

MAXIMATOR®
maximum pressure



PRODUCTS FOR
HYDROGEN APPLICATIONS

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MAXIMATOR has been designing and manufacturing high pressure equipment for more than thirty years and has a world-wide reputation for quality and reliability, backed by one of the best service organizations in the industry.

Medium Pressure Valves to 22,500 psi (1,550 bar)

Maximator Medium Pressure Valves with metal to metal seats have a high level of safety and reliability under adverse operating conditions.

Sizes 1/4 to 1 inch

Double Block and Bleed Valves to 22,500 psi (1,550 bar)

Double Block and Bleed Needle Valves are three stem manifold valves designed for blocking and bleeding in test and pressure monitoring applications as well as for chemical injection or drain line isolation up to 22,500 psi (**1,550 bar**).

Air Actuated Valves to 15,200 psi (1,050 bar)

Air Actuated Valves are a great option for process automation, pressure control or safety devices in high pressure test and production systems.

From slow fill processes in compact filling stations up to high flow rates for hydrogen refilling stations for busses, trucks and trains

Medium Pressure Fittings to 22,500 psi (1,550 bar)

Maximator Medium Pressure Fittings are designed for use with the 15V series air actuated hydrogen valves and 21V series medium pressure valves and medium pressure tubing

Sizes 1/4 to 1 inch, also available with variable connections

Check Valves to 22,500 psi (1,550 bar)

Especially for hydrogen applications, where best of class sealing ability is required, Maximator developed their Cone Check Valve series design with a highly media compatible soft sealing system and improved spring guide.

Filters to 22,500 psi (1,550 bar)

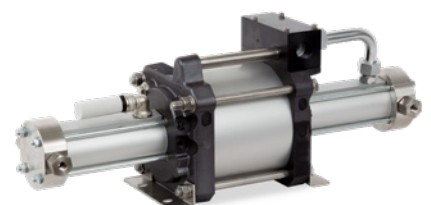
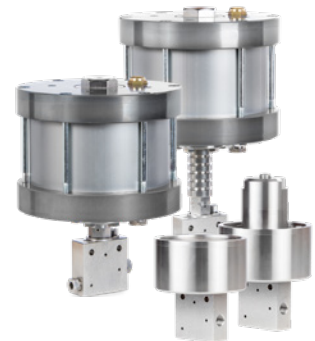
Cup-Type Filters are used when maximum filtration surface area down to a single micron size is required. They are used to filter gases or liquids in high pressure systems. Angle type filters allow easy in-situ replacement of the filter elements.

Tubing & Tools

Precise tools are necessary for manually coning and threading tubing. Maximator offers these tools, allowing for the coning and threading of medium and high pressure tubing up to 9/16" O.D.

Gas Boosters

The Maximator high pressure gas boosters are suitable for the oil free compression of gases and air. Industrial gases like argon, helium, nitrogen and hydrogen can be compressed to operating pressures of 2,400 bar (**36,000 psi**).



Competence in hydrogen

Maximator GmbH successfully develops complex systems in high-pressure and testing technology, hydraulics and pneumatics and has been the market leader in these segments for decades.

Maximator has many years of experience with components, power units and test systems especially for hydrogen applications. We give professional advice, plan projects and supply testing and manufacturing systems. We also develop special solutions precisely customised to the requirements of our customers.

Our high-performance service department not only carries out the installation and maintenance of the machines, we also inspect and retrofit our products, both nationally and international. In our own testing laboratories it is possible to test the product before the start of the project; we also carry out exceptional individual and series testing for your hydrogen products.

Hydrogen technology reduces CO² output - But is it safe?

Many components for the development of this future technology are exposed to extreme stresses. Maximator meets this challenge with innovative high pressure test technology for hydrogen components such as valves, pipes or CGH vessels.

We can carry out all legally prescribed testing on pressure bearing components with our test technology: from individual acceptance to type approval testing. We also offer gas control technology for hydrogen applications - approved effective and reliable technology for automotive manufacturers and suppliers.

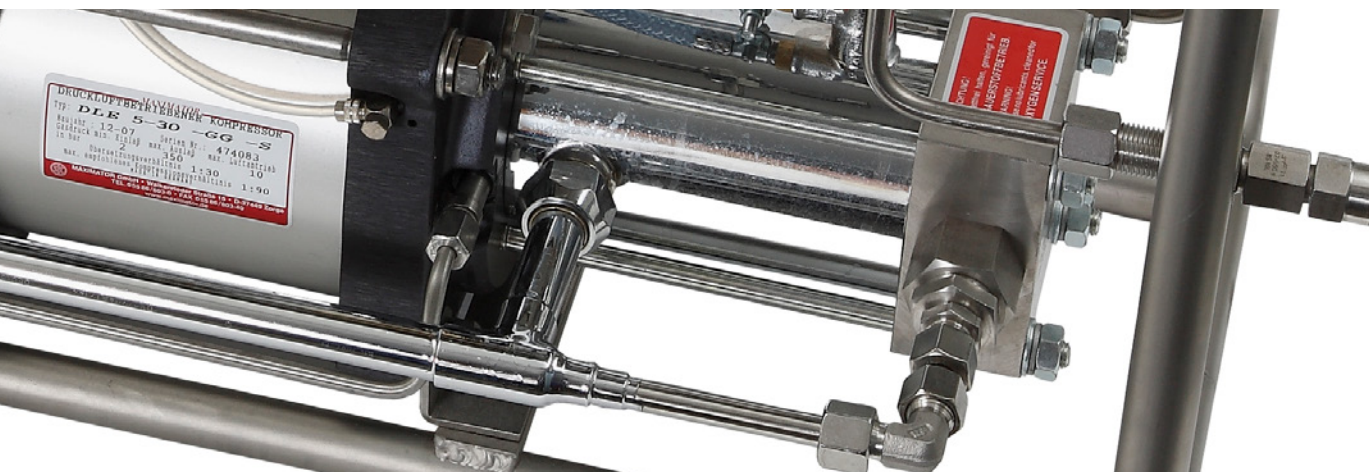
What you need to know

Hydrogen is a colourless, odourless and flavourless gas and therefore cannot be detected with our human sensory organs. Hydrogen burns with invisible flame and radiates only little heat in this process.

When mixing with air in a ratio of 4 to 76 percent by volume (vol. %) of hydrogen a detonating gas develops that already can be brought to explosion by a low-energy spark. Oxygen-hydrogen mixtures with a fraction of below 10.5 percent by volume are heavier than air and sink to the floor.

Physical and chemical properties

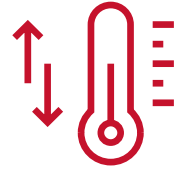
Appearance:	colourless gas
Odour:	odourless
Molar mass:	2 g/mol
Melting point:	-259 °C
Boiling point:	-253 °C
Critical temperature:	-240 °C
Ignition temperature:	560 °C
Explosion limits (vol. % in air):	4 %(V) - 75 %(V)
Relative density, gaseous (air=1):	0,07
Solubility in water:	1,6 mg/l



Special features of Maximator H₂ Valves

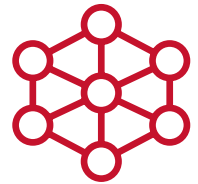
Temperature range

- Selection of seal materials for a temperature range of -40°C to +85°C
- Temperature range according to ISO19880-3 and ANSI/SAE HGV 4.7



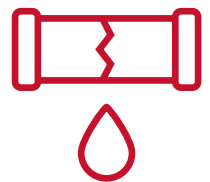
Choice of material

- Predominantly use of austenitic stainless steels, evaluated for their suitability in high pressure hydrogen applications
- Use of 1.4404 or 1.4435 (SST 316L) as body material with minimized risk of hydrogen embrittlement for high durability
- Material 1.4980 (A286) and 1.4542 (17-4PH) for valves stems where compression stresses prevail



Leakage

- Internal leakage of seat/stem as well as external leakage over seal are bubble tight
- Leak testing of valves with helium for internal and external leakage for air operated valves
- Valves are in the qualification process in order to meet the requirements of ISO 19880-3



Seals

- Special seal designs are used for air operated valves instead of conventional packings in order to maintain their initial tension
- Lifetime related to opening and closing cycles is much higher compared to conventional packing designs



Lubrication

- Lubricant used for functionality of valves has been selected especially for hydrogen applications
- No chemical reactions with the media are going to happen



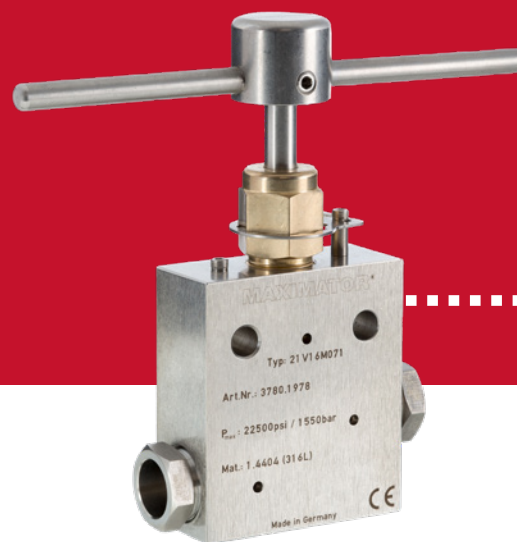
Cleaning

- Use of special cleaning process in order to reduce hydrocarbons and particles
- Avoidance of fuel cell contamination which would effect the life time



Medium Pressure Valves

Pressures to 22,500 psi (1,550 bar)



Medium pressure valves

Maximator Medium pressure valves with metal to metal seats have a high level of safety and reliability under adverse operating conditions. These valves may be used both with gases and liquids.

Traceability is ensured through extensively documented data (batch number, maximum pressure, material number, type designation). All medium pressure valves include glands and collars.

Materials:

- Valve body: 1.4404 (SST 316L)
- Valve stem: 1.4542 (17-4PH)

21 V Valve Series	4M O.D. Tube Size	07 Stem Type	1 Body Pattern	Options
21 V	4M - 1/4"	07 - VEE stem	1 - two-way straight	Extended temperature option, see information below.
	6M - 3/8"	87 - VEE stem with replaceable seat	2 - two-way angle	
	9M - 9/16"			
	12M - 3/4"			
	16M - 1"			

Options for Medium pressure valves

Special Designs for Extreme Temperatures

Standard valves are supplied with Teflon / Carbon packing and may be operated to 450°F (230°C). High temperature packing and / or extended stuffing box are available for service from -423°F to 1200°F (-252°C to 650°C) by adding the following suffixes to catalog order number.

- **B** – standard valve with cryogenic trim materials and Teflon packing to -100°F (-73°C).
- **LT** – extended stuffing box valve with teflon packing and cryogenic trim materials to -423°F (-252°C).

For further available options and more detailed information please refer to our VFT catalogue.

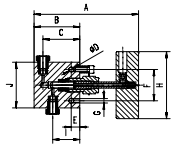
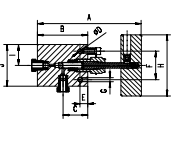
Consult your MAXIMATOR representative for repair kits and valve bodies. Refer to the Tools and Installation section for proper maintenance procedures.

Ordering Information
Typical catalog number:
21V16M071

O.D. Size in. (mm)	Connection Type	Orifice Size in. (mm)	Rated Cv **	Pressure Rating @ R.T. psi (bar) ***
1/4 (6.35)	4MF	0.106 (2.7)	0.31	22,500 (1,550)
3/8 (9.53)	6MF	0.201 (5.1)	0.75	22,500 (1,550)
9/16 (14.29)	9MF	0.307 (7.8)	1.30	22,500 (1,550)
3/4 (19.05)	12MF	0.438 (11.1)	2.50	22,500 (1,550)
1 (25.4)	16MF	0.562 (14.3)	4.40	22,500 (1,550)

** Cv values shown are for 2-way straight pattern vee stem valves. For 2-way angle patterns, increase the Cv value by 50%.
 For Flow coefficient reference curves, please refer to chapter Technical Informations.

*** See page 2 in the Technical Section of our VFT catalogue for Pressure/Temperature Rating Chart.

Valve Pattern	Catalog Number	Stem Type	O.D. Tube in.	Orifice Size in. (mm)	Dimensions in. (mm)										Valve Panel Hole	Block Thick-ness
					A	B	C	D	E	F	H	I	J	K		
2-Way Straight																
	21V4M071	Vee	1/4	0.106 (2.7)	4.61 (117)	2.01 (51)	1.6 (41.1)	0.22 (5.6)	0.37 (9.5)	1.24 (31.5)	2.95 (75)	1.19 (30.2)	2.01 (51)		0.75 (19.1)	0.79 (20.1)
	21V6M071	Vee	3/8	0.201 (5.1)	4.61 (117)	2.01 (51)	1.62 (41.1)	0.22 (5.6)	0.37 (9.5)	1.24 (31.5)	2.95 (75)	1.19 (30.2)	2.01 (51)		0.75 (19.1)	0.79 (20.1)
	21V9M071	Vee	9/16	0.307 (7.8)	5.87 (149)	2.88 (73.2)	2.38 (60.5)	0.37 (9.5)	0.45 (11.5)	1.38 (35)	3.94 (100)	1.75 (44.5)	2.50 (63.5)		1.00 (25.4)	1.02 (25.9)
	21V12M071	Vee	3/4	0.438 (11.1)	7.05 (179)	3.74 (95)	3.00 (76)	0.43 (11)	0.63 (16)	1.76 (44.7)	10.31 (262)	2.25 (57.2)	3.00 (76)		1.25 (31.8)	1.38 (35)
	21V16M071	Vee	1	0.562 (14.3)	8.98 (228)	4.65 (118)	3.75 (95.3)	0.53 (13.5)	1.13 (28.7)	2.50 (63.5)	10.31 (262)	2.81 (71.4)	4.13 (105)		1.62 (41.1)	1.77 (45)
2-Way Angle																
	21V4M072	Vee	1/4	0.106 (2.7)	5.00 (127)	2.43 (61.7)	1.19 (30.2)	0.22 (5.6)	0.37 (9.5)	1.24 (31.5)	2.95 (75)	1.00 (25.4)	2.01 (51)		0.75 (19.1)	0.79 (20.1)
	21V6M072	Vee	3/8	0.201 (5.1)	5.00 (127)	2.43 (61.7)	1.19 (30.2)	0.22 (5.6)	0.37 (9.5)	1.24 (31.5)	2.95 (75)	1.00 (25.4)	2.01 (51)		0.75 (19.1)	0.79 (20.1)
	21V9M072	Vee	9/16	0.307 (7.8)	6.36 (161.5)	3.38 (85.9)	1.75 (44.5)	0.37 (9.5)	0.45 (11.5)	1.38 (35)	3.94 (100)	1.25 (31.8)	2.50 (63.5)		1.00 (25.4)	1.02 (25.9)
	21V12M072	Vee	3/4	0.438 (11.1)	7.56 (192)	4.25 (108)	2.25 (57.2)	0.43 (11)	0.63 (16)	1.76 (44.7)	10.31 (262)	1.50 (38)	3.00 (76)		1.25 (31.8)	1.38 (35)
	21V16M072	Vee	1	0.562 (14.3)	9.45 (240)	5.12 (130)	2.81 (71.4)	0.53 (13.5)	1.13 (28.7)	2.50 (63.5)	10.31 (262)	2.07 (52.5)	4.13 (105)		1.62 (41.1)	1.77 (45)

G - Panel mounting screw thread size 10-24 UNC (screw included).

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Double Block and Bleed Needle Valves

Pressures to 22,500 psi (1,550 bar)



Double Block and Bleed Needle Valves

Maximator series DBBNV Double Block and Bleed Needle Valves with metal to metal seats have a high level of safety and reliability under adverse operating conditions. Double Block and Bleed Needle Valves are three stem manifold valves designed for blocking and bleeding in test and pressure monitoring applications as well as for chemical injection or drain line isolation up to 22,500 psi (**1,550 bar**).

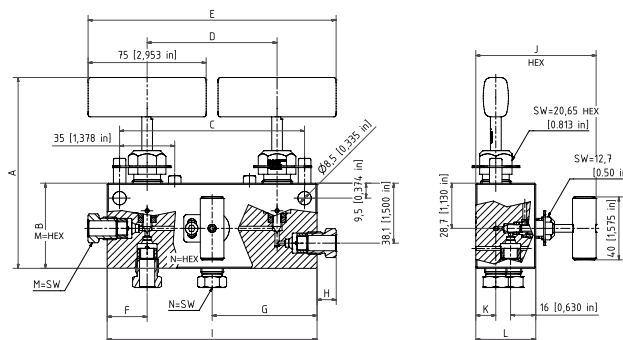
Ordering Information
Typical catalog number:
21DBBNV4M4P

Due to the standard valve packing and Vee stem design, Maximator double block and bleed needle valves are very compact and easy to use. In addition, manifold style valves reduce the number of fittings and space required for installation.

Materials:

- Valve body: 1.4404 (SST 316L)
- Valve stem: 1.4542 (17-4PH)

21 DBBNV Valve Series	4M Connection	4P Vent Connection
21 DBBNV	4M - 1/4"	4P - 1/4" NPT
	6M - 3/8"	6P - 3/8" NPT
	9M - 9/16"	8P - 1/2" NPT
	9H - 9/16"	4M - 1/4"



Catalog Number	Stem Type	O.D. Tube in.	Orifice in. (mm)	Dimensions in. (mm)													
				A	B	C	D	E	F	G	H	I	J	K	L	M	N
21DBBNV4M	Vee	1/4	0.11 (2.7)	4.882 (124)	2.13 (54.1)	4.63 (117.6)	3.252 (82.6)	6.205 (157.6)	1.00 (25.4)	2.626 (66.7)	0.378 (9.6)	5.252 (133.4)	3.012 (76.5)	0.50 (12.7)	1.50 (38.1)	0.50 (12.7)	0.50 (12.7)
21DBBNV4M4P	Vee	1/4	0.11 (2.7)	4.882 (124)	2.13 (54.1)	4.63 (117.6)	3.252 (82.6)	6.205 (157.6)	1.00 (25.4)	2.626 (66.7)	0.378 (9.6)	5.252 (133.4)	3.012 (76.5)	0.50 (12.7)	1.50 (38.1)	0.50 (12.7)	
21DBBNV6M	Vee	3/8	0.11 (2.7)	4.776 (121.3)	2.13 (54.1)	4.63 (117.6)	3.252 (82.6)	6.205 (157.6)	1.00 (25.4)	2.626 (66.7)	0.48 (12.2)	5.252 (133.4)	3.012 (76.5)	0.50 (12.7)	1.50 (38.1)	0.625 (15.88)	0.625 (15.88)
21DBBNV6M6P	Vee	3/8	0.11 (2.7)	4.776 (121.3)	2.13 (54.1)	4.63 (117.6)	3.252 (82.6)	6.205 (157.6)	1.00 (25.4)	2.626 (66.7)	0.48 (12.2)	5.252 (133.4)	3.012 (76.5)	0.50 (12.7)	1.50 (38.1)	0.625 (15.88)	
21DBBNV9M	Vee	9/16	0.11 (2.7)	5.646 (143.4)	3.00 (76.2)	4.638 (117.8)	3.26 (82.8)	6.213 (157.8)	1.311 (33.3)	2.941 (74.7)	0.63 (16)	5.882 (149.4)	3.283 (83.4)	0.752 (19.1)	1.772 (45)	0.937 (23.8)	0.937 (23.8)
21DBBNV9M8P	Vee	9/16	0.11 (2.7)	5.646 (143.4)	3.00 (76.2)	4.638 (117.8)	3.26 (82.8)	6.213 (157.8)	1.311 (33.3)	2.941 (74.7)	0.63 (16)	5.882 (149.4)	3.283 (83.4)	0.752 (19.1)	1.772 (45)	0.937 (23.8)	
21DBBNV9H4M	Vee	9/16	0.11 (2.7)	5.646 (143.4)	3.00 (76.2)	4.638 (117.8)	3.26 (82.8)	6.213 (157.8)	1.311 (33.3)	2.941 (74.7)	0.941 (23.9)	5.882 (149.4)	3.283 (83.4)	0.752 (19.1)	1.772 (45)	1.187 (30.16)	0.50 (12.7)

Panel mounting screw thread size 10-24 UNC (screw included).

A - Stem in closed position.

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Double Block and Bleed Needle Valves

with full bore



Double Block and Bleed Needle Valves - full bore

Maximator Double Block and Bleed Needle valves with full bore will allow you to control the entire flow of your application combined with the proven benefits of an integrated solution.

21 DBBV Valve Series	9M Connection	4P Vent Connection
21 DBBV	6M - 3/8"	4P - 1/4" NPT
	9M - 9/16"	4M - 1/4"
	12M - 3/4"	
	16M - 1"	

Ordering Information
Typical catalog number:
21DBBV9M4P

		Catalogue Number			
Stem Type Vee		21DBBV6M	21DBBV9M	21DBBV12M	21DBBV16M
O.D. Tube in.		3/8	9/16	3/4	1
Orifice in. (mm)		0.201 (5.1)	0.307 (7.8)	0.438 (11.1)	0.562 (14.3)
Dimensions in. (mm)					
	A	4.796 (121.81)	6.231 (158.27)	7.42 (188.47)	9.23 (234.5)
	B	2.362 (60)	3.346 (85)	4.134 (105)	4.921 (125)
	C	4.587 (116.5)	5.709 (145)	12.551 (318.79)	13.13 (333.5)
	D	3.346 (85)	4.331 (110)	10.787 (274)	10.63 (270)
	E	6.299 (160)	8.268 (210)	21.102 (536)	20.906 (531)
	F	1.319 (33.5)	1.319 (33.5)	1.496 (38)	2.067 (52.5)
	G	2.992 (76)	3.484 (88.5)	6.89 (175)	7.382 (187.5)
	H	0.48 (12)	0.591 (15)	0.793 (20)	0.843 (21.4)
	I	5.984 (152)	6.969 (177)	13.78 (350)	14.764 (375)
	J	3.25 (82.54)	3.25 (82.54)	3.25 (82.54)	3.762 (95.54)
	K	0.551 (14)	0.551 (14)	0.681 (17.3)	0.886 (22.5)
	L	1.752 (44.5)	1.752 (44.5)	1.752 (44.5)	2.264 (57.5)
	M	0.63 (16)	0.63 (16)	0.63 (16)	0.63 (16)
	N	1.189 (30.2)	1.752 (44.5)	2.252 (57.2)	2.693 (68.4)
	O	1.618 (41.1)	2.382 (60.5)	3 (76.2)	3.752 (95.3)
	P	0.374 (9.5)	0.374 (9.5)	0.63 (16)	1.13 (28.7)
	Q	0.335 (8.5)	0.335 (8.5)	0.433 (11)	0.531 (13.5)
	R	1.24 (31.5)	1.378 (35)	1.76 (44.7)	2.5 (63.5)
	S	2.953 (75)	3.937 (100)	10.315 (262)	10.276 (261)
	T	0.625 (15.88)	0.937 (23.8)	0.681 (30.16)	1.375 (34.93)
	U	0.625 (15.88)	0.813 (20.65)	0.937 (23.8)	1.375 (34.93)

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Air Actuated Valves

Pressures to 15,200 psi (1,050 bar)



Air Actuated Compact H2 Valves

- Slow fill processes for compact filling stations
- Hydrogen filling of two-wheelers
- Pressure release of dispenser filling hoses

15 V Valve Series	4M O.D. Tube Size	07 Stem Type	1 Body Pattern	Configuration
15 V	4M - 1/4"	07 - VEE stem	1 - two-way straight	3MNC = Compact air-drive normally closed
15,200 psi 1,050 bar				3MNO = Compact air-drive normally open

Technical Data and Dimensions

Technical Data

Operating temperature: -40°C / +85°C
Drive pressure: 58 psi-116 psi (4-8 bar)
Operating pressure: 15,200 psi (1,050 bar)

Materials

Valve body: 1.4404 (SST 316L)
Valve stem: 1.4980
Seal: UHMWPE

Dimensions

Height: Normally closed: 6.04 in. (154 mm)
Normally open: 3.917 in. (99.5 mm)
Diameter: 3.543 in. (90 mm)
Orifice: 2.0 mm

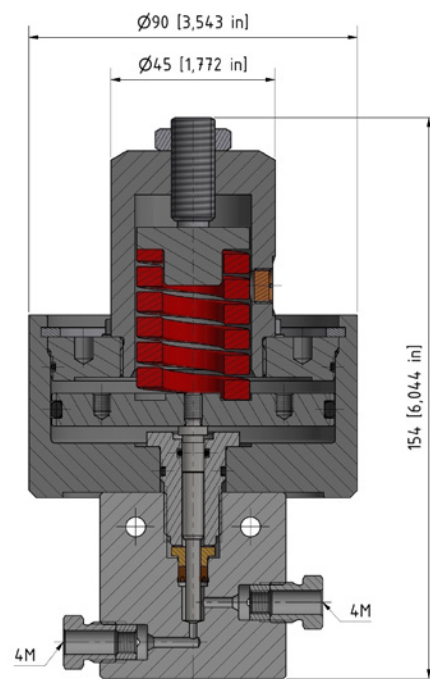
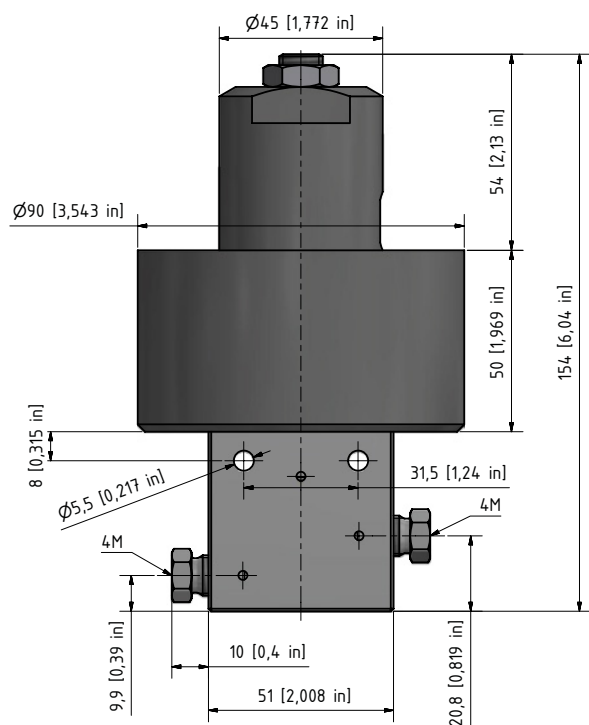


The valves are marked with an EX sign and are in conformity to Group II Category 2G Explosion group IIC constructive safety.

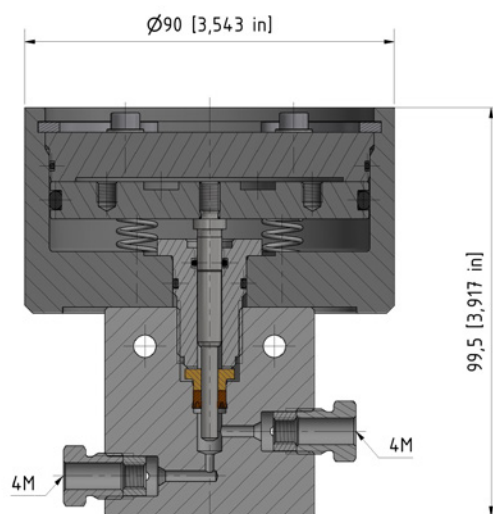
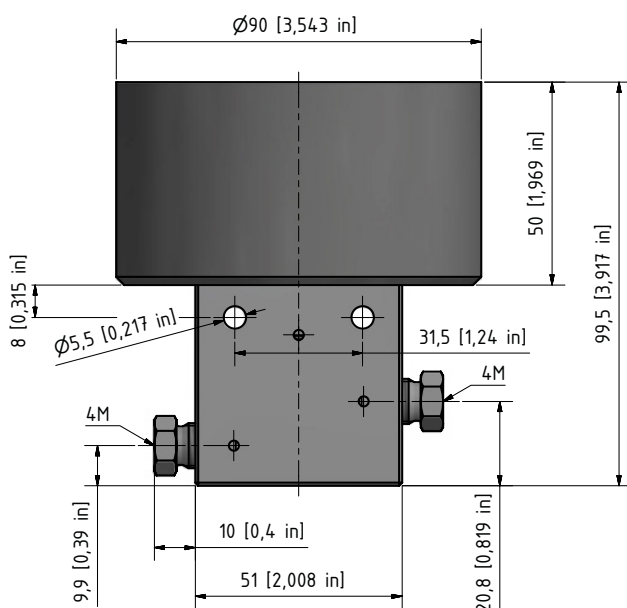
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Ordering Information
Typical catalog number:
15V4M071-H2-3MNC

15V4M071-H2-3MNC



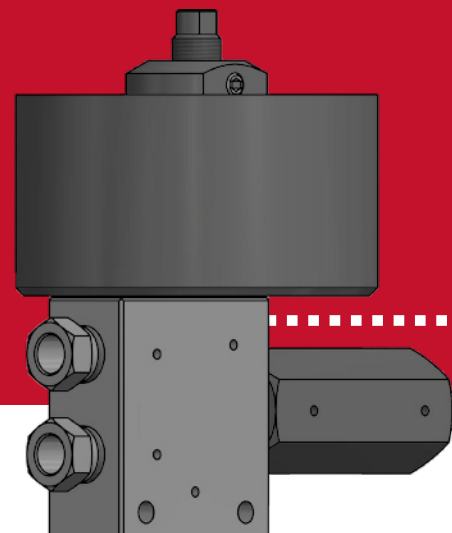
15V4M071-H2-3MNO



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Air Actuated Valves

Pressures to 15,200 psi (1,050 bar)



4-Way Air Actuated H2 Valves for Dispenser includes Adjustable Stroke and Check Valve

Air Actuated H2 Valve Manifolds

- Pressure release of dispenser filling hoses
- Adjustable orifice to limit noise emissions
- Compact design with multiple functions integrated

15 V Valve Series	6M O.D. Tube Size	AS Stem Type	Body Pattern	Configuration
15 V	6M - 3/8"	AS - Vee Stem with adjustable stroke	4-way valve	3MNO = Compact air-drive normally open

Characteristics

- Compact integrated design for high leak integrity
- Flow through function to dispenser filling hose
- Double porting on left hand side eliminates need for Tee type fitting
- Normally open valve for pressure release after filling
- Bottom port for optional pressure relief valve or rupture disc installation
- Adjustable orifice to limit noise emissions during pressure release
- Cone check valve at outlet in order to avoid contamination from vent line
- Low wear because of optimal choice of materials of construction

Technical Data and Dimensions

Technical Data

Operating temperature: -40°C / +85°C
Drive pressure: 58 psi-116 psi (4-8 bar)
Operating pressure: 15,200 psi (1,050 bar)

Materials

Valve body: 1.4404 (SST 316L)
Valve stem: 1.4980
Seal needle valve: UHMWPE
Seal check valve: PEEK

Dimensions

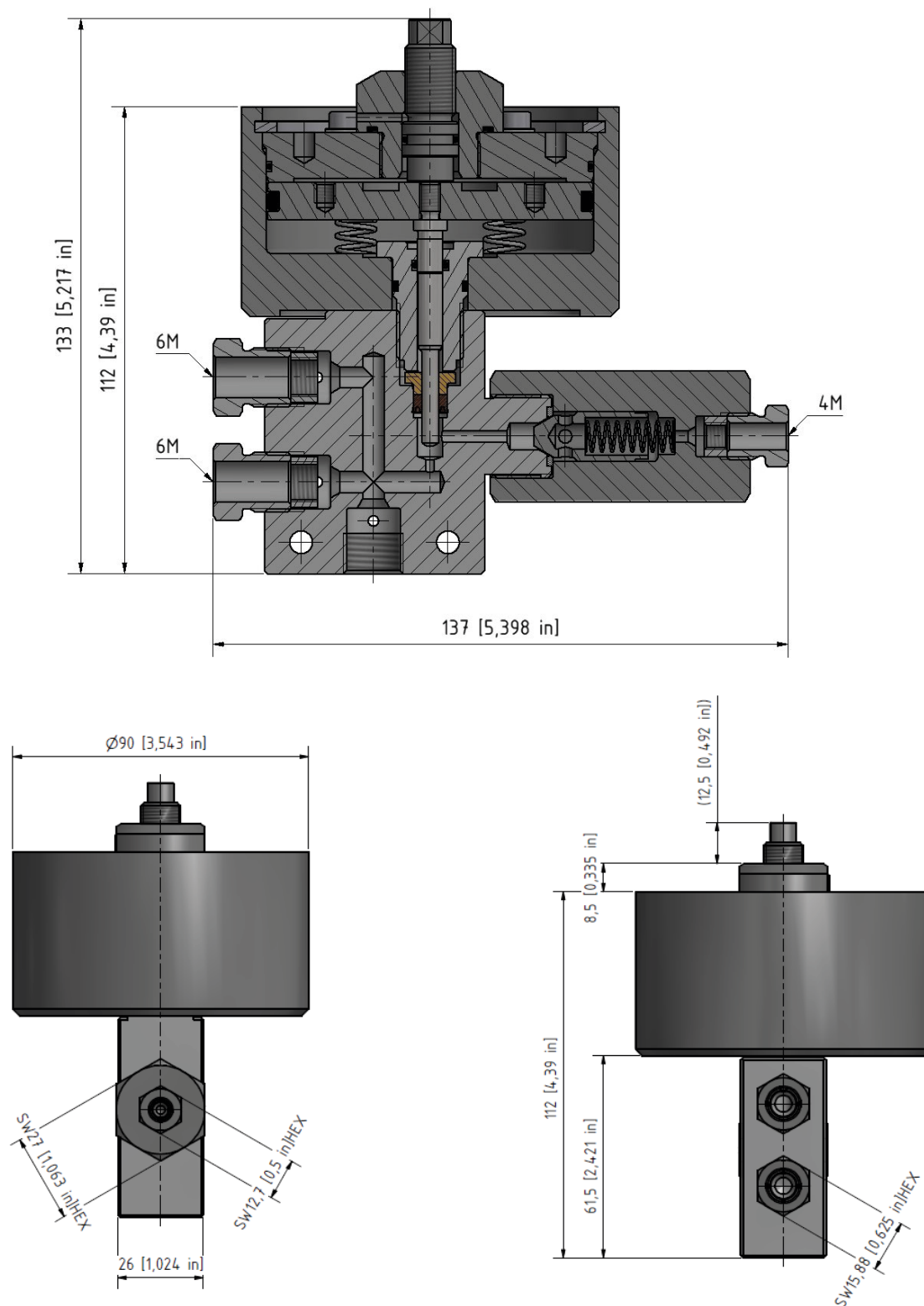
Height: 5.217 in. (133 mm)
Net weight: 2.9 kg
Diameter: 3.543 in. (90 mm)
Orifice: 2.0 mm
Actuator: 3MNO



The valves are marked with an EX sign and are in conformity to Group II Category 2G Explosion group IIC constructive safety.

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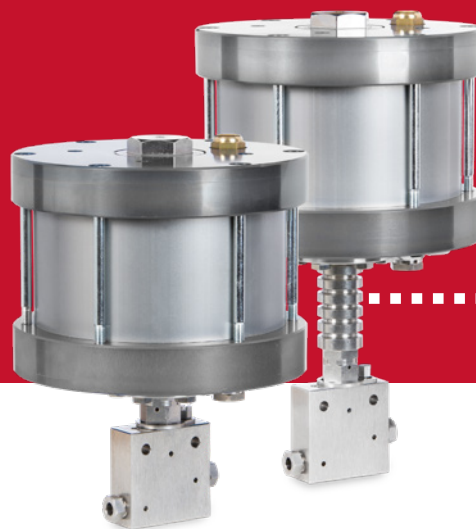
Ordering Information
Typical catalog number:
15V6M-H2-AS-CC4M-3MNO



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Air Actuated Valves

Pressures to 15,200 psi (1,050 bar)



Air Actuated H₂ Valves

- Standard type for hydrogen refilling stations for passenger cars
- Use for shut-off at compressor, distribution at gas storage banks
- Shut-off function for dispenser filling hose

15 V Valve Series	4M O.D. Tube Size	07 Stem Type	1 Body Pattern	Configuration
15 V	4M - 1/4"	07 - VEE stem	1 - two-way straight	5MNC = Air-drive normally closed
	6M - 3/8"		2 - two-way angle	5MNO = Air-drive normally open
				B = Packing for cold applications (-73°)

Technical Data and Dimensions

Technical Data

Operating temperature: -40°C / +85°C
(-73°C / +85°C *)

Drive pressure: 73 psi-145 psi (5-10 bar)

Operating pressure: 15,200 psi (1,050 bar)

Materials

Valve body: 1.4404 (SST 316L)

Valve stem: 1.4980

Seal needle valve: UHMWPE

Dimensions

Height: 195 mm (245 mm*)

Net weight: 5.6 kg

Diameter: 155 mm

Orifice: 4M: 2.7 mm
6M: 5.1 mm

* B-Type with extended connection for
low temperature applications

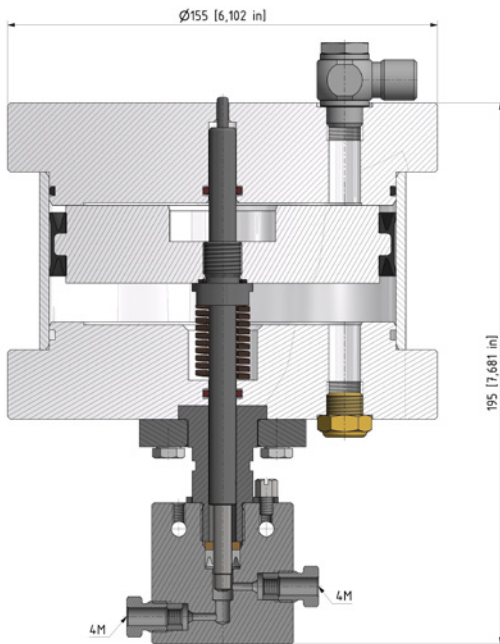


The valves are marked with an EX sign and are in conformity to Group II Category 2G Explosion group IIC constructive safety.

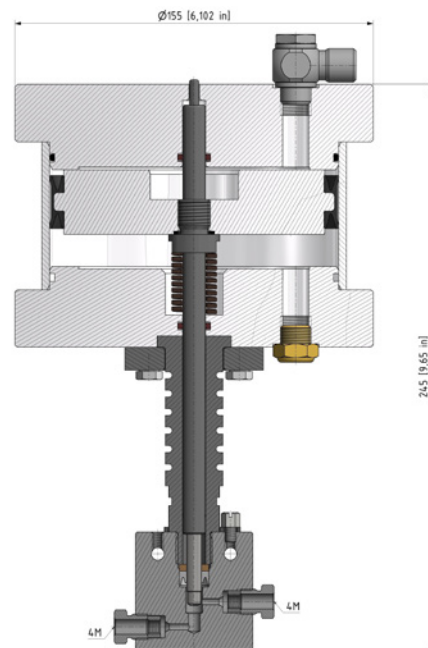
All technical and dimensional information are for reference only and are subject to change. All general Terms and Conditions of sale, including limitations of our liability, apply to all products and services sold.

Ordering Information
Typical catalog number:
15V4M071-H2-5MNC

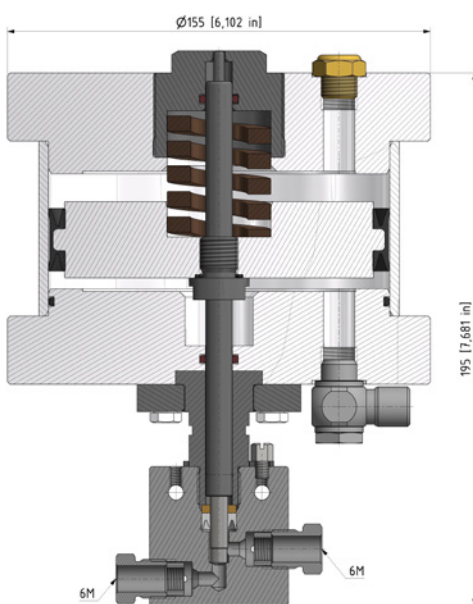
15V4M071-H2-5MNO



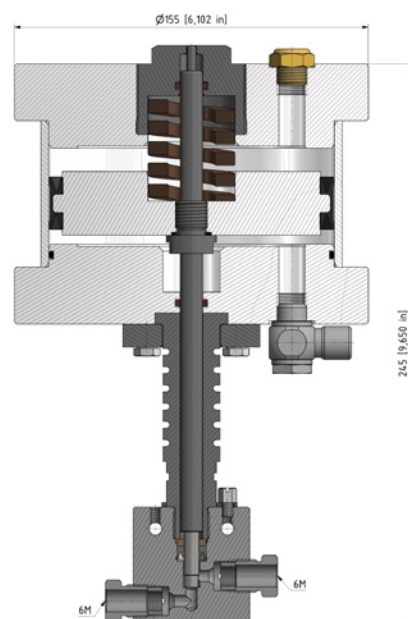
15V4M071-B-H2-5MNO



15V6M071-H2-5MNC



15V6M071-B-H2-5MNC



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Air Actuated Valves

Pressures to 15,200 psi (1,050 bar)



Air Actuated High Flow Valves for H₂

- Standard type for hydrogen refilling stations for busses, trucks and trains
- Use for shut-off at compressor, distribution at gas storage banks
- Shut-off function for dispenser filling hose

15 V Valve Series	4M O.D. Tube Size	07 Stem Type	1 Body Pattern	Configuration
15 V	9M - 9/16"	07 - VEE stem	1 - two-way straight	8MNC = Air-drive normally closed
			2 - two-way angle	

Technical Data and Dimensions

Technical Data

Operating temperature: -40°C / +85°C
Drive pressure: 73 psi-145 psi (5-10 bar)
Operating pressure: 15,200 psi (1,050 bar)

Materials

Valve body: 1.4404 (SST 316L)
Valve stem: 1.4980
Seal needle valve: UHMWPE

Dimensions

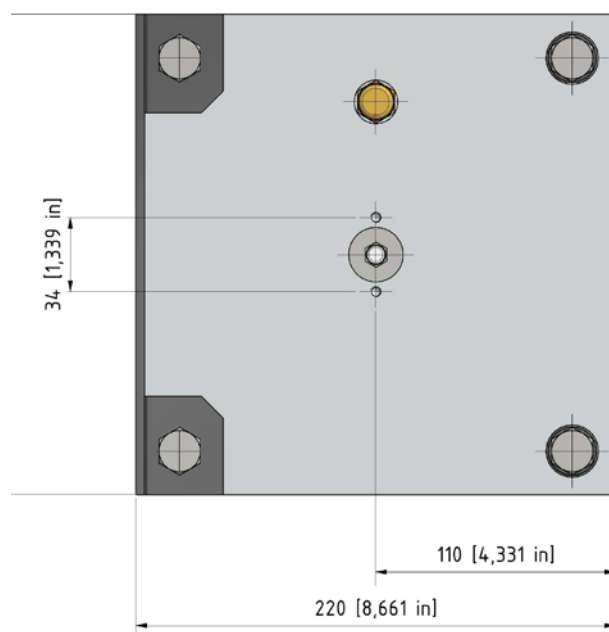
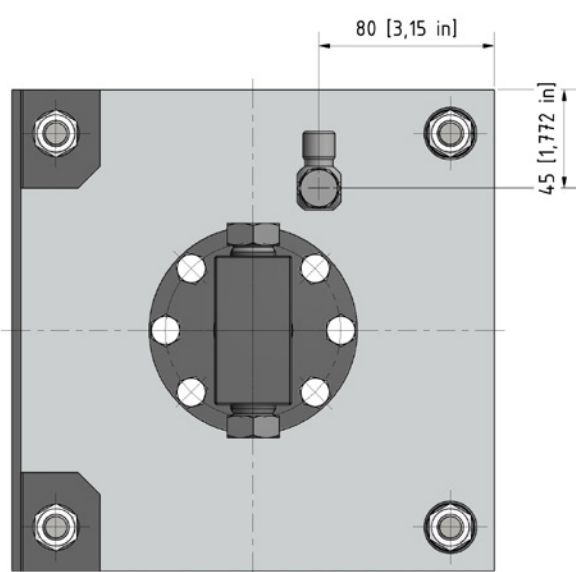
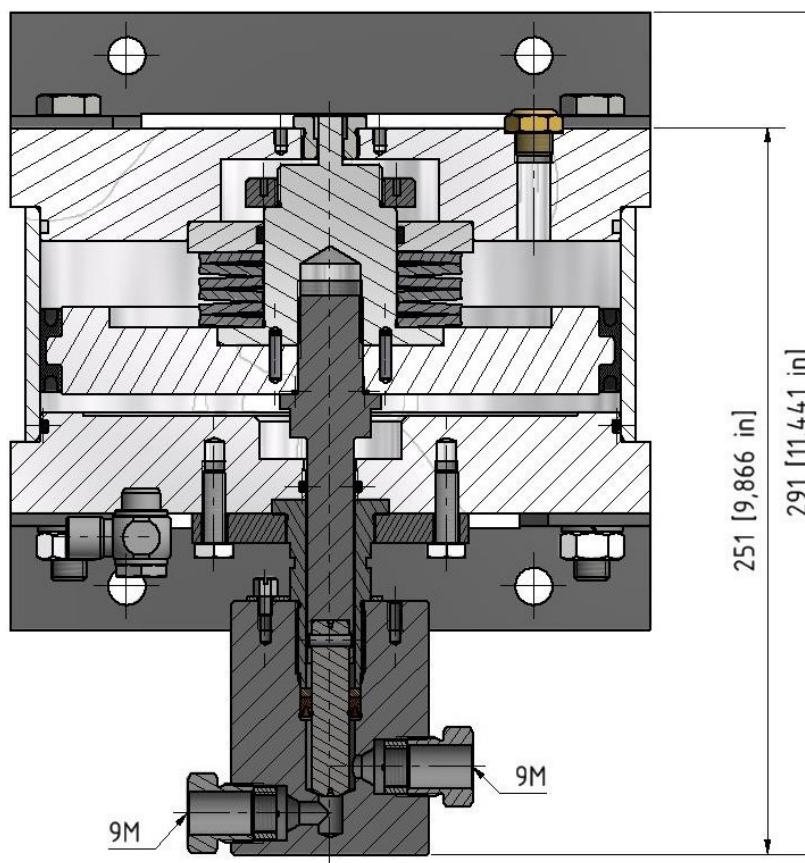
Height: 291 mm
Net weight: 16.8 kg
Diameter: 220 mm
Orifice: 7.8 mm
Actuator: 8MNC



The valves are marked with an EX sign and are in conformity to Group II Category 2G Explosion group IIC constructive safety.

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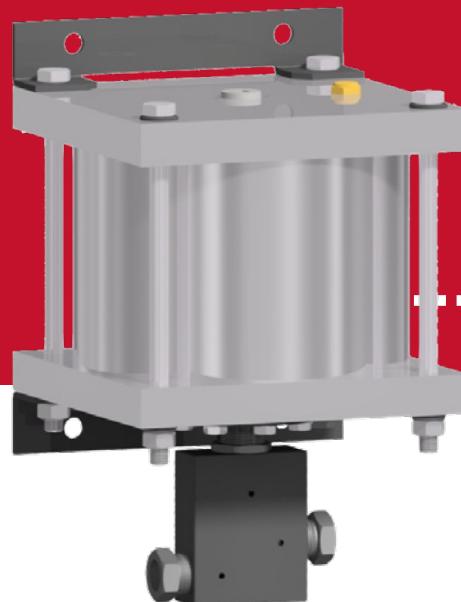
Ordering Information
Typical catalog number:
15V9M071-H2-8MNC



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Air Actuated Valves

Pressures to 15,200 psi (1,050 bar)



Air Actuated High Flow Valves for H₂

- Standard type for hydrogen refilling stations for busses,, trucks and trains
- Use for shut-off at compressor, distribution at gas storage banks
- Shut-off function for dispenser filling hose

15 V Valve Series	4M O.D. Tube Size	07 Stem Type	1 Body Pattern	Configuration
15 V	12M - 3/4"	07 - VEE stem	1 - two-way straight	8MNC = Air-drive normally closed
			2 - two-way angle	

Technical Data and Dimensions

Technical Data

Operating temperature: -40°C / +85°C
Drive pressure: 102 psi-145 psi (7-10 bar)
Operating pressure: 15,200 psi (1,050 bar)

Materials

Valve body: 1.4404 (SST 316L)
Valve stem: 1.4980
Seal needle valve: UHMWPE

Dimensions

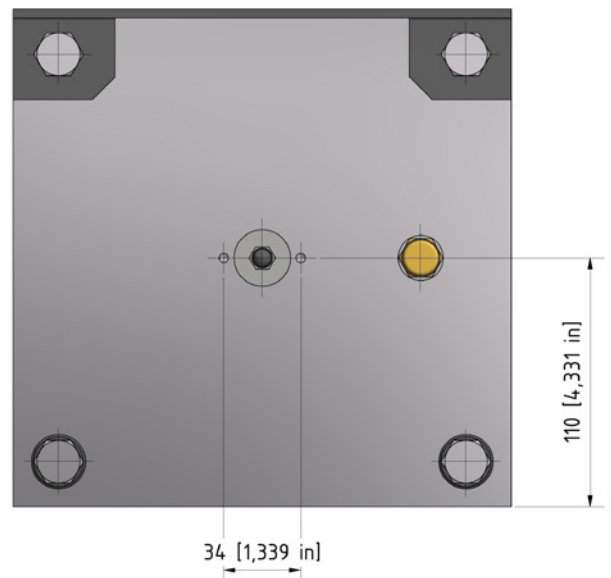
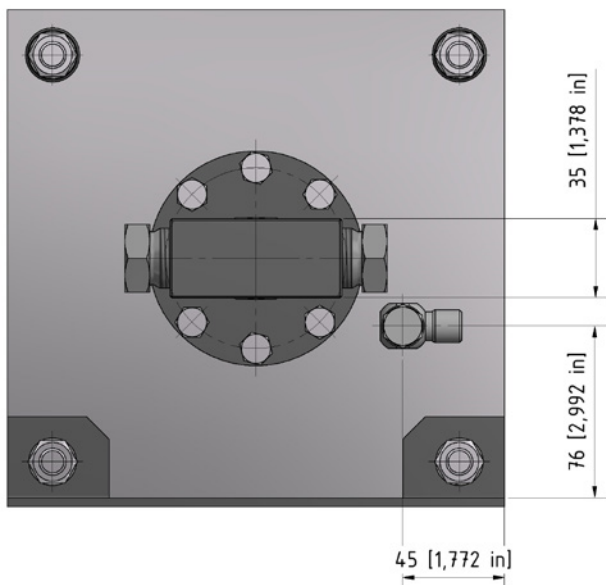
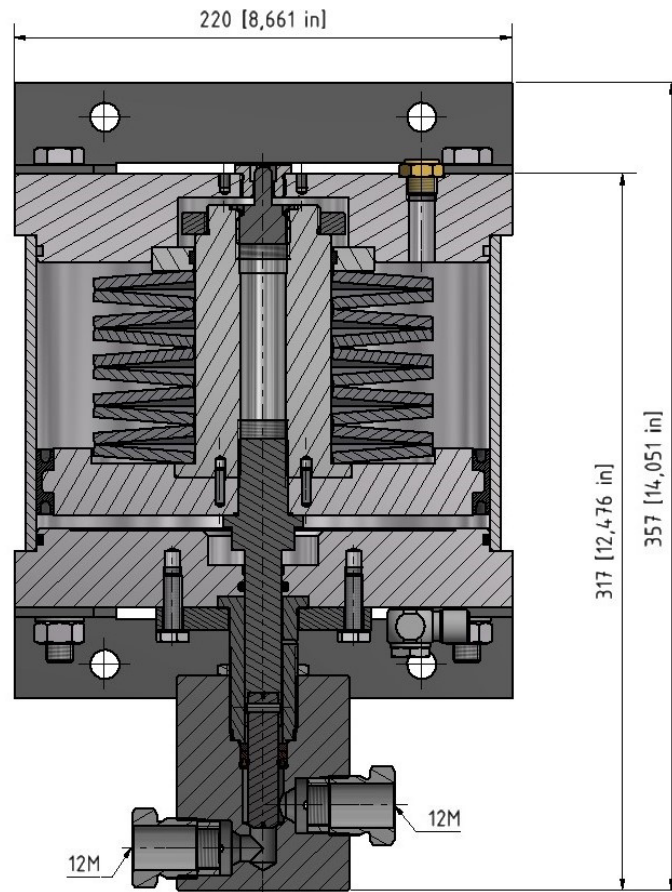
Height: 357 mm
Net weight: 24.4 kg
Width: 200 mm x 220 mm
Orifice: 11.1 mm
Actuator: 8MNC



The valves are marked with an EX sign and are in conformity to Group II Category 2G Explosion group IIC constructive safety.

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Ordering Information
Typical catalog number:
15V12M071-H2-8MNC



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Discover the future of valve technology with ValvolutionX!

Our new ValvolutionX valve series offers maximum precision, reliability and efficiency. Developed for demanding hydrogen applications, ValvolutionX sets new standards in high-pressure valve technology.

Benefit from innovative functions and an ultra-compact design that optimise your processes and increase your productivity. Put your trust in ValvolutionX - the perfect solution for your requirements.

Compared to conventional high-pressure needle valves with compressed air actuators, ValvolutionX breaks new grounds with:



Space Reduction



Service Time Reduction



Weight Reduction

MAXIMATOR®
maximum pressure



Valvolution

The New Ultra Compact
Air Actuated H2 Valve

ValvolutionX-Series



Ultra Compact Air Actuated H₂ Valves

- Compact valve series for hydrogen refuelling stations
- Use for shut-off and distribution at gas storage banks

15 VX Valve Series	16M O.D. Tube Size	Valve Body Type	Body Pattern	Configuration
15 VX	9M – 9/16"	1 - flat design	11 - two-way one bottom & one top connection	PNC = Air-drive normally closed
	12M – 3/4"			
	16M – 1"			

Technical Data and Dimensions

Technical Data

Operating temperature*: -40°F / 185°F (-40°C / +85°C)
Ambient temperature: -40°F / 140°F (-40°C / +60°C)

Drive pressure: 73 psi-145 psi (5-10 bar)
Operating pressure: 15,200 psi (1,050 bar)
Rated c_v : 2.4

Materials

Valve body: 1.4404 (SST 316L)

Dimensions

Height / Length / Width: 9.9 / 6.3 / 3.4 in
(251 / 161 / 87.5 mm)

Net weight: approx. 10 kg
Internal Orifice**: 0.44 in (11.2 mm)

Connections

Air supply (PL): 1/8" BSP
High pressure port (A): 9M / 12M / 16M
Leakage port (Z1/Z2): 1/8" BSP

* Design Temperature. Please consult factory for further information and application consultancy.

** Internal Orifice; reduced effective orifice in accordance with connection / tubing orifice (9M/12M)

Features



Space reduction



In-situ maintenance



High pressure leakage
connections



Weight reduction



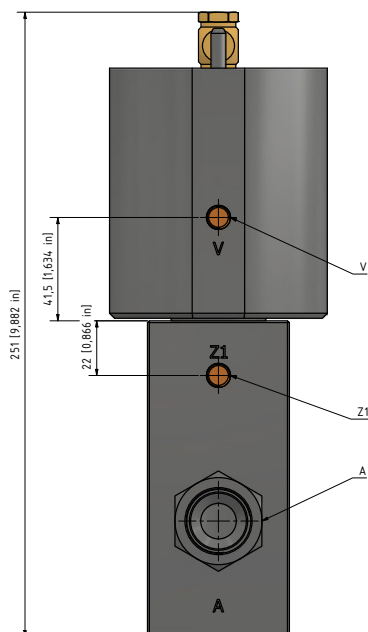
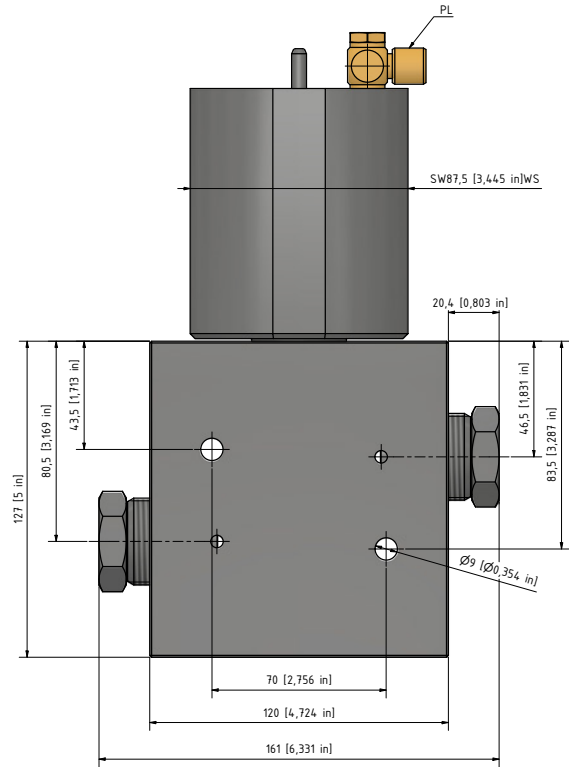
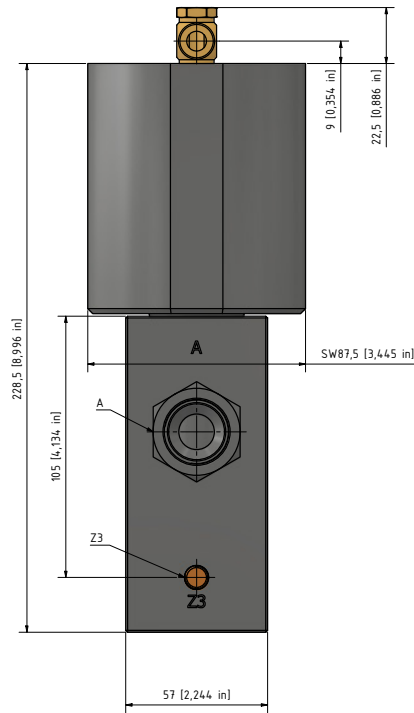
Bidirectional operation



Convincing service life

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Ordering Information
Typical catalog number:
15VX16M111-PNC



Medium Pressure Fittings

Pressures to 22,500 psi (1,550 bar)



Medium pressure fittings

Maximator medium pressure fittings are designed for use with the 15V series hydrogen valves and 21V series medium pressure valves and medium pressure tubing. All medium pressure fittings have coned and threaded type connections. Mounting holes are standard on all elbows, tees and crosses.

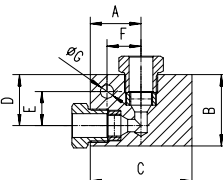
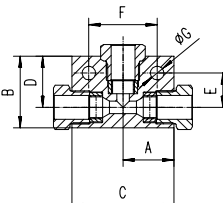
Connection Components

All medium pressure fittings are supplied with glands and collars. Refer to the adjacent chart for ordering any of the connection components individually. When using the plug, the collar is not needed.

Tubing Size in. (mm)	Gland	Collar	Plug	Tubing Cap
1/4 (6.35)	21G4M	21C4M	21P4M	21TC4M
3/8 (9.53)	21G6M	21C6M	21P6M	21TC6M
9/16 (14.29)	21G9M	21C9M	21P9M	21TC9M
3/4 (19.05)	21G12M	21C12M	21P12M	21TC12M
1 (25.4)	21G16M	21C16M	21P16M	21TC16M

Materials:

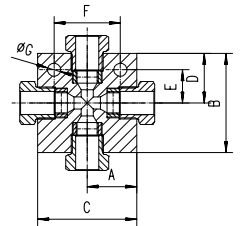
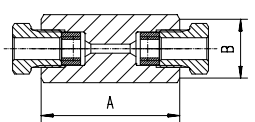
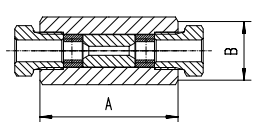
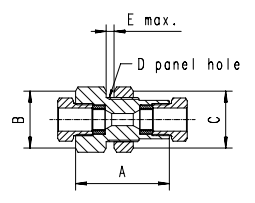
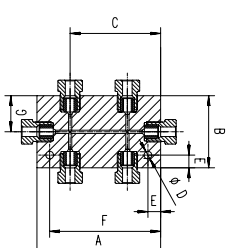
- Fitting body: 1.4404 (SST 316L)
- Gland, collar: 1.4404 (SST 316L)

Fitting Pattern	Catalog Number	Connection Type	O.D. Tube Size in.	Orifice in. (mm)	Dimensions in. (mm)							Block Thickness
					A	B	C	D	E	F	G	
Elbow												
	21L4M	4MF	1/4	0.106 (2.7)	0.75 (19.1)	1.10 (28)	1.54 (39.1)	0.75 (19.1)	0.49 (12.5)	0.49 (12.5)	0.22 (5.6)	0.63 (16)
	21L6M	6MF	3/8	0.201 (5.1)	1.00 (25.4)	1.38 (35)	2.00 (50.8)	1.00 (25.4)	0.63 (16)	0.63 (16)	0.26 (6.6)	0.79 (20.1)
	21L9M	9MF	9/16	0.307 (7.8)	1.25 (31.8)	1.75 (44.5)	2.50 (63.5)	1.25 (31.8)	0.84 (21.3)	0.84 (21.3)	0.33 (8.4)	1.02 (25.9)
	21L12M	12MF	3/4	0.438 (11.1)	1.50 (38.1)	2.25 (57.2)	3.00 (76)	1.50 (38.1)	1.00 (25.4)	1.00 (25.4)	0.35 (8.9)	1.38 (35)
	21L16M	16MF	1	0.562 (14.3)	2.06 (52.3)	3.00 (76)	4.13 (105)	2.06 (52.3)	1.38 (35)	1.38 (35)	0.53 (13.5)	1.77 (45)
Tee												
	21T4M	4MF	1/4	0.106 (2.7)	0.75 (19.1)	1.10 (28)	1.54 (39.1)	0.75 (19.1)	0.49 (12.5)	0.98 (25)	0.22 (5.6)	0.63 (16)
	21T6M	6MF	3/8	0.201 (5.1)	1.00 (25.4)	1.38 (35)	2.00 (50.8)	1.00 (25.4)	0.63 (16)	1.26 (32)	0.26 (6.6)	0.79 (20.1)
	21T9M	9MF	9/16	0.307 (7.8)	1.25 (31.8)	1.75 (44.5)	2.50 (63.5)	1.25 (31.8)	0.84 (21.3)	1.67 (42.6)	0.33 (8.4)	1.02 (25.9)
	21T12M	12MF	3/4	0.438 (11.1)	1.50 (38.1)	2.25 (57.2)	3.00 (76)	1.50 (38.1)	1.00 (25.4)	2.00 (50.8)	0.35 (8.9)	1.38 (35)
	21T16M	16MF	1	0.562 (14.3)	2.06 (52.3)	3.00 (76)	4.13 (105)	2.06 (52.3)	1.38 (35)	2.76 (70)	0.53 (13.5)	1.77 (45)

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Medium Pressure Fittings

Pressures to 22,500 psi (1,550 bar)

Fitting Pattern	Catalog Number	Connection-Type	O.D. Tube Size in.	Orifice in. (mm)	Dimensions in. (mm)							Block Thickness
					A	B	C	D	E	F	G	
Cross												
	21X4M	4MF	1/4	0.106 (2.7)	0.77 (19.5)	1.54 (39.1)	1.54 (39.1)	0.77 (19.5)	0.49 (12.5)	0.98 (25)	0.22 (5.6)	0.63 (16)
	21X6M	6MF	3/8	0.201 (5.1)	1.00 (25.4)	2.00 (50.8)	2.00 (50.8)	1.00 (25.4)	0.63 (16)	1.26 (32)	0.26 (6.6)	0.79 (20.1)
	21X9M	9MF	9/16	0.307 (7.8)	1.25 (31.8)	2.50 (63.5)	2.50 (63.5)	1.25 (31.8)	0.84 (21.3)	1.67 (42.6)	0.33 (8.4)	1.02 (25.9)
	21X12M	12MF	3/4	0.438 (11.1)	1.50 (38.1)	3.00 (76)	3.00 (76)	1.50 (38.1)	1.00 (25.4)	2.00 (50.8)	0.35 (8.9)	1.38 (35)
	21X16M	16MF	1	0.562 (14.3)	2.06 (52.3)	4.13 (105)	4.13 (105)	2.06 (52.3)	1.38 (35)	2.76 (70)	0.53 (13.5)	1.77 (45)
Straight Coupling / Union Coupling												
<div><div>Straight Coupling</div><div>Union Coupling</div></div>	21F4M	4MF	1/4	0.106 (2.7)	1.62 (41.1)	0.69 (17.5)	Straight Coupling					
	21UF4M						Union Coupling					
	21F6M	6MF	3/8	0.201 (5.1)	1.75 (44.5)	0.88 (22.3)	Straight Coupling					
	21UF6M						Union Coupling					
	21F9M	9MF	9/16	0.307 (7.8)	2.12 (53.8)	1.06 (27)	Straight Coupling					
	21UF9M						Union Coupling					
	21F12M	12MF	3/4	0.438 (11.1)	2.50 (63.5)	1.44 (36.5)	Straight Coupling					
	21UF12M						Union Coupling					
	21F16M	16MF	1	0.562 (14.3)	3.50 (88.9)	2.00 (50.8)	Straight Coupling					
	21UF16M						Union Coupling					
Bulkhead Coupling												
	21BF4M	4MF	1/4	0.106 (2.7)	1.88 (47.8)	1.06 (27)	1.06 (27)	0.94 (23.9)	0.67 (17)			
	21BF6M	6MF	3/8	0.201 (5.1)	2.01 (51)	1.06 (27)	1.06 (27)	0.94 (23.9)	0.39 (9.9)			
	21BF9M	9MF	9/16	0.307 (7.8)	2.38 (60.5)	1.44 (36.5)	1.44 (36.5)	1.12 (28.5)	0.39 (9.9)			
	21BF12M	12MF	3/4	0.438 (11.1)	2.81 (71.4)	1.62 (41.3)	1.62 (41.3)	1.37 (34.8)	0.47 (11.9)			
	21BF16M	16MF	1	0.562 (14.3)	3.54 (89.9)	2.00 (50.8)	2.00 (50.8)	1.68 (42.6)	0.51 (13)			
Manifold Block												
	21MB64M	4MF	1/4	0.106 (2.7)	3.39 (86)	1.54 (39.1)	2.6 (66)	0.22 (5.5)	0.28 (7)	3.11 (79)	0.77 (19.5)	0.63 (16)
	21MB66M	6MF	3/8	0.201 (5.1)	3.39 (86)	2.00 (50.8)	2.38 (60.5)	0.26 (6.5)	0.37 (9.5)	3.01 (76.5)	1.00 (25.5)	0.79 (20.1)
	21MB69M	9MF	9/16	0.307 (7.8)	5.12 (130)	2.50 (63.5)	3.86 (98)	0.33 (8.5)	0.41 (10.5)	4.7 (119.5)	1.25 (31.75)	1.02 (25.9)
	21MB612M	12MF	3/4	0.438 (11.1)	6.50 (165)	3.00 (76)	5.00 (127)	0.35 (9)	0.49 (12.5)	6.00 (152.5)	1.5 (38)	1.38 (35)
	21MB616M	16MF	1	0.562 (14.3)	7.25 (191)	4.13 (105)	5.45 (138.5)	0.53 (13.5)	0.69 (17.5)	6.83 (173.5)	2.07 (52.5)	1.77 (45)

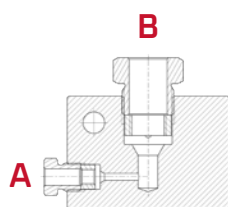
Medium Pressure Fittings - variable connections

Pressures to 22,500 psi (1,550 bar)

Medium pressure fittings with variable connections

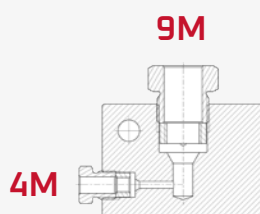
Maximator also offers medium pressure elbow, tee and cross fittings with variable connections. The dimensions depend on the largest connection type. All medium pressure fittings have coned and threaded type connections. Mounting holes are standard on all elbows, tees and crosses.

Elbow



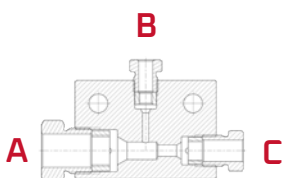
Catalog Number **21L** A B

Example:



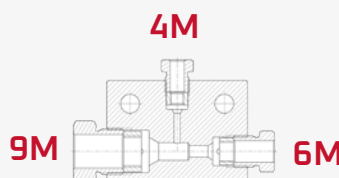
Catalog Number
21L **4M** **9M**
A B
Largest connection type*

Tee



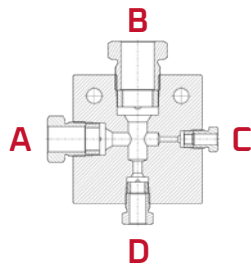
Catalog Number **21T** A B C

Example:



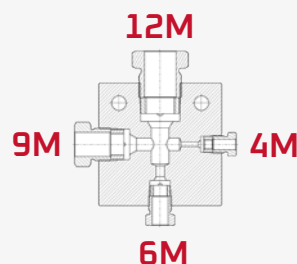
Catalog Number
21T **9M** **4M** **6M**
A B C
Largest connection type*

Cross



Catalog Number **21X** A B C D

Example:



Catalog Number
21X **9M** **12M** **4M** **6M**
A B C D
Largest connection type*

* All dimensions can be found on the previous pages.

Anti-Vibration Collet Gland Assembly

Pressures to 22,500 psi (1,550 bar)



Anti-vibration collet gland assemblies

Maximator anti-vibration collet gland assemblies are for use in applications where there could be extreme external mechanical vibrations or shock in tubing lines. These collet gland assemblies are interchangeable with the standard medium pressure coned and threaded tube connections.

In a normal coned and threaded tube connection, any external mechanical loading on the tubing lines, valves or fittings would be concentrated on the first thread of the tube. This can cause failure of the tube at this thinner cross-section. The anti-vibration collet gland assembly grips the tube behind the connection, supporting the tube at the full cross-section and straight area, moving the loading away from the threaded area.

The back part of the assembly has a gland nut that, when tightened properly, compresses a split collet on the tube, providing the beneficial gripping action. All anti-vibration collet gland assemblies come with a Molybdenum Disulfide Coating to guard against galling of the stainless components.

Gland Pattern	Catalog Number	Part	O.D. Tubing Size in.	Dimensions in. (mm)		
				A	B (Hex.)	C (Hex.)
	21AVA4M	Complete Assembly	1/4	1.27 (32.2)	0.50 (12.7)	0.62 (15.7)
	21AVB4M	Collet Body				
	21AVC4M	Slotted Collet				
	21AVG4M	Gland Nut				
	21AVA6M	Complete Assembly	3/8	1.54 (39.1)	0.62 (15.7)	0.81 (20.6)
	21AVB6M	Collet Body				
	21AVC6M	Slotted Collet				
	21AVG6M	Gland Nut				
	21AVA9M	Complete Assembly	9/16	1.82 (46.2)	0.94 (23.9)	0.94 (23.9)
	21AVB9M	Collet Body				
	21AVC9M	Slotted Collet				
	21AVG9M	Gland Nut				
	21AVA12M	Complete Assembly	3/4	2.01 (51)	1.19 (30.2)	1.25 (31.8)
	21AVB12M	Collet Body				
	21AVC12M	Slotted Collet				
	21AVG12M	Gland Nut				
	21AVA16M	Complete Assembly	1	2.44 (62)	1.38 (35)	1.50 (38.1)
	21AVB16M	Collet Body				
	21AVC16M	Slotted Collet				
	21AVG16M	Gland Nut				

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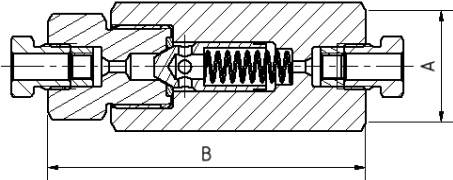
Check Valves

Pressures to 22,500 psi (1,550 bar)



Cone Check Valves

Especially for hydrogen applications, where best of class sealing ability is required, Maximator developed their cone check valve series design with a highly media compatible soft sealing system and improved spring guide. This series is available for Medium Pressure applications up to 22,500 psi (1.550 bar) with 4M to 16M connection.

Valve Pattern	Catalog Number	Connection Type	Pressure Rating psi (bar)	Orifice in. (mm)	Rated (Cv)	Dimensions in. (mm)	
						A (Hex.)	B
Cone Check Valves							
	21CC4M-H2	4MF	22,500 (1,550)	0.106 (2.7)	0.28	0.88 (22.3)	2.91 (73.9)
	21CC6M-H2	6MF	22,500 (1,550)	0.201 (5.1)	0.84	1.06 (27)	3.31 (84.1)
	21CC9M-H2	9MF	22,500 (1,550)	0.307 (7.8)	2.30	1.44 (36.5)	4.29 (109)
	21CC12M-H2	12MF	22,500 (1,550)	0.438 (11.1)	4.70	2.00 (50.8)	5.35 (136)
	21CC16M-H2	16MF	22,500 (1,550)	0.562 (14.3)	7.40	2.00 (50.8)	6.88 (175)

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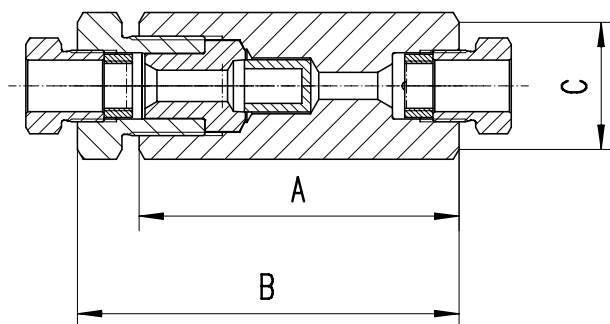
Line Filters

Pressures to 22,500 psi (1,550 bar)

Cup-Type Line Filters

Maximator Cup-Type Line Filters are used when maximum filtration surface area and a single micron size element is preferred. This design increases the filter area as much as 6 times the area of the disc type filter, and will permit higher flow rates with a lower pressure drop, and longer intervals between element changes.

Filter elements come standard in 5, 30, or 56 micron sizes and are easily replaced. Filters are rated for temperatures -423°F to 660°F (-252°C to 350°C). All line filters come with glands and collars.



Materials:

- Body, cover, cover gland: 1.4404 (SST 316L)
- Element: 1.4404 (SST 316L)

Catalog Number	Pressure Rating psi (bar)	Orifice in. (mm)	Micron Size	Connection Type	Filter Element Area in. ² (mm ²)	Dimensions in. (mm)		
						A	B	C (Hex.)
Cup-Type Line Filters								
21CF4 M-5	22,500 (1,550)	0.106 (2.7)	5	4MF	0.82 (530)	2.38 (60.5)	2.87 (72.9)	0.88 (22.3)
21CF4 M-30			30					
21CF4M-56			56					
21CF6 M-5	22,500 (1,550)	0.201 (5.1)	5	6MF	0.82 (530)	2.83 (71.8)	3.35 (85.1)	1.06 (27)
21CF6 M-30			30					
21CF6M-56			56					
21CF9 M-5	22,500 (1,550)	0.307 (7.8)	5	9MF	1.55 (1,000)	3.63 (92.2)	4.33 (110)	1.44 (36.5)
21CF9 M-30			30					
21CF9M-56			56					
21CF12M-5	22,500 (1,550)	0.438 (11.1)	5	12MF	6.14 (3,960)	5.75 (146)	6.57 (166.9)	2.00 (50.8)
21CF12M-30			30					
21CF12M-56			56					
21CF16M-5	22,500 (1,550)	0.562 (14.3)	5	16MF	6.14 (3,960)	5.75 (146)	6.57 (166.9)	2.00 (50.8)
21CF16M-30			30					
21CF16M-56			56					

It is recommended that all fluids entering a high pressure system be thoroughly cleaned.

Maximator filters are designed to remove small amounts of process particles. Pressure differential should not exceed 1000 psi across the filter elements.

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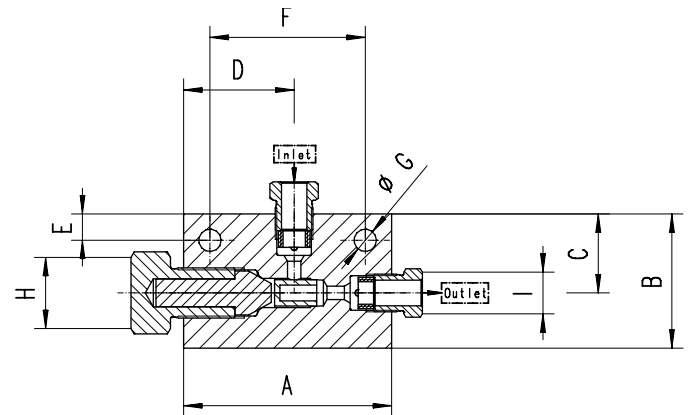
Angle Filters

Pressures to 22,500 psi (1,550 bar)

Angle Filters

Maximator Angle Filters are used to filter gases or liquids in high pressure systems. The filter elements can be easily changed in-situ. The special design allows the exchange of the filter element without the need to first disassemble the filter in front of the tubing. Filter elements are made of sintered material with pore sizes of 5 µm,

30 µm or 56 µm. Filters are rated for temperatures -423°F to 660°F (-252°C to 350°C). All angle filters come with glands and collars.



Materials:

- Body, cover, cover gland: 1.4404 (SST 316L)
- Element: 1.4404 (SST 316L)

Catalog Number	Pressure Rating psi (bar)	Orifice in. (mm)	Con-nection Type	Micron Size	Filter Element Areas in. ² (mm ²)	Dimensions in. (mm)									Block Thick-ness
						A	B	C	D	E	F	G	H (Hex.)	I (Hex.)	
Angle Filter															
21AF4M-5	22,500 (1,550)	0.106 (2.7)	4M	5	0.82 (530)	3.11 (79)	2.01 (51)	1.18 (30)	1.65 (42)	0.39 (10)	2.32 (59)	0.34 (8.5)	1.06 (27)	0.50 (12.7)	1.02 (26)
21AF4M-30				30											
21AF4M-56				56											
21AF6M-5	22,500 (1,550)	0.201 (5.1)	6M	5	0.82 (530)	3.11 (79)	2.01 (51)	1.18 (30)	1.65 (42)	0.39 (10)	2.32 (59)	0.34 (8.5)	1.06 (27)	0.50 (12.7)	1.02 (26)
21AF6M-30				30											
21AF6M-56				56											
21AF9M-5	22,500 (1,550)	0.307 (7.8)	9M	5	1.55 (1,000)	3.62 (92)	2.64 (67)	1.61 (41)	1.81 (46)	0.51 (13)	2.17 (55)	0.34 (8.5)	1.19 (30.2)	0.94 (23.8)	1.54 (39)
21AF9M-30				30											
21AF9M-56				56											
21AF12M-5	22,500 (1,550)	0.438 (11.1)	12M	5	6.14 (3,960)	5.71 (145)	3.54 (90)	2.3 (57.2)	2.44 (62)	0.39 (10)	4.92 (125)	0.34 (8.5)	2.00 (50.8)	1.19 (30.2)	2.25 (57.15)
21AF12M-30				30											
21AF12M-56				56											
21AF16M-5	22,500 (1,550)	0.562 (14.3)	16M	5	6.14 (3,960)	5.71 (145)	3.54 (90)	2.3 (57.2)	2.44 (62)	0.39 (10)	4.92 (125)	0.34 (8.5)	2.00 (50.8)	1.38 (34.9)	2.25 (57.15)
21AF16M-30				30											
21AF16M-56				56											

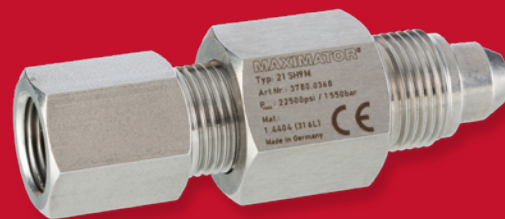
It is recommended that all fluids entering a high pressure system be thoroughly cleaned.

Maximator filters are designed to remove small amounts of process particles. Pressure differential should not exceed 1000 psi across the filter elements.

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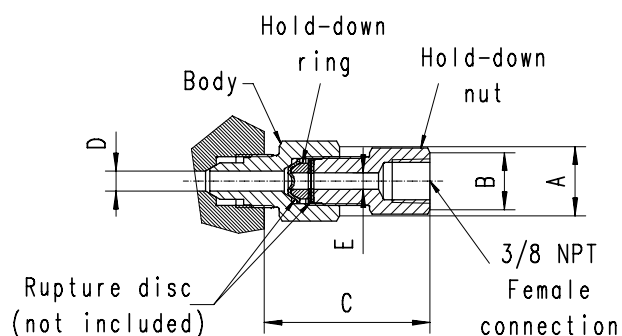
Safety Head Assembly

Pressures to 22,500 psi (1,550 bar)



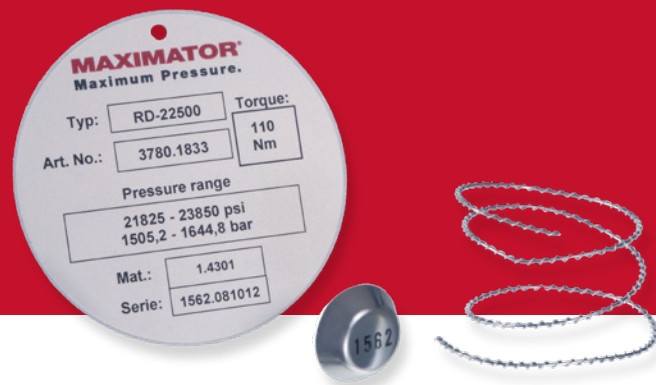
Safety Head Assemblies

Maximator safety head assemblies are used to provide over-pressure protection to high pressure systems. These safety head assemblies are to be used with the appropriate 1/4" angular rupture disc listed on the next page.



Safety Head Assembly Catalog Number without Disc	Fits Connection Type	Pressure Rating psi (bar)	Body Torque ft - lbs. (Nm)	Dimensions in. (mm)				
				A (Hex.)	B (Hex.)	C (LG.)	D (I.D.)	E (I.D.)
21SH4M	4MF	22,500 (1,550)	20 (30)	1.06 (27)	0.88 (22.3)	2.48 (63)	0.109 (2.8)	0.250 (6.3)
21SH6M	6MF	22,500 (1,550)	30 (40)	1.06 (27)	0.88 (22.3)	2.72 (69.1)	0.203 (5.1)	0.250 (6.3)
21SH9M	9MF	22,500 (1,550)	55 (75)	1.06 (27)	0.88 (22.3)	2.51 (63.7)	0.255 (6.5)	0.250 (6.3)
21SH12M	12MF	22,500 (1,550)	90 (120)	1.19 (30.2)	0.88 (22.3)	2.72 (69.1)	0.307 (7.8)	0.250 (6.3)
21SH16M	16MF	22,500 (1,550)	150 (200)	1.44 (36.6)	0.88 (22.3)	2.72 (69.1)	0.307 (7.8)	0.250 (6.3)

1/4" Rupture Discs



1/4" Rupture discs

1/4" angular and flat seat rupture discs are designed to be used with the safety head assemblies that are shown on page 13. Minimum rupture disc pressure ratings should be at least 110% of system operating pressure. The standard material is 1.4404 (SST 316L). The pressure ranges indicated in the table below are at room temperature (22°C/72°F).

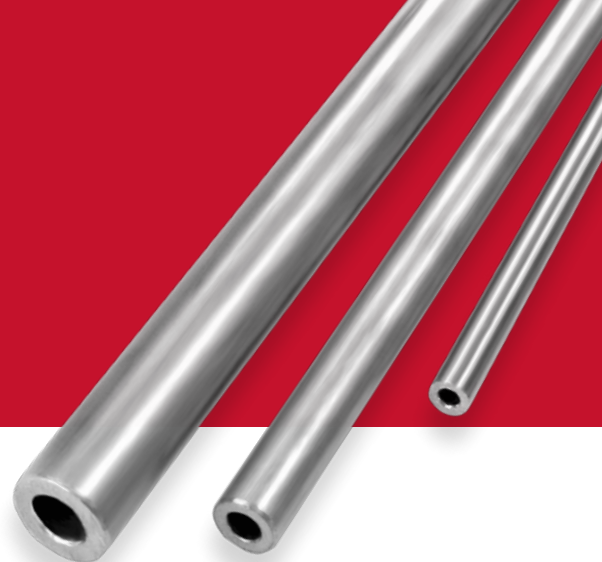
Other materials and pressure ranges are available upon request.

Rupture Discs are individually packed and marked type plate.

Catalog Number	Pressure range psi (bar)
RD-9000-H2	8,730 - 9,540 (602.1 - 657.9)
RD-9500-H2	9,215 - 10,070 (635.5 - 694.5)
RD-10000-H2	9,700 - 10,600 (669 - 731)
RD-11000-H2	10,670 - 11,660 (735.9 - 804.1)
RD-12000-H2	11,640 - 12,720 (802.8 - 877.2)
RD-13000-H2	12,610 - 13,780 (869.7 - 950.3)
RD-14000-H2	13,580 - 14,840 (936.6 - 1023.4)
RD-15000-H2	14,550 - 15,900 (1,003.4 - 1,096.6)
RD-16000-H2	15,520 - 16,960 (1,070.3 - 1,169.7)
RD-17000-H2	16,490 - 18,020 (1,137.2 - 1,242.8)
RD-18000-H2	17,460 - 19,080 (1,204.1 - 1,315.9)
RD-19000-H2	18,430 - 20,140 (1,271 - 1,389)
RD-20000-H2	19,400 - 21,200 (1,337.9 - 1,462.1)
RD-21000-H2	20,370 - 22,260 (1,404.8 - 1,535.2)
RD-22000-H2	21,340 - 23,320 (1,471.7 - 1,608.3)

Medium Pressure Tubing

Pressures to 22,500 psi (1,550 bar)



Medium Pressure Tubing

Maximator offers a line of cold drawn thick wall tubing, with flow areas to compliment the large orifice medium pressure valves and fittings. This tubing is made under strict manufacturing and quality control standards and inspections, with dimensional tolerances to match the requirements of the medium pressure coned and threaded connections.

The standard material is 1.4404 (SST 316L). Other materials may be provided on special request, depending on the specific material, diameters and lengths.

Tubing Tolerances

Normal Tubing Size in. (mm)	Tolerance O.D in. (mm)
1/4 (6.35)	0.248 / 0.243 (6.299 / 6.172)
3/8 (9.53)	0.370 / 0.365 (9.398 / 9.271)
9/16 (14.29)	0.557 / 0.552 (14.147 / 14.021)
3/4 (19.05)	0.745 / 0.740 (18.923 / 18.796)
1 (25.4)	0.995 / 0.990 (25.273 / 25.174)

Catalog Number	Tube Material	Fits Connection Type	Tube Size in. (mm)	Tube Size in. (mm)	Working Pressure psi (bar)				
			O.D.	I.D.	-325°F to 100°F (-198°C to 37°C)	200°F (93°C)	400°F (204°C)	600°F (315°C)	800°F (426°C)
21TU4M-316	1.4404 SST 316L	4MF	1/4	0.109 (2.77)	22,500 (1,550)	18,900 (1,300)	17,430 (1,200)	15,960 (1,100)	15,120 (1,040)
21TU6M-316		6MF	3/8	0.203 (5.17)	22,500 (1,550)	18,900 (1,300)	17,430 (1,200)	15,960 (1,100)	15,120 (1,040)
21TU9M-316		9MF	9/16	0.312 (7.93)	22,500 (1,550)	18,900 (1,300)	17,430 (1,200)	15,960 (1,100)	15,120 (1,040)
15TU9M-316		9MF	9/16	0.359 (9.12)	15,200 (1,050)	13,680 (940)	12,616 (870)	11,552 (790)	10,944 (750)
21TU12M-316		12M	3/4	0.438 (11.13)	22,500 (1,550)	18,900 (1,300)	17,430 (1,200)	15,960 (1,100)	15,120 (1,040)
15TU12M-316				0.516 (13.11)	15,200 (1,050)	13,680 (940)	12,616 (870)	11,552 (790)	10,944 (750)
21TU16M-316		16MF	1	0.562 (14.27)	22,500 (1,550)	18,900 (1,300)	17,430 (1,200)	15,960 (1,100)	15,120 (1,040)
15TU16M-316				0.688 (17.48)	15,200 (1,050)	13,680 (940)	12,616 (870)	11,552 (790)	10,944 (750)

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Coned and Threaded Nipples

Pressures to 22,500 psi (1,550 bar)



Coned and threaded nipples

Maximator offers a line of coned and threaded medium pressure tube nipples in a variety of lengths for all standard tube sizes. The coned and threaded medium pressure tube nipples are available in 1.4404 (SST 316L).

They are also available in the 15,200 psi (1,050 bar) or 22,500 psi (1,550 bar) versions for the 9/16", 3/4" and 1" OD tube sizes. See chart below for ordering information.

Special length coned and threaded nipples are available upon request. Consult Maximator for availability and price.

Catalog Numbers are 1.4404 (SST 316L) material							Fits Connec- tion Type	Tube Size in. (mm)	Tube Size in. (mm)	Working Pressure at 100°F psi (bar)
2.75" (69.85) Length	3" (76.2) Length	4" (101.6) Length	6" (152.4) Length	8" (203.2) Length	10" (254) Length	12" (304.8) Length		O.D.	I.D.	
21N4M-2.75-316	21N4M-3-316	21N4M-4-316	21N4M-6-316	21N4M-8-316	21N4M-10-316	21N4M-12-316	4MF	1/4	0.109 (2.77)	22,500 (1,550)
	21N6M-3-316	21N6M-4-316	21N6M-6-316	21N6M-8-316	21N6M-10-316	21N6M-12-316	6MF	3/8	0.203 (5.17)	22,500 (1,550)
		21N9M-4-316	21N9M-6-316	21N9M-8-316	21N9M-10-316	21N9M-12-316	9MF	9/16	0.312 (7.93)	22,500 (1,550)
		15N9M-4-316	15N9M-6-316	15N9M-8-316	15N9M-10-316	15N9M-12-316	9MF	9/16	0.359 (9.12)	15,200 (1,050)
			21N12M-6-316	21N12M-8-316	21N12M-10-316	21N12M-12-316	12MF	3/4	0.438 (11.13)	22,500 (1,550)
			15N12M-6-316	15N12M-8-316	15N12M-10-316	15N12M-12-316	12MF	3/4	0.516 (13.11)	15,200 (1,050)
			21N16M-6-316	21N16M-8-316	21N16M-10-316	21N16M-12-316	16MF	1	0.562 (14.27)	22,500 (1,550)
			15N16M-6-316	15N16M-8-316	15N16M-10-316	15N16M-12-316	16MF	1	0.688 (17.48)	15,200 (1,050)

Standard nipples are not supplied with glands and collars.

For further available options and more detailed information please refer to our VFT catalogue.

Tools

Cone & Threading-Toolbox

VFT-ToolBoXX Type CTTB

The MAXIMATOR VFT-ToolBoXX Type CTTB provides order and clarity for your coning and threading tools.

The ToolBoXX is available in 3 versions:

- **Complete:** tube dimension 1/4", 3/8" and 9/16" of the Medium, High and Ultra High Pressure series
- **Medium Pressure:** tube dimension 1/4", 3/8" and 9/16" of the Medium series
- **High Pressure:** tube dimension 1/4", 3/8" and 9/16" of the High and Ultra High Pressure series

By using a pre-formed foam inlay each tool has its defined place in the ToolBoXX:

- Coning tool, complete
- Collet chuck and cutting plate
- Threading tool complete and cutting oil
- Guide bushings and threading dies
- Deburring tool with 2 deburring heads
- Step-by-step instruction
- L-BoXX tool case, impact-resistant (ABS plastics)



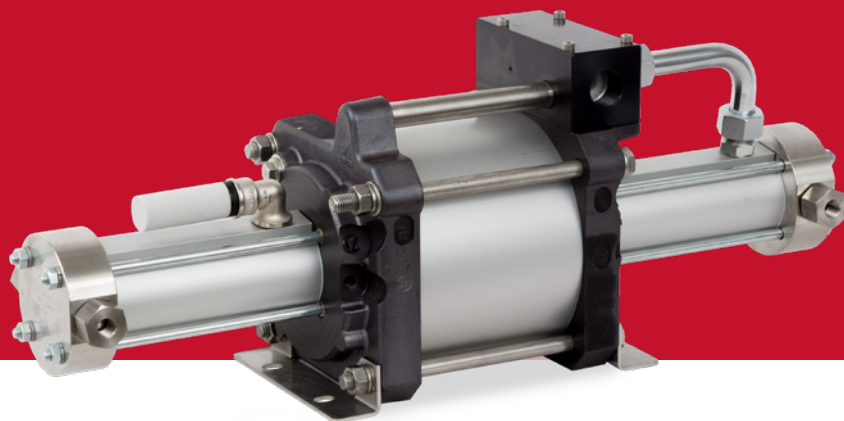
1. Coning tool
2. Chuck key
3. Collet chuck
4. Coning Blades
5. Threading tool
6. Guide bushing & threading dies
7. Cutting oil 100 ml
8. Deburring tool
9. Deburring head $\varnothing 10,4$ & $\varnothing 16,5$ mm

Catalogue key	Connection Type	Description
CTTB-M-H/U	-M-H/U	Medium, High and Ultra High Pressure
CTTB-M	-M	Medium Pressure
CTTB-H/U	-H/U	High and Ultra High Pressure

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Gas Boosters

Type DLE



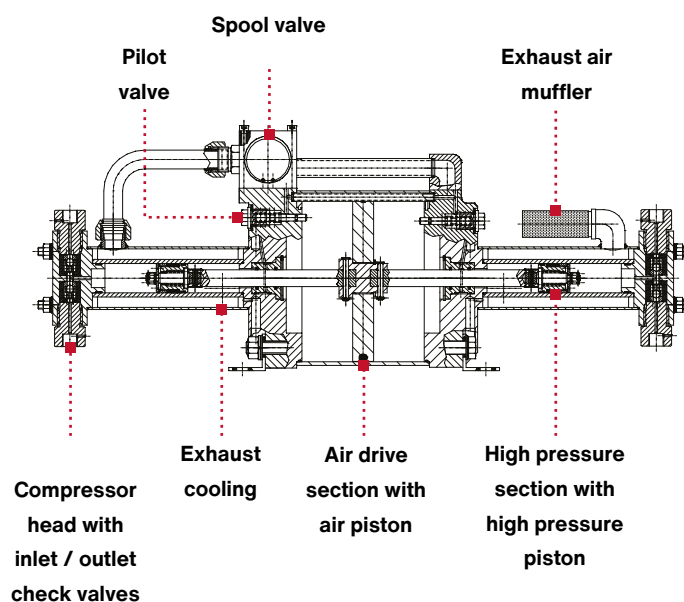
High pressure gas boosters – the Maximator concept

The Maximator high pressure gas boosters are suitable for the oil free compression of gases and air. Industrial gases like argon, helium, nitrogen and hydrogen can be compressed to operating pressures of 2,400 bar (36,000 psi) and oxygen up to 350 bar (5,075 psi), depending on the application. Air driven gas boosters are an efficient alternative instead of electrically driven products and can be used in explosion-proof areas (according to 2014/34/EU).

The gas boosters in detail

Features at a glance

- Pressure regulation via manual pressure regulator or pneumatically actuated valve
- Operation with compressed air allows use in explosion-proof areas
- Gas booster automatically stops operating upon reaching pre-selected final pressure
- Gas booster restarts automatically to compensate leaks
- No power consumption during long pressure holding periods
- No heat generation during pressure holding period
- Easy installation and trouble-free handling of gas boosters
- Low maintenance thanks to reliable, easy-to-install devices
- Effective cooling of the high pressure cylinders through integrated exhaust air cooling



Function and operation

The Maximator gas boosters' operating principle is similar to a pressure intensifier. A large air piston is charged with low pressure (air piston) and works on a small area with high pressure (high pressure piston).

The continuous operation is achieved by a pilot operated 4/2 way valve (spool valve). The spool valve applies the drive air alternately to the upper and bottom surface of the air piston.

The spool is piloted through two 2/2 way valves (pilot valves) which are mechanically actuated through the air piston in its end positions. The pilot valves charge and discharge the spool chamber.

The high pressure piston supported by the check valves (inlet check valve and outlet check valve) delivers the flow.

The outlet pressure is directly related to the set air drive pressure. According to the formulas indicated in the technical features table for the gas boosters, the static end pressure can be calculated.

At this pressure a force balance between drive section and gas section is achieved. The booster stalls when this end pressure is reached, and does not consume any further air.

A pressure drop at the high pressure side or a pressure increase at the drive side starts the booster automatically until the force balance is achieved again.

Additionally the Maximator boosters can be switched on and off automatically through Maximator air pilot switches, contact gauges or external control devices.

Notice: Purging plans for compression of combustible gases using Maximator gas boosters are explained in detail in the operators manual available on our website www.maximator.de.

Overview of technical features and connections

Type	Stroke volume [cm ³]	max. working pressure	max. compression ratio	pressure ratio	max. operating temperature	gas inlet pressure		Connections		Recommended pipe internal diameter		
		p _B [bar]	e	i	T [°C]	min. p _A [bar]	max. p _A [bar]	Inlet A	Outlet B	p _L [mm]	p _A [mm]	p _B [mm]
DLE 2-1	922	20	1:10	1:2	60	0	20	G 1/2	G 1/2	19	13	13
DLE 5-1	373	50	1:15	1:5	60	2	50	G 1/2	G 1/2	19	13	13
DLE 15-1	122	150	1:20	1:15	100	7	150	G 1/4	G 1/4	19	6	4
DLE 30-1	60	300	1:20	1:30	100	15	300	G 1/4	G 1/4	19	6	4
DLE 75-1	25	750	1:20	1:75	100	35	750	G 1/4	G 1/4	19	6	4
DLE 2-1-2	922	40	1:10	1:4	60	0	40	G 1/2	G 1/2	19	13	13
DLE 5-1-2	373	100	1:15	1:10	60	4	100	G 1/2	G 1/2	19	13	13
DLE 15-1-2	122	300	1:20	1:30	100	10	300	G 1/4	G 1/4	19	6	4
DLE 30-1-2	60	600	1:20	1:60	100	20	600	G 1/4	G 1/4	19	6	4
DLE 75-1-2	25	1500	1:20	1:150	100	45	1500	G 1/4	G 1/4	19	6	4
DLE 2	1844	40	1:10	1:2	60	0	40	G 1/2	G 1/2	19	13	13
DLE 5	746	100	1:15	1:5	60	2	100	G 1/2	G 1/2	19	13	13
DLE 15	244	300	1:20	1:15	100	7	300	G 1/4	G 1/4	19	6	4
DLE 30	120	600	1:20	1:30	100	15	600	G 1/4	G 1/4	19	6	4
DLE 75	50	1500	1:20	1:75	100	35	1500	G 1/4	G 1/4	19	6	4
DLE 2-2	1844	40	1:10	1:4	60	0	40	G 1/2	G 1/2	19	13	13
DLE 5-2	746	100	1:15	1:10	60	4	100	G 1/2	G 1/2	19	13	13
DLE 15-2	244	300	1:20	1:30	100	10	300	G 1/4	G 1/4	19	6	4
DLE 30-2	120	600	1:20	1:60	100	20	600	G 1/4	G 1/4	19	6	4
DLE 75-2	50	1500	1:20	1:150	100	45	1500	G 1/4	G 1/4	19	6	4
DLE 2-5	922	70	1:25	1:2/1:5	60	0	0,8 x p _L	G 1/2	G 1/2	19	13	13
DLE 5-15	373	198	1:45	1:5/1:15	100	2	1,6 x p _L	G 1/2	G 1/4	19	13	4
DLE 5-30	373	330	1:90	1:5/1:30	100	2	0,5 x p _L	G 1/2	G 1/4	19	13	4
DLE 15-30	122	450	1:40	1:15/1:30	100	7	7,5 x p _L	G 1/4	G 1/4	19	6	4
DLE 15-75	122	875	1:100	1:15/1:75	100	7	2,5 x p _L	G 1/4	G 1/4	19	6	4
DLE 30-75	60	1050	1:50	1:30/1:75	100	15	12 x p _L	G 1/4	G 1/4	19	6	4
DLE 2-5-2	922	100	1:25	1:4/1:10	60	0	1,6 x p _L	G 1/2	G 1/2	19	13	13
DLE 5-15-2	373	300	1:45	1:10/1:30	100	2	3,2 x p _L	G 1/2	G 1/4	19	13	4
DLE 5-30-2	373	600	1:90	1:10/1:60	100	2	1 x p _L	G 1/2	G 1/4	19	13	4
DLE 15-30-2	122	600	1:40	1:30/1:60	100	7	15 x p _L	G 1/4	G 1/4	19	6	4
DLE 15-75-2	122	1500	1:100	1:30/1:150	100	7	5 x p _L	G 1/4	G 1/4	19	6	4
DLE 30-75-2	60	1500	1:50	1:60/1:150	100	15	24 x p _L	G 1/4	G 1/4	19	6	4
DLE 30-75-3	60	2400	1:50	1:90/1:225	100	30	30 x p _L	G 1/4	4H	19	4	6
8DLE 1,65	4100	100	1:10	1:1,65	100	0	100	G 1/2	G 1/2	19	13	13
8DLE 3	4100	40	1:15	1:3,3	60	0	40	G 1/2	G 1/2	19	13	13

p_L = Air drive pressure
p_A = Gas inlet pressure
p_B = Working pressure

i = Pressure ratio
e = Compression ratio (e = p_B/p_A)

Hydrogen Compressor Systems



High pressure technology for hydrogen applications

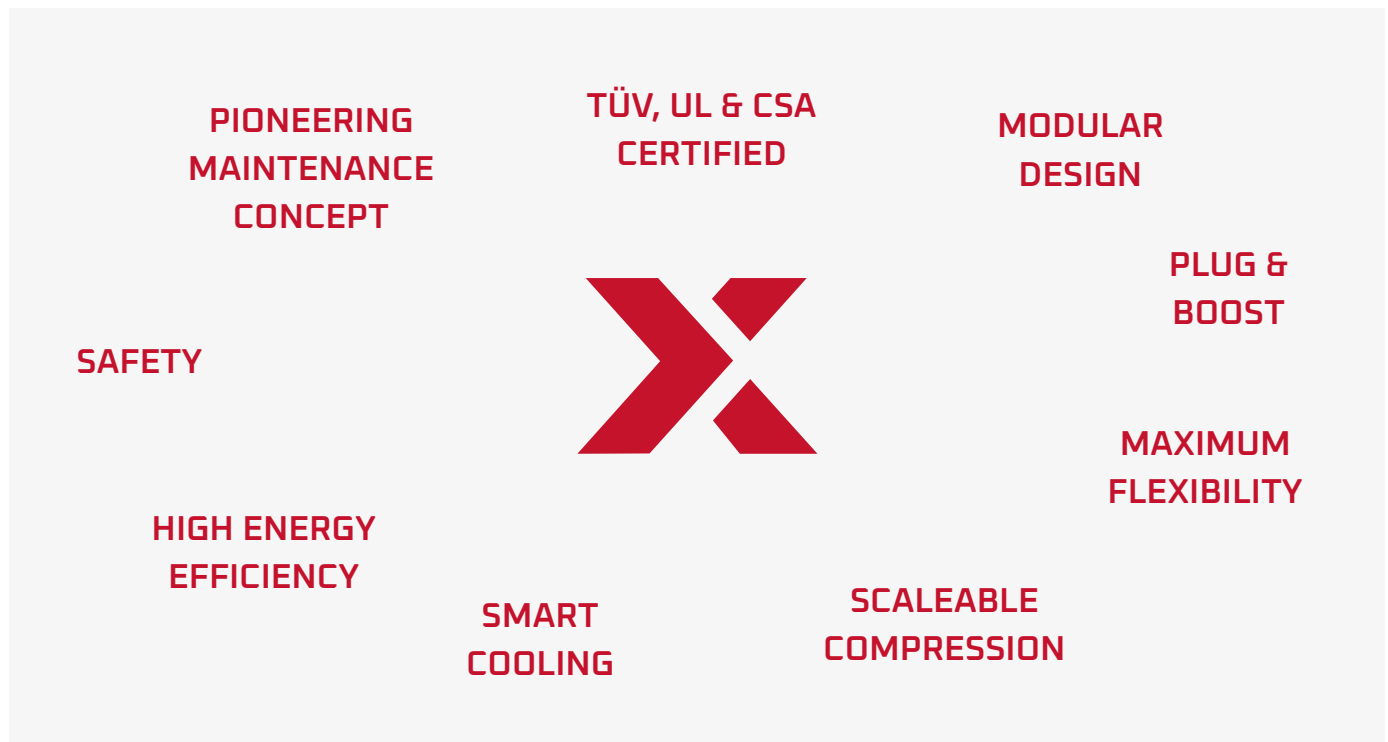
The sustainable and secure supply of clean energy to our society is one of the greatest challenges of our time. Hydrogen combines energy security, climate neutrality and has extraordinary potential as an energy carrier to make a significant contribution to the energy transition.

At Maximator, we have been involved in the compression and control of hydrogen for more than 20 years. As a high-pressure specialist, we offer our customers a wide range of products and services.

With our sister companies Maximator Hydrogen, Maximator Gas Solutions and Maximator Veteq, we offer smart solutions for hydrogen refuelling, hydrogen storage and hydrogen container testing.

What if your H₂ Compression:

- grows with your challenges and demands
- provides highest availability
- offers max. flexibility in terms of H₂ sources
- redefines the energy efficiency benchmarks in your industry
- redefines the energy efficiency benchmarks in your industry



All technical and dimensional information are for reference only and are subject to change. All general Terms and Conditions of sale, including limitations of our liability, apply to all products and services sold.

Welcome to the future of Hydrogen compression up to 900 bar



HULC X

HULC Solution for small scale applications

The Maximator HULC Series is a modular Gas Compression System, specifically designed for Hydrogen compression up to 1,050 bar with scaleable volume flow.

Compressed air driven H2 compressor

- Up to 1,050 bar
- Up to 4 kg/h
- Modular system
- Plug & boost
- Scaleable compression power
- Safety & service friendly
- -10°C up to +40°C ambient temperature



X-TOWER

X-TOWER Solution for integrators

The Maximator X-TOWER is a modular, electrically powered Gas Compression System, specifically designed for Hydrogen compression up to 900 bar with scalable volume flow. The X-TOWER is designed for integration in existing systems and is covering nearly all requirements for efficient gas compression.

Electric driven H2 compressor

- Optimised for integration
- Remote access
- Modular system
- Up to 900 bar
- Scaleable up to 28 kg/h
- -20°C up to +40°C ambient temperature
- UL & CSA approval



**Gas
Filling
System** X

GFS / GFX Solution for operators

The Maximator GFS Series Systems are standalone Gas Filling Systems for hydrogen applications. We designed the GFS especially for customers who need an "all in one" solution with a small foot print for hydrogen compression.

Electric driven H2 compressor

- Optimised for operators
- X-Tower inside
- Water cooling on board
- Safety & service friendly
- Scaleable up to 28 kg/h
- -20°C up to +40°C ambient temperature
- UL & CSA approval

Service

Our team of more than 50 specialists is available at over 20 locations around the globe with technology and engineering know-how, to support you in all aspects of your system - from commissioning and operator training to maintenance.

In addition, we supply your Maximator products with original spare parts at all times throughout their entire life cycle, thus protecting your investment in the long term.



Technical support

The Technical Support consists of a team of experts from different departments. The aim is to solve your problem together in the shortest possible time and thus help you as quickly as possible. In doing so, we pay attention to uncomplicated and efficient support.



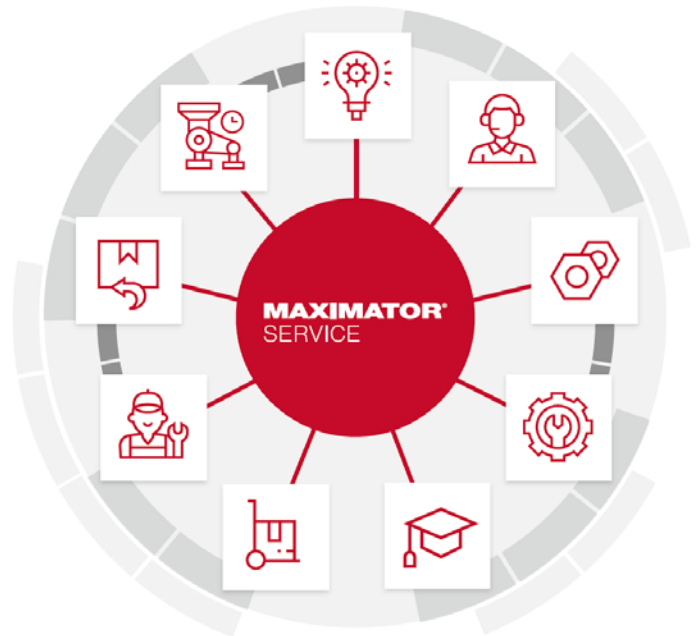
Spare parts service

The Maximator spare parts service offers the fastest possible solutions for spare parts supply. The aim is to define spare and wear parts together with you and then supply them in original Maximator quality. In order to ensure the greatest possible product and system availability, we pay attention to uncomplicated and efficient processing.



Maintenance service

Regular maintenance ensures the safe availability of your plant and enables you to maintain production, minimise malfunctions and save costs. Optimal maintenance intervals tailored to the plant ensure reliable operation as well as the operation of your plant. In addition to plant availability and minimised downtimes, we make maintenance transparent and plannable for you.



Training

Knowledge of the structure and functioning of the plant is one of the most important prerequisites for optimum plant safety and long service lives. Our machines and plants can be used more effectively if the operators are fully informed and trained. Our team of experts from various specialist areas imparts specialist knowledge about the system and the installed high-pressure technology in training courses that are tailored to your needs.



Repair returns & complaints

The Maximator repair service is part of our high-performance service department and takes care of the rapid recommissioning of components and systems manufactured by Maximator. The aim is to repair defective components as quickly as possible with maximum cost transparency. In doing so, we pay attention to uncomplicated and efficient processing in order to keep throughput times as low as possible.



Retrofit & relocation

Modernisation without cost-intensive investments in new system technology - with the Maximator Retrofit, your systems remain state-of-the-art. By modifying the hardware and software, you set standards in terms of operational reliability with your testing and production systems.

Testing Services

Our test laboratories in Germany, the USA and China are equipped to perform static pressure testing and burst testing, pressure fatigue testing, as well as Autofrettage services - swiftly and precisely.

Our services provide you the opportunity to determine the performance parameters and quality features of your products while still in the prototype stage and under real-life conditions.

Our labs can support you with: material validation testing, PPAP testing, and component/assembly validation testing, etc...

In short, we can provide you with the data you need to make informed decisions.

Testing & Production Services

- Pulsation and durability testing
- Pressure testing (also with temperature-controlled environment)
- Leakage testing
- Burst pressure testing
- Autofrettage
- Rail flushing and assembly

MAXIMATOR Service Testing Centers

Our test labs MAXIFES (Germany), MAXIMATOR Customer Center (China) and MAXIMATOR Test, LLC (USA) provide innovative and cost-efficient services to help you solve your high-pressure test tasks.

Experienced test engineers and technicians carry out tests for you, swiftly and reliably. Our unique equipment is capable of performing a wide variety of contract testing orders.

As a specialist for static and dynamic pressure tests, burst pressure tests, pulse and fatigue tests, tests with temperature regulation from -40°C to +200°C we can test for you on our technically advanced machines in our Nordhausen factory.

- Hoses
- Fittings
- Tanks
- Accumulators
- Hollow bodies
- Pressure transducers
- Hydraulic components

Pressure Vessel Test Service

Maximator offers you all legally required tests for pressure vessels as a service, such as Tests in accordance with ECE R110, ECE R134, EC79 / 2009 or EU406 / 2010 or even UN GTR no. 13. In addition, we can also offer services according to your individual requirements.

In our test laboratories, we assume responsibility to support your production tests of prototypes as well as to perform the quality control of serial parts. Our service testing center not only carries out its own development activities, but also a wide range of tests as a service. (e.g. tests on large-volume composite components up to 500 litres capacity and 4 m long)

Our service program

- Proof pressure / Burst pressure tests
- Pressure cycle tests
 - At ambient or extreme temperatures
 - With pre-treatment
- Leakage tests
- Real-gas cycles (e.g. with hydrogen)
- Bonfire and penetration tests





Find out more



ePortal

MAXIMATOR GmbH

Lange Straße 6, 99734 Nordhausen

Telephone +49 (0) 3631 9533 – 0

info@maximator.de

www.maximator.de

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