



QUALITY MANAGEMENT SYSTEM
CERTIFIED BY DNV
== ISO 9001:2008 ==

Installation, Operation and Maintenance Manual

VREL[®]

Variable Pressure Reducing Element

SPD 5.6.4 Rev. 12 03/11

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TABLE OF CONTENTS

Safety Precautions	iii
1.0 Overview	1
2.0 Installation	2
3.0 Operation	4
4.0 Replacement Parts.....	5
5.0 Warranty.....	7

WARNING notices as used in this manual apply to hazards or unsafe practices, which could result in personal injury or death.

CAUTION notices apply to hazards or unsafe practices which could result in minor personal injury or property damage.

NOTES highlight procedures and contain information which assists the operator in understanding the information contained in this manual.

WARNING

Do not install, maintain, or operate this equipment without reading, understanding and following the proper Sentry Equipment Corp. instructions. Otherwise, injury or damage or both may result.

NOTICE

The information contained in this document is subject to change without notice.

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SAFETY PRECAUTIONS

Please read the entire manual before attempting to unpack, set up or operate this product. Pay careful attention to all warnings, cautions and notes. Failure to do so could result in serious personal injury or equipment damage.

Use of Hazard Information

If multiple hazards exist, the signal word corresponding to the greatest hazard shall be used.

Definitions



Indicates an imminently hazardous situation, which if not avoided, will result in death or serious injury.



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



Indicates a potentially hazardous situation, which if not avoided, may result in minor or moderate injury.



CAUTION used without the safety alert symbol indicates a potentially hazardous situation, which if not avoided, may result in property damage.

NOTE

Information that requires special emphasis

SHALL

This word understood to be mandatory

SHOULD

This word understood to be advisory

▲WARNING

It is solely the responsibility of the user, through its own analysis and testing, to select products suitable for their specific application requirements, ensure they are properly installed, ensure that they are safely applied, ensure they are properly maintained, and limit their use to their intended purpose.

Improper selection, installation, or use can cause personal injury or property damage.

Sentry does not warrant against erosion and corrosion. Sentry makes no claims regarding suitability for specific use, and provides no warranty regarding material compatibility of elastomers in specific services.

▲WARNING

Hot Surfaces! This equipment may have very hot surfaces. If an operator contacts a hot surface, injury may occur. Use protective clothing to prevent injury. If other equipment comes in contact with a hot surface, damage to the equipment may occur. Ensure the area around this equipment is kept clear to prevent damage from occurring.

▲WARNING

High Pressures! This equipment may contain fluids at very high pressures. Prior to installing, removing or maintaining this equipment, ensure that the equipment is isolated from all connecting piping, the equipment is de-pressurized, the contents have been drained and the equipment is cool.

1.0 Overview

The Sentry Variable Pressure Reducing Element (VREL®) is a valve specifically designed for high-pressure liquid sampling. Typical applications are for the pressure reduction and flow control of samples greater than 500 psig (34.5 bar).

The adjustable rod-in-tube design allows for variable pressure drop and flow control of high-pressure liquid samples. The VREL® is also cleanable in place.

The VREL® is an adjustable rod-in-tube pressure reducing device. The pressure of the incoming sample is reduced as the liquid is forced to travel through the narrow gap between the tapered rod and the rod opening. Because the reduction in pressure is done over the entire length of the rod, localized wear is held to a minimum. The result is a very long service life compared with devices in which the pressure drop is taken over a very short distance (fixed orifice, pressure regulator, etc.). Other devices erode frequently causing friction loss and down time.

With a VREL®, the flow or pressure drop can be changed while the sample is flowing by adjusting the position of the rods. Turning the handle moves the rods in or out on the lead screw. If sample flow is blocked, the rods can be fully retracted to allow sample pressure to flush the dirt through. The sample line never needs to be shut off or the VREL® disassembled to accomplish this. This is very important as the operator tries to get critical samples while boiler pressure is rising or falling during startup or shutdown.

2.0 Installation



To ensure the protection provided by this equipment is not impaired, this equipment must not be installed or used in any manner other than that which is specified in this manual.

CAUTION

Ensure that the VREL® is installed such that it will not be subject to steam or water sample temperatures greater than 300°F. Damage to the VREL® or downstream equipment may occur.

The physical dimensions are shown on the drawing FIGURE 4 below. The VREL® can be mounted in any position. The cutouts for panel mounting are shown below. The locating pin ensures correct orientation to connecting tubing. As an alternative, a U-bolt can be used to hold the body to a panel face or post.

2.1 Installing the VREL® in a Panel



Ensure that the sample line is isolated and cannot be opened during installation of the VREL®. This is necessary to prevent exposure to high pressure and/or hot materials.

1. Drill holes in panel per Panel Cutout diagram in Figure 4.
2. Remove valve handle assembly by unscrewing head nut and pulling assembly out of body.
3. Remove panel lock nut.
4. Insert body assembly from rear of panel using locating pin to position body.
5. Install panel locknut. Pull up snug.
6. Insert rods into barrel. Be sure keyway on rod assembly lines up with key inside barrel. Tighten head nut finger tight.
7. From the backside of the panel, use a wrench on the body nut to hold the body while further tightening the head nut. It may require considerable torque to get a tight seal on the metal-to-metal sealing surface inside the head nut.

CAUTION

Do not rely on the locating pin to hold the barrel assembly while tightening the head nut.

8. The head nut must be fully tightened before the packing nut can be tightened or loosened. Tighten packing nut with 15-20 ft.-lbs of torque.

2.2 Connecting Sample Tubing



Ensure that the sample line is isolated and cannot be opened during installation of the VREL®. This is necessary to prevent exposure to high pressure and/or hot materials.

Three types of tube end configurations are available:

Type 1: Plain end – 1/4" tubes with no connections for use with customer supplied compression fittings.

Type 2: Socket weld – socket weld fittings for customer's 1/4", 3/8" or 1/2" tubing.

Type 3: 37° Fitting - 37° metal to metal fitting for customers 1/4" or 3/8" tubing.

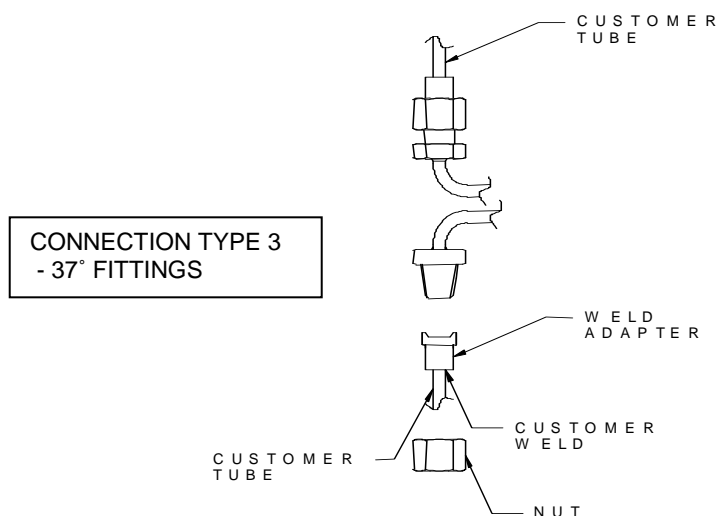


FIGURE 1

A VREL® with Type 1 or Type 3 connectors can be easily disassembled. Type 2 connectors must be cut out.

For Type 2 and Type 3 connections, the customer must weld the system tubes either to the socketed weld fittings (Type 2), or to the loose weld adapter (Type 3). In the case of Type 3 connections, be sure to slide the nut onto the tube before welding the adapter. See Figure 1.

3.0 Operation



During operation, the VREL® may become hot. Do not touch. Use care not to touch adjacent hot sample lines.



When starting up a sample line that includes a VREL®, always be sure that the rods are fully inserted before opening the sample isolation valve (turn handle clockwise to insert rods). The VREL® is not a positive shut-off device. Even when fully closed, approximately 150 cc/min sample flow through the VREL® is possible.

When the rods are fully inserted, the yoke bottoms in the barrel. When the rods are fully retracted, the yoke is stopped by the seal.



Do not try to turn the handle by using extra force. The threads will be damaged.

After opening the isolation valve fully, adjust the setting of the VREL® until the desired flow is established. Turning the handle clockwise will decrease flow; turning counterclockwise will increase flow.

Clean in place

Since corrosion products, scale, and other foreign matter may be present in sample lines, plugging of the VREL® is possible. To clean, fully retract the rods by turning the handle in a counter-clockwise direction. Allow the obstruction to clear. Readjust the setting of the VREL® until desired flow is established.



When performing this cleaning operation, the sample pressure is not being reduced by the VREL®. Ensure that resulting sample flow is directed away safely.

Service

No normal maintenance is required. Replacement parts available are listed below.



Before servicing, ensure that the sample line is isolated and cannot be opened during this service. This is necessary to prevent exposure to high pressure and/or hot materials. Allow the VREL® to cool to a comfortable touch prior to commencing service.

4.0 Replacement Parts

<u>Part Number</u>	<u>Item</u>
6-02302C	VREL® Seal Kit (FIGURE 2) (includes spring seal & backup)
6-02302A	Valve Handle Assembly (without tapered rod) (FIGURE 3)
6-02302E	Valve Handle & Rod Assembly (FIGURE 3)
6-02303A	Tapered Rod & Nut Assembly Only (FIGURE 3)

6-02302C VREL® Seal

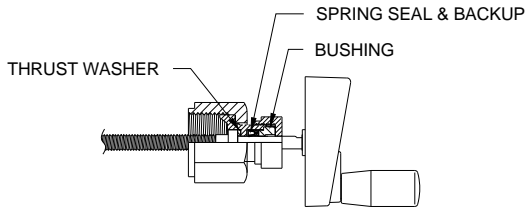


FIGURE 2

Ratings

Wetted materials: 316 Stainless Steel

Weight: 4 lbs

Pressure: 5000 psig at 300°F
(345 barg at 149° C)

VALVE HANDLE & ROD ASSEMBLY (6-02302E)

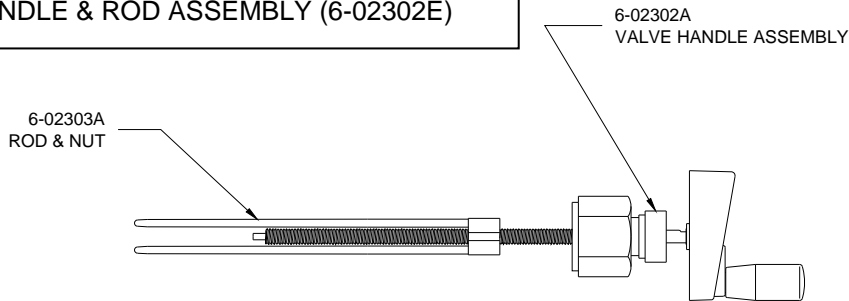
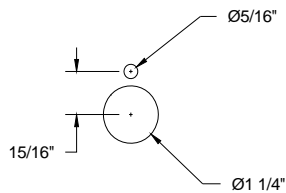
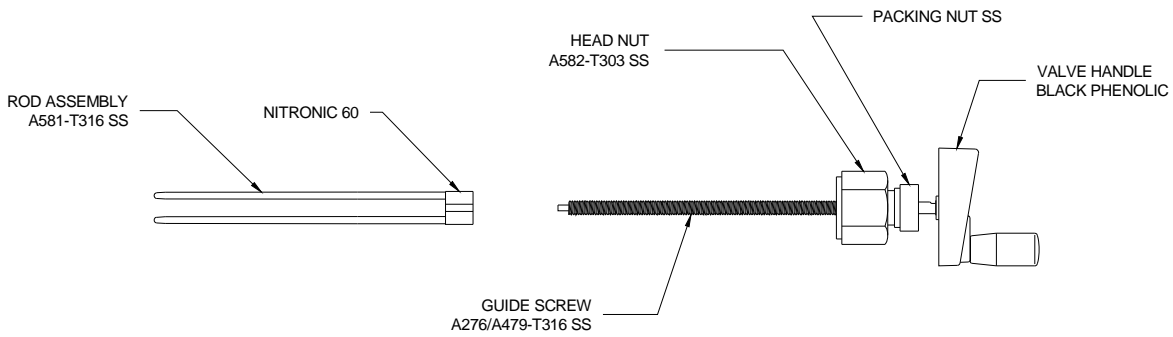
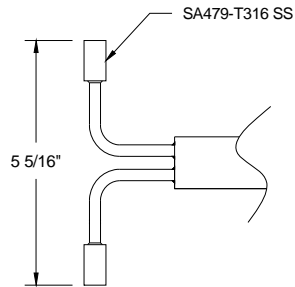
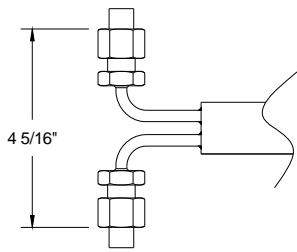
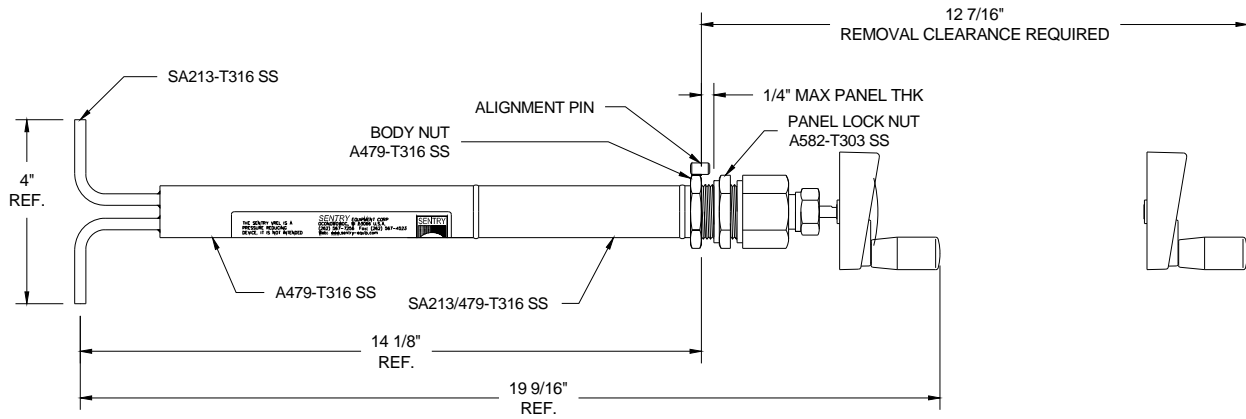


FIGURE 3



PANEL CUTOUT

FIGURE 4

5.0 Warranty

Seller warrants products manufactured by it and supplied hereunder to be free from defects in materials and workmanship for a period of eighteen months from date of shipment or twelve months from start up (which ever occurs first). If within such period any such products shall be proved to Seller's satisfaction to be defective, such products shall be repaired or replaced at Seller's option. Seller's obligation and Buyer's exclusive remedy hereunder shall be limited to such repair and replacement and shall be conditioned upon Seller's receiving written notice of any alleged defect within 10 days after its discovery and, at Seller's option, return of such product to Seller, ex-works Sentry's factory.

The foregoing warranties are exclusive and in lieu of all other express and implied warranties except in title, including but not limited to implied warranties of merchantability and fitness for purpose. Seller shall not be subject to any other obligations or liabilities whatsoever with respect to products manufactured or furnished by it, or any undertakings, acts or omissions relating thereto.

Warranty Conditions & Limitations

This Warranty shall not apply to any Sentry product which, in the opinion of Sentry Equipment Corp, has been (a) altered or repaired in a manner affecting the efficiency of performance of the unit or (b) incorrectly installed or operated or (c) damaged in shipment or (d) damaged by flood or fire or (e) if the serial number is missing, altered or defaced.

Any materials proposed to be used by Sentry Equipment Corp. ("Seller") are based on published reference literature and/or customer recommendations, and customer assumes sole responsibility for the selection of such materials. Any references are based on third-party studies, and may not correlate directly with the end user's intended usage or process (i.e. chemical composition, concentrations, temperatures, etc.).

EXCEPT FOR THE LIMITED WARRANTIES SET FORTH HEREIN, SELLER HEREBY DISCLAIMS ANY AND ALL WARRANTIES AND REPRESENTATIONS (EXPRESS OR IMPLIED, ORAL OR WRITTEN), INCLUDING ANY AND ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR ANY PURPOSE WHETHER OR NOT SELLER KNOWS, OR HAS REASON TO KNOW, HAS BEEN ADVISED, OR IS OTHERWISE IN FACT AWARE OF ANY SUCH PURPOSE, WHETHER ALLEGED TO ARISE BY LAW, BY REASON OF CUSTOM OR USAGE IN THE TRADE, OR BY COURSE OF DEALING OR PERFORMANCE.

Without limiting the generality of the foregoing, Seller makes no warranty regarding ability of products sold hereunder to withstand erosion or corrosion, or regarding material compatibility of elastomers in specific services, and no warranty made hereunder shall apply to products which have been subjected to adverse storage

The owner shall be responsible for maintenance of his equipment. Wear or damage caused by lack of normal maintenance or by misuse of the equipment shall not be considered as defective workmanship and material.

Sentry reserves the right to make product design changes or improvements without notice and without imposing any obligation upon itself to install these changes or improvements on its products previously manufactured.

This warranty is for the sole benefit of the original purchaser and is not transferable unless agreed to in writing by Sentry Equipment Corp.

Receiving Shipments (including loss or damage by transportation)

It is the customer's responsibility to check for missing cartons and sign of damage to cartons. If found, customer should note missing and/or damaged cartons on the delivery receipt and have delivery receipt signed by the representative of the transportation company. If unpacking discloses concealed damage from rough handling, the customer should request a concealed damage inspection from the transportation company.

The Sentry Customer Service Department will aid your organization in any claim proceeding for shortages or damages in shipment, but it is the receiver's responsibility to file claim with the carrier for damage or loss.

Customer Actions For Claims on Products During the Warranty Period

1. Contact the Customer Service Department, Sentry Equipment Corp., Oconomowoc, WI, Telephone: 262-567-7256, to obtain a Return Material Authorization (RMA) number.
2. You will be sent an "RMA" and a "Decontamination Statement" that is required to be filled out and **returned with the equipment**.
3. The following information must appear on the outside of the package:
 - a. RMA number marked on outside of box.
 - b. Decontamination Statement filled out and attached to outside of box.
4. Return defective equipment **FREIGHT PREPAID**. Collect shipments will be refused.
5. The factory will not process warranty claims until the customer has properly accomplished the above items.
6. The Sentry factory may accept the entire claim, a part of the claim or none of the claim if our inspection of returned parts proves the failure was for reasons other than defective material or factory workmanship.

Important Notes:

1. Sentry will not be responsible for damage incurred during the return shipment.
2. All returns subject to inspection and a minimum \$100.00 evaluation fee.
3. This RMA is not authorization for credit. Credits and/or replacements will be issued upon evaluation of returned goods.
4. RMA is valid for thirty (30) days from issue date.