

## Instructions

Type VSD Valve Controllers are designed to provide high accuracy feedback of valve position with comprehensive diagnostics, including Partial Stroke Testing (PST). This document, outlines the essential safety information for installing the device, connecting into the device (including connecting the primary solenoid) and the connection to and setting of the independent feedback systems. Additional connections to and operation of the Valve Diagnostic/PST system within the device are covered by document VSD-IOM-001.

### Installation - Mounting

Attach mounting plate (1) to the actuator using fasteners (2) and lockwashers (2a) provided with mounting kit (if supplied by Imtex).

Loosen indicator cover set screw (3) and rotate indicator cover (4) to desired viewing angle. Retighten set screw (3).

Fit VSD assembly to actuator ensuring that the NAMUR coupler (7) engages the shaft of the actuator (9). If a torque coupler (7a) is used instead of the NAMUR Coupler on Non-NAMUR actuators, ensure this is securely fitted to the underside of the controller using the screw, flatwasher and lockwasher supplied (7b/7c/7d) before fitting over the flats on the actuator shaft (9). Secure the assembly using the screws (10) and lockwashers (11) provided with the mounting kit. Eccentricity of the shaft must not exceed 0.25mm. If it should be necessary, re-align controller by loosening mount screws (10). Retighten screws when satisfied with alignment.

Fine tune the indicator cover (4) by loosening set screw (3). Retighten set screw when completed.

### Installation - Wiring and Setting Internally Wired Transmitter and Independent Switches

Once the controller is fitted to the actuator, remove cover (12) by loosening 2 x cover lock screws (13).

Bring field wiring into the enclosure via the conduit entries (14) fitted with a suitable cable gland. Use blanking plugs to block off any un-used cable entries. If wiring in the actuator solenoid(s) or additional components, bring these into the enclosure using conduit entries 14a to facilitate wiring. NOTE: Suitable IP6x rated cable glands, blanking plugs and thread adaptors must be used to maintain controller IP rating. On flameproof enclosures, only ATEX/IECEx certified Exd cable gland, blanking plugs and thread adaptors can be used. Blanking plugs must not be used with a gland adaptor.

Connect wiring to the terminals (15, 15a, 15b) within the enclosure according to the wiring diagram and terminal labelling. Connect earth conductor (which forms part of the supply cable and MUST be at least equal to the size of the phase conductors) to the internal earth points (18). Connect the external earth/equipotential bonding conductor to the controller using the external earth clamp assembly(19). Conductor should be 4mm<sup>2</sup> (min)

The next stage of the installation requires the actuator to be stroked. This can be done in a number of ways depending on the configuration of the controller installed. Document VSD-IOM-001 covers how the actuator might be stroked using the controller. Otherwise, the actuator can be stroked using the solenoid(s) backwired into the controller as operated from the control room, (may require a separate 24VDC power supply to be connected depending on unit supplied).

The internally wired transmitter is factory set to provide feedback for 90 degree rotation - clockwise to close. If required, the internally wired transmitter can be re-programmed. **NOTE: THIS SHOULD ONLY BE DONE IF CONFIDENT THE TRANSMITTER REQUIRES RESETTING BECAUSE IT IS PROVIDING AN INVERTED SIGNAL.** Clear the transmitter (20) programming by pressing and holding buttons 'A' and 'B' for 2 seconds until the LED blinks. Drive the actuator to closed position. Press and hold button 'A' for 2 sec until it blinks. Drive the actuator to open position. Press and hold button 'B' for 2 sec until it blinks.

For controllers fitted with standard cam/spline activated switches/sensors, drive the actuator to the first required indication position and set the bottom switch by lifting and rotating the bottom cam (16). Secure the cam by allowing it to fully re-engage with the spline (17). Repeat the process for each switch in-turn by lifting/pushing down the appropriate cam, rotating and re-engaging as desired position is reached.

For controllers with barrel or slotted sensors, or with a transmitter, consult page 2 of these instructions for 'Further Setting Instructions'.

Once completed, verify that indication is as required by fully stroking the actuator. Then refit cover (12) and secure using the 2 x cover lock screws (13).

### SPECIAL CONDITIONS FOR SAFE USE OF CERTIFIED ENCLOSURES - ATEX / IECEx

Installation should be carried out by suitably trained personnel to an applicable Code of Practice (eg IEC/EN60079-14 & IEC/EN61241-14).

Only suitably IP and Exd certified and temperature rated cable glands, thread adaptors and blanking plugs are permitted for use with ATEX/IECEx flameproof enclosures.

The equipment shall not be subjected to a build up of dust and is to be cleaned regularly to prevent dust build up forming on the enclosure.

Where intrinsically safe components are fitted and are to be used within an Intrinsically Safe Circuit, they MUST be supplied by an ATEX/IECEx approved barrier that is suitable to work with Input Parameters of the respective components

**WARNING** - For units operating at +85°C, cable, cable glands or conductors in conduit shall be rated +100°C (minimum).

**WARNING** - Monitor includes external plastic parts and presents an Electrostatic Hazard: Clean Only with a Damp Cloth.

**WARNING** - Do not install on an external source of heating or cooling e.g. by hot/cold air blowing temperature units

**WARNING** - Locate monitor to prevent propagating brush discharges

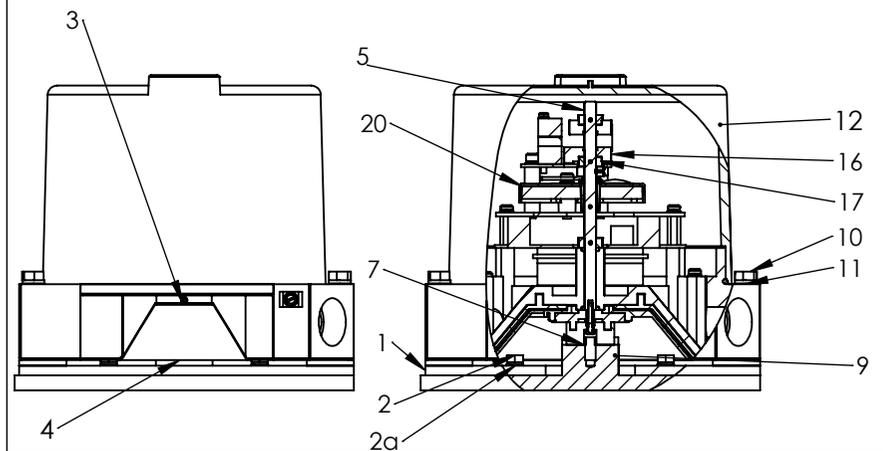
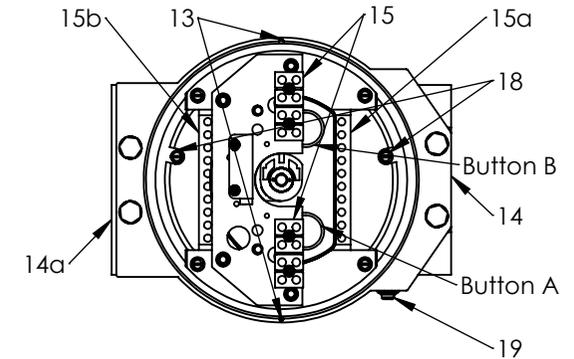
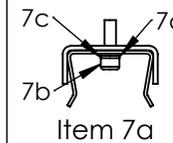
**WARNING** - Monitor should not be opened when energised or an explosive atmosphere may be present. The cover screws (13) must be loosened before opening and re-tightened before the controller re-enters service.

The maximum constructional gap ( $i_c$ ) is less than that required by

Table 1 of IEC 60079-1:2007 clause 5.2.2 as detailed below:

Flamepath - Through Shaft  
Max Gap (mm) - 0.07  
Comment - Cylindrical Spigot Joint

## Reference Diagram



### Additional Instructions for Safe Use

The certification for this monitor relies upon the following materials used in its construction:

- Stainless Steel
- EDPM 70

If the equipment is likely to come into contact with aggressive substances, then it is the responsibility of the user to take suitable precautions that prevent it from being adversely affected, thus ensuring that the type of protection provided by the equipment is not compromised. Aggressive substances might be: acidic liquids or gases that attack Stainless Steel, or direct and prolonged contact with some Hydrocarbons that could affect the seals. Regular checks/inspections should be carried out if aggressive substances are present.

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Installation, Operating & Maintenance

VSD - IECEx/ATEX

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DWG NO.

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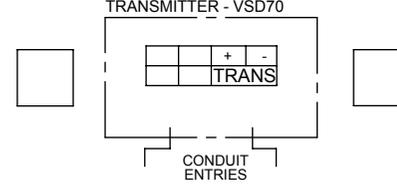
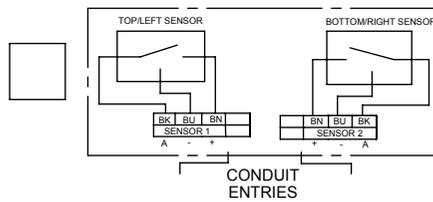
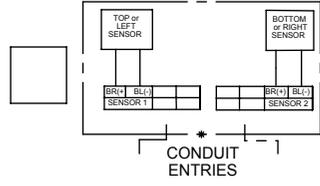
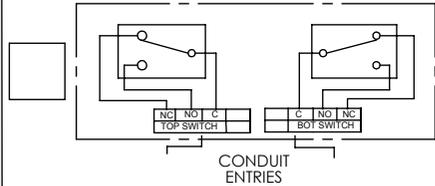
# WIRING DIAGRAMS ('X' Indicates the applicable Diagram)

**CONTROLLER - 2 x SPST/SPDT Switch**  
VSD16, 17, 25 & 40  
For SPST Switch NC contact is not available

**CONTROLLER - 2 x 2-Wire Prox Sensor**  
VSD42, 43

**CONTROLLER - 2 x 3-Wire Prox Sensor**  
VSD42, 43

**CONTROLLER - w/ 2 WIRE TRANSMITTER - VSD70**



VALVE CONTROLLER BOARD - NOTE: TERMINAL 7 MUST BE CONNECTED TO GROUND. ALL OTHER GROUNDS ARE INTERNALLY CONNECTED

TERMINAL	ALLOCATION	TERMINAL	ALLOCATION	TERMINAL	ALLOCATION	TERMINAL	ALLOCATION	TERMINAL	ALLOCATION	TERMINAL	ALLOCATION
1	'+' PASSIVE ANALOGUE INPUT (OPTIONAL)	7	EXTERNAL POWER SUPPLY - GROUND	13	'+' ACTIVE ANALOGUE INPUT 2	27	'+' DIGITAL OUTPUT 1	33	'+' DIGITAL OUTPUT 3	43	'+' DIGITAL INPUT 3
2	'-' PASSIVE ANALOGUE INPUT (OPTIONAL)	8	NOT USED	14	'-' ACTIVE ANALOGUE INPUT 2	28	'-' DIGITAL OUTPUT 1	34	'-' DIGITAL OUTPUT 3	44	'-' DIGITAL INPUT 3
3	'+' PASSIVE ANALOGUE OUTPUT (OPTIONAL)	9	NOT USED	21	EMERGENCY SHUTDOWN INPUT (+)	29	GROUND	39	'+' DIGITAL INPUT 1	39	
4	'-' PASSIVE ANALOGUE OUTPUT (OPTIONAL)	10	NOT USED	22	EMERGENCY SHUTDOWN INPUT (-)	30	'+' DIGITAL OUTPUT 2	40	'-' DIGITAL INPUT 1	40	
5	EXTERNAL, 24VDC POWER SUPPLY (+)	11	'+' ACTIVE ANALOGUE INPUT 1	23	EMERGENCY SHUTDOWN OUTPUT (+)	31	'-' DIGITAL OUTPUT 2	41	'+' DIGITAL INPUT 2	41	
6	EXTERNAL, 24VDC POWER SUPPLY (-)	12	'-' ACTIVE ANALOGUE INPUT 1	24	EMERGENCY SHUTDOWN OUTPUT (-)	32	GROUND	42	'-' DIGITAL INPUT 2	42	

NOTE: Terminal 7 must be connected to Ground. All other Electronic Board grounds are connected internally

NOTE 2: If VSD is fitted to actuator with 2 Solenoids but where only one is backwired into the Controller, Terminals 21 to 24 would be for Power and Connections to the PST Solenoid.

## ELECTRICAL CHARACTERISTICS - NON-I.S. COMPONENTS ('X' Indicates the applicable Rating(s))

## INTRINSICALLY SAFE PARAMETERS

VSD16 - Mechanical w/ Silver Contacts

Electrical Ratings: 10.0A @ 125/250VAC  
0.5A @ 125 VDC  
Temp Range: -40 to +60 °C  
Operating Life: 400,000 Cycles

Not recommended for circuits operating less than 20mA @24VDC

VSD17 - Mechanical w/ Gold Contacts

Electrical Ratings: 1.0A @ 125VAC  
0.5A @ 30 VDC  
Temp Range: -40 to +60 °C  
Operating Life: 100,000 Cycles

Recommended for use in 24VDC computer input circuits

VSD40 (A140077-SU) - SPST(Hermetically Sealed Reed - w/ Choke)

Electrical Ratings: 0.15A @ 125VAC / 30VDC  
Inductance: 680 µH  
Resistance: 10 Ohms  
Temp. Range: -40 to +60°C (T6) or +85 °C (T4)  
Operating Life: 5,000,000 Cycles

VSD25 (A140088) - High Power SPDT(Hermetically Sealed Reed - Tungsten)

Electrical Ratings: Max Current: 3 Amps  
Max Power: 100 Watts/VA  
Min Power: 2 Watts  
Temp. Range: -40 to +60°C (T6) or +85 °C (T4)  
Operating Life: 5,000,000 Cycles  
Not recommended for use in 24VDC operating at <20mA

VSD25 (A140077-SU) - SPDT(Hermetically Sealed Reed)- w/ Choke

Electrical Ratings: 0.15A @ 125VAC / 30VDC  
Inductance: 680 µH  
Resistance: 10 Ohms  
Temp. Range: -40 to +60°C (T6) or +85 °C (T4)  
Operating Life: 5,000,000 Cycles

VSD25 (A140077) - SPDT (Rhodium) Reed Switch

Electrical Ratings: 0.5A (Switching Current)  
1.0A (Steady State Current)  
120V Max (Voltage)  
10W/VA Max (Power)  
Temp. Range: -50 to +60°C (T6) or +85 °C (T4)  
Operating Life: 5,000,000 Cycles

VSD42 - NAMUR Proximity Sensor

Current Ratings: Target Present - Current < 1.0mA  
Target Absent - Current > 3.0mA  
Voltage Range: 5 to 25VDC (nominal 8VDC)  
Temp. Range: -25 to +60°C (T6) or +72 °C (T4)  
Operating Life: Unlimited Cycles

Use with intrinsically safe repeater barrier. Namur sensors fully conform to EN60947-5-6 (VDE0660 Part 212) standard.

VSD70 - Analogue Transmitter - Non-Contact Style

Supply Voltage: 12 to 24VDC  
Load Impedance: R < (U - 9) / 0.02  
Linearity: < 1% of FS  
Repeatability: < 0.36°  
Op Temp Range: -40 to +85 Deg C

BASE BOARD

Supply Voltage: 24VDC  
Max Dissipated Power under Max Load Conditions: 3.57 Watts  
Op Temp Range: -40 to +85 Deg C

See Unit Title Plate

**SPECIAL NOTE:**

**Installation of Reed Switches (without Choke):** Where reed switches (particularly low power, Rhodium contact versions) are installed at the end of long cable runs, it is the responsibility of the installer to ensure suitable precautions are taken to ensure cable capacitance does not induce premature switch failure. Consult Intex for further information

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