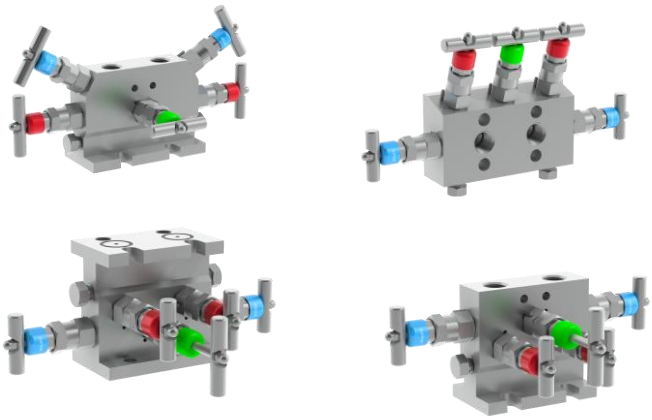
Five valve manifold for differential pressure measuring instruments

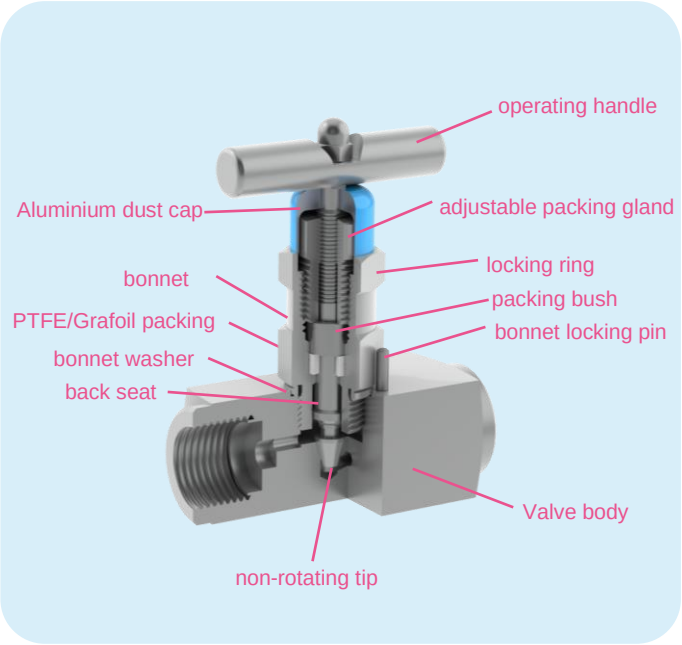


Design description

Badotherm five valve manifold series can be used for isolation, bleeding, calibration and testing of differential pressure instruments. There is a broad variation of configurations BDTM957 manifold has the process connection at the bottom and the flanged instrument connection on the top. All Badotherm manifolds are standard stainless steel and optional available in exotic materials, such as Alloy C276 and Alloy 400. This manifold has a non-rotatable conical tip to ensure perfect alignment for a bubble tight shut-off. Badotherm manifolds are manufactured within the European Union.

Valve assembly

The valves spindle assembly is build up from various parts. All non-wetted parts are made from AISI316(L). All wetted parts are matching the body material. The bonnet is locked with a locking pin to the main valve body. The spindle has a safety back seat that prevents that the spindle can be removed accidently.



Operating handle bar

The operating handle is big enough to operate the manifold under pressure. Optionally the anti-tamper construction is available. Valves that have been cycled for a period of time may have a higher initial actuation torque.

Materials of Construction

Component	Material
Handle bar	AISI 316(L)
Handle locking nut	A2-70
Dust cap	Aluminium
Gland locking nut	AISI 316(L)
Gland	AISI 316(L)
Compression ring	AISI 316(L)
Packing set	PTFE or Graphite
Locking pin	AISI 316(L)
Lubricant	Silvermark / Krytox 8908 (oxygen service)
Purge plug◄	Wetted parts (See selection table)
Bonnet body◄	
Manifold body◄	
Main gasket◄	
Spindle◄	
Spindle tip◄	

◄ are wetted parts

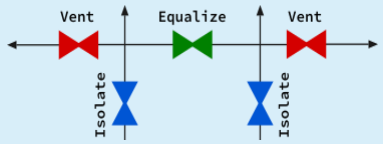
Other materials then mentioned in the selection table are possible. Contact Badotherm for more information and possibilities

Bonnet packing

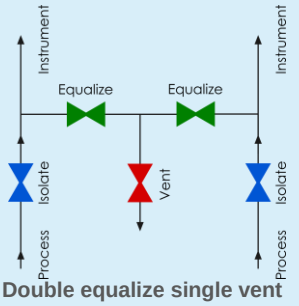
The valve bonnet contains the main packing set. This packing set is PFTE or Graphite material. PTFE Packing set can be used from -40 °C up to 260°C where the Graphite can be used between -40°C up to 538°C. Packing adjustment may be required during the service life of valves.

Flow

The flow direction is marked on the body. The flow symbol on the product is:



Single equalize double vent



Double equalize single vent

Color coding

The spindle of the valve is color coded. The isolation valves are colored with a blue anodized aluminum dust cap marked "ISOLATION". The vent valves are colored with a red anodized aluminum dust cap marked "VENT". The equalizing valve is colored with a green anodized aluminum dust cap marked "EQUALIZING".

Venting

The five valve manifolds are equipped with a ¼" NPT vent port. The vent port is standard blocked with a vent plug in same material as the wetted parts. The vent ports can be used for external draining or the connection of an external pressure source for testing and calibration of the pressure instrument.

Cleaning

The manifolds are all dried and cleaned after testing. For special service such as oxygen service the manifolds are assembled, tested and packed in a special area. The packing of the manifold is in a double plastic sealed bag with a clear label and individual box. This option is only possible in combination with a PTFE packing in the bonnet.

Marking

The marking on the manifolds is containing all relevant information needed for determining the function and material as mentioned in the MSS SP-25. The marking on the body contains the manufacturer, model, threads, traceability information, material designation, operating pressure, functional diagram and flow direction.

Pressure test

All manifolds are tested in the factory according the EN12266-1 (P10, P11, P12) and MSS SP-61. This means that the manifolds have undergone a shell test at ≥1.5x the MWP and a seat test at ≥1.1x the MWP, both at +/- 20°C. More information on test media and process can be found in the general datasheet "pressure testing"

Certification & Declaration of Conformity

A 3.1 Inspection certificate according the EN 10204 is available on the body material.

A 2.1 conformity certificate according EN 10204 can be supplied a a conformation for the pressure test.

Additional certification and testing can be provided on request, such as Positive Material Identification (PMI), NACE compliance certificate and many more.

Standards used

Design Standards

Standard	Description
ASME B16.34	valves - flanged, threaded and welding end
ASME B31.1	power piping
ASME B31.3	process piping
ASME B1.20.1	pipe threads, general purpose
MSS SP-99	valves for measuring instruments
IEC 61518	Mating dimensions between differential pressure (type) measuring instruments

Test Standards

Standard	Description
EN12266-1	pressure tests, test procedures and acceptance criteria for industrial valves
MSS SP-61	pressure testing of valves
ISO 5208	pressure testing of metallic valves with leakage rate A

Marking Standards

Standard	Description
MSS SP-25	Marking on valves

Material Standards

Standard	Description
NACE MR0175/MR0103 ISO 15156	use in H_2S-containing environments in oil and gas production
NORSOK M-630	specification for use in pipelines
ASTM standards	Material specific standards

Certification Standards

Standard	Description
EN 10204	Inspection documents

Pressure – Temperature limits

The manifolds are limited by pressure and temperature based on the materials used and the packing set materials.

Standard execution

Packing material	Pressure vs temperature	
PTFE (High Pressure)	690 bar at 38°C	10.000 psi at 100 °F
PTFE	420 bar at 38 °C	3000 psi at 100 °F
	276 bar at 204 °C	4000 psi at 400 °F
Graphite	420 bar at 38 °C	6000 psi at 100 °F
	209 bar at 538 °C	3000 psi at 1000 °F

ASME B31.1 execution

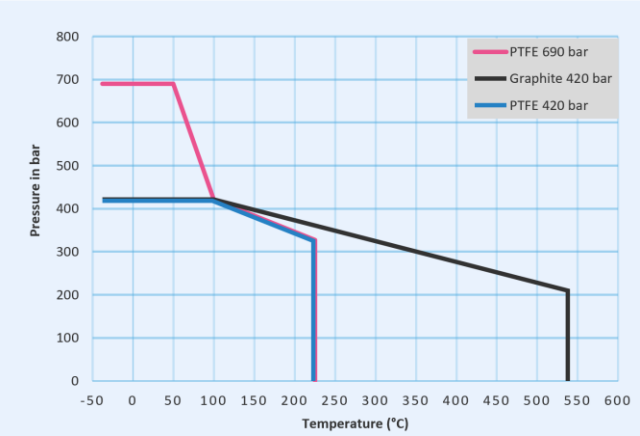
Body material	Pressure vs temperature	
AISI 316/316L	420 bar at 38 °C	6100 psi at 100 °F
	209 bar at 538 °C	3000 psi at 1000 °F
Alloy 400	345 bar at 38 °C	5000 psi at 100 °F
	173 bar at 475 °C	2500 psi at 885 °F
Alloy 276	430 bar at 38 °C	6100 psi at 100 °F
	237 bar at 425 °C	3500 psi at 800 °F

Note: Pressure rating based on cl 2500 ASME B16.34

Cleaned for oxygen purpose execution

Packing material	Pressure vs temperature	
PTFE	420 at 60 °C	6000 psi at 140 °F
	90 bar at 200 °C	1305 psi at 392 °F

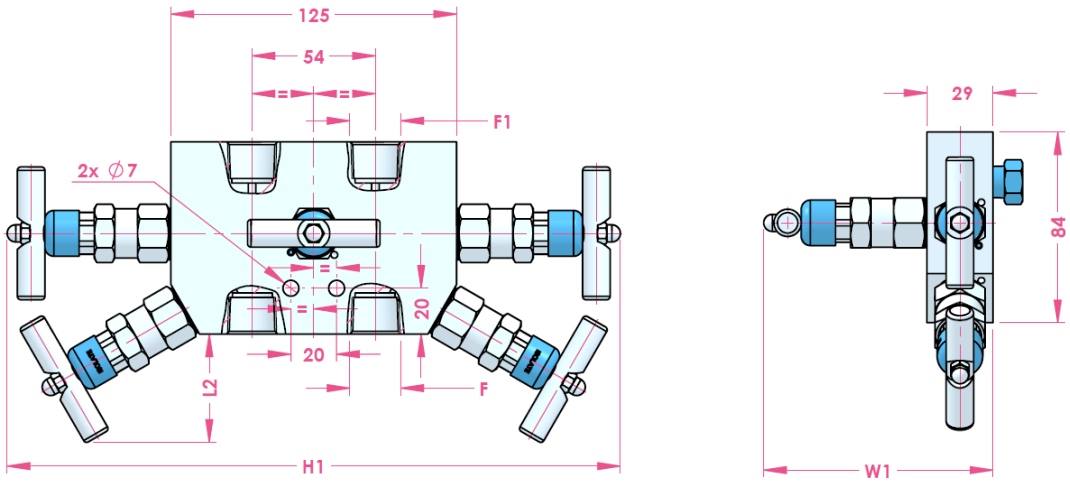
Low temperature limits are -40 °C for both PTFE as graphite gasket



Remote mount series

½" NPT female threaded x ½" NPT female threaded

Model Type 951

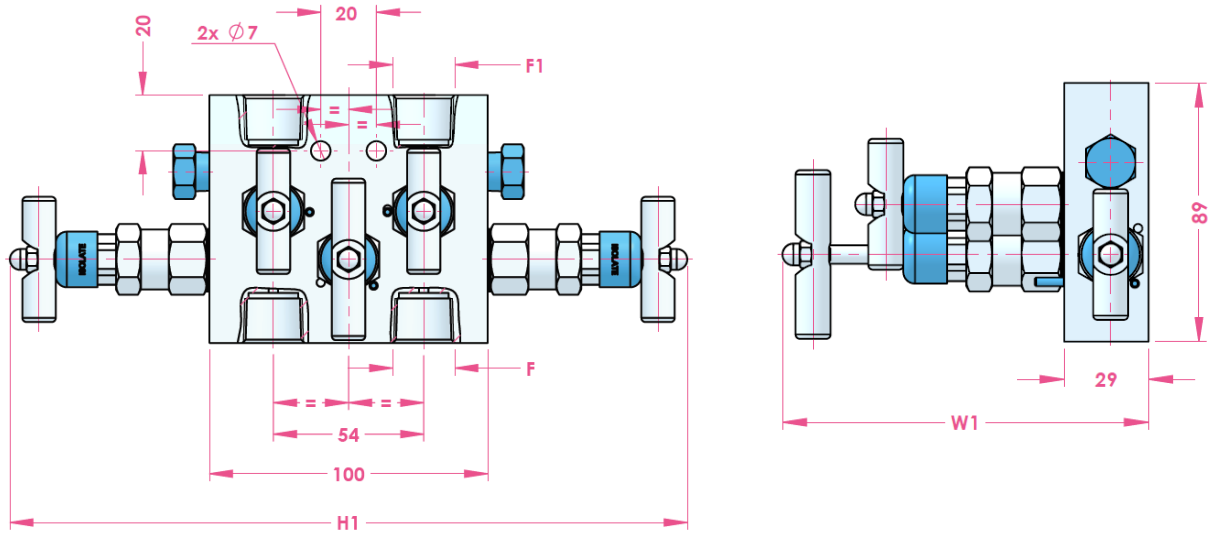


F (process)	F1 (process)	H	L2	H1 (open)	W1 (open)
½" NPT female	½" NPT female	125.0	47.0	240.0	118.0

All dimensions in mm

½" NPT female threaded x ½" NPT female threaded

Model Type 952

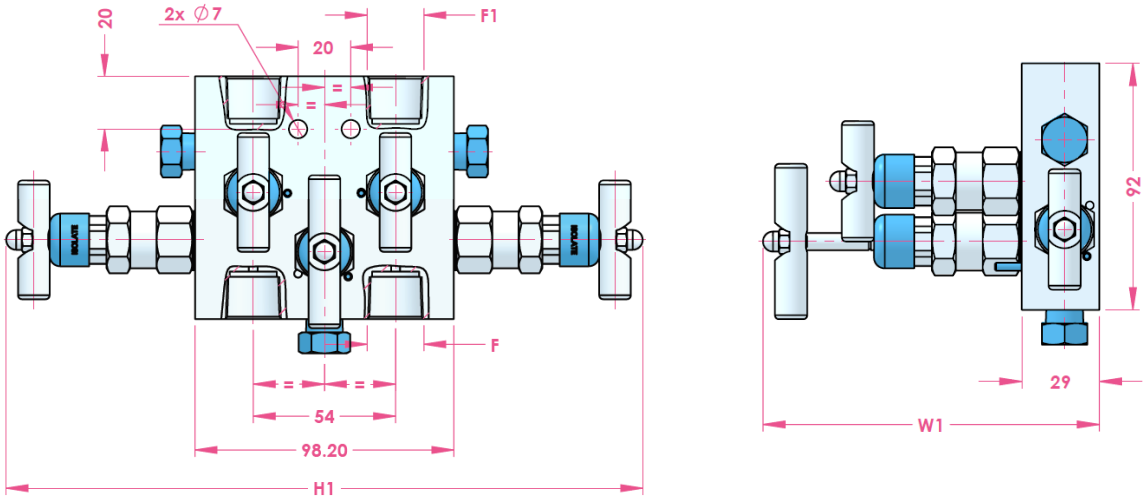


F (process)	F1 (Instrument)	H1 (open)	W1 (open)
½" NPT female		240.0	125.0

All dimensions in mm

½” NPT female threaded x ½” NPT female threaded

Double isolate valve and one vent valve and two equalize.
Model Type 954

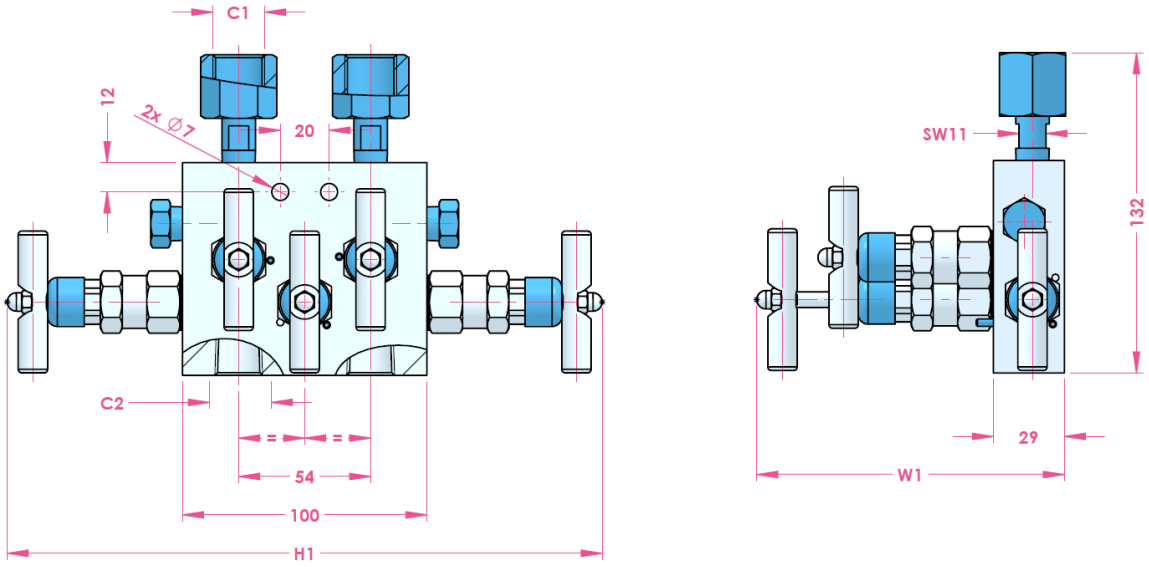


F (process)	F1 (instrument)	H1 (open)	W1 (open)
1/2"NPT-f	1/2"NPT-f	242.0	125.0

Direct mount series

½" NPT female threaded x G ½" female threaded

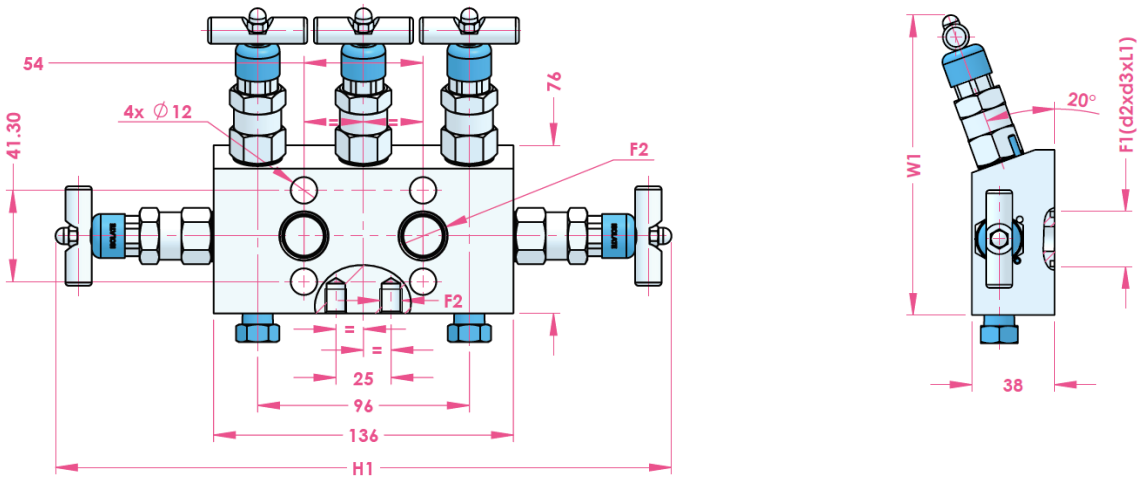
Specifically designed to fit DP pressure gauges BDT13
Model Type 953



C1 (instrument)	C2 (process)	H1 (open)	W1 (open)
G ½" rotating nut	1/2"NPT-f	242.0	125.0

½" NPT female threaded x flanged IEC 61518-B

Specifically designed to fit DP pressure transmitters (Compact design)
Isolation valve position is angled for better access when direct mounted to the instrument
Model Type 955
*Suitable mounting kits with code _M**20**

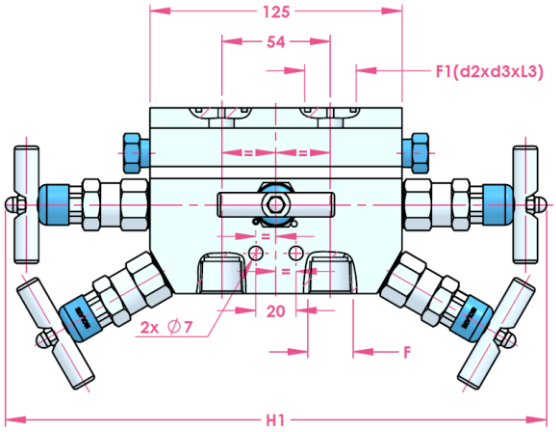


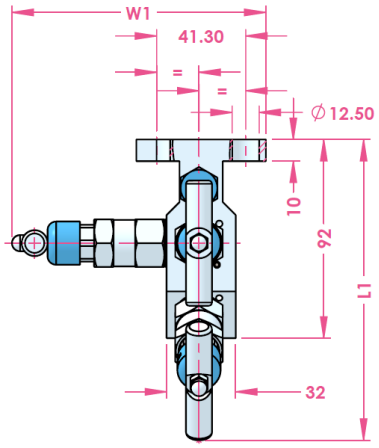
F 2 process connection	F1 Instrument connection	d2	d3	L3	F2	H1	W1
½" NPT female	flanged - IEC 61518	Ø25,5	Ø19,9	2.0	7/16" UNF	278.0	138.0

All dimensions in mm

½” NPT female threaded x flanged IEC 61518-B

Specifically designed to fit DP pressure transmitters (traditional design)
Isolation valve position is angled for better access
Model Type 956
*Suitable mounting kits with code _M**78**



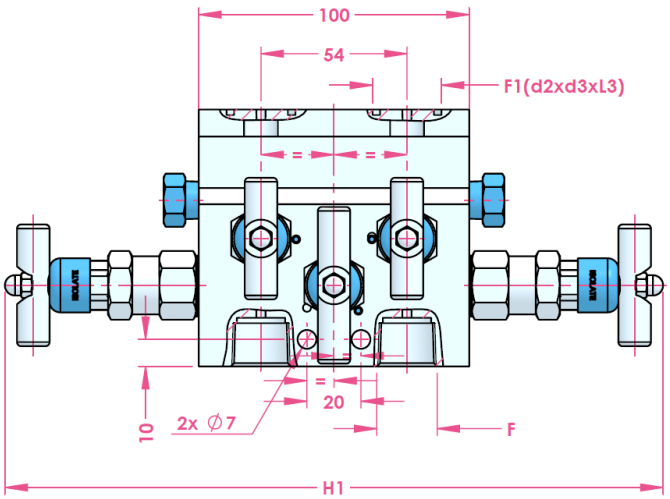


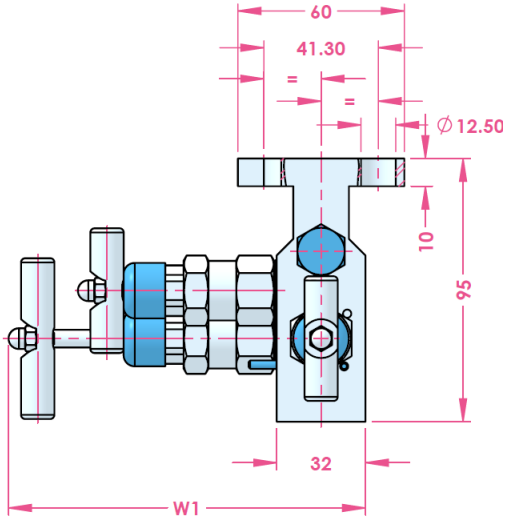
F process connection	F1 Instrument connection	d2	d3	L3	H1	L1	W1
½” NPT female	flanged - IEC 61518	Ø25,5	Ø19,9	2.0	267.0	138.0	117.0

All dimensions in mm

½” NPT female threaded x flanged IEC 61518-B

Specifically designed to fit DP pressure transmitters (traditional design)
Model Type 957
*Suitable mounting kits with code _M**78**



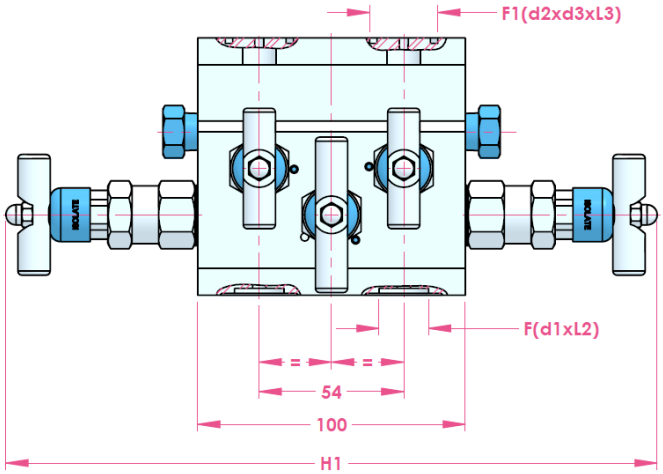


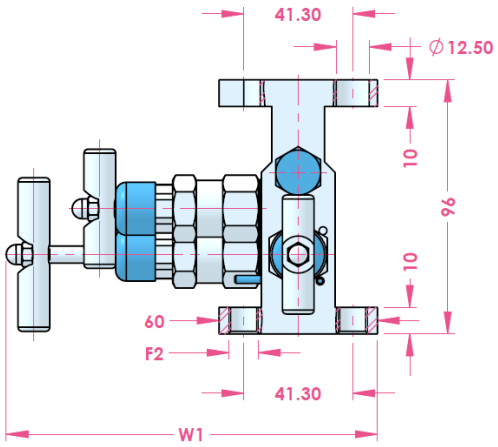
F process connection	F1 Instrument connection	d2	d3	L3	H1	W1
½” NPT female	flanged - IEC 61518	Ø25,5	Ø19,9	2.0	240.0	140.0

All dimensions in mm

flanged IEC 61518 x flanged IEC 61518-B

Specifically designed to fit DP pressure transmitters (traditional design)
Model Type 958
*Suitable mounting kits with code _M**78**





F process connection	d1	L2	F1 Instrument connection	d2	d3	L3	F2	H1 (open)	W1 (open)
flanged - IEC 61518	Ø18,5	2.5	flanged - IEC 61518	Ø25,5	Ø19,9	2.0	7/16" UNF	242.0	140.0

All dimensions in mm

Mounting kit options

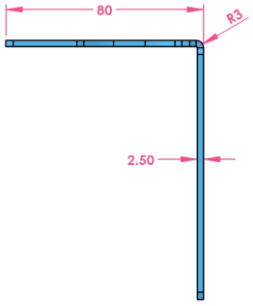
Typical assembly of the manifolds are with differential pressure instruments both electronic as a mechanical dial gauge like the BDT13. Especially the manifolds mounted directly to electronic pressure instruments using the IEC 61518 connection needs some specific parts for mounting like gaskets and bolts.

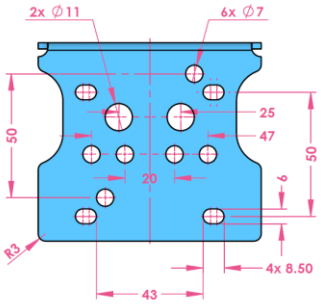
Bracket sets

Most manifold and valves have the possibility to be mounted to a bracket in order to fix it to a 2” pipe when required. The brackets are supplied with U-bolts, washers, hexagon nuts, and screws and washers to mount the valve to the bracket. The size and quantity are depending on the type of bracket.

90° bracket

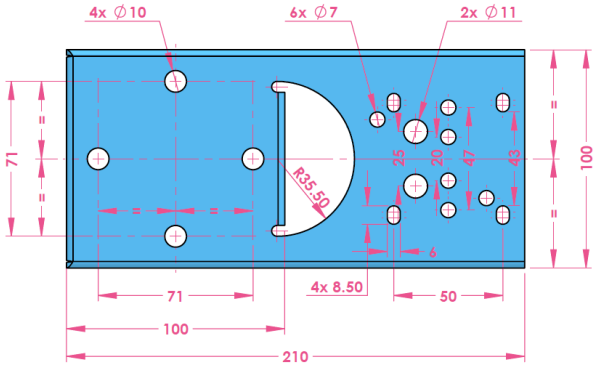
For all models except BDTM958

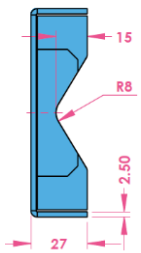




Straight bracket

For all models except BDTM958





Product code five valve manifolds

Code				
Example code:	BDT	P	S316	P
Type				
½" NPT-f x ½" NPT-f (spreaded valve pattern 1 x Eq 2 x Vent)	M951			
½" NPT-f x ½" NPT-f (front plane valve pattern 1 x Eq 2 x Vent)	M952			
½" NPT-f x G ½" rotating (front plane valve pattern)	M953			
½" NPT-f x ½" NPT-f (front plane valve pattern 2 x Eq 1x Vent)	M954			
½" NPT-f x flanged IEC 61518-B (compact design)	M955			
½" NPT-f x IEC 61518-B (spreaded valve pattern traditional design)	M956			
½" NPT-f x IEC 61518-B (front plane pattern traditional design)	M957			
IEC 61518 x IEC 61518-B (front plane pattern traditional design)	M958			
Vent port				
With ¼" NPT plugged connection◄	P			
Without plugs	N			
Material				
AISI 316(L)◄	S316			
Alloy C276	A276			
AISI 321	S321			
Alloy 400	A400			
Alloy 625	A625			
Alloy 825	A825			
254 SMO	S254			
Duplex 2205	2205			
Super Duplex 2507	2507			
Titanium Grade 2	TI02			
Packing set				
PTFE◄	P			
Grafoil	G			

Table 1: General options

Option (start options with X_)	code
Valve high pressure 689 bar (10,000 psi)	_HPV
Cleaned for Oxygen use *1	_CFO
NACE ISO 15156 (MR 01 75) *2	_N75
ASME B31.1 for power piping (Grafoil gasket only)	_AB31
3.1 material certificate	_IC31
2.1 Pressure leak test certificate standard pressure	_LTPS
2.2 Positive Material Identification	_PMI
Anti-Tamper bonnet	_ATB
Bracket set straight*3	_BRS
Bracket set 90°*3	_BR9

*1: Only in combination with PTFE gasket (Code P)
*2: Not possible for all materials (see NACE explanation)
*3: Bracket set not required for model type 958

Table 2: Mounting options

Option (start options with X_)	Manifold type	code
Hex cap screw set 7/16-20 UNF, bolt length 7/8" Carbon Steel, Graphite seal ring	956 | 957 | 958	_MCS78G
Hex cap screw set 7/16-20 UNF, bolt length 7/8" Carbon Steel, PTFE seal ring		_MCS78P
Hex cap screw set 7/16-20 UNF, bolt length 7/8" 316 ASTM A193 B8M cl 2, Graphite seal ring		_MSS78G
Hex cap screw set 7/16-20 UNF, bolt length 7/8" 316 ASTM A193 B8M cl 2, PTFE seal ring		_MSS78P
Hex cap screw set 7/16-20 UNF, bolt length 2" Carbon Steel, Graphite seal ring	955	_MCS20G
Hex cap screw set 7/16-20 UNF, bolt length 2" Carbon Steel, PTFE seal ring		_MCS20P
Hex cap screw set 7/16-20 UNF, bolt length 2" 316 ASTM A193 B8M cl 2, Graphite seal ring		_MSS20G
Hex cap screw set 7/16-20 UNF, bolt length 2" 316 ASTM A193 B8M cl 2, PTFE seal ring		_MSS20P

Note: A set contains 2 screws, 2 gaskets, and a bag of anti-seizure paste .

Change log

Date	Change
6-11-2020	Additional information on standards and regulations.
26-11-2020	Code selection table “Graphite” changed to “Grafoil”
5-7-2021	Extra code for bracket selection 90° added