

1 General

1.1 Introduction

This Instruction Manual is provided to familiarise the user with the system arrangement and its use. The instructions must be read and applied whenever work is done on the system and must be available to the operating and maintenance personnel.

These instructions will help to avoid danger and increase reliability. They should be used with the appropriate mechanical seal Instruction Manual.

John Crane reserve the right to change the system and specifications described on a future supply.

The following definition is used in this document.

Barrier Gas

The 9280 Gas Box supplies a pressurised dry barrier gas (usually nitrogen) from an external source between the inboard and outboard dry running seal arrangement, supplied at a pressure higher than the product pressure. The gas box contains a coalescing filter to remove any moisture and particulate's present in the supply of plant gas. A pressure regulator in the box regulates the barrier gas to 1.5-2 bar / 22 - 30 psi above the seal chamber pressure.

Consumption

The 9280 Gas box is used in applications where process leakage cannot be tolerated, to achieve this the system is designed to inject a small amount of barrier gas into the process fluid. Any emissions at the outboard seal will be pure barrier gas. The barrier gas which passes across the inboard and outboard seal is referred to as the consumption.

1.2 European Declaration of Incorporation

(Machinery Directive, 2023/1230/EU)

If applicable this is attached.

1.3 European Declaration of Conformity

(Pressure Equipment Directive, 2014/68/EU)

If applicable this is attached.

1.4 European Declaration of Conformity (ATEX, 2014/34/EU)

John Crane supports the ESA position that complete Seal auxiliary systems are not considered ATEX components. When the system is required to be installed into a potentially explosive hazard zone and it includes specific electrical switches/alarms and other parts which are required to be ATEX accredited, these items will individually comply with the specified ATEX zone and specific documentation will be supplied.

2 Safety & Environment

The safety notes refer to the system supplied. They can never be exclusive, and must be used in connection with the relevant safety regulations for the machine, auxiliary equipment, plant and sealed product.

2.1 Warning symbols

The following symbols are used in this instruction manual to highlight information of particular importance



Danger

Mandatory instructions designed to prevent personal injury or extensive damage.



Warning of electric current.

ATTENTION

Special instructions or information to avoid damage to the system or its surroundings.

NOTE

Information for easy installation and efficient operation.



Environmental note

Compliance is required with any additional warning signs affixed to the system.

2.2 Safety Instructions



Danger

Every working practice that compromises personal safety is to be avoided. All safety requirements in this document must be strictly adhered to.

In the event of an operating problem the machinery must be switched off immediately and made safe! Problems must be solved promptly.

Installation, operation and maintenance of the equipment should be carried out by qualified, experienced and competent personnel only, having first read and understood these instructions. Ensure all personnel are equipped with suitable protective clothing when maintaining the system.

The 9280 Gas Box is commonly used with dual dry gas seal configurations. The intermediate, protective barrier gas in certain failure modes, may risk being contaminated by the process fluid that can be flammable, explosive, toxic or lethal fluids. During any maintenance operation operators must thus assume they will be exposed to the process properties and have suitable protective gloves, clothing, respirators and equipment. Particular attention must be undertaken for the guidelines relating to electrical installations.

During venting or draining of the barrier gas – it should be piped to a safe area or carried out in well ventilated areas to prevent a build-up or pocket of gas from developing.

Gas systems normally operate at ambient temperatures; however any surface temperatures above 60°C should be protected against accidental contact.



The equipment must only be operated within its recommended design limits. Compounds containing PTFE, fluorocarbons and perfluoroelastomers should never be burnt as the fumes and residues are highly toxic. If this accidentally occurs protective equipment should be worn as hydrofluoric acid may be present.

Additional equipment / flanges / joint seals used within the system are to be rated for the appropriate electrical and pressure requirements and are to be chemically compatible with the barrier gas. All above according to the local legislation. For further information and safe operating limits contact John Crane. All periodical maintenance checks have to be in accordance with local legislation and rules.

All welding or cutting operations are forbidden without permission from John Crane.

If you are in any doubt please contact your local John Crane office for further information before proceeding.

2.3 Environmental Aspects

2.3.1 Company policy extract

"It is the policy of John Crane to manage its business activities in an environmentally responsible manner, comply with all relevant laws and regulations, prevent pollution, and continually improve its environmental performance, certification to the latest issue of ISO 14001 ensures compliance."



John Crane adopts the 'Design For the Environment' (DFE) principle in making this product. Using this product will benefit the environment directly by:

- **Reducing waste** of precious resources through decreasing the risk of leakage and minimizing energy consumption.
- **Preventing pollution** through controlling harmful emissions to the atmosphere and ground contamination.
- **Preserving valuable materials** through the use of high quality durable materials.

2.3.2 Recycling

Product Refurbishment

This product has been designed for long life.

Disposal

When the product is considered to be beyond economical repair and potential reuse, it should be disposed of by **environmentally beneficial** means. The product can be disassembled with ease.

Scrapped Components

These should be handled with extra care due to possible contamination. They should be **recycled** through **local** industrial recycling plants.

Packaging

All packaging materials used are made from recyclable, environmentally friendly materials.

When in doubt or for further information and advice on this subject, please consult **John Crane**.

3. Transportation and Storage

Transport and store the system where possible in its original packaging.

It is necessary to protect and preserve the integrity of the equipment between shipment and installation/start-up at site. This is particularly important when extended periods of storage are envisaged.

Where Gas Box's are shipped first to the rotating equipment vendor it is customary for them to be mounted on the rotating equipment baseplate, and the connecting product piping already installed.

Gas Box's and generally all auxiliary sealing products which are to be mounted off the rotating equipment baseplate, shall be shipped directly to site and shall be packed in suitable crates or cases to protect them from damage during shipment. All openings to the system are closed and sealed for shipping. In this event follow the following instructions.

On arrival at site and before unloading for storage, a visual inspection of the crate/case should be carried out for signs of damage during shipment. In the event of any damage the crate/case must be opened and the contents thoroughly examined for signs of equipment damage. If any seals are broken, then the system is assumed to be contaminated and shall be cleaned accordingly.

If the parts are considered acceptable with no visual signs of damage, the crate/case should be properly closed again prior to storage.

After checking for shipment damage, the following recommendations should be undertaken to prevent deterioration arising from long-term storage.

- Gas Box's should be stored in their original packaging and if possible the crate/case should be stored away from direct sunlight, in a well-ventilated building with a hard floor.
- Temperature control is not normally necessary, but large temperature fluctuations > 40°C/72°F should be avoided.
- If stored outdoors, it is recommended that the crate/case be placed on square timber bearers resting on a concrete or similar hard surface.
- The crate/case must then be wrapped with waterproof tarpaulin to prevent ingress of water and dirt.
- Loose components or accessories in the case should be stored as above, after proper itemisation.
- A weekly visual external inspection of the protection and preservation should be undertaken and any deficiencies noticed should be corrected without delay. The system must be stored far from backwater to avoid the (M/C) phenomenon (microbial corrosion).

NOTE

Should water, condensation, sand, dirt or other contaminant enter the system, through package/tarpaulin damage or improperly positioned covers, the cause of the problem must be eliminated and the equipment thoroughly dried and cleaned before re-storing.

If used Gas Box's or parts are to be transported to the manufacturer or a third party they have to be cleaned, decontaminated and require safe-handling instructions externally attached.

The system normally does not require any preservatives; it is resistant against most environmental conditions.

ATTENTION Ensure preservatives and cleaning agents do not affect the elastomers in the Gas Box.

4 Description of the System

4.1 Function of the System

9280 Gas Box Barrier Gas System for Dual Pressurized Mechanical Seals



Properties of process fluids may be the source of flammable or explosive hazards, In Europe, barrier gas systems are classified as Group 1 in the P.E.D Pressure Equipment directive(2014/68/EU), must not be used without formal approval from John Crane.



If the process or operating conditions are changed from those referenced in this Manual, John Crane must be consulted to ensure the sealing system is safe.



If the rating of the equipment on which the Gas Box is installed exceeds the system Maximum Allowable Working Pressure (MAWP) a pressure relief valve, vented to a safe area, should be included. If a safe vent is not possible, the outlet connection should be piped down to grade and appropriate warnings erected adjacent to the valve.

The 9280 Gas Box is designed to provide a pressurised gas, typically nitrogen to a dual pressurized gas lubricated mechanical seal. When rotating machines (pumps, fans or mixers) work with hazardous fluids, it is common practice to install double mechanical seals which prevent leakage of the process fluid escaping into the surrounding environment.

Non contacting dry running gas seals are frequently used for this purpose. The barrier fluid is a clean dry gas normally nitrogen, constantly supplied to the mechanical seal inter-space from a reliable source at a pressure greater than 2 bar (30 psi) above the product pressure. A small flow of barrier gas flows across the inboard mechanical seal into the process fluid, and a small flow of the barrier gas flows across the outboard mechanical seal to the atmosphere.

The 9280 Gas Box includes a coalescing filter to ensure that the final barrier gas supply to the seal is free of particulates and moisture.

Seal operating pressure is set by adjusting the control panel regulator in conjunction with the pressure gauge.

Gas flows are visually monitored using the panel mounted flow indicators. The low flow indicator will be active during normal running consumption. The high flow indicator should only show a reading if the gas consumption rate is high, often indicating an issue with mechanical seal. An optional flow switch located on the gas supply to the seals monitors excessive consumption in the event of a seal failure. An optional pressure switch monitors the barrier gas supply pressure to the 9280 Gas box.

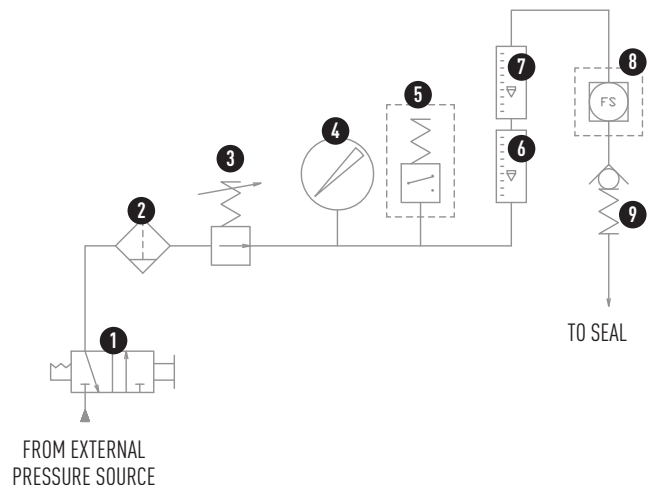
4.2 Instrumentation & Fittings

The Gas Box Control Panels are usually supplied with the following instrumentation and fittings.

- Threaded terminations to interconnecting lines (inlet / outlet / drain)
- Drain connection for the coalescing filter.
- Gas Box vent connection
- High flow indicator
- Low flow indicator
- Pressure gauge

And upon request with the following options:

- High Flow Switch.
- Low Pressure switch.
- 10 Litre (2.6 gallon) Gas Receiver Reservoir
- External Pressure Booster (2:1 or 4:1 compression ratio)
- External junction boxes for electrical instruments.



5 Installation/Operation

5.1 Before installation

Prior to installation ensure that internally all connecting pipe work has been thoroughly cleaned. Remove protection caps from pipes and connections.

5.2 installation Position

The location of the installation position is particularly important for the efficient operation of the system. Refer to the G.A drawing for mounting details. It is recommended that piping between the 9280 Gas Box and the seal should be kept below 2 metres (6 ft) where possible. If this length is exceeded consideration should be given to increased friction losses and if necessary allowances must be made when setting the seal barrier pressure.

4 off mounting holes are included on the panel enclosure each with a M8 diameter clearance hole on 302mm x 260mm centres. The mounting brackets on the 9280 Gas Box may also be orientated vertically, changing the position of the holes to 210mm x 352mm centres. To change the orientation of the mounting brackets, remove the screws fixing the mounting brackets to the 9280 Gas Box, rotate the brackets 90° then

replace the screws to fix the brackets back into the 9280 Gas box in the new position. Mount the panel to a suitable pillar or support alongside the seals. The 9280 Gas Box may also be supplied already mounted to a mounting stand supplied by John Crane. In that case securely fix the mounting stand to the ground or rotating equipment skid.

Please pay attention to the following points:

- Easy access to the equipment for operation and maintenance
- Easy access to drain plugs/valves and connections
- Sufficient room for removal of the system (see dimensions in the G.A. drawing, Section 8)
- Practical installation of all inter-connecting lines. (see Section 5.3)
- Visibility of Instruments and indicators.

5.3 Preparations for Installation

Carry out the following steps prior to assembly:

- Examine system components for any damage caused during transport or storage
- Remove protection caps from pipes and connections
- Keep everything clean when assembling the system.

5.4 Assembly

The system should be assembled using the G.A. Drawing in Section 8 but considering the following.

Any system supports must be able to support the weight of the system and enclosure (see G.A. drawing section 8) and be sturdy enough to withstand wind force and normal vibration conditions.



Any welding of pressure components is strictly forbidden.

It is advisable to install a vent connection in the inter-connecting pipe work close to the seal chamber.

5.5 Installation

From a regulated gas supply source (12 bar / 175 psi max) pipe up to the inlet 6mm OD stainless steel compression coupling on the enclosure base. The gas supply to the unit must be isolated while this is carried out. With the gas supply to the unit still isolated, pipe up from the 6mm OD stainless steel compression coupling on the enclosure base to the mechanical seal gas barrier in (GBI) connection.

The central rear connection on the base of the enclosure is the filter drain.

The central front connection on the base of the enclosure is the Gas Box vent.

Recheck all pipework and connections for tightness following assembly. When supplied, a gas receiver reservoir should be connected between the gas supply and the inlet of the 9280 Gas Box.

When supplied, a pressure booster should be connected between the gas supply and the inlet of the 9280 Gas Box, before the gas receiver reservoir if also supplied.

Ensure that the inlet of the gas receiver reservoir and/or pressure booster are connected to the supply side, so that gas flows in the correct direction through this component to the 9280 Gas Box.

The system should be installed using the G.A Drawing in Section 8 but considering the following.

- Piping or tubing to have a minimum bore of 1/4" or 6 mm.
- 316 Stainless steel material.
- Pipework bends should have a minimum radius of 5xD. There should be a maximum of 6 bends in total.
- Isolating valves should be full-bore type.
- Do not include check valves in the interconnecting pipework between the 9280 gas box and the mechanical seal.

5.6 Electrical Connections

When fitted, ensure that the Low Pressure switch and High Flow switch are fitted and installed with appropriate cable and cable glands rated for the Electrical Area classification and correctly wired by a qualified electrician. If in doubt, see Pressure Switch and Flow Switch data sheets for wiring diagrams.

Cabling to the pressure switch and flow switch when supplied with flying leads, should enter the unit through the cable gland supplied. This gland is only provided to prevent damage to the cable where it enters the enclosure, and to offer an alternative wiring position depending on the cable used to wire up the pressure switch when the flow switch is supplied with a junction box fitted, wiring to the switch will be via the junction box (located externally on the right hand side of the enclosure when viewed from the front).



Only authorised and qualified personnel are permitted to carry out work on electrical systems. International and local safety regulations must be followed in all cases.

Before connecting cables, check the electrical data on the name plate matches the available power supply and complies with the area hazard classification.

Refer to the diagrams in the terminal housing and the supplier's Instruction Manual for wiring instructions.

Connect the electrical component using flexible conduit or armoured cable to assist removal of the component for maintenance purposes.



If passive switching elements are installed in potentially explosive areas you should add suitable protective devices, following the pertinent rules.

5.7 Operation – (refer to GA drawing)

The 9280 Gas box is used to regulate, condition and monitor the supply of an external barrier gas (nitrogen) so that the mechanical seals receive a stable, regulated, clean and dry source of barrier gas at a pressure higher than that of the process.

The gas enters the gas box via the inlet / isolating connection, before passing through a coalescing filter (item 2) which conditions the gas to remove dirt and moisture.

Gas then passes through a pressure regulator (item 3) which in conjunction with the pressure gauge (item 4) is used to set the barrier gas operating pressure. It then passes through a Flow meter (items 6 and 7), which monitors the flow rate of gas going to the seals.

An increase in the normal gas flow passing through the panel would indicate the onset of seal wear or a break in the supply line pipework. A pressure switch can be provided to monitor the supply pressure and give a remote signal in the event of a fall or loss of barrier gas pressure. Finally the gas passes through a non-return valve (item 9) included to prevent the process fluid/gas from contaminating the system in the event of a loss of barrier gas pressure, to the seals.



The process should not be started until the 9280 Gas Box is connected to the seal chamber and the correct pressure and flow is established.

5.7.1 Initial set up:

Check that the regulated gas supply to the unit is closed.

- Ensure all connections are piped correctly Refer to GA Drawing.
- Ensure all instruments are wired correctly and functioning prior to operational pressure being applied
- Using the lock key, ensure that the supply isolator valve on the enclosure front is in the 'OFF' position
- Ensure any additionally fitted vent valves are closed.
- Using the latch key open the enclosure front and ensure the regulator is fully backed off. To do this, pull the regulator adjuster knob on the bottom and turn fully anti-clockwise.
- Open the isolator/supply valve. Slowly open the regulated gas supply line allowing barrier gas to the system.
- Using the lock key turn the supply isolator valve on the front of the enclosure to the 'ON' position. Remove the key to prevent accidental isolation.
- Turn the regulator adjuster very slowly clockwise until the required pressure is showing on the pressure gauge mounted in the enclosure front (Refer to GA for values) (While doing this, see also 5.7.1.1).
- Turning the adjuster clockwise increases the set pressure and anticlockwise decreases it. The system is now pressurised.
- Ensure flow to the seal chamber by carefully slackening the final pipe fitting at the seal chamber or cracking the vent valve installed in this line, until a small flow of gas is observed and registers on the flow meters.
- While checking the flow, allow the barrier gas to flow for a few seconds to ensure that any air in the system has been purged. (10-15 seconds max)

NOTE Ensure that this is carried out in a well-ventilated area to avoid the build-up of gas and possible hazard to personnel. While purging the system recheck the pressure reading on the pressure gauge (2) and adjust if necessary by repeating above steps. With the pressure correctly set push the regulator adjuster upwards until it locks.

- Retighten the pipe fitting (or close the vent if fitted) and close the enclosure front securing it using the latch key,

- At this point the barrier gas pressure is established and the process pressure can now be applied.
- Monitor the panel over the first few hours of operation and adjust the operating pressure if required.

5.7.1.1 The Low Pressure Switch (when fitted) should be set at approximately 1 bar (15 psi) below the normal operating pressure. This setting can be checked in conjunction with the system pressure gauge.

5.7.1.2 The High Flow Switch (when fitted) is factory pre-set at 5 normal liters per minute (1.1 normal gallons per minute) and cannot be adjusted. Functionality can be checked in conjunction with the system flow meter, noting that the flow meter measures in volumetric flow rather than gas flow, so the alarm point may not trigger at exactly 5 liters per minute / 1.1 gallons per minute.

5.7.2 Leak check

During transit, tube fittings may work loose, check all fittings / connections for tightness. With the system pressurized using a suitable leak testing liquid, check all joints and if necessary rectify any leaks found.

6 Commissioning and Decommissioning

6.1 Commissioning

Before starting the machine (pump or mixer) carry out the following operations:

ATTENTION Before commencing the start-up procedure, review and become familiar with all the available instructions concerning the equipment, especially the safety warnings.

- Ensure that the pressure setpoint of the 9280 Gas Box matches the required setpoint for the mechanical seal (typically 2 bar g/ 30 psi g greater than the process pressure) by adjusting the regulator valve until the correct pressure is shown on the pressure gauge, and that the regulator adjuster is pushed in to 'lock' it in position.
- Ensure the system is purged of air by cracking open the vent connection (if fitted) or by carefully cracking open the fitting at the seal and allowing barrier gas to escape. After 10-15 seconds flow retighten the vent / fitting.
- Recheck the operating pressure on the pressure gauge and fine tune if necessary.
- If fitted, check that the pressure switch and or flow switch set points are correctly adjusted to suit the duty.
- Check that all electrical instruments are correctly connected and in compliance with the area classification.

This should be carried out by a qualified electrician.



Before start-up, ensure that all personnel and assembly equipment have been moved to a safe distance and that any safety guards are refitted.

- Start the machine
- During initial start-up it is recommended that the gas pressure and flow is regularly monitored for correct operation. Fine tune pressure setting if necessary.

6.2 Normal running

The equipment shall be kept clean and free from debris to allow ease of access and reading of instrumentation.

Care should be taken to prevent damage to the system from accidental knocks and/or exposure excessive sources of heat. Disconnection of any part of the system should not be undertaken without appropriate authorization and until all pressure has been completely discharged and system allowed to cool. All joints broken for maintenance should be plugged off to prevent ingress of dirt.

During normal operation the only attention required is to monitor the pressure setpoint and barrier gas flow.

Periodic visual checking (at least every 48 hours) of the pressure and flow within the system is recommended. If the consumption rate of the barrier gas is low, this can result in a phenomenon where the check valve closes fully and does not open again until the pressure difference across the valve exceeds its cracking pressure. This results in sudden increases in flow when the valve opens, and the zero flow once it closes again, which will appear as pulsations in the flow indicator. This is normal and does not indicate a failure mode for the equipment. If the pulsations are large enough to trigger high flow alarms, the high flow alarm value may need to be raised to avoid nuisance alarms.

6.3 Decommissioning



Work on the Gas Box or seal must only be carried out when the machine is stationary, and secured against any unforeseen start-up. Isolation from connections to pressurisation sources, vent or flare systems must be carried out.

Before carrying out any work, the gas box barrier gas must be fully de-pressurised and vented. To do this, using the lock key. Switch the isolator valve on the enclosure front to the 'OFF' position. This will vent all barrier gas from the panel. Ensure that the pressure indicated on the pressure gauge drops to zero. Once this has been done the barrier gas supply to the 9280 Gas Box control panel can be isolated.

Do not isolate the barrier gas supply before rotating equipment is made safe.

Once the barrier supply is isolated carefully vent any residual pressure from the panel and interconnecting pipework and drain off any liquids before carrying out any maintenance. If the rotating equipment / panel is to be removed cover any open tubing fittings / connections to prevent contamination.



If the equipment has been used on toxic or hazardous fluids, ensure all precautions are taken to avoid personnel hazards such as correct decontamination when draining the system and removal of any remaining dangerous gas. Remember fluid/gas can be trapped during draining.

NOTE

It is recommended that a pressure test be carried out on the system after any repair and before operation on the equipment.

7 Maintenance

7.1 Routine Maintenance

Check the following as part of regular site walk-around checks for trouble-free operation:

- That the connections are leak-free
- Check the condition of the coalescing filter element for contamination (see section 7.2)
- Barrier pressure. Compare with the operating pressure required for the seal.
- Barrier flow. Compare with the normal flow rate observed.
- Condition of alarm signals (see section 7.3).

7.2 Filter Maintenance

It is recommended that the filter is checked after the first month of operation and if no contamination is detected thereafter at 6-month intervals. Contamination and moisture may collect in the filter bowl and must be periodically drained.

7.2.1 Filter Moisture Check

- Open the enclosure front using the latch key (D). The element can then be viewed through the indicator window on the side of the filter bowl without the need for removal.
- The filter is supplied with an auto drain so no condensate should be observed.
- If there is a condensate build up in the filter bowl this will be visible through the indicator window, and must be drained away. It is important that the process pump is out of operation for this to be carried out.
- Close the enclosure front and lock it using the latch key (D).

7.2.2 Draining the Filter Bowl

- Ensure the process pump is deactivated before draining the filter.
- Open the enclosure front using the latch key (D). The element can then be viewed through the indicator window on the side of the filter bowl without the need for removal.
- Using the lock key, turn the supply isolator valve to the 'OFF' position, this will automatically depressurize the enclosure pipework causing the filter drain valve to open. Any condensate in the filter bowl will then drain away through the drain outlet.
- Check that moisture has fully drained by looking through the sight glass on the side of the filter bowl.
- Close the enclosure front and lock it closed using the latch key (D).
- Using the lock key, turn the supply isolator valve to the 'ON' position
- The process pump can now be restarted, following the procedure in section 6.1.

7.2.3 Filter Clogging

- If the filter element shows signs of clogging it must be replaced.
- Ensure the process pump is deactivated.
- Open the enclosure front using the latch key (D)
- Using the lock key, turn the supply isolator valve to the 'OFF' position, this will automatically depressurize the enclosure pipework
- The filter bowl can now be removed, after disconnecting the drain tube, by unscrewing it from the filter head.

- Remove the element and fit a replacement.
- Reassemble the filter in the reverse order.
- Close the enclosure front and lock it closed using the latch key (D).
- Using the lock key, turn the supply isolator valve to the 'ON' position
- The process pump can now be restarted, following the procedure in section 6.1.

Irrespective of visual condition it is recommended that the filter element is replaced annually.

7.3 Indicators and alarms

The instrumentation on the system has the specific purpose of signalling a deterioration in the seal condition or malfunction of the mechanical seals. A sudden or noticeably steady increase in the gas consumption should be considered abnormal and may indicate a deteriorating seal. Possible alarm signals are indicated as shown in Table A below.

John Crane must be consulted in the event of any abnormal malfunction of the Gas Box.

High Flow indication / alarm

A pair of flow indicators are provided to give an indication of a high gas flow, if the flow rate is high enough to be measured on the high flow indicator, this indicates that there is a significant problem and it should be investigated immediately. A high flow switch can be provided to give a signal / alarm as to the onset of a high flow. A high flow alarm / signal should be investigated immediately.

Low Pressure signal / alarm

A pressure gauge is provided to give an indication of a drop of gas pressure, which would be caused by a drop in the supply pressure, or by severe damage to the seal or supply pipework causing a loss of pressure. A pressure switch can be provided to give a signal / alarm as to the onset of falling supply pressure. A low pressure alarm / signal should be investigated immediately.

TABLE A. POSSIBLE ALARM SIGNALS INDICATING A MALFUNCTION

Effect	Instrument	Action	Cause
Falling Pressure	Pressure Gauge	A	E to H
Low Pressure Alarm	Low Pressure Switch	B	E to H
Falling Flow	High Flow Indicator or Low Flow Indicator	C	G or H
Rising Flow	High Flow Indicator or Low Flow Indicator	A	E or F
High Flow Visible on High Flow Indicator	High Flow Indicator	B	E or F
Pulsations in the Flow	Low Flow Indicator	D	I
High Flow Alarm	High Flow Switch	E	E, F or I

Actions	
A	Investigate cause and monitor to ensure values do not breach safe limits.
B	Shut down machine to prevent damage or loss of containment. Investigate condition of seal before restarting the equipment.
C	Check coalescing filter and gas supply.
D	No Action Required.

Causes	
E	Excessive gas consumption across the inboard seal or outboard seal, indicating likely seal damage.
F	Pipe work/joint failure causing loss of barrier gas to atmosphere.
G	Drop in the barrier gas supply pressure/flow.
H	Blockage of the coalescing filter.
I	Actuation of the check valve – see Section 6.2



9280 GAS BOX

BARRIER GAS SYSTEM

The signal from the pressure, or high flow switch can be used either:

- LOCALLY (with a Klaxon and/or beacon)
- REMOTELY (in the control room)

On critical items the alarm signal could be utilized as a trip function for the plant machinery.

Consult the specific instrument manufacturers manual should there be a malfunction.

7.4 Instrument maintenance

All instruments require regular calibration, following local processes and regulations. See the suppliers instruction manual for any additional instructions for maintenance of electrical instruments.

7.5 Spare Parts

Spare parts must conform to the established technical specifications of the manufacturer.

This is guaranteed with John Crane spare parts. You are advised to stock the most important wear parts on site. The following data is necessary for spare part orders:

- John Crane code/part number
- John Crane order/ref no.
- Part description
- Quantity

Refer to general arrangement drawings for part numbers.

7.6 Annual maintenance checks

Disconnect shall be made by plant person in charge of authorization.

Before any maintenance operation the system, the machine must be stopped and depressurized, then the barrier gas pressure must be fully discharged, and the equipment allowed to cool to ambient temperature. A suitable container should be available to contain any liquid drained from the barrier system.

Any parts requiring maintenance must be thoroughly decontaminated prior to any work commencing.

All joints should be checked for tightness and signs of barrier gas leakage. If present, all flange joints should be checked for tightness and, if necessary, gaskets changed using replacements available from John Crane.

It is recommended to change the coalescing filter element annually (see section 7.2)

8 Accompanying Documents

G.A. Drawing:

Wiring Diagram:

Manufacturer's IOM's:

Pressure Switch (if fitted)

Coalescing Filter

Pressure Regulator

Flow Switch (if fitted)

Flow Indicator

