted
Options	Gas Heating Panel (See *Addendum A*) Sample Collection Head Sample Volume

1.4 System Diagram

Figure 1: Recommended General Arrangement



No.	Description
1	Panel
2	LSS-1 Sample Pump
3	Flow Indicator
4	Inline Filter
5	Eductor
6	Manifold Block
7	Instrument Regulator
8	Relief Valve
9	Instrument Regulator Pressure Gauge
10	Mounting Bracket
11	Electronic Counter
12	Drain / Breather
A	Product Outlet Valve
B	3-Way Solenoid Valve

SECTION 2: INSTALLATION & OPERATION

2.1 Before You Begin

After unpacking the unit, check the equipment for compliance and for any damage that may have occurred during shipment. Immediately contact a Welker® representative if you received damaged equipment.

When sealing fittings with PTFE tape, refer to the proper sealing instructions for the tape used.

A sample probe is recommended to extract the sample from the center one-third (1/3) of the pipeline. The sample probe should be located in the least turbulent area of the flowing stream available (i.e., not in a header or non-flowing area and away from obstructions, elbows, and partially closed valves) in an area where the sample is well-mixed and representative of the product.

2.2 Installation

1. Mount the sample panel in a location convenient for sample collection (*Figure 2*).

Figure 2: Bolt Pattern

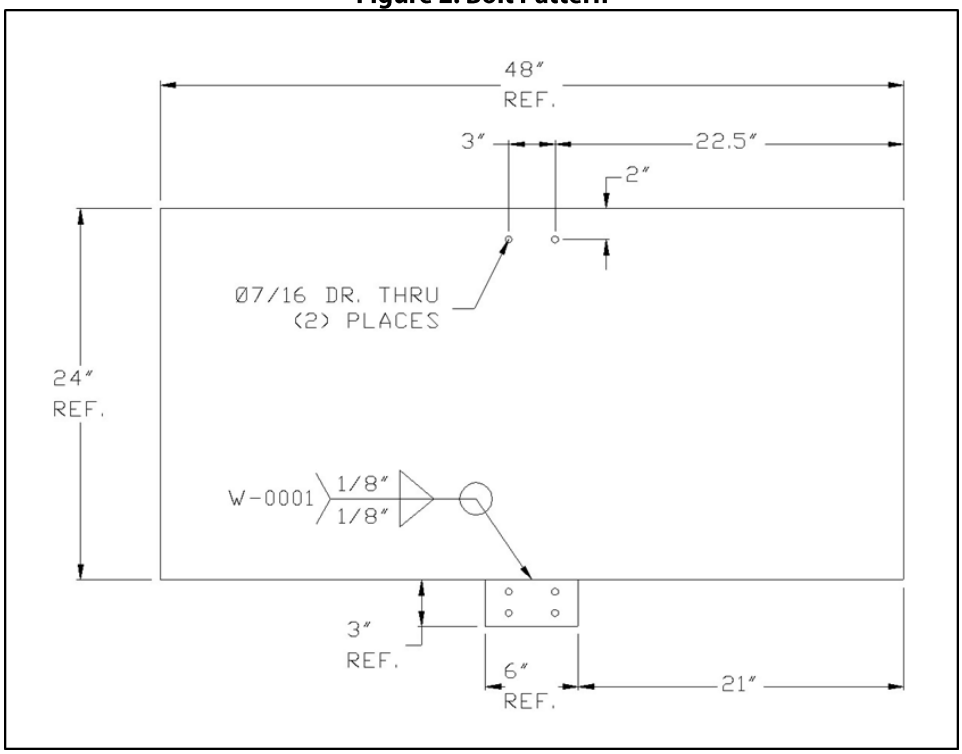
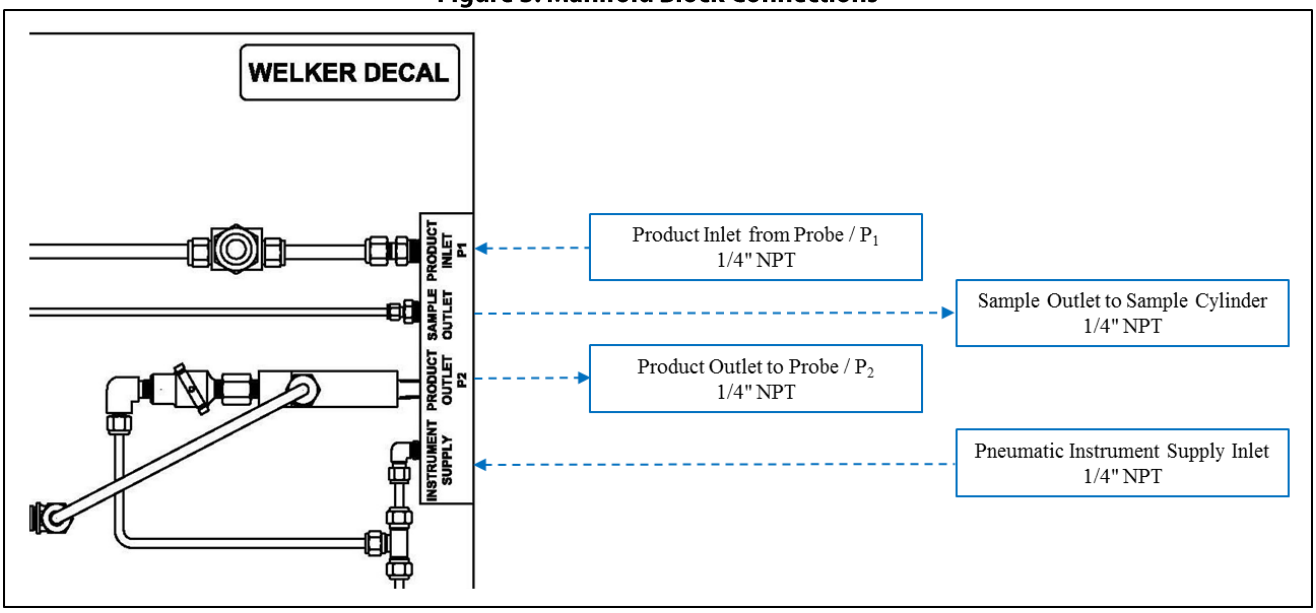


Figure 3: Manifold Block Connections

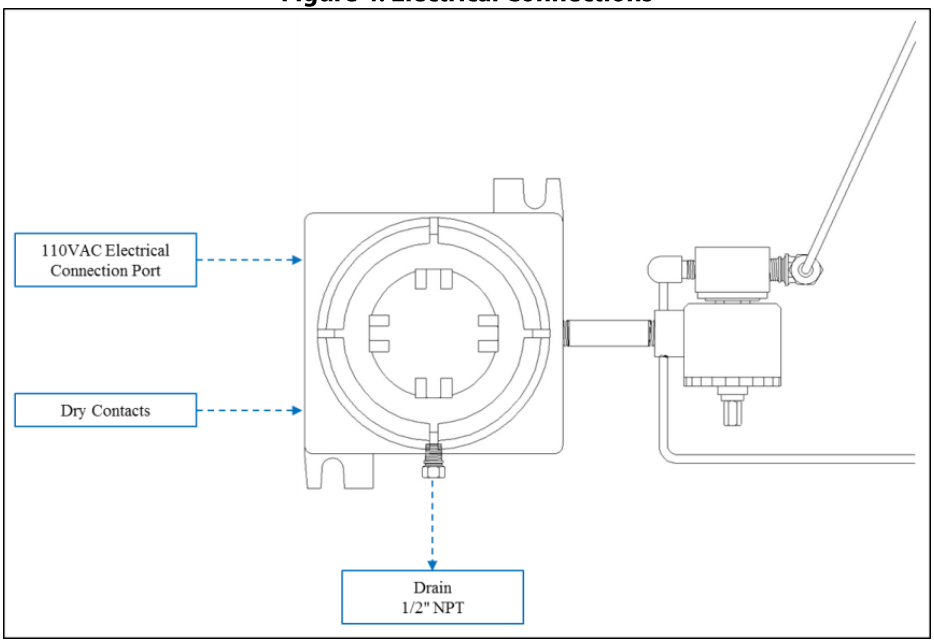


2. Using 1/4" tubing, connect from the probe in the pipeline to the product inlet (P_1) port on the manifold.
3. Using 1/4" tubing, connect from the product outlet (P_2) port on the manifold to the P_2 line of the probe, if supplied, or to a flare for discharge.
4. Using 1/4" tubing, connect from the instrument supply port on the manifold to a pneumatic supply.
5. Using 1/4" tubing, connect from the sample outlet port on the manifold to a sample container.

For low pressure, toxic, or vacuum systems, Welker® suggests the use of a vacuum sample container. If such a container is not available, the sample container should be pre-charged with helium to purge the sample cylinder.

6. Connect a 110VAC electrical supply to the counter. As necessary, refer to the *Installation, Operation, and Maintenance* (IOM) *Manual* for the counter for more detailed connection instructions (*Figure 4*).
7. Connect dry contacts from the PLC to the explosion-proof electrical enclosure (*Figure 4*).

Figure 4: Electrical Connections



2.3 Operation

1. Close product outlet valve A (*Figure 1*).
2. Open the connection to the pneumatic supply.
3. The relief valve and instrument regulator should be set by the system manufacturer prior to shipment. If not set, adjust the instrument regulator until pressure reaches approximately 40 psig as indicated by the instrument regulator pressure gauge, and then set the relief valve to between 50 and 60 psig. As necessary, refer to the *Installation, Operation, and Maintenance* (IOM) *Manuals* for the instrument regulator and the relief valve for detailed instructions.
4. If using a helium-filled sample container and not a vacuum sample container, open the sample container outlet valve to release the helium from the container.
5. Open the sample container inlet valve.
6. Open the probe connection.
7. Open the product outlet connection.
8. Slowly open product outlet valve A until the flow indicator indicates positive flow.
9. Turn ON power to the counter.
10. Program the PLC to the desired number of contacts between samples.
11. Check for leaks and repair as necessary. The system is operational when no leaks are present.

SECTION 3: MAINTENANCE

3.1 Before You Begin

1. **Welker® recommends that the unit have regular maintenance under normal operating conditions:** for ***gas sampling*** every six (6) months; and for ***liquid sampling*** every twelve (12) months. In cases of severe service, dirty conditions, excessive usage, or other unique applications that may lead to excess wear on the unit, a more frequent maintenance schedule may be appropriate.
2. Prior to maintenance or disassembly of the unit, it is advisable to have a repair kit available for repairs of the system in case of unexpected wear or faulty seals.

New seals supplied in spare parts kits are not lubricated. They should be lightly lubricated before installation. Welker® recommends Dow Corning® 111 (DC 111) or an equivalent lubricant for use with this unit.

3. All maintenance and cleaning of the unit should be performed on a smooth, clean surface.

3.2 Maintenance

1. During sampling, monitor the system for leaks. If leaks are present, halt sampling and repair as necessary.
2. Occasionally, a system component may need to be repaired or removed for manufacturer's recommended maintenance. To perform maintenance on components:
    a. Depressurize the system and close all valves.
    b. Turn OFF all electrical power to the system.
    c. Drain the contents of the system to a safe recovery system or sump.
    d. Disconnect the tubing and remove individual system components for maintenance.
    e. For complete and proper maintenance on individual system components, refer to their respective *Installation, Operation, and Maintenance* (IOM) *Manuals*. A list of component *Installation, Operation, and Maintenance* (IOM) *Manuals* is available in the *Appendix* section of this manual.
    f. After performing necessary maintenance on system components, reconnect all instrument tubing.
    g. Reinstall the system according to the instructions in *Section 2.2, Installation*.

APPENDIX

Attached Documents

Welker® *Installation, Operation, and Maintenance* (IOM) *Manuals* suggested for use with this unit:

- IOM-025: Welker® IR-1, IR-2, IR-4, and IR-6 Instrument Regulators
- IOM-033: Welker® RV-1, RV-2, RV-2CP, and RV-3 Relief Valves
- IOM-064: Welker® LSS-1 Liquid Stainless Sampler

Other *Installation, Operation, and Maintenance* (IOM) *Manuals* suggested for use with this unit:

- ATC Shawnee II High Speed Counter (Welker® IOM-V034)
- Fox Valve Mini Eductor (Welker® IOM-V010)
- Parker 3-Way Solenoid Valve (Welker® IOM-V016)
- Siemens® Wallace & Tiernan® Armored Purge Meter (Welker® IOM-V033)
- Swagelok® Filters (Welker® IOM-V092)

Addendum available for this *Installation, Operation, and Maintenance* (IOM) *Manual*:

- Addendum A: Installation Guide for Welker® Gas Heating Panel

Welker® drawings and schematics suggested for use with this unit:

- System Drawing: LS3075.1

ADDENDUM A

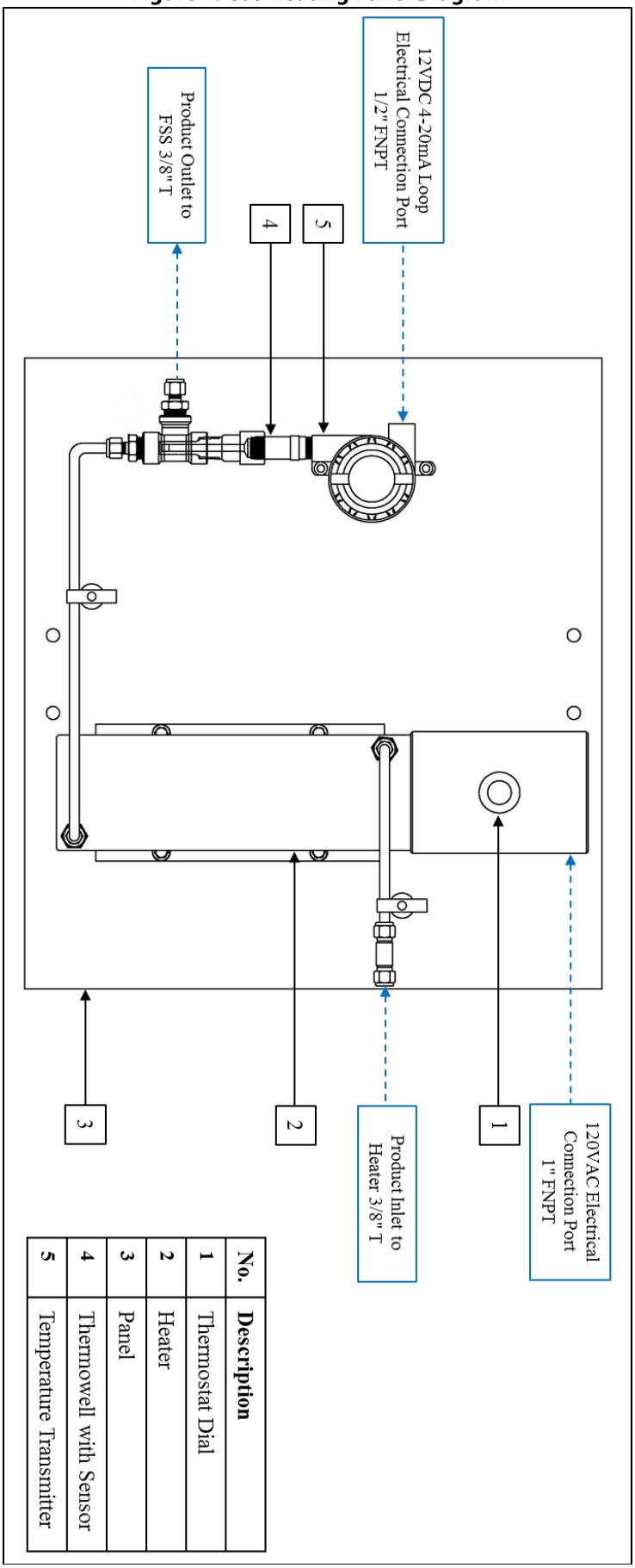
Installation Guide for Welker® Gas Heating Panel

The specifications listed in this section are generalized for this equipment. Welker® can modify the equipment according to your company's needs. However, **please note that the specifications may vary depending on the customization of your product.**

Table 1: Gas Heating Panel Specifications

Product(s) Heated	Gas
Materials of Construction	316 / 316L Stainless Steel, Anodized Aluminum, PTFE
Panel	24" x 22" x 1/4"
Heater Connections	3/8" T (Inlet & Outlet)
Thermostat Range	50°F to 250°F (*10° C to 121°C*)
Customer Electrical Connections & Supply	**Heater:** 1" FNPT, 120VAC **Temperature Transmitter:** 1/2" FNPT, 12VDC 4-20mA Analog Signal

Figure 1: Gas Heating Panel Diagram

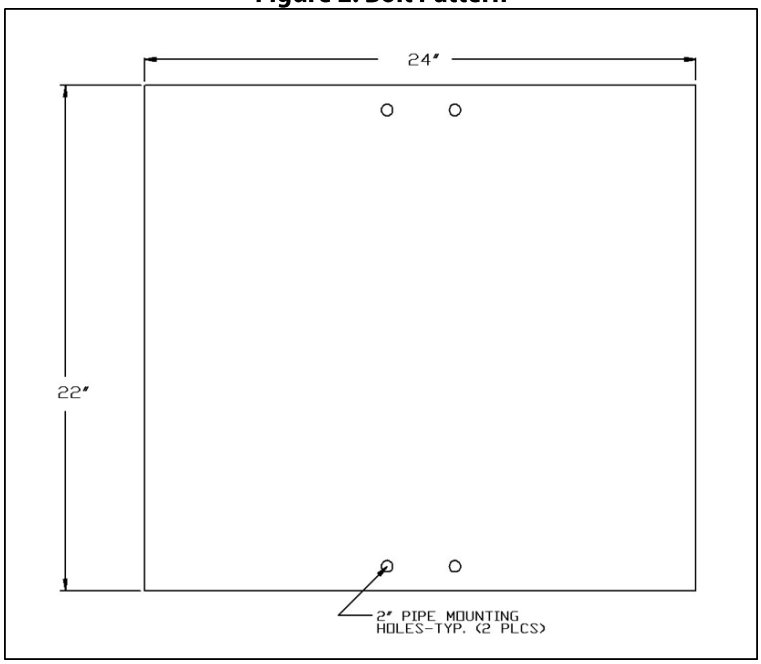


No.	Description
1	Thermostat Dial
2	Heater
3	Panel
4	Thermowell with Sensor
5	Temperature Transmitter

Installation

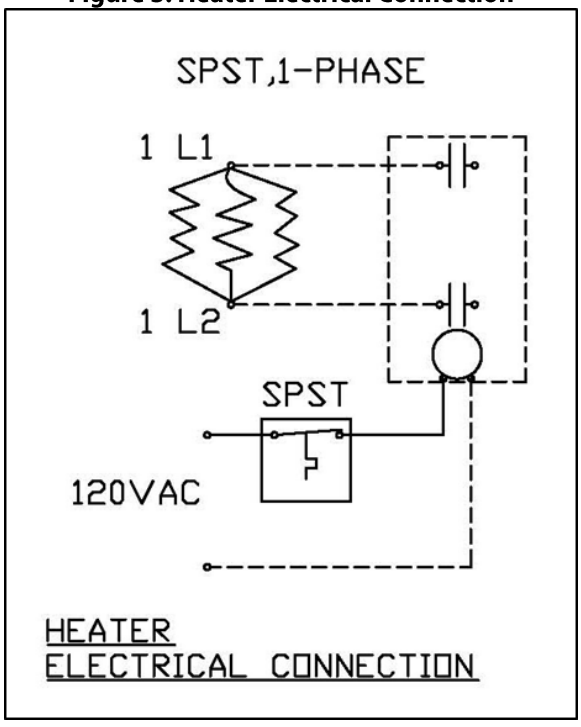
1. Using U-bolts, mount the gas heating panel to the appropriate 2" pipe stand as close as possible to the flare stack sampling system (*Figure 2*).

Figure 2: Bolt Pattern



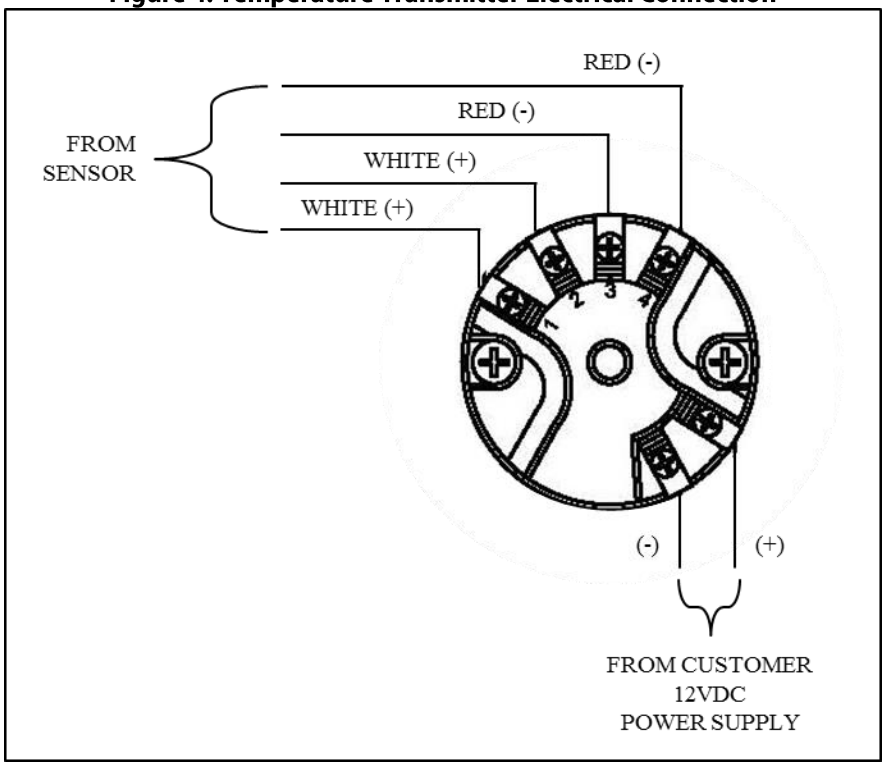
2. Using 3/8" tubing, connect from the probe in the product pipeline to the product inlet on the gas heating panel (Figure 1).
3. Using 3/8" tubing, connect from the product outlet on the gas heating panel to the product inlet (P_1) on the manifold of the flare stack sampling system (*Figure 1*).
4. Connect a 120VAC electrical supply to the heater (*Figures 1 & 3*). As necessary, refer to the *Installation, Operation, and Maintenance* (IOM) *Manual* of the heater for more detailed instructions.

Figure 3: Heater Electrical Connection



5. Connect a 12VDC electrical supply from the temperature transmitter to the PLC (*Figures 1 & 4*). As necessary, refer to the *Installation, Operation, and Maintenance* (IOM) *Manual* of the temperature transmitter for more detailed instructions.

Figure 4: Temperature Transmitter Electrical Connection



6. Set the thermostat on the heater to the desired temperature.

Allow approximately 20 minutes for the heater to warm up before supplying product to the heater.

7. Continue installing the flare stack sampling system according to the installation instructions in the *Installation, Operation, and Maintenance* (IOM) *Manual* of the flare stack sampling system.
8. Once the gas heating panel and flare stack sampling system have been installed, refer to *Section 2.3, Operations*, in the *Installation, Operation, and Maintenance* (IOM) *Manual* of the flare stack sampling system for operating instructions.

APPENDIX: ADDENDUM A

Attached Documents

Welker® *Installation, Operation, and Maintenance* (IOM) *Manuals* suggested for use with this unit:

- None

Other *Installation, Operation, and Maintenance* (IOM) *Manuals* suggested for use with this unit:

- Rosemount® Temperature Transmitter (Welker® IOM-V045)
- Rosemount® Thermowell with Sensor (Welker® IOM-V031)
- Thermal Solutions of Texas Circulation Heater (Welker® IOM-V097)

Welker® drawings and schematics suggested for use with this unit:

- System Drawing: GS1531

NOTES

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welker.com