User Manual
ROXA20034733
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Roxar Sacrificial Probe User Manual

ROXAR™

EMERSON™

Contents

1 Introduction

This manual provides general information and procedures for using the Roxar Sacrificial Probe, and is intended for use by qualified personnel. The information presented in this manual is not specific to a particular application, installation or process, and must be evaluated on a case-by-case basis by the operator. Contact Emerson for more information.

1.1 Conformity to standards

This document has been issued in compliance with the most common international standards for user manual documentation.

1.2 Warnings

WARNING

The instructions and procedures described in this document may require special precautions to ensure the safety of the personnel performing the operations. Information that potentially raises safety issues is indicated by a warning symbol followed by a safety message.

1.3 Acronyms and definitions

Acronym	Definition
PPE	Personal Protective Equipment
MSDS	Material Safety Data Sheet

1.4 Personnel qualifications and safety

You must read and follow all instructions, warnings and cautions to avoid personal injury or damage to property during system operation. Emerson is not responsible for damage or injury resulting from unsafe use of the product, lack of maintenance, incorrect installation of equipment, or system operation. Contact Emerson if you have questions about any applications and safety precautions described in this manual.

Ensure that operators working on the equipment are following the end-user guidelines on the use of protective equipment including, but not limited to the following:

- Safety helmet/hard hat
- Steel-toed shoes
- Safety glasses
- Working gloves (suitable for mechanical operations)
- Chemical resistant latex gloves, or equivalent

- Long sleeved fire-retardant shirt and fire-retardant trousers, or full-length fire-retardant coveralls

Additional Personal Protective Equipment (PPE) may be required depending on facility requirements and Material Safety Data Sheet (MSDS) requirements. Failure to do so may result in personnel injury.

1.5 Warranty restrictions

You must visually inspect all components for shipping damage and notify the carrier, if you find any shipping damage. Shipping damage is not covered by the warranty. The carrier is responsible for all repair and replacement costs resulting from shipment damage.

1.6 Additional documentation and resources

- ROX000295904 - Roxar Mechanical Retrieval Tool User Manual
- ROX000337352 - Roxar Hydraulic Retrieval Tool User Manual

1.7 Assistance

The Roxar Global Service Centre is organized through a network of service centers worldwide, and supports all service requirements or technical queries.

For the Product Support Help Desk, contact Roxar.GSC@Emerson.com.

2 Technical description

The term "probe" is collective noun for the equipment used to provide information relating to process changes and their effect on metal loss from corrosion and/or erosion. There are different types of probes with different measurement techniques.

This manual describes the Roxar Sacrificial Probe. Contact Emerson for more information on other types of Roxar probes.

2.1 Roxar Sacrificial Probe

The early detection of sand production in fields is one of the biggest challenges faced by oil and gas companies. High sand production can cause damage to pipes and instruments, pose a safety risk, and be very costly for operators. Therefore, the early warnings and detection of erosion is crucial for operators. The Roxar Sacrificial Sand Probe is used to provide information when sand erosion has exceeded the element thickness of the probe, in order to avoid erosion damage, or control sand production.

The Roxar Sacrificial Probe is an intrusive sand probe that consists of a hollow tube and a holder. The Roxar Sacrificial Probe is inserted into a high velocity flow, and an indication is given by a pressure gauge, or a pressure transmitter, once the pressure has penetrated the sacrificial tube due to the wear caused by sand and other particles in the flow.

The Roxar Sacrificial Probe can be installed in two ways:

- The Roxar Sacrificial Probe (Retrievable) is installed in an tee-type 2 in access fitting.
- The Roxar Sacrificial Probe (Non-retrievable) is installed in taps welded directly onto the pipe or vessel (welding bosses or threadolets).

Note
If the Roxar Sacrificial Probe is installed in an tee-type 2 in access fitting system, the probe can be retrieved and replaced without any interruptions to the mainstream flow, or the need to depressurize the pipe.

The sensing element of the Roxar Sacrificial Probe consists of a tube made from corrosion resistant material. The tube is closed at one end and threaded at the other end to mate with the probe nut. The nut enables the Roxar Sacrificial Probe to be attached to a solid plug and used in a Roxar Access Fitting Assembly with a tee.

Emerson recommends placement of the probe within the pipeline, so that the midpoint of the sacrificial tube is placed approximately 60% into the pipeline diameter (ID). This placement allows for maximum theoretical sand impingement at center of line where the sand concentration and flow rates are often greatest. It also allows for heavier suspended particles flowing slightly lower in the flow stream to also contact the sacrificial tube.

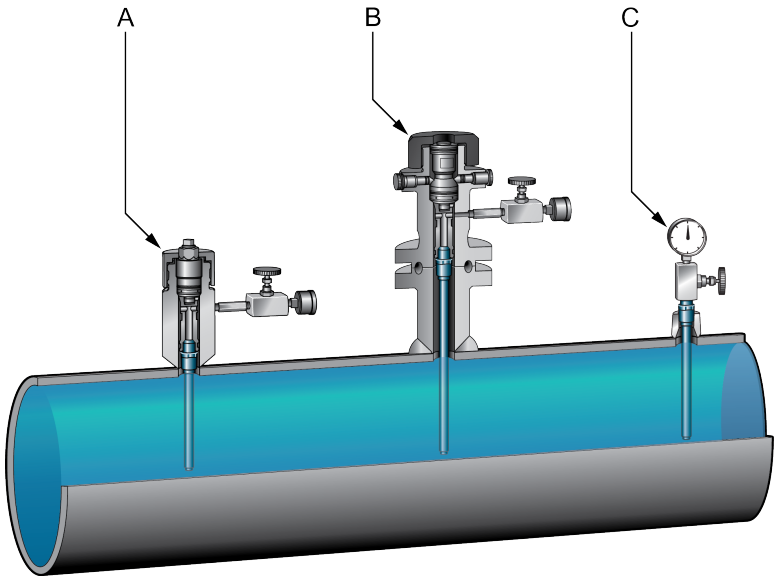
If there is sufficient flow velocity, the effect of sand and solids erodes through the Sacrificial Probe sensing element over time, and exposes the sealed system to the working pressure of the line. The pressure passes through a valve assembly and is registered by the pressure gauge.

The Non-retrievable sacrificial system is available in a fixed configuration and can only be removed and replaced when the process line is not exposed to pressure. The Retrievable

sacrificial system can be removed and replaced under full operation, with the support of the Roxar Mechanical Retriever Tool or the Roxar Hydraulic Retriever Tool.

Figure 2-1 shows the different ways in which the Roxar Sacrificial Probe can be installed.

Figure 2-1: Roxar Sacrificial Probe Assembly

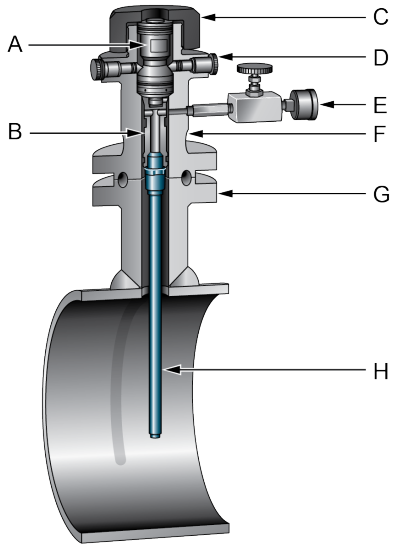


A. *Sacrificial Probe Assembly (Retrievable) mounted in a tee-type flareweld mechanical access fitting*
B. *Sacrificial Probe Assembly (Retrievable) mounted in a tee-type flanged hydraulic access fitting*
C. *Sacrificial Probe Assembly (Non-retrievable) mounted in a threadolet*

2.2 Main components

The Roxar Sacrificial Probe (Retrievable) system in a 2 in tee-type hydraulic flanged access fitting consists of the following parts:

Figure 2-2: Complete Hydraulic Retrievable Sacrificial Probe Assembly



A. Plug
B. Injection nut
C. Cover
D. Locking pins
E. Pressure gauge
F. Tee-type 2 in access fitting
G. Flanged connection
H. Sacrificial Probe

Figure 2-3: Complete Mechanical Retrievable Sacrificial Probe Assembly

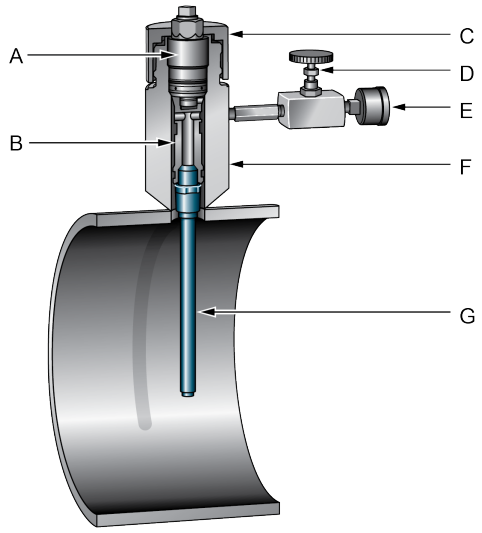


Figure 2-3 shows a Retrievable Sacrificial Probe system in a tee-type 2 in mechanical flareweld access fitting.

A. *Plug*
B. *Injection nut*
C. *Cover*
D. *Shut-off valve*
E. *Pressure gauge*
F. *Tee-type 2 in access fitting, flareweld*
G. *Sacrificial Probe*

Figure 2-4: Complete Roxar Sacrificial Probe (Non-retrievable) Assembly

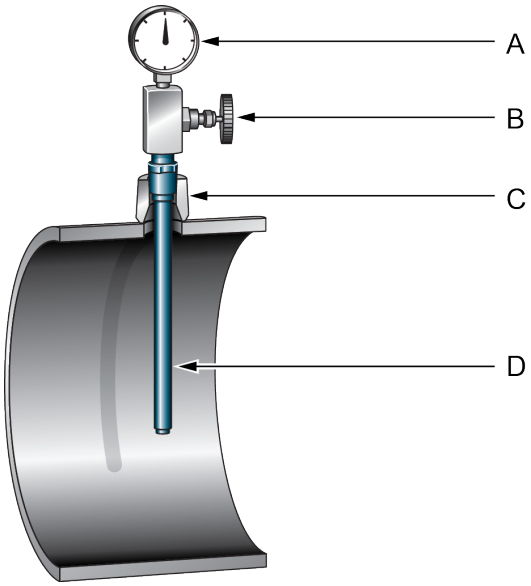


Figure 2-4 shows the parts of a Roxar Sacrificial Probe (Non-retrievable).

A. *Pressure gauge*
B. *Shut-off valve*
C. *Threadolet or welding boss*
D. *Sacrificial Probe*

2.3 Specifications and dimensions

Specifications	Value
Probe body material	Stainless Steel AISI 316L/316 (dual certification)
Diameter of sacrificial tube	Ø16 mm
Wall thickness of sacrificial tube	1 mm
Probe length	From 80 mm to 390 mm (depending on the type of probe)
Probe installation in pipe	Installed approximately 60% into the pipe diameter (ID)
Maximum operating temperature	204 °C
Maximum operating pressure	6,000 psi
Mechanical interface	½ in NPT (retrievable) and ¾ in NPT (non-retrievable)

3 Preparation

This section describes the prerequisites and preparations (including observations) to be carried out before installing the different parts of the equipment. The instructions cover the following equipment:

- Roxar Sacrificial Probe (Retrievable and Non-retrievable)
- Injection nut

You can install the Roxar Sacrificial probe in two ways:

- Manually, by using hand tools before the system starts up, or during shut down when the line or vessel is empty and depressurized.
- By using a special retrieval tool during full operational conditions of the system. For more information, see Additional documentation and resources.

Note
The guidelines provided in this manual are based on the 2 in hydraulic or mechanical system that is being operated. If you are using a retrievable system, make sure you read and follow the instructions in the user manual of your system, including the recommendations for spare parts.

3.1 Tools

Retrievable Probe with tee-type 2 in access fitting system

In addition to the tools listed in the manuals for the applicable Retriever Tool (mechanical or hydraulic), you will need a 23 mm spanner to assemble the Sacrificial Probe into the injection nut.

WARNING
DANGER TO PERSONNEL AND EQUIPMENT. Make sure that the length of retriever tool available for the operation is compatible with the length of the Sacrificial Probe.

Non-retrievable Probe

You will need a 23 mm spanner to assemble the Roxar Sacrificial Probe into the pipe tap. A set of two adjustable spanners is also required to assemble the shut-off valve and the pressure gauge (or pressure transmitter, if applicable).

WARNING
DANGER TO PERSONNEL AND EQUIPMENT. Installation or replacement of a non-retrievable probe requires a depressurized, drained and ventilated pipe or vessel.

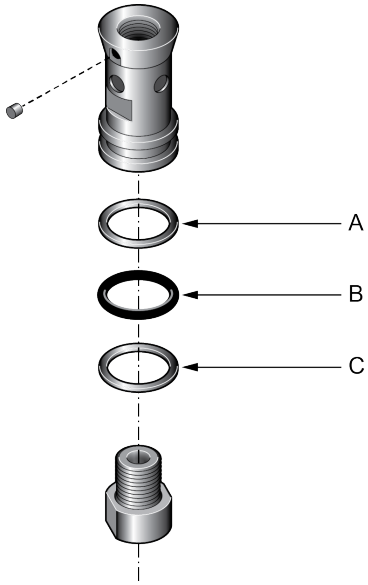
3.2 Consumables

You do not need any additional consumables for non-retrievable sacrificial probes that are installed in a welding boss or threadolet.

If the probe is installed in a retrievable type 2 in access fitting, you will need the spare parts that are listed under operational instructions for the applicable retriever tool (mechanical or hydraulic).

In addition, a new probe and the following spares shall be available:

Figure 3-1: Consumables for Roxar Sacrificial Probe Nut (Retrievable)



A. Position 1
B. Position 2
C. Position 1

3.2.1 Part numbers for consumables

Position	Description	Material	Part number
Pos.1	Backup ring	PTFE	ROX000323092
Pos.2	O-ring	VITON 75	ROX000278467
		FKM938	ROX000323093
		HNBR90	ROX000342560
		ELAST-O-LION	ROXA20035755
		FR25/90	ROX000339898
		FKM 75	ROXA20035756

4 Operating instructions

Introduction

Generally, the Roxar Sacrificial Probe is operated only during the replacement of probe itself. Due the nature of the sensor, a local indication is provided by the pressure gauge (or a signal is sent to control room, if a pressure transmitter is applied) once the probe tube is eroded. That means if 1 mm of metal loss is eroded, the rate can be calculated by dividing the thickness of the tube (1 mm) by the time that elapsed since the probe was exposed to flow and until the indication came on the pressure gauge.

It is important to highlight the importance of replacing the Sacrificial Probe as soon as there is metal loss due to erosion, which must be taken into consideration for assessment of pipe integrity and future production of the actual well.

4.1 Roxar Sacrificial Probe (Retrievable)

Note
To replace a Roxar Sacrificial Probe (Retrievable) installed in a 2 in access fitting, refer to the user manuals for the applicable retriever tool and 2 in access fittings.

After you have retrieved the plug, injection nut and probe, replace the sealing device at the plug, the O-ring and the back-up ring at the injection nut and the Sacrificial Probe.

The Sacrificial Probes are equipped with NPT threads. This means the threads have a tapered design, and in most cases that is enough to seal the connection. In order to prevent spiral leakage and avoid galling, Emerson recommends that you use some type of sealant (tape or paste) and apply the sealant to the male thread only.

When using the tape sealant, wrap the threads in a clockwise motion starting at the first thread. As the layers are applied, work towards the imperfect (vanishing) thread. If the system that the connection being made to cannot tolerate foreign matter, leave the first thread exposed and apply the tape sealant as outlined above.

When using paste sealant, apply to the threads with a brush, using the brush to work the sealant into the threads. Apply enough sealant to fill in all the threads all the way around.

Follow the instructions on retrieval procedure to install the probe into the pipe.

4.2 Roxar Sacrificial Probe (Non-retrievable)

To replace a Roxar Sacrificial Probe (Non-retrievable), you must first depressurize and drain the pipe. Once the pipe is confirmed to be depressurized and drained, unscrew the pressure gauge (or pressure transmitter), the shut-off valve and the eroded probe.

The Sacrificial Probes are equipped with NPT threads. This means the threads have a tapered design, and in most cases that is enough to seal the connection. In order to prevent spiral leakage and avoid galling, Emerson recommends that you use some type of sealant (tape or paste) and apply the sealant to the male thread only.

When using the tape sealant, wrap the threads in a clockwise motion starting at the first thread. As the layers are applied, work towards the imperfect (vanishing) thread. If the

system that the connection being made to cannot tolerate foreign matter, leave the first thread exposed and apply the tape sealant as outlined above.

When using paste sealant, apply to the threads with a brush, using the brush to work the sealant into the threads. Apply enough sealant to fill in all the threads all the way around.

Install the new probe into the existing pipe tap, followed by the shut-off valve and pressure gauge (or pressure transmitter).

5 Maintenance

The Roxar Sacrificial Probe does not require any maintenance during normal operational conditions.

Emerson recommends limited routine inspections to ensure that there are no visual damages on pressure gauges, covers, shut-off valves and access points.

WARNING
DANGER TO PERSONNEL AND EQUIPMENT. Do not remove the pressure gauge or the pressure transmitter with the shut-off valve on its open position, even if the probe is still sealed, and the pressure indication is zero.

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Roxar
Head Office Roxar products:
+47 51 81 8800
info.roxar@emerson.com

CIS: +7 495 504 3405
Europe: +47 51 81 8800
North America: +1 281 879 2300
Middle East: +971 4811 8100
Asia Pacific: +60 3 5624 2888
Australia: 1 300 55 3051
Latin America:
Portuguese: +55 15 3413 8888
Spanish: + 52 55 5809 5000

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