

ICO4-PST Solenoid Valve

Partial Stroke Testing System



ICO4-PST Solenoid Valve

Key Benefits

- > High performance solenoid valve with integrated Partial Stroke Testing
- > Hydraulic and pneumatic versions available
- > Up to 4.5Cv in pneumatic
- > Compatible with valve closure times from 1.5 to 120 seconds
- > Compatible with QEVs and POVs for very fast closing valves
- > SIL 3 capable, always tests all final elements for best possible PFD
- > PST operates final elements in identical manner to a shutdown
- > Both remote (from DCS) and local (handheld device or control panel) operation



Technical Features

Medium:

Hydraulic and pneumatic – customer to specify and confirm compatibility

Operation:

Direct solenoid operated poppet valves

Mounting Position:

Solenoid vertical

Flow:

0,8 Cv (11,5 Kv) ...
5.0 Cv (72.0 Kv)

Port Size:

1/4 NPT, 1/2 NPT, G1/4,
G1/2 or manifold version

Operating Pressure:

0 ... 20 bar (0 ... 290 psi)
0 ... 50 bar (0 ... 725 psi)
0 ... 207 bar (0 ... 3002 psi)
0 ... 414 bar (0 ... 6004 psi)

Temperature:

Media:

-20 ... +90°C (-4 ... +194°F)

Options to -60°C (-76°F)
available on request.

Ambient:

See table on page 2

Air supply must be dry enough to avoid ice formation at temperatures below +2°C (+35°F)

Materials:

Valve body, trim, coil housing and top cover:

stainless steel 1.4404 (316 L)

Other trim and body

materials available

O-rings seats & seals:

high NBR

Other seal materials available on request

Warning

These products are intended for use in industrial compressed air systems only. Do not use these products where pressures and temperatures can exceed those listed under »**Technical features/data**«.

Before using these products with fluids other than those specified, for non-industrial applications, life-support systems or other applications not within published specifications, consult Thompson Valves Ltd.

Through misuse, age, or malfunction, components used in fluid power systems can fail in various modes. The system designer is warned to consider the failure modes of all component parts used in fluid power systems and to provide adequate safeguards to prevent personal injury or damage to equipment in the event of such failure. System designers must provide a warning to end users in the system instructional manual if protection against a failure mode cannot be adequately provided. System designers and end users are cautioned to review specific warnings found in instruction sheets packed and shipped with these products. For further information please see Functional Safety Manual MI0560.

For further information please contact: imithompson.sales@imi-critical.com

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Technical Data – Standard

Parameter		Pneumatic				Hydraulic
Size		¼"	½"	¾"	1"	1½"
Configuration		3/2	5/2 *	3/2	3/2	3/2
Thread Type *		NPT, BSPP(G)				
Fluid Specification						
Flow Rate	Cv	0.8	0.6	2.1	4.5	0.3
	Kv	11.5	8.6	30	65	4.3
Maximum Operating Pressure	bar	20	12	12	10	300
	PSI	290	174	174	145	4350
Fluid Temperature	°C	-40 ... +60		-40 ... +50		-20 ... +60
	°F	-40 ... 140		-40 ... 122		-4 ... 140
Electrical Specification						
Power Consumption		6W	9W	9W	13W	8W
Current Drain @ 24V		0.25A	0.38A	0.38A	0.52A	0.35A
Available Voltages		24Vdc, 48Vdc, 110/115Vdc, 125Vdc, 120Vac				
Voltage Tolerance	%	±12.5%				
	@24Vdc	21 - 27V				
Trip Signal		De-energise to trip (DTT)				
Analogue Input		4-20mA pass-through with HART 7				
Physical Specification						
Weight	kg	6.5	7.0	6.5	8.5	6.5
	lb	14.3	15.4	14.3	18.7	14.3
Ambient Working Temperature Range	°C	-40 ... +60		-40 ... +50		-20 ... +60
	°F	-40 ... +140		-40 ... +122		-4 ... +140

* Contact Maxseal engineering for details regarding valve manifolds and NAMUR interfaces

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Solenoid Valve Specification



Type	Direct operated poppet
Operation	Auto, Local Manual Reset, Remote Manual Reset
Redundancy Architectures	1oo1, 2oo2 (SIL2), 1oo2, 2oo3 (SIL3)
Mounting Orientation	Vertical or horizontal
All Exposed Metalwork	Stainless steel 1.4404 (316L)
Conduit Connection	1/2" NPT or M20 x 1,5
Insulation Class	Class H
Ingress Protection EN 60529	IP66
Safety Function Trip Position	Normally Open (NO), Normally Closed (NC)
Safety Function Trip Signal	De-energise to trip (DTT)

Certifications

Hazardous Area		
Model Certification Code	ICO4E	
ATEX	Ex db IIC T4/T6	
T6 Ambient Temperature Limit	+43°C, +109°F	
Additional Approvals	InMetro, TR CU, Class 1 Div 2 FM3600 / FM3615 / CSA 22.2	
Functional Safety		
SIL Capability	SIL 2 with HFT=0, SIL 3 with HFT=1	
Operational Mode	Low demand mode	
Device Type	Type A	
Hardware Analysis Method	Prior Use : Route 2H	
Data Sample	> 50-years, 200,000 valves & 2 billion hours	
Confidence Interval	90%	
Certifying Body	SIRA	
Trip Signal	De-energise to trip (DTT)	
Failure Rates (Failures/109 Hrs)	λ_{DD}	5
	λ_{DU}	0
	λ_S	31

Fluid Requirements

Pneumatic	Instrument air supply must be dry enough to avoid ice formation below +2°C (+35°F)
Hydraulic	Suitable for media conforming to NAS 1638 Class 6/ ISO 4406 18/16/13 and Devlon compatible
Seats & Seals †	
Pneumatic	NBR/FMP/ FKM
Hydraulic	Seat - Devlon O-Rings - NBR/FMP/ FKM

† Others available on request

ICO4-PST Solenoid Valve

Option Selector

YV*****S*

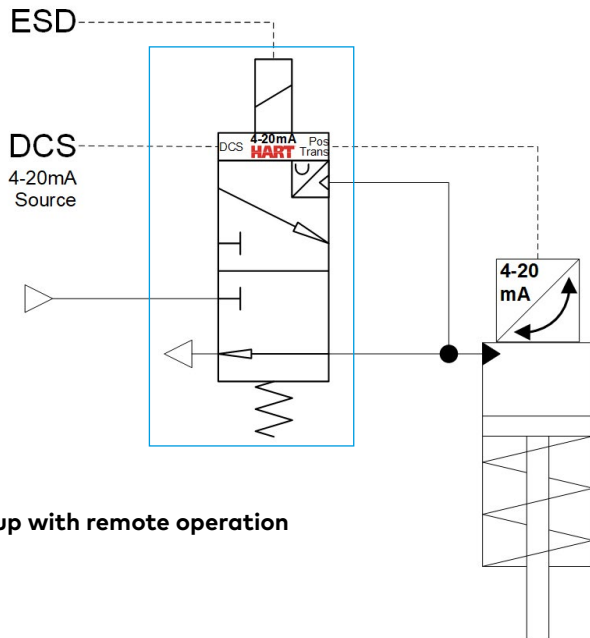
Fluid Type	Max Pressure	Substitute
Pneumatic	10Bar *	1
Hydraulic	300bar	7
Port Config		Substitute
3/2		3
5/2 Pneu 1/4" †		5
Operation		Substitute
Auto Reset		A
Local manual reset		P
Remote manual reset		J
Port Thread Type		Substitute
G (BSPP)		E
NPT		A
RVM 1/4" †		KF
Port Size	Cv	Substitute
1/4" Hyd	0.3 Cv	1
1/4" Pneu	0.8 Cv	1
1/2" Pneu	2.1 Cv	3
3/4" Pneu †	4.5 Cv	5
RVM 1/4" †	0.8 Cv	

Additional Certification		Substitute
InMetro		-INM
Voltage		Substitute
24Vdc		B
48/50Vdc		C
125Vdc		E
110Vac		J
110/115Vdc		R
120Vac		T
Conduit	IS Barrier	Substitute
M20 x 1.5mm	No	1
1/2" NPT	No	2
M20 x 1.5mm	Yes	3
1/2" NPT	Yes	4
Seal Material	Substitute §	
	Pneumatic	Hydraulic †
Nitrile	H	N
Viton	V	W

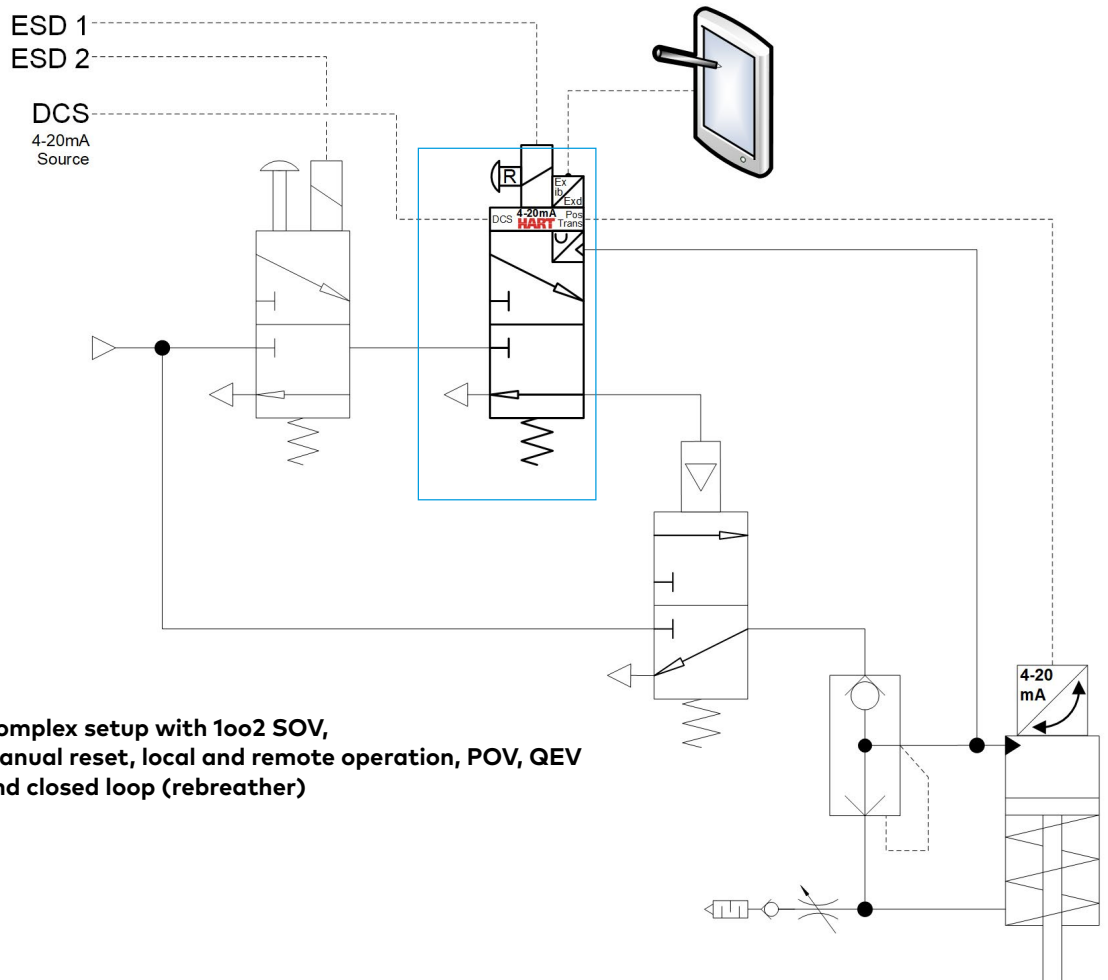
* For 1/4" at 20bar substitute "2"
 † Consult Maxseal engineering for configuration advice
 ‡ Other seals available on request
 § Hydraulic fluid must be Devlon compatible

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Typical Schematics



Basic setup with remote operation

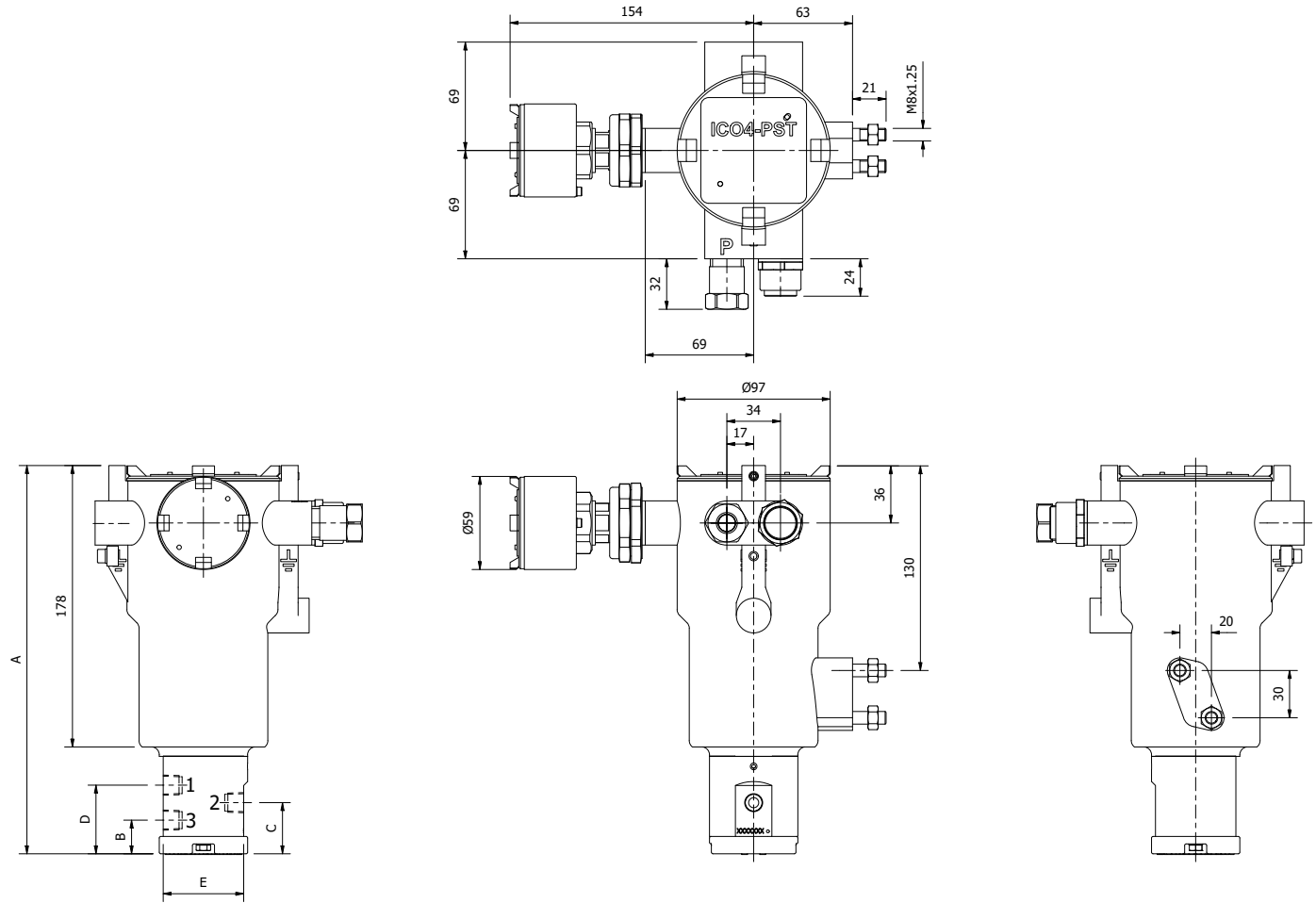


Complex setup with 1oo2 SOV,
Manual reset, local and remote operation, POV, GEV
and closed loop (rebreather)

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Dimensions

Dimensions in mm
Projection/First angle



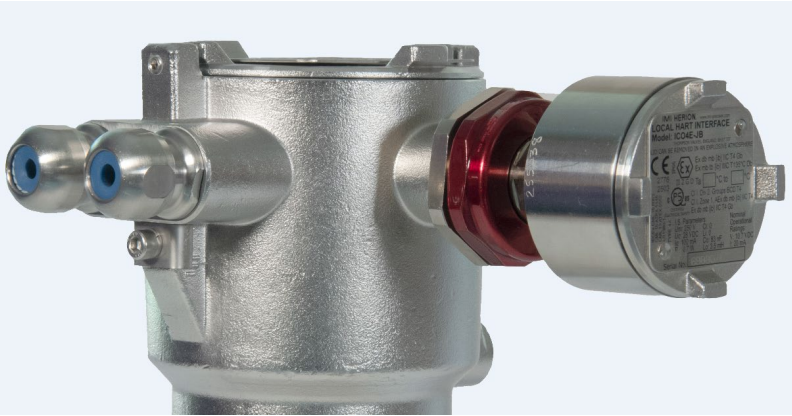
Valve Type		Dimensions (mm)					Port Function *			Weight (kg) †
		A	B	C	D	E	1	2	3	
Pneumatic	1/4"	246	21	32	44	51	In	Out	Ex	7.3
	1/2"	273	18	42	64	64	Ex	Out	In	7.3
	3/4"	292	26	57	86	74	Ex	Out	In	9.3
1/4" Hydraulic		254	25	36	48	51	In	Out	Ex	7.3

* In = Inlet, Out = Outlet, Ex = Exhaust

† Include IS Barrier

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Options



IS Barrier

The ICO4-PST has an optional IS Barrier that provides an Exib connection for HART that can be opened for use without the need for a hot permit. This facilitates easy use of handheld devices such as the 457 communicator, Trex or suitable tablet computers.

Manual reset

A manual reset option provides a facility to manually reset the solenoid valve after an ESD event. After re-energising the ESD signal the operator must press the button to move the valve to the open position. This button can be incorporated into the valve or used in a local junction box.

Local Control Panel

A Local Control Panel (LCP) can be used to initiate a PST and report the result. This can be configured to match the customers requirements and include functions such as:

Functions:

- > Perform ESD
- > Local ESD
- > Manual reset
- > Test lamps
- > Perform solenoid valve test

Indication:

- > Test pass/fail
- > Process valve open/closed
- > Ready to reset solenoid valve

Redundant Valve Manifolds

IMI manufacture Redundant Valve Manifolds that can incorporate the ICO4-PST. These can be configured for 1oo1, 1oo2, 2oo2 & 2oo3 solenoid valve redundant architectures. In addition, this can simplify the supply chain, warranty, and certification and greatly reduce the requirements for installation, commissioning, and servicing. The following components can be included in the manifolds:

- > ICO4-PST
- > Solenoid valves
- > Filter regulator
- > Flow control
- > Check valves
- > Pressure relief valve



Advanced Condition Monitoring

As the ICO4-PST captures data for pressure, position, and time, advanced valve condition monitoring can be performed by exporting this data in to custom designed tools. This permits the monitoring of valve torque parameters, such as Break To Close, over a period of time or against other identical valves. This can greatly help with planned and/or preventative maintenance thus reducing downtime caused by unexpected ESD valve failures.

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