

Instruction Manual

GXS Nitrogen Flow Switch Kit

Description	Item Number
Nitrogen Flow Switch	A50633000
Nitrogen Flow Switch - High Flow	A50634000

Original Instructions



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For return of equipment, complete the HS Forms at the end of this manual.

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1 Introduction

1.1 Scope and definitions

This manual provides installation, operation and maintenance instructions for the Edwards GXS Dry Pumping System Nitrogen Flow Switch, abbreviated to Flow Switch in the remainder of this manual. Use the Flow Switch as specified in this manual. Use this manual in conjunction with the GXS pump manual.

Read this manual before you install and operate the Flow Switch. Important safety information is highlighted as WARNING and CAUTION instructions; you must obey these instructions. The use of WARNINGS and CAUTIONS is defined below.



WARNING

Warnings are given where failure to observe the instruction could result in injury or death to people.

CAUTION

Cautions are given where failure to observe the instruction could result in damage to the equipment, associated equipment and process.

The abbreviation slm used in this manual refers to a standard litre per minute, i.e. a flow of one litre per minute under standard conditions of 1 atm pressure at 0°C.

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1.2 Product description



WARNING

This flow switch is designed for use with nitrogen purge gas. However, as an alternative, CDA (Compressed Dry Air) can be used. It is the user's responsibility to ensure the selected purge gas is compatible and safe to use with their process.



WARNING

The Flow Switch is not considered a high integrity safety device by Edwards. For processes where high dilution flows are required to maintain safety, an appropriate device should be fitted.

The Flow Switch is designed to be externally fitted to an Edwards GXS dry pumping system and connected internally to the gas module loom.

When installed, the Flow Switch enables the system to monitor the flow of nitrogen purge gas to the dry pumping system, and to indicate a no-flow condition.

The flow switch is normally open. The presence of a flow of gas, above an adjustable set point, closes the switch. The actual flow at the switching point depends on the gas supply pressure. For these reasons, the Flow Switch is suitable for indicating that there is no nitrogen purge flow to the pump system, but it is not suitable for detecting an abnormally low purge flow.

The flow switch is intended to be used in combination with Edwards supplied flowmeter only. If a flowmeter is not fitted use either flow monitor 0-60 SLM (A60027043) or flow monitor 0-200 SLM (A60027044) before installing the flow switch.

1.3 Construction

Refer to Figure 1.

The Flow Switch kit is comprised of:

- Flow Switch assembly.
- Bracket.
- Pipe.
- Y cable.

2 Technical data

2.1 Technical data

Mass	1.5 kg
Switching voltage	24 V d.c.
Contact rating	50 W(DC)
Maximum switching current	1.0 A(DC)
Accuracy	± 1%
Ambient operating temperature range	5 to 40° C
Maximum ambient operating humidity	90% RH (non condensing)
Maximum working pressure	6.9 bar (100 psig)
Electrical connector type	Molex 6W Micro Fit 3.0 Connector

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3 Installation

3.1 Safety



WARNING

Obey the safety instructions given below and take note of appropriate precautions. Failure to do so can cause injury to personnel and/or damage to equipment.



WARNING

This flow switch must not be installed as a safety device. Refer to [Section 1.2](#) for further information.

- A suitably trained and supervised technician must install the Flow Switch.
- Purge and shut down the dry pumping system and disconnect the nitrogen supply before you start installation.
- Disconnect the dry pumping system and the other components in the process system from the electrical supply so that they cannot be operated accidentally.
- If the dry pump system is operating, shut it down and allow it to cool to a safe temperature before you start installation.
- Do not allow debris to get into the Flow Switch system during installation.
- Strong magnetic fields may affect the operation of the Flow Switch. Do not locate equipment which generates strong magnetic fields close to the Flow Switch and do not route electrical supply cables close to the Flow Switch.
- Leak test the system after installation is complete and seal any leaks found to prevent further leakage. Leakage rate must be less than 1×10^{-5} mbar ls^{-1} .
- Ensure that you connect, disconnect and tighten all tube connection components correctly (Refer to [Figure A1](#) and [A2](#)).
- Obey all national and local rules and safety regulations when you install the Flow Switch.

3.2 Unpack and inspect

Remove all packing materials and protective covers and inspect the Flow Switch. If it is damaged, notify your supplier and the carrier in writing within three days; state the Item Number of the Flow Switch together with your order number and your supplier's invoice number. Retain all packing materials for inspection. Do not use the Flow Switch if it is damaged.

If the Flow Switch is not to be used immediately, refit any protective packaging and store the Flow Switch in suitable conditions, as described in [Section 5.1](#).

Check that your package contains the items listed in [Table 1](#). If any of these items are missing, notify your supplier in writing within three days.

Table 1 - Flow switch parts list

Quantity	Description	Check (✓)
1	Pipe	<input type="checkbox"/>
2	Male connector	<input type="checkbox"/>
2	6-32 UNC x 3/8 inch screw	<input type="checkbox"/>
2	M4 flat washer	<input type="checkbox"/>
2	M4 single coil washer	<input type="checkbox"/>
1	Flow Switch and bracket	<input type="checkbox"/>
1	Label	<input type="checkbox"/>
1	Isolation plate	<input type="checkbox"/>
1	Y cable	<input type="checkbox"/>

3.3 Install the flow switch

Install the Flow Switch as shown in [Figure 1](#).

Take note of the following points before starting installation:

- Do not commence installation with the electrical power on.
- Refer to instructions in [Appendix A1](#) for assembly of all compression type fittings.

Refer to [Figure 1](#) for the flow switch assembly components.

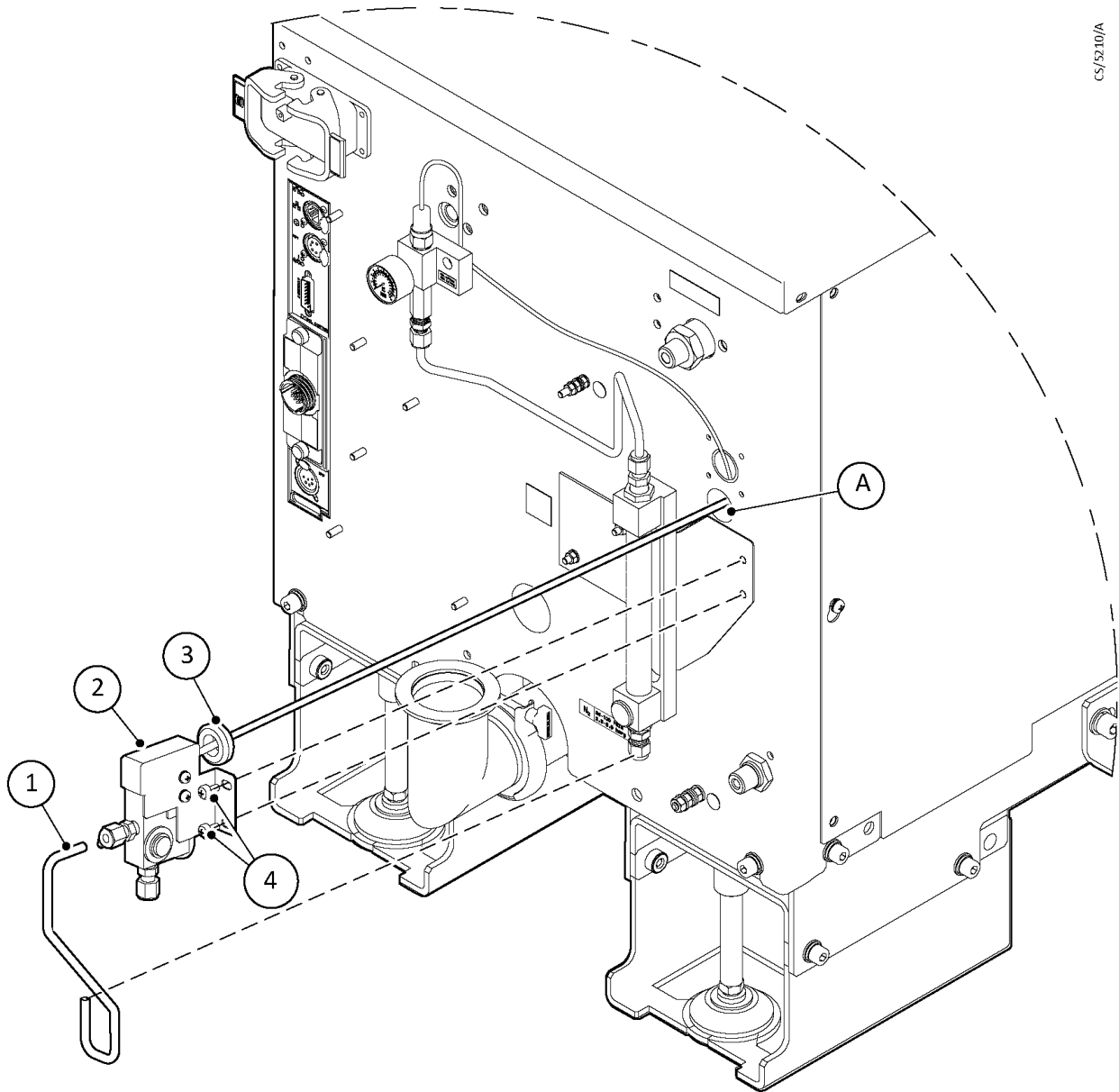
- Check for electrical continuity in the electrical line from the Flow Switch back to the gas module loom.
- Leak check the installation. Leakage rate must be less than 1×10^{-5} mbar ls⁻¹
- For electrical connection, refer to [Figure 2](#).

Using the PDT, configure the pump set-up to show the switch as fitted.

- Setup> scroll to 'Fit Accessory'> enter password (538)
- Scroll to 'N2 flow sensor'> select FITTED> Enter.

Confirm operation of switch by reducing purge flow to ensure warning ('Warning 34.01 N2 purge low') is displayed on PDT.

Figure 1 - Flow switch kit general arrangement

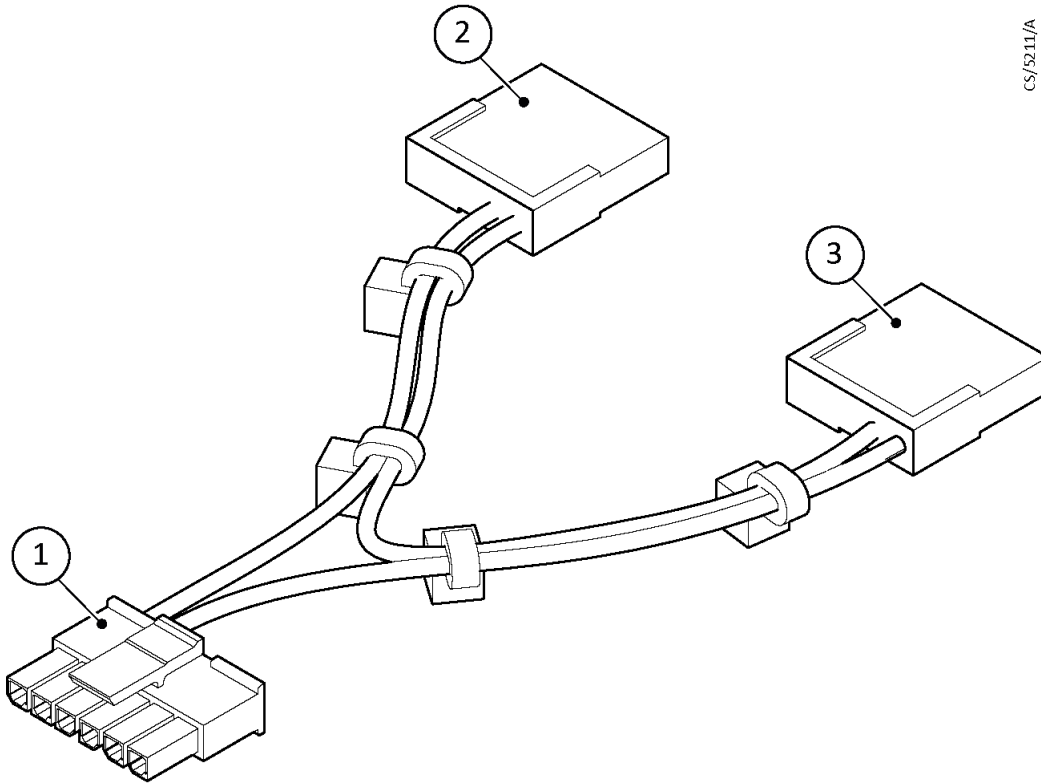


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Item No.	Description	Qty
1	N2 Flow Switch to Rotameter Pipe	1
2	N2 Flow Switch Assy	1
3	Open Grommet	1
4	M5 Securing Screws	2

A - Molex plug and cable to be fed through the bulkhead at location A and the open grommet secured into bulkhead. The pressure switch cable may already be in the same hole, if so, the grommet can be removed and both cables use the same hole. The connector and cable should be fed along the rear of the bulkhead and connected into the 6 way socket on the supplied Y cable. Use the second 6 way socket to connect the pressure switch cable and then connect the 6 way plug to the gas module loom. If the pressure switch is not used on the system connect the flow switch cable directly to the gas module loom.

Figure 2 - Flow switch kit electrical connection



3.4 Adjust the flow switch

The Flow Switch must be adjusted so that it operates at the correct nitrogen flow rate for your process. The flow switch output will open when the flow rate of nitrogen into the dry pumping system is too low. The Flow Switch output will reset automatically (that is, close) when the flow rate of purge nitrogen into the dry pumping system is acceptable.

1. Isolate the inlet of the pumping system from your vacuum system.
2. Ensure that there is a normal flow of purge nitrogen into the pumping system: refer to the pumping system instruction manual.
3. Reduce the nitrogen flow until the total purge nitrogen flow rate reaches the minimum flow rate for your process. It is recommended that you reduce the nitrogen supply pressure to below 35 psig to do this.
4. The GXS gas module requires a minimum of 35 psig nitrogen supply pressure for correct flow measurement. If the nitrogen supply pressure falls below 35 psig the gas module will continue to provide flow measurements until the supply pressure is insufficient to enable the gas module flow meter to function correctly. If this happens the flow measurement defaults to zero slm. The actual flow will however continue to fall in proportion to the drop in supply pressure. For this reason it is recommended that an independent flow measurement device is used to measure the flow rate if a flow rate below which the module can measure it being set.
5. Refer to [Figure 1](#). With the nitrogen supply pressure reduced to provide your preferred minimum flow rate use a flat-blade screwdriver to turn the adjuster (14) until the Flow Switch operates.
6. Return the nitrogen supply to normal pressure and flow rate. Check that the Flow Switch has reset correctly.
7. The maximum switching flow of the GXS nitrogen Flow Switch A506-33-000 is 70-80 slm. At flows above this the switch will be continually closed regardless of switch adjustment, provided the supply pressure is above 35 psig.
8. Nitrogen flow switch A506-34-000 is suitable for use at flows up to 204 slm.

4 Maintenance

4.1 General

Carry out the following checks when maintaining the dry pumping system:

- Check that the switch enclosure is securely fitted to the Flow Switch. If necessary, tighten the screws which secure the switch enclosure to the Flow Switch.
- Check that the bracket is securely fitted to the switch enclosure and is correctly located and attached to the accessories mount plate. If necessary, tighten the screws which secure the bracket to the switch enclosure and accessories mount plate.
- Check that the nitrogen fittings are secure. Tighten any loose connections.
- Check that the nitrogen pipes and fittings are not damaged or corroded. Repair or replace any damaged or corroded component.
- Regularly clean the Flow Switch: refer to [Section 4.2](#).

4.2 Clean the flow switch



WARNING

Prevent and ejected matter from entering the eyes. Use of eye protection (face shield, goggles or glasses) is recommended.



A suitably trained technician must clean the Flow Switch.

1. Remove the Flow Switch assembly.
2. Refer to [Figure 1](#). Undo and remove the plug (5).
3. Use a small magnet to remove the piston from the Flow Switch; take note of the orientation of the piston as you remove it.
4. Turn on the nitrogen supply to flush any dust from the Flow Switch, then turn off the nitrogen supply.
5. Thoroughly clean the piston; if necessary, use a suitable cleaning solution.
6. Refit the piston in the Flow Switch: ensure that the piston is in the same orientation as noted in [Step 3](#).
7. Check and clean the O-ring which seals the plug. Slide the O-ring over the thread on the plug.
8. Refit and tighten the plug (5).
9. Refit the Flow Switch then leak check the Flow Switch on completion of installation. Leakage rate must be less than 1×10^{-5} mbar ls⁻¹.

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5 Storage and disposal

5.1 Storage

If the Flow Switch is not used immediately, refit any protective packaging and store in cool, dry conditions until required. When required for use, install the kit as described in [Section 3.3](#).

5.2 Disposal

Dispose of the Flow Switch and any components in accordance with all local and national safety and environmental requirements.

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Appendix A1 Tube fittings

A1.1 Correct use of tube fittings

Note: *It is recommended that a second spanner is used to hold the connector in position when connecting or disconnecting a tube fitting.*

You must know how to correctly fit and tighten tube fittings in order to prevent gas leaks; use the procedures in the following sections.

A1.1.1 Connect a tube fitting

1. Refer to [Figure A1](#) detail A. Undo and remove the nut (4) from the tube fitting (1). Ensure that the front (tapered) ferrule (2) and the rear ferrule (3) are correctly oriented as shown in detail A, then loosely refit the nut (4) to the tube fitting (1).
2. Refer to detail B. Insert the tube (5) through the nut (4) and into the tube fitting (1). Ensure that the tube rests firmly on the shoulder inside the fitting, and that the nut (4) is finger tight.
3. Tighten the nut (4) until you cannot rotate the tube (5). If the tube cannot be turned because of the way it is installed, tighten the nut by 1/8 th of a turn.
4. Refer to detail C. Mark the nut (4) at the six o'clock position.
5. Refer to detail D. Hold the body of the connector steady, then turn the nut (4) by 1 ¼ turns (to the nine o'clock position) to fully tighten the connection.

A1.1.2 Reconnect a tube fitting

A tube fitting can be disconnected and reconnected many times whilst still maintaining a correct leak-proof seal. Refer to [Figure A2](#) detail A which shows a tube fitting after it has been disconnected. Use the following procedure to reconnect it:

1. Refer to detail B. Insert the tube (5) with the swaged ferrules (2, 3) into the tube fitting (1), until the front ferrule (2) is fully in the body of the fitting.
2. Refer to detail C. Tighten the nut (4) by hand.
3. Use a wrench or spanner to turn the nut (4) to its original position (an increase in resistance will be felt when the nut is in its original position), then tighten the nut slightly.

Figure A1 - Connect a tube fitting

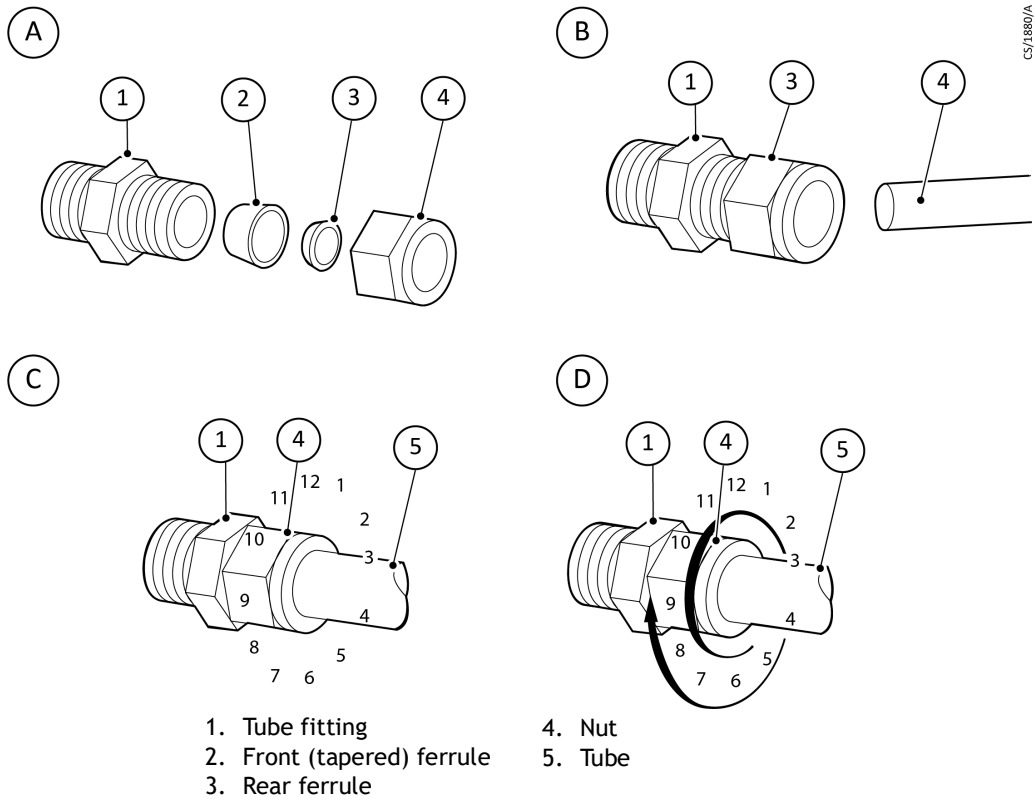


Figure A2 - Reconnect a tube fitting

