

Interlocking Manifold Solutions

DATASHEET

rev.2

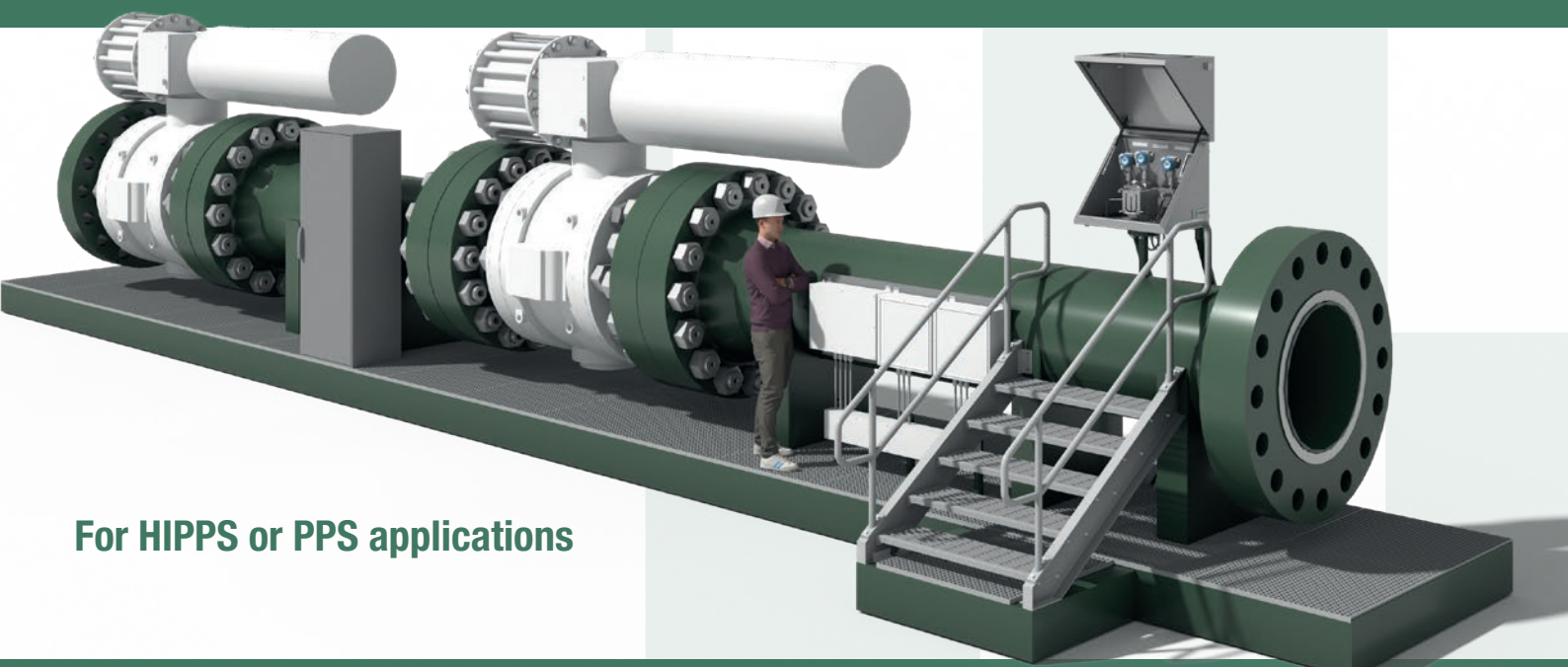
Imperial Interlocking Manifold Solutions

- Interlocking Manifold Solutions for PPS and HIPPS applications (complied to IEC 61508 / IEC 61511)
- Valve design up to 10,000psi (690bar)
- Internal bore 10mm (standard)
- SIL Certified



Basic principles

The Mechanical Interlocking procedure on the manifold solution is providing a maximum safety for the operator due to forced sequence of the (double) block and bleed procedure in maintenance and provides a maximum availability of the process fluids of the piping (emergency safety) system.



For HIPPS or PPS applications

Interlocking Philosophy

Protection against overpressure is normally obtained by means of a cascade of independent layers of defense, such as:

- Pressure control system to maintain the process within its normal operating envelope
- Safeguarding system to maintain the process within the design pressure (DP) limits
- and consequently, maintain system integrity
- Pressure protection by means of a pressure safety relief valve (PSV) or HIPP system, as last layer of defense to maintain the process system within maximum allowable incidental pressure ($MAIP = 1.1 \times DP$). The dynamic response of the safeguarding layer (HPSD) should avoid activation of the last layer of defense (HIPPS). HIPPS shall function independently of any other layer of defense. The combined use of equipment for HIPPS shall not be tolerated.

General information

The installation of a non-relieving high integrity pressure protection system (HIPPS) may be considered to prevent and/or reduce the release of toxic gases or large volumes of non-toxic gas, thereby avoiding or reducing environmental impact. The system may also be used for detecting pipeline rupture.

To prevent operational errors, an interlocking manifold with a foolproof “sliding key” design, is part of the system. This “sliding key” principle will only permit closing and opening of isolating valves and vent valves in a pre-determined safe sequence. This will allow on-line calibration of instruments while preventing any faulty operation and consequently eliminating undesired (nuisance) shutdowns.

Applications

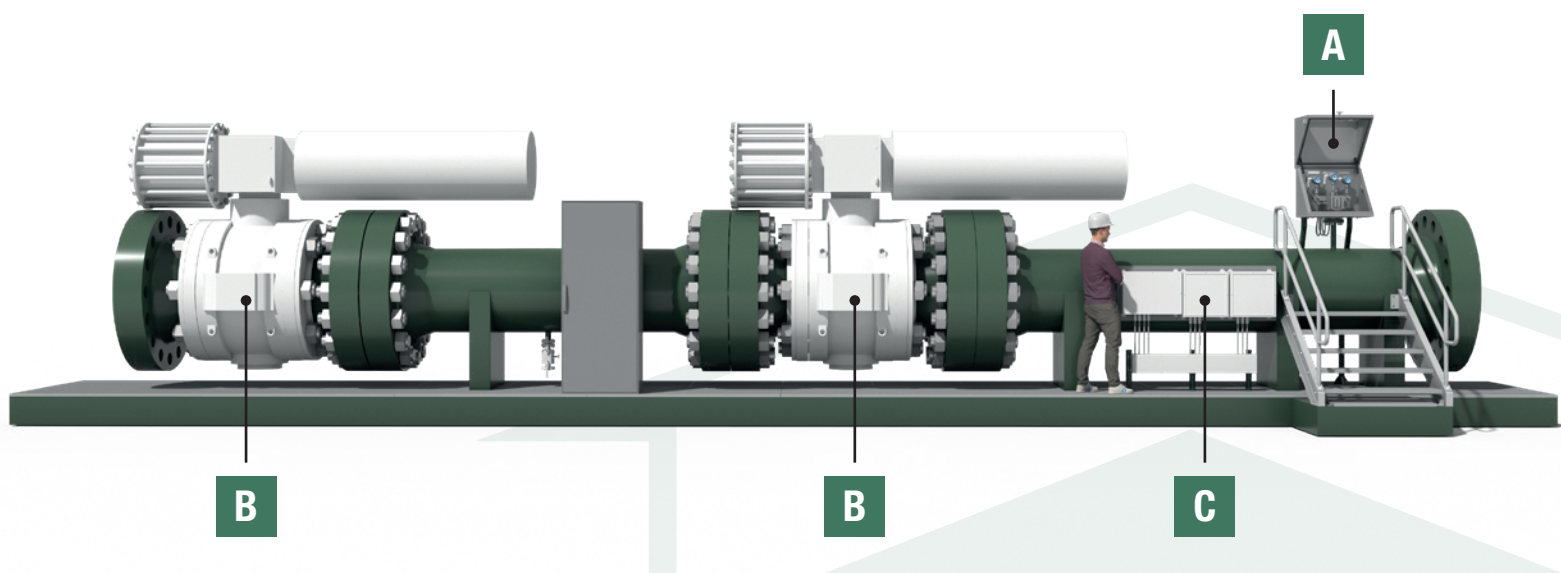
- Pipeline Overpressure Protection Systems
replacing mechanical blow-down valves (PSV's) at both ends of a gas transport line.
- Gas wells, gas treatment plants and underground storage installations
avoiding the necessity for very high, large capacity, flares
- Petrochemical and sour gas processing installations
avoiding large safety release emissions to atmosphere
- Economical spec-break design in process installations and compressor stations
avoiding pressure beyond the most economical design pressure.

The safety loop preparation

The safety loop preparation for interlocking manifolds and pre-assembled housings is a common practice. The process nozzle on which the Interlocking Manifold Solution is being assembled is placed in 12 o'clock upright position on a horizontal process pipe.

The 2" vertical self-draining process pipe will prevent dirt from collecting in the manifold and therefore it will prevent clogging of the manifold. The Interlocking manifold is engineered in such a way to maximize the self-draining of the complete solution

Applications



HIPPS or PPS

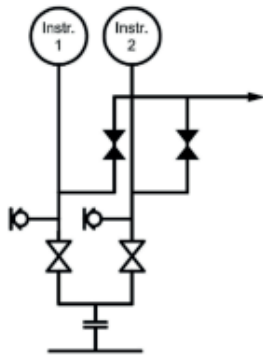
A High Integrity Pressure Protection System (HIPPS) or a Pipeline Protection System (PPS) is designed around the following modules or components, see above mentioned scheme:

- Imperial Valve Interlocking Manifold Solution (A)
- HIPPS Valves or Emergency Shutdown Valves (B)
- Logic solver (C)

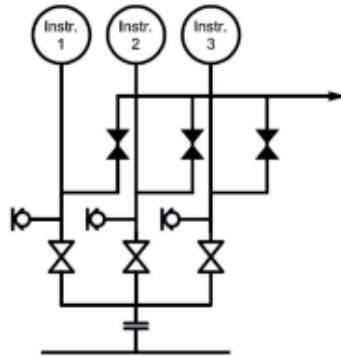
The solutions offered by Imperial Valve consist out of two separate parts:

1. Interlocking manifold (*page no. 7*)
2. Interlocking housing (*see page no. 6*)

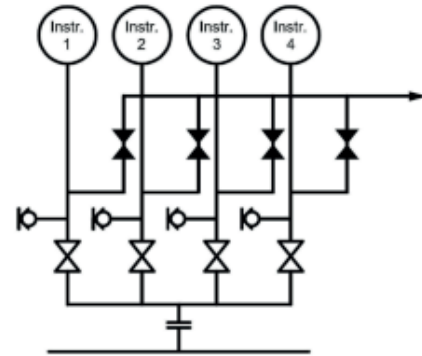
Interlocking functionality



Functionality: 1 out of 2



Functionality: 2 out of 3



Functionality: 1 out of 4

Examples Manifolds



1oo2 voting logic



2oo3 voting logic



1oo4 voting logic

General Imperial Valve Interlocking manifolds consists out of a one-piece body with a 2" flanged connection with a nominal inlet size of DN 50. The large inlet size is being engineered to avoid blockage or clogging of gasses and fluids.

However other options like NPT, BSP, BW, or SW are also available but are not used frequently.

In case of 1 single/common tapping, each transmitter has a separate impulse line which results in the required separate, independent pressure measurement.

Operating an Interlocking manifold

The sliding key arrangement mechanically enables operators to close one isolating valve at a time, thereby isolating one pressure transmitter or pressure switch only. After closing the isolating valve, the key is at a lower level in the slotted plate. It can only be moved to the corresponding vent valve, which is now at the same lower level.

The sliding key system is valid for all types of interlocking manifolds. The valves being on different levels, the sequence of opening and closing the various valves cannot be changed. Operator mistakes cannot be made. The mechanical interlocking system is providing maximum safety for the operator due to sequence of operation as well as maximum availability of client's installation or piping system.

SIL 4 Certification

The SIL certification is currently pending.

The complete operating facility, often called the Interlocking manifold or High Integrity Manifold Block (HIMB) will eventually be tested and examined by qualified NOBO in accordance with the IEC 61508.

The test will result in certification of the Imperial Valve Interlocking with a Probability of Failure on Demand (PFD-value) of:

PFD avg = t.b.a. (pending)

resulting in a Safety Integrity Level

Certified SIL 4

The complete report on SIL 4 certification will be available on request at in due time.

Flow schedules

The flow schedule within the interlocking from process connection to measuring device can differ in various option, herewith the most common:

- Block-bleed-block-test
- Block-block-bleed-test
- Block-bleed-test

How to order a Housing

Housing (H)	
0	No housing required
22	Enclosure PURSI, Blind, (W=400, H= 500, D= 400), IP65
22W	Enclosure PURSI, Safety glass Window, (W=400, H= 500, D= 400), IP65
44	Enclosure PURSI, Blind, (W=700, H= 500, D= 400), IP65
44W	Enclosure PURSI, Safety glass Window, (W=700, H= 500, D= 400), IP65
32	Enclosure AISI 316, Blind, (W=450, H=530, D=500), IP65
32W	Enclosure AISI 316, Safety glass Window (W=450, H=530, D=500) , IP65
36	Enclosure AISI 316, Blind, (W= 700, H=600, D=550), IP65
36W	Enclosure AISI 316, Safety glass Window (W=700, H= 600, D= 550) , IP65
Insulation	
0	No Insulation
INS	Polystyrene insulation
Heater	
0	No heater
CT	1x block heater 250-25 W, Atex, Ex d 230 V/AC, black anodized aluminium on body
CT2	2x block heater 250-25 W, Atex, Ex d 230 V/AC, black anodized aluminium on body
LPA	. x block heater 100-10 W, Atex, Ex d 230 V/AC, black anodized aluminium on adapter(s)
CS	1x block heater 250-25 W, Atex, Ex d 230 V/AC, AISI 316
CS2	2x block heater 250-25 W, Atex, Ex d 230 V/AC, AISI 316
LPS	. x block heater 100-10 W, Atex, Ex d 230 V/AC, AISI 316 on adapter(s)
Thermostat	
0-	No thermostat
T-	Thermostat Atex, Ex d 230 V/AC, setpoint
Low temperature alarm	
0A-	Without low temperature alarm.
1P-	Including Temperature transmitter, PT-100 element probe type
-2P	Including 2x Temperature transmitter, PT-100 element probe type
Junction boxes	
0JB0-	No Junction boxes
1JBG-	1 Junction box polyester Ex i / e / d
2JBG-	2 Junction boxes polyester Ex i / e / d
1JBA-	1 Junction box AISI 316 (L) Ex i / e / d
2JBA-	2 Junction boxes AISI 316 (L) Ex i / e / d
Glands / brand / material	
0	No cable glands
1	Polyamide
2	Cable gland brass nickel plated (standard is CMP, or HAWKE on request)
3	Cable gland brass (standard is CMP, or HAWKE on request)
4	Cable gland stainless steel 316 (standard is CMP, or HAWKE on request)

How to order a Housing

Options	
00	No options
ER	earthrail + Earthstud / pe-rail
DG	Drain plug or Breather GRP
DS	Drain plug or Breather AISI 316
LF	Labyrinth filter (Loufre) set of 2pcs
LL	Lifting Lugs (4x) and Lifting support brackets (2x)
MB	2x 2" mounting brackets on backside of enclosure (300 mm c-to-c)
T	Tagplates including scope DGFG
+MT	Mounting & Testing free issue supplied transmitter (incl assembly & pressure test)
+MTP	Mounting & Testing Purchased instrument by DGF (incl assembly & pressure test)

Example Housing model code : **H-36W-INS-CT2-T-2P-2JBG-2-ER-LF-T+MTP**

Imperial Interlocking Manifold (IMM)	
1	One common test, double block and bleed functionality for two instruments (2oo1) No SIL
2	block-bleed-test functionality for one instrument (1oo1)
22	Unique key lock system to maintain 1oo2 functionality for 2x single tapping manifold
23	Unique key lock system to maintain 2oo3 functionality for 3x single tapping manifold
24	Unique key lock system to maintain 1oo4 functionality for 4x single tapping manifold
3	block-bleed-block-test functionality for one instrument (1oo1)
32	Unique key lock system to maintain 1oo2 functionality for 2x single tapping manifold
33	Unique key lock system to maintain 2oo3 functionality for 3x single tapping manifold
34	Unique key lock system to maintain 1oo4 functionality for 4x single tapping manifold
4	Individual block-bleed-test functionality for two instruments (1oo2)
6	Individual block-bleed-test functionality for three instruments (2oo3)
7	Individual block-bleed-block-test functionality for two instruments (1oo2)
9	Individual block-bleed-block-test functionality for three instruments (2oo3)
12	Individual block-bleed-block-test functionality for four instruments (1oo4)

Transmitter mounting	
I	Flanged outlet IEC 61518 (traditional facing)
B	Flanged outlet IEC 61518 (bottom facing)
F	1/2" NPT Female
M	1/2" NPT Male
x	Integrated flanges (special)

Type of process connection	
A	ASME B16.5
P	API 6B
E	EN 1092-1
N	NPT
x	other....(please specify)

How to order a Housing

Size	ASME B16.5	API 6B	EN 1092-1	NPT
4				1/4-18
8				1/2-14
16	1"		DN25	
32	2"	2-1/16	DN50	

Pressure class	ASME B16.5	API 6B	EN 1092-1	NPT
150	150lbs			
600	300/600lbs			
1500	900/1500lbs			
2500	2500lbs			413 bar / 6000 psi
DIN / EN	Code upon request			
API	Code upon request			

Flange type	
blanc	N/A in case of NPT
RF	Raised face
RTJ	Ring Type Joint

Body code	Body material	Other material	Stem material	O-ring seal	Temp.
S	AISI 316 (L)	AISI 316 (L)	Alloy K500	Silicone rubber	-55/230 C°
D	Duplex, W. Nr. 1.4462	Duplex, W. Nr. 1.4462	Alloy K500	Silicone rubber	-55/230 C°
DM	Duplex 22Cr M650	Duplex 22Cr M650	Duplex 22Cr M650	Silicone rubber	-55/230 C°
SD	SuperDuplex	SuperDuplex	Alloy 625	Silicone rubber	-55/230 C°
HC	Alloy C-276	Alloy C-276	Alloy 625	Silicone rubber	-55/230 C°
I625	Alloy 625	Alloy 625	Alloy 625	Silicone rubber	-55/230 C°
6Mo	254 Smo (EN 1.4547)	254 Smo	Alloy 625	Silicone rubber	-55/230 C°
x	Others on request				

Explosionproof proximity switches on first isolate	
0	No proximity switches required.
L	Ex i Proximity switch for interlocking manifold, NJ2-12GK-SN (M12x1)
D	Ex D Proximity switch for interlocking manifold, AISI 316 (L), SPDT
K	Ex I Proximity switch for interlocking manifold, AISI 316 (L), SPDT

Options	
T1	G1/4 connection for a PT 100 temperature probe element (non-wetted)
T2	2 x G1/4 connection for a PT 100 temperature probe element (non-wetted)
PMB	Mounting bracket for 2" pipe
WMB	mounting bracket for wall mounting

Example Manifold model code : **MM-6-F-A-32-1500-RTJ-S-0-T2**

Inquiries

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Imperial Valve BV is member of:

