Quick Reference Guide

MiniTrac 32 Density Detector

for extreme vibration and shock environments

Document ID:
47454

Nuclear

Revision History

Version of manual	Description	Date
1.0	Initial release	140201

ISO 9001 approval by Lloyd's Register Quality Assurance Limited, to these Quality Management System Standards: ISO 9001:2008, ANSI/ASQC Q9001-2008, Approval Certificate No. 107563

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Safety Instructions

Refer to the Radiation Safety Manual and Reference CD that came with your source holder.

Always refer to the safety instructions in this guide and the country specific installation standards. Follow the prevailing safety regulations and accident prevention rules of your company and country.

For complete installation, mounting, wiring, and operating instructions, refer to the **MiniTrac 31 Operating Instructions**, part number 40447, included with your shipment.

General

The MiniTrac 32 is a density detector for extreme vibration and shock environments.

Operational reliability is ensured only if the instrument is properly used according to the specifications detailed in the MiniTrac 31 operating instructions and any other supplementary instructions.

Inappropriate or incorrect use of the instrument can cause application-specific hazards such as vessel overfill or damage to system components through incorrect mounting or adjustment.

When mounting the equipment, make certain you take all precautions to safeguard against crushing hazards due to the weight of the equipment. VEGA recommends mounting the source holder and cradle assembly to the pipe spool piece while they are on the ground.

Only trained personnel must carry out all operations described in this quick reference guide.

Always wear the required personal protective equipment during work on and with the device.

CE conformity

- IECEx Ex d [ia (Ga)] IIC T6 Gb
- IECEx Ex t IIIC T.. Da, Db IP66NEMA Type 4X IP66/67

Safety information for EX areas

- ATEX II 2G Ex d [ia (Ga)] IIC T6 Gb
- ATEX II 1D, 2D Ex t IIIC T.. Da, Db IP66

CSA

- CL I DIV 1 GP ABCD, CL II DIV 1 GP EFG, CL III

FM

- CL I DIV 1 GP ABCD, CL II DIV 1 GP EFG, CL III

Special Installation, Maintenance, or Operating Instructions

If it is necessary to open the gauge, the following warning applies:

Do not disconnect the equipment unless the power has been switched off or the area is known to be non-hazardous.

Open the circuits before removing the cover. An explosion-proof seal shall be installed within 450 mm (18") of the enclosure (including Division 2 installations with rigid conduit).

To avoid an electrostatic discharge, wipe the enclosure with a damp cloth.

Substitution of any components may impair the stability for Class I, Division 2.

Unpacking the Equipment

When you unpack your equipment, make sure you follow the steps below:

1. Unpack the unit in a clean, dry area.
2. Inspect the shipment for completeness by checking against the packing slip.
3. Inspect the shipment for damage during shipment or storage.
4. If the detector is included as a separate package in the shipment, inspect the assembly for damage. If damaged, file a claim against the carrier and report the damage in detail. Any claim on VEGA for shortages, errors in shipment, or other problems must be made within 30 days of receipt of the shipment.
5. If you need to return the equipment, refer to **the MiniTrac 31 Operating Instructions**, part number 40447 for information concerning returning equipment for repair.
6. After you unpack the equipment, inspect the gauge, the cradle assembly, and the source holder in the shipment to assure that the components are not damaged.

7. Inspect the source holder to ensure that the operating handle is locked.

If you find the operating handle in the ON position, place the handle in the OFF position immediately and contact your Radiation Safety Officer or Nuclear Services at VEGA Americas, Inc. See the ***Customer Service*** *section of this guide for contact information.*

Storing and Handling

You are responsible for familiarizing yourself with all national and local radiation safety guidelines and procedures prior to storing or handling radioactive materials. See the **Radiation Safety Manual** for specific details.

1. Store the source holder in a clean, dry area.
2. Verify that the source holder is locked in the off position.
3. Store the detector in an area that has temperature-control between 10 º C and 35 º C (50 º F and 95 ºF) and less than 50% relative humidity.

Source Holder

If you must store the source holder, follow these steps:

1. Store the source holder in a clean, dry, and secure area.
2. Ensure the shutter is in the OFF or CLOSED position and locked.
3. Check the current local regulations (U.S. NRC, Agreement State, or other international regulatory agencies) to determine if this area must have access restrictions.

Detector

If you must package or store the detector, follow these steps:

1. Package the gauge carefully to ensure safe handling.
2. Store gauge in dry conditions.
3. Store the gauge indoors in an area with temperature control between - 40 °C … + 50 °C (-40 °F … + 122 °F) and < 50 % humidity

NOTES

Overview

Well drilling developments in the United States have led to a dramatic increase in demand for well fracturing ("fracking" or "frac") services. These services involve splitting open rock formations utilizing multiple horizontal well bores. Rock splitting is accomplished by pumping a slurry of water, chemicals, and proppant (sand or other granular material) into the well at extreme pressure.

Fracturing service companies must demonstrate they follow a specific plan for solids content in each stage of pumping. To verify this, they measure the slurry density in two places: on a blending truck at low pressure and at the well head at extremely high pressure. This latter "down hole" location is the more demanding location due to extreme shock and vibration.

Basic Components

The primary components of the heavy-duty density gauge assembly are the Heavy Duty SHLD 1 Source Holder, the MiniTrac 32 Heavy Duty detector, and the Cradle Assembly. See Figure 3.1.

Figure 3.1: Basic Components

1 *Heavy Duty SHLD 1 Source Holder*
2 *MiniTrac 32 Heavy Duty Detector*
3 *Cradle Assembly*

MiniTrac 32

Density gauges are used primarily for measuring the density (mass per volume) of liquids and slurries through a pipe or vessel wall. The gauge receives a narrow beam of radiation, through the process material, from the source holder. The amount of radiation that the detector senses is in proportion to the amount of the material's mass.

Cradle Assembly

Because the fracking process creates an extreme amount of vibration, the cradle assembly's primary purpose is to protect the detector against this vibration. The cradle assembly also protects against the shock that normally comes from handling, transportation, and hammer union engagement/disengagement.

Specific features of the assembly include:

- Urethane foam inserts
- Stainless steel housing
- Cover bolts captive to the cover
- Integral lifting eyes to facilitate handling entire gauge assembly

Heavy Duty SHLD 1 Source Holder

The source holder is constructed from cast stainless steel and performs the following:

- Houses a radiation-emitting source capsule
- Protects the radioactive element
- Provides a means for turning off and locking the radiation beam
- Directs radiation safely through the process
- Provides shielding for all areas in which radiation is not intended

Mounting Instructions

Measurement accuracy is highly influenced by the proper installation of the gauge. This section contains the guidelines for optimizing performance through proper installation. You may also reference the application sizing sheet and any installation drawings provided at the time of order.

At the time you ordered your gauge, VEGA sized the source holder for optimal performance for the designated application. If the location of the gauge has changed or is different from the original order, notify VEGA before installing the measurement system.

Locate the source holder where debris or other material cannot coat it to ensure the continuing proper operation of the source ON/OFF shutter. Many regulatory agencies, such as your U.S. Agreement State, the U.S. Nuclear Regulatory Commission, or other local and international nuclear regulatory agencies, require periodic testing of the ON/OFF mechanism. See the **Radiation Safety Manual** for details about current regulations.

Secure the shutter mechanism on the source holder before installing or removing the assembly from the pipe. You must turn the handle to the closed or OFF position and lock the handle.

When mounting the equipment, make certain you take all precautions to safeguard against crushing hazards due to the weight of the equipment. VEGA recommends mounting the source holder and cradle assembly to the pup while they are on the ground.

Install the source holder according the manufacturer's recommendations.

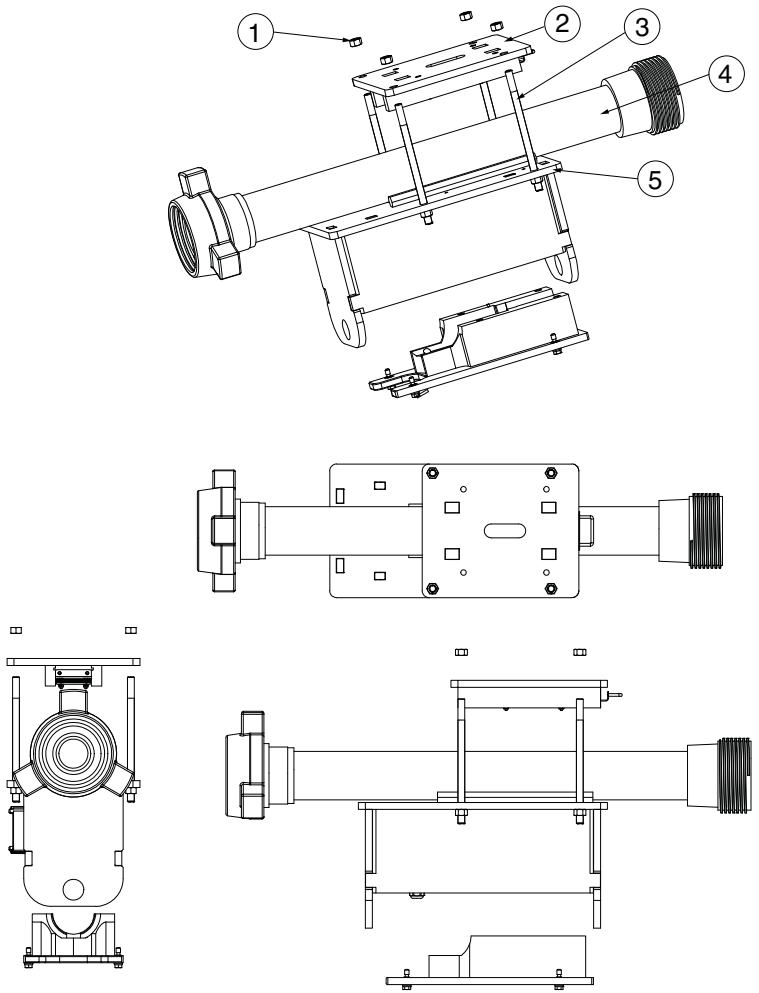


Figure 4.1: Mounting

1 Four (4) Nuts (Tighten to 49 ft lbs of Torque)
2 Source Holder Plate
3 Four (4) Bolts
4 Pipe Spool Piece
5 Cradle Assembly Plate

1. Secure the cradle assembly plate and the source holder plate to the pipe using the fours (4) sets of rods and nuts.
2. Tighten the four (4) nuts to 49 ft lbs of torque.
3. Make sure you maintain the plates parallel to one another as you tighten the bolts.

Wiring the Equipment

For most applications, wiring consists of power and signal. The manufacturer provides an internal and an external ground screw for the connection of the power earth ground wire. After removing the top cover, note that the internal ground screw is located at the front of the housing. The external ground screw is located next to the conduit entry.

Before attempting any wiring, make sure all wires meet the requirements as specified by your local electrical codes. If you are unsure of the specific wires or correct connections for the wiring, contact a VEGA Field Service Technician. See the **Customer Service** section of this manual for contact information.

NOTE

If you receive an interconnect drawing from VEGA or the engineering contractor, and the instructions differ from the instructions specified in this manual, use the drawing you received. The drawing from VEGA or the engineering contractor may contain special instructions specific to your application.

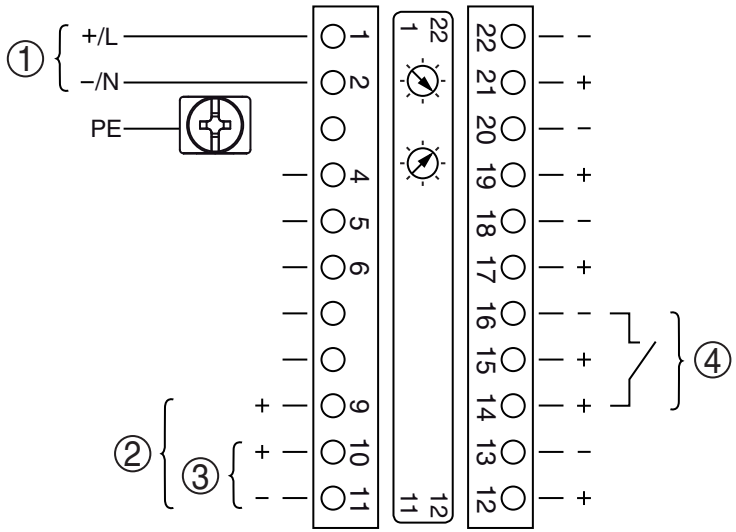


Figure 5.1: Main Wiring Compartment

1 Voltage Supply
2 Signal Output 4 … 20 mA/HART active
3 Signal Output 4 … 20 mA/HART passive
4 Switching input float

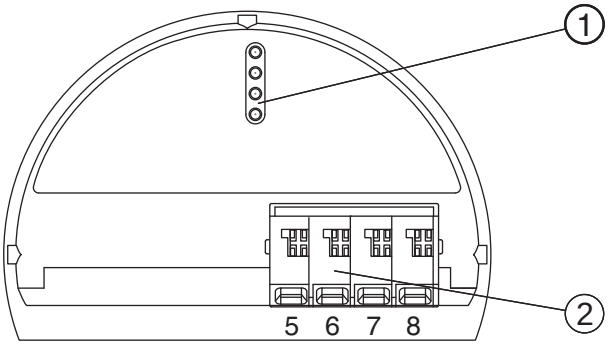


Figure 5.2: Side Wiring Compartment

1 Contact Pins for Display and Adjustment Module or Interface Adapter
2 Terminals for External Display and Adjustment Unit

Removing or Installing the MiniTrac 32 Detector

Secure the shutter mechanism on the source before replacing or installing the Minitrac 32 detector

If it is necessary to remove or reinstall the MiniTrac 32 detector for any reason, follow these steps.

Removing

1. Switch the power off.
2. Loosen and remove the four (4) HHCS captive screws and remove the top of the cradle assembly.
3. Remove the detector from the cradle assembly.
4. Disconnect the wiring from the detector.

Make certain that all power and signal wiring has been safely disconnected from the detector by a well-qualified person.

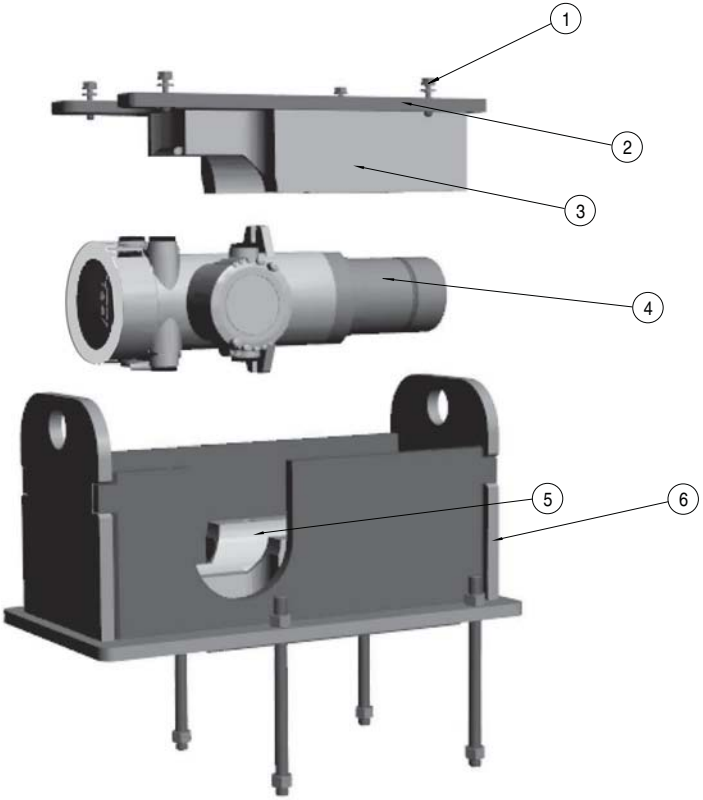
If the electronics in the MiniTrac 32 are bad, you must return the detector to VEGA Americas for replacement. See **Customer Service, Returning Equipment for Repair**.

Installing

1. Connect or reconnect all wiring to the detector.
2. Place the detector into the cradle assembly.

Make certain that all the wiring has been safely reconnected to the detector by a well-qualified person.

3. Replace the cradle top and tighten the four (4) HHCS captive screws.
4. Switch the power on.



6.1: Removing or Installing Detector

1 *HHCS Captive Screws*
2 *Cradle Assembly Top*
3 *Top Urethane Foam Insert*
4 *MiniTrac 32*
5 *Bottom Urethane Foam Insert*
6 *Cradle Assembly Bottom*

Setup (Display and Adjustment Module, PACTware, or Other Systems)

NOTE

For complete setup and adjustment instructions, refer to the **MiniTrac 31 Operating Instructions**, part number 40447, included with your shipment.

Specifications

General data	
316L corresponds to 1.4404 or 1.4435	
Materials, non-wetted parts	
- Scintillation material	NaI (sodium iodide)
- Aluminium die-casting housing	Aluminium die-casting AlSi10Mg, powder-coated-basis: Polyester
- Stainless steel housing	316L
- Seal between housing and housing cover	NBR (stainless steel housing, investment casting), silicone (Aluminium housing)
- Inspection window in housing cover (optional)	Polycarbonate
- Ground terminal	316L
Process fittings	
- Fastening lugs	Ø9mm (0.35 in), hole center distance 119 mm (4.69 in)
Weight	
- Aluminium housing, with electronics	5.67 kg (12.50 lbs)
- Stainless steel housing, with electronics	12.58 kg (27.75 lbs)
Max. torque, mounting screws – fastening lugs on the sensor housing	50 Nm (38.88 lb ft)
Max. torque for NPT cable glands and Conduit tubes	
- Aluminium/Stainless steel housing	50 Nm (38.88 lb ft)

Output variable	
Output signals	4 … 20 mA/HART – active or passive
Range of output signal	3.8 … 20.5 mA/HART
Terminal voltage passive	9 … 30 V DC
Short circuit protection	Available
Potential separation	Available
Signal resolution	0.3 µA
Failure signal current output (adjustable)	22 mA, < 3.6 mA
Max. output current	22 mA

Starting current	≤ 3.6 mA
Load	
- 4 … 20 mA/HART - active	< 500 Ω
- 4 … 20 mA/HART – intrinsically safe	< 300 Ω
Damping (63 % of the input variable)	Automatically
HART output values	
- PV (Primary Value)	Density value
- PV (Secondary Value)	Electronics temperature
Relay Input	
Input	Dry Contact (Push button or relay)
Voltage (Supplied by detector)	12 VDC
Current	100 mA
Accuracy (according to DIN EN 60770-1)	
Process reference conditions according to DIN EN 61298-1	
- Temperature	+18 … +30 °C (+64 … +86 °F)
- Relative humidity	45 … 75 %
- Air pressure	860 … 1060 mbar/86 … 106 kPa (12.5 … 15.4 psig)
Repeatability	≤ 0.1 %
Deviation with bulk solids	The values depend to a great extent on the application. Binding specifications are thus not possible.
Deviation under EMC influence	≤ 1 %
Variables influencing measurement accuracy	
Specifications apply also to the current output	
Temperature drift - Current output	±0.03 %/10 K relating to the 16 mA span max. ±0.3 %
Max. deviation on the current output through analogue/digital conversion	±15 µA

Max. deviation on the current output due to strong, high frequency electromagnetic interference according to EN 61326	±150 µA
Ambient conditions	
Ambient, storage and transport temperature	-40 … +60 °C (-40 … +140 °F)
Electromechanical data - version IP 66/IP 67	
Cable entry	
- M20 x 1.5	2 x cable gland M20 x 1.5 (cable: ø 6 … 12 mm), 4 x blind plug M20 x 1.5 Included: 1 x cable gland M20 x 1.5
- ½ NPT	5 x closing cap (red) ½ NPT Included: 3 x cable gland ½ NPT (cable: ø 6 … 12 mm), 4 x blind plug ½ NPT
Spring-loaded terminals for wire cross-section	
- Massive wire, cord 1.5	0.2 … 2.5 mm^2 (AWG 24 … 14)
- Stranded wire with end sleeve	0.2 … 1.5 mm^2 (AWG 24 … 16)
Display and adjustment module	
Display element	Display with backlight
Measured value indication	
- Number of digits	5
- Size of digits	W x H = 7 x 13 mm
Adjustment elements	4 keys
Protection rating	
- Unassembled	IP 20
- Mounted into the housing without cover	IP 40
Integrated clock	
Date format	Day.Month.Year
Time format	12 h/24 h
Time zone Ex factory	CET
Rate deviation max	10.5 min/year

Measurement electronics temperature	
Resolution	1 °C (1.8 °F)
Accuracy	±1 °C (1.8 °F)
Voltage supply	
Operating voltage	20 … 72 V DC or 20 … 253 V AC, 50/60 Hz
Interpolation protection	Available
Max. power consumption	6 VA (AC); 4 W (DC)
Electrical protective measures	
Protection, depending on housing version	IP 66/IP 67
Overvoltage category	III
Protection class	I

Customer Service

VEGA has Field Service Engineers available for onsite service, emergency services, or equipment start up.

Contact Information	**Telephone Number**
Monday through Friday 8:00 A.M. - 5:00 P.M. EST (Eastern Standard Time)	1-513-272-0131
Emergencies: Follow the voice mail instructions	1-513-272-0131
Fax	1-513-272-0133

NOTES

Returning Equipment for Repair

1. Call VEGA Nuclear Products Repair at 513-272-0131 between Monday and Friday, 8:00 A.M. to 5:00 P.M. United States Eastern Standard Time
2. VEGA assigns the job a material return authorization (MRA) number

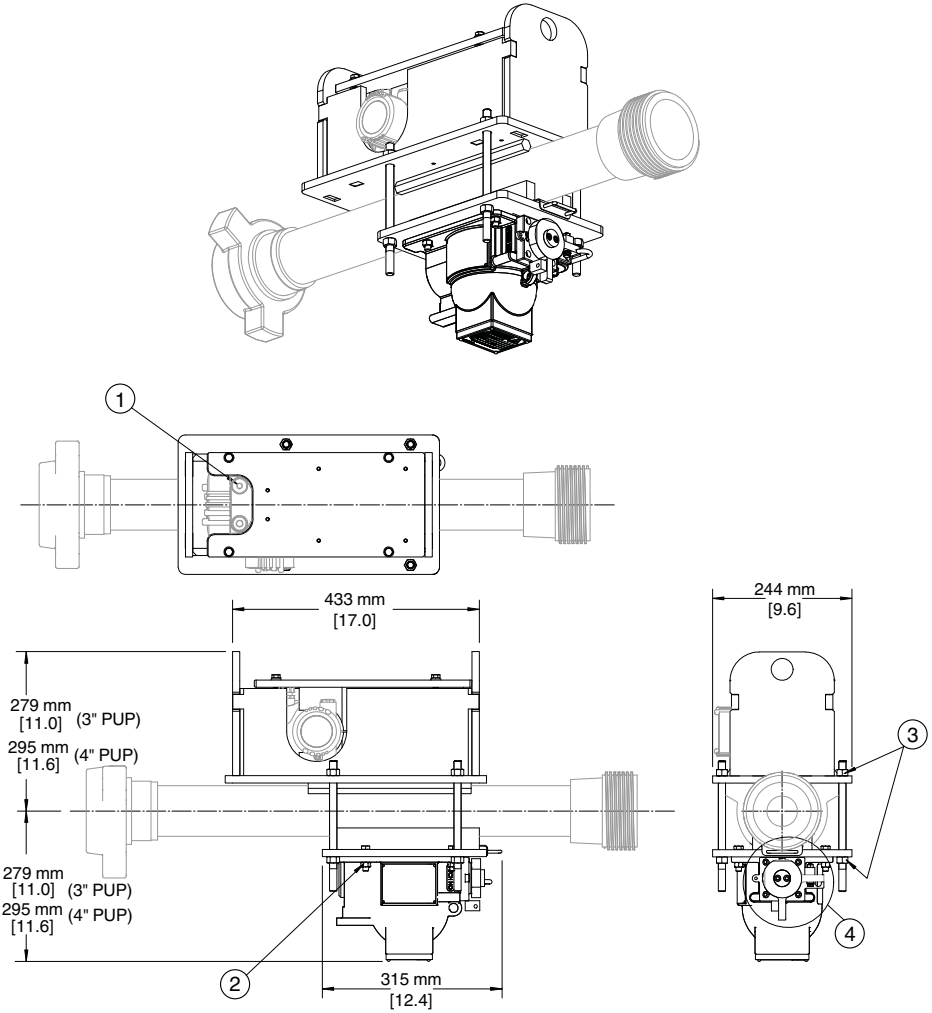
VEGA reserves the right to refuse any shipment that does not have a MRA number assignment

3. Indicate the MRA on the repair service purchase order.
4. Clearly mark the shipping package with the MRA number.
5. Send the confirming purchase order and the equipment to:
   VEGA Americas, Inc.
   Attention: Repair Department
   4170 Rosslyn Drive
   Cincinnati, OH 45209-1599 USA

You must first contact VEGA and receive a material return authorization number (MRA) before returning any equipment to VEGA. VEGA reserves the right to refuse any shipment not marked with the MRA number.

NOTES

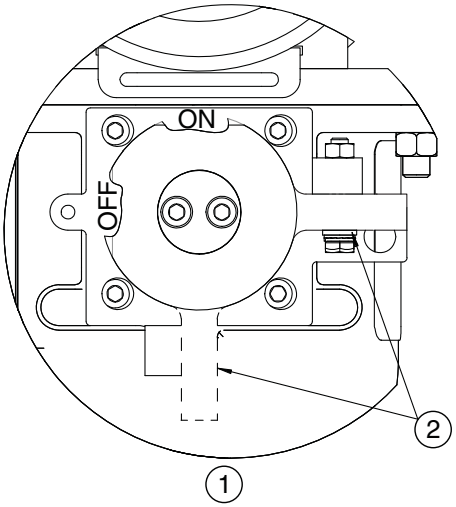
Appendix A – Heavy-Duty Density Gauge Assembly



Appendix A 1: Heavy-Duty Density Gauge Assembly

1 *2 x ½" NPT Cable Entry*
2 *Torque: 20 ft lbs Weld Nut to Bolt After Tightening 4 Places*
3 *Torque: 49 ft lbs Weld Nut to Rod After Tightening 4 Places*
4 *See Detail of Source Shutter Handle*

Detail of Source Shutter Handle



Appendix A 2: Detail of Source Shutter Handle

1 Source On/Off Detail

2 Bolt and Nut to Secure Handle in On/Off Position

VEGA Americas, Inc.
4170 Rosslyn Drive
Cincinnati, Ohio 45209 USA
Phone: 1.513.272.0131
Fax: 1.513.272.0133
E-mail: americas@vega.com
www.vega-americas.com

All statements concerning scope of delivery, application, practical use, and operating conditions of the sensors and processing systems correspond to the information available at the time of printing.