

# Maxseal ICO4S & D

## Installation, Operation and Maintenance Instructions

(MI0202 Rev.7 - 10.02.09)

Certificate No. IECEx BAS 04.0016  
 Certificate No. SIRA 00 ATEX 1147  
 Exd Certificate No CSA 1805901 (LR51486)  
 FUNCTIONAL SAFETY Certificate SIRA FSP 04001/01

THE ICO4 SHALL ONLY BE USED IN ACCORDANCE WITH REQUIREMENTS OF THIS DOCUMENT. READ ALL THE INSTRUCTIONS CAREFULLY BEFORE USING THIS PRODUCT.

All users shall be trained in the Exd concept and the health & safety requirements of ATEX directive 137 and work to the relevant code of practice (e.g. en 60079-14 & 17).

Repair and overhaul of this equipment shall be conducted in accordance with the relevant code of practice (e.g. IEC 60079-19).

The certification of this equipment relies upon 316 stainless steel materials used in its construction. 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: e.g. acidic liquids or gases that may attack metals, or solvents that may affect polymeric materials.  
 Suitable precautions: e.g. regular checks as part of routine inspections or establishing from the material's data sheets that it is resistant to specific chemicals.

The ICO4 is designed and certified to meet the requirements of: IEC61508-1:1998 & IEC61508-2:2000 as being suitable for use in safety-related applications up to and including SIL3 & SIL4 where safety operation of the valve is by de-energisation of the solenoid. This manual covers all installation, maintenance and operation requirements for these applications.

DO NOT MODIFY, RECLAIM OR CHANGE ANY COMPONENTS.

### Maxseal sales

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Maxseal products are manufactured by:

### Thompson Valves

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### Marking indicator

MARKING	DESCRIPTION
WARNING DO NOT OPEN WHEN AN EXPLOSIVE ATMOSPHERE IS PRESENT	COVER FORMS PART OF FLAMEPROOF ENCLOSURE AND SHOULD NOT BE REMOVED WHEN AN EXPLOSIVE ATMOSPHERE IS PRESENT
Ex II 2 G Exd IIC	EQUIPMENT RELIES ON FLAMEPROOF PROTECTION AND IS SUITABLE FOR USE IN EX ENVIRONMENTS
T6 Ta (-40 to 60°C)	T-CLASSIFIED EQUIPMENT SHOULD NOT BE EXPOSED TO TEMP OUTSIDE THE SPECIFIED TEMPERATURE RANGES (Ta)
Y123AA1H1BS	WORKING CONDITIONS SHOULD NOT EXCEED THE CAPABILITIES OF COMPONENTS/MATERIALS DETAILED IN THE CONSTRUCTION
WP 0-20BAR	THE RANGE AND MAXIMUM MEDIA PRESSURE RATING
INLET, OUTLET, VENT	PIPEWORK SHOULD BE CONNECTED SUCH THAT IT FUNCTIONS AS PORT MARKINGS
24V DC 4.6W	THE ELECTRICAL SUPPLY LIMITS ARE NOMINAL VOLTAGE +/-10%
Serial No.	FOR YEAR OF MANUFACTURE REFER TO CERTIFICATE OF CONFORMITY
Maximum Internal Rise 31K	THIS INDICATES THE MAX INTERNAL TEMPERATURE RISE. THIS CAN BE USED TO EVALUATE CABLE TEMPERATURE RATING.
COVER BOLTS M6x1 6g Grade A2-70 or 12.9	ICO4D COVER BOLT SPECIFICATION

### Expected duty

The ICO4 should not be used in excess of the expected duty limits as shown below. In special applications that exceed these duty limits, contact Maxseal sales before installing / operating an ICO4.

CONDITIONS	LIMITS
FUNCTION	The working temperature and pressure shall not exceed the marked label rating. The valve should not be operated at a speed >6 cycles/min.
ENVIRONMENT	All external conditions shall not exceed IP66. External conditions shall not degrade the Exd enclosure or pressure boundary.
MAINTENANCE PERIOD	5 years or 10,000 cycles. 12 month Max Proof Test Interval. For best practice exercise the valve once per month.
LIFE	20 years or 1million cycles.
MEDIA	Media: Instrument air or hydraulic fluid. Must be clean and free from particulate pollution. An Inlet supply <10µm filter should be fitted.

### Part Number Details

RESET OPERATION	CODE	CODE	SEAT/SEAL MATERIAL
AUTOMATIC	A	H	HIGH NITRILE
PUSH BUTTON MANUAL RESET	P	V	VITON
TAMPERPROOF MANUAL RESET	T	L	LOW TEMP NITRILE / FLUOROSILICONE
AUTOMATIC LATCHING LEVER	B		
JACK SCREW MANUAL OVERRIDE	S		

MEDIA PRESSURE	CODE	CODE	VOLTAGE
0-20 BAR (0.8 Cv)	2	A	18/33 VDC
0-50 BAR (0.6 Cv)	3	C	48/50 VDC
0-207 BAR (0.28 Cv)	6	H	50 VAC
		J	110/115 VAC
		M	220/240 VAC
		R	115 VDC

IC04S	Y1	2	3	A	A1	H	1	B	S
IC04D	Y3								

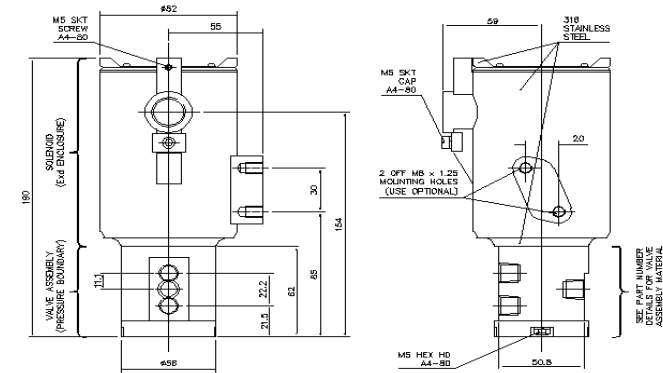
No OF PORTS	CODE	CODE	BODY / TRIM MATERIAL
2/2 E/OPEN	1	S	316 SS / 316 SS
2/2 E/CLOSE	2		
3/2	3		
5/2	5		

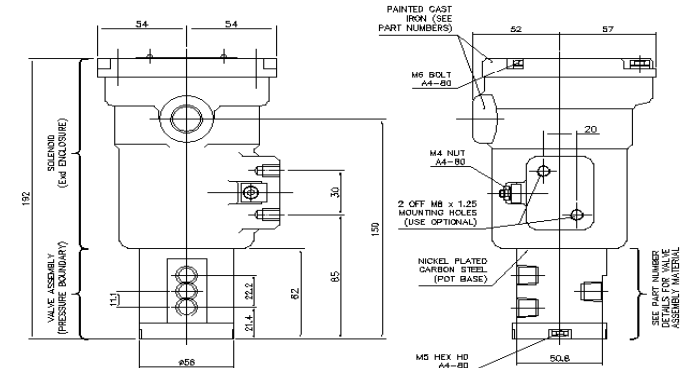
THREAD	CODE	CODE	CONDUIT CONNECTION
1/4"NPT	A1	1	M20 X 1.5 ISO (F)
1/4"BSPP	E1	2	1/2" NPT
1/2"NPT	A3		
1/2"BSPP	E3		

NOTE:  
 IF THE PART NUMBER DIFFERS FROM THE OPTIONS SHOWN AND THE FUNCTION IS UNKNOWN CONTACT MAXSEAL SALES

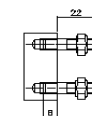
### Construction and Installation Dimensions



ICO4S Standard Variant 1/4" 3/2 Auto 20 bar



ICO4D Standard Variant 1/4" 3/2 Auto 20 bar



NOTE:  
 SCREW SHORTER (8MM) THREADED END OF MOUNTING STUDS (3M79-3J-004) INTO M8 HOLES UNTIL SHOULDER IS FLUSH WITH MOUNTING FACE. FIT M8 FULL NUTS (4V61-6H-007) TO LONGER (16MM) END OF THREAD.

Optional Mounting Stud Fixing Details (Both Variants)

### Description

The ICO4D or S is a flameproof certified solenoid valve used to control a pressurised media (liquid or gas). The standard variant (3/2 1/4" 0-20 bar auto) has the following characteristics.

- Equipment weighs 5kg.
- Valve's typical speed <120ms pull in, <80ms drop out.

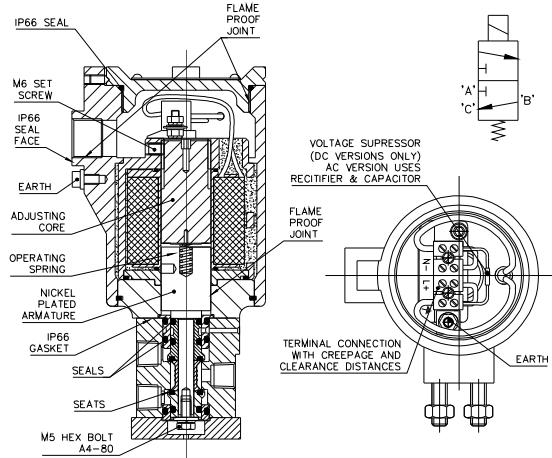
## Storage and Handling

The ICO4 should not be stored in a corrosive environment. All ports should remain sealed and the valve markings made visible. Recommended storage temperature 5 to 25 °C, relative humidity <75%. Storage areas shall not contain ozone producing equipment (eg. welding equipment, mercury vapour lamps). Due attention should be paid to personal protection during handling.

## Operation

All ICO4 solenoid valves consist of an Exd enclosure. In order for the enclosure to provide flameproof protection:

- None of the flameproof joints shall be damaged.
- All flameproof joints with threads shall be fully engaged.



The pressurised media is retained within the valve assembly (pressure boundary) by the mechanical strength of all its metal parts, seats and seals. Degradation of any of these components will cause the valve to leak.

The flow path of the media is altered by moving the spool assembly and engaging / disengaging the seats. The spool assembly can be moved by either:

- Energising the coil to produce an electromotive force.
- Applying a pressure to a piston.
- Applying a mechanical force to a linkage.
- Compressing a mechanical spring.

Restricting the spool movement or allowing the seats to degrade will not allow the flow to be re-directed.

The ICO4 has an IP66 rating. Degradation of the IP66 seals / gaskets / sealing faces or failure to tighten all sealing joints, will allow water to leak inside the enclosure.

For best practice, the valve should ideally be exercised at least once a month.

## Removing an existing valve

### Tools

Electrical 3mm Screw Driver

Allen Keys: 3/16", 2.5mm, 3mm, 4mm, 5mm, and 6mm.

A/F sockets: 8mm, 10mm, and 13mm. 5mm Tommy Bar.

1. Obtain work permit and check area for hazards.
2. Isolate valve from all pipeline and electrical supplies.
3. Loosen M5 locking screw and unscrew cover (ICO4S) or remove M6 cover bolts and cover (ICO4D).
4. Disconnect supply cable and remove.
5. Remove pipe connections from valve assembly.
6. Unscrew M8 mounting nuts (or M8 bolts) and remove the valve.

## Installing a valve

### General requirements

- Pipe work and media must be clean.
- Inlet filters are recommended (e.g. <10 microns).
- Prevent pipe sealant from entering the system.
- Use only correct tools. (i.e. as listed above)
- Do not use valve as a lever.
- Earth equipment to prevent the build up of an electrostatic charge.
- Ensure all interfacing equipment is rated to the expected duty conditions and will not degrade the integrity of the ICO4.

### Mounting

Mount ICO4 using M8 mounting flange. Ensure M8 mounting bolts enter ICO4 mounting flange **TO A MAXIMUM DEPTH OF 8mm**. An ICO4 will function satisfactorily when mounted inclined from the vertical. However for maximum life and efficiency mount vertically. The ICO4 is not designed for use in high vibration applications. Do not invert. Do not mechanically stress the equipment.

### High temperature applications

In applications where the media is > 90°C, a high temperature spacer shall be used. The high temperature spacer provides a thermal barrier between the media and the Exd enclosure. To ensure that the spacer performs its intended function:

- The user shall provide ventilation around the valve assembly, Exd enclosure and spacer.
- The valve assembly, Exd enclosure and spacer shall not be lagged.

Additionally, ensure all associated parts, including cable glands and cabling is fit for rated duty.

### Low temperature applications

Contact Maxseal Sales for special operating conditions.

### Procedure

1. Make connections to the valve ports as required. **DO NOT OVERTIGHTEN**.
2. Loosen M5 locking screw and remove solenoid cover.
3. Install cable using an appropriate certified gland fit for duty.
4. Make terminal connections as labelled. All terminals must be tightened before commissioning.
5. Replace solenoid cover and lock M5 locking screw.

## Maintenance

**It is recommended that all products be returned to Thompson Valves for refurbishment.**

### Spares

Only Maxseal spares kits should be used.

Main valve kit includes all seals, seats and operating spring.

### Lubrication

-20°C to 90°C: Molycote 111 grease

-60°C to 50°C: Molycote 33 medium grease

### Part A. Disassembling a valve

1. Remove manual reset lever retaining clip (if fitted).
2. Remove the Hex Head Bolts at the base of the valve body and remove valve body and armature assembly.
3. Secure armature with a *Tommy bar* and remove Hex Bolt/Nut at the base of the armature.
4. Separate all valve assembly components, noting orientation, sequence and position of parts,

### Part B. Examining a valve's components

Examine and replace all worn or damaged parts.

The flameproof joints will retain their original certified clearances provided they are not damaged.

Replace all seals and operating springs with Maxseal spare parts kit. All seals should be lubricated and have no deformation. All seating and sealing faces should be free from contamination, marks, scratches, etc.

**DO NOT MODIFY OR RECLAIM FLAMEPROOF JOINTS.**

### Part C. Assembling a valve

Smear all seals with recommended grease. Build assemblies in reverse order shown in part A. Torque M5 bolts to 5Nm.

### Part D. Adjusting & testing a valve

1. Loosen M5 locking screw and remove solenoid cover.
2. Make connections to valve ports as per markings.
3. Remove the M5 socket screw on the terminal plate and slide out terminal assembly to reveal core adjuster.
4. Loosen M6 core set screw.
5. Apply air to valve body and energise coil.
6. Screw down core to the point *just before* ports leak.
7. Screw core back a further 1/10 of a turn.
8. Lock M6 core set screw.
9. Ensure valve operates correctly at Nom Voltage  $\pm$  12%

### Part E. Problems

If the ICO4 does not function as intended, do not install valve. Repeat the maintenance procedures Parts A to D. If the problem persists contact Maxseal Sales.

**If you are not sure about any application, maintenance or technical issue, contact Maxseal Sales for advice.**