



HYDROGEN BALL VALVES



MHA ZENTGRAF
FlowControlTechnology



H₂ Ready

In the future, hydrogen will make a significant contribution to sustainability and environmental protection. For example, in e-mobility as an alternative fuel in fuel cells or in the production of green steel.

With years of experience in the gas sector, **MHA ZENTGRAF** has developed ball valves and flow control solutions for the complete hydrogen process chain: Hydrogen generation, transport and mobile pipelines as well as compression and dispenser stations. Pressure ratings up to 1000 bar are realized.

Since 2020 **MHA ZENTGRAF** has been a member of the German Hydrogen and Fuel Cell Association.



MHA ZENTGRAF

Your sustainable partner

Sustainability not only needs innovative products but also a sustainable partner. You can rely on **MHA ZENTGRAF** as your reliable supplier to build up a sustainable partnership. What makes **MHA** a sustainable partner?



Environment

- ISO14001 certified
- RoHS und REACH compliant products
- Recyclable packaging material
- Lead free carbon steel
- Raw materials from certified european sources

Our ball valves are used in renewable energy and innovative systems like:

- Wind turbines
- Hydropower plants
- CO₂ extraction systems



Global

- 4 branch offices worldwide
- Customer support in all time zones



Risk management

- Private owned company
- Manufacturing sites at multiple locations



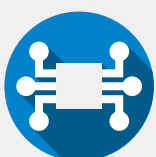
Certified quality

- ISO 9001 certified
- DNV/GL type approval
- ABS design assessment
- VdS certified



Innovative

- Supplier for customized solutions
- 15% engineers and scientists



Digital

- ERP controlled production
- Digitally supported test cert. creation
- EDI-ready for customers



Fast & flexible

- High level of manufacturing depth
- Customized products and processes
- Over 30000 products on stock

Key features of **MHA** ball valves in hydrogen applications



Size reduction

Ball valves have a significant advantage compared to other types of valves:

Full flow cross section in open position! A DN13 1/2" ball valve has a Cv value of 22 gal / min. This Cv value can only be reached with sizes of approx. DN32 (1 1/4") at other valve types, e.g. globe or needle valves. In addition, ball valves can be used to achieve a high degree of leakage free closure.



Temperature range

- Materials suitable for temperatures from -40 °C up to +150 °C
- Temperature range acc. ISO 19880-3 is specified as -40 °C / +85 °C



Leakage

Internal and external leakage acc. DIN EN 12266 leakage rate A and the upcoming TPED standard for ball valves, ISO 23826



Lubricants and cleaning

- Oil and grease free products through ultrasonic cleaning
- Assembly of valves without additional lubrication at all wetted surfaces



Metallic materials

- Due to its high resistance against hydrogen embrittlement, 316-Series stainless steels (1.4404, 1.4571) are used whenever possible.
- If higher material strength is required, e.g. for stems, balls or trunnions, high strength austenitic stainless steels with particular resistance to strain-induced phase transformations, such as A286 (1.4980) and Nitronic-50®, are used. Duplex or Martensitic grades are avoided.



Pressure testing

- Pressure testing acc. DIN EN 12266-1
- Static and Cyclic high pressure gas testing with air (≤ 550 bar) or nitrogen (up to 1000 bar) in the temperature range from -40 °C to + 85 °C
- Valve endurance tests acc. to ISO 19880-3 and ISO 23826 (actuation at full ΔP , $-40 \text{ °C} \leq T \leq +85 \text{ °C}$) carried out inhouse during development and on customer request

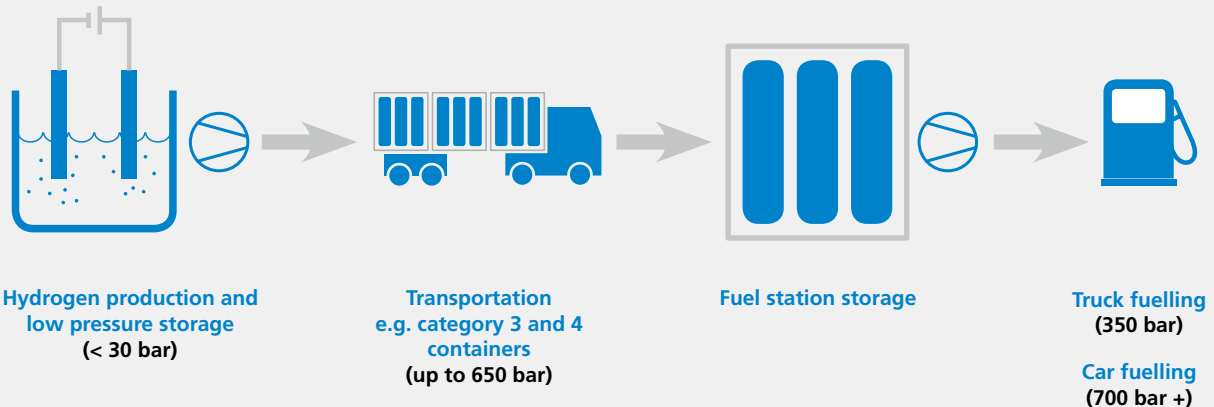


Sealing materials

- All sealing materials chosen to prevent damages through explosive decompression (e.g. NORSOK M-710)
- Sealing materials acc. DIN EN ISO 11114-2 for hydrogen usage
- Special attention is paid to low temperature seal performance

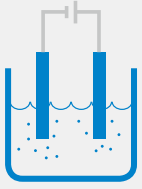


The right product for your hydrogen application

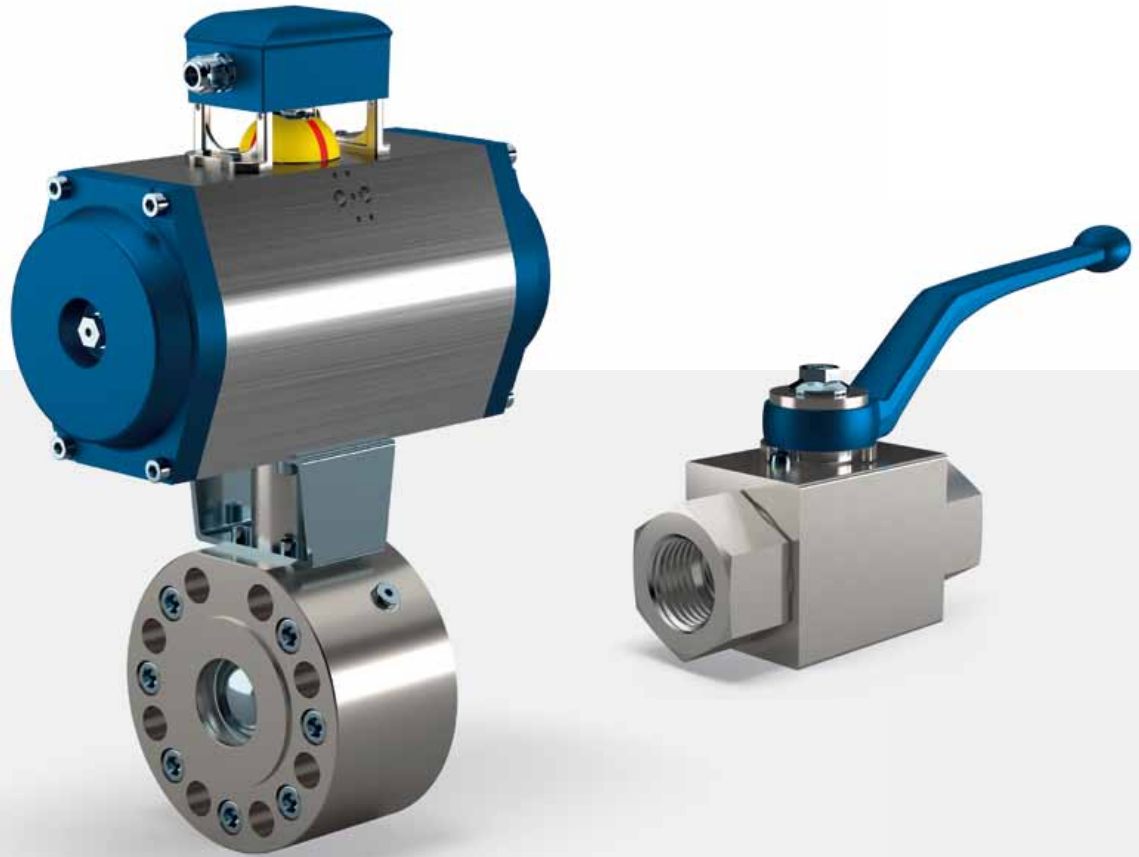


Our products can be used in the complete hydrogen process chain - hydrogen generation, transport and mobile pipelines as well as compression and fuelling stations. We also pay attention to your specific application conditions to offer you the technically and economically best solution.





Hydrogen production



H₂ production up to 30 bar

This application includes systems e.g. for electrolysis or power-to-gas systems. These systems typically work at pressure levels of up to 30 bar. Of course, ball valves from **MHA ZENTGRAF** can also be used at these lower pressure applications.

Larger nominal widths of up to 4" can also be offered to ensure maximum flow capacity. A leakage rate A according to DIN EN 12266 is guaranteed even at larger nominal diameters.

Our valves are available with either threaded or flange connection according your specification. On request accessories like limit switches, locking devices or fully automated valves are available.

Transport applications & fuelling systems for hydrogen

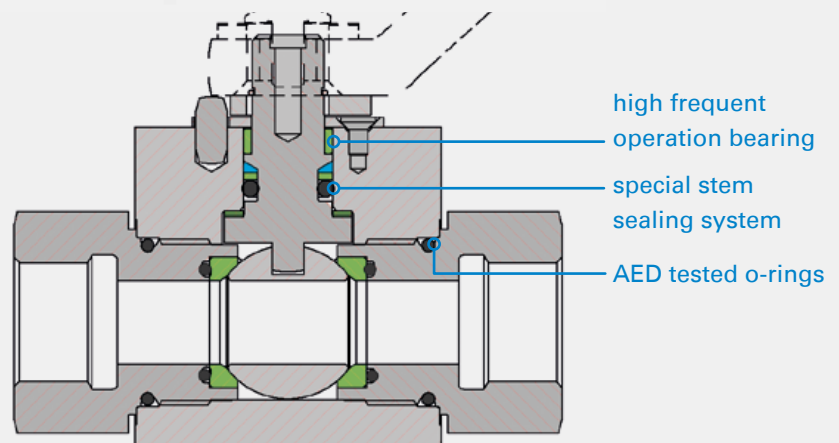


HFKH500

Transport and
fuelling up to
500 bar



Gas transport and fuelling applications set higher requirements for ball valves. At 350 bar fuelling, system pressures up to 500 bar occur during compression and storage. Considering the temperature influence, a Type 3 Technology Cylinder for example is designed for system pressures of approximately 480 bar. During transport, vibrations and weather influences can put heavy strain on the system equipment. Additionally, valves for such kind of applications are actuated more frequently because filling and drain processes are carried out regularly.



For use as a maintenance valve, with occasional operations, we recommend our proven ball valves with gas seat system using hydrogen-compatible materials.

For ball valves with higher operation frequencies up to 500 bar, we offer our new HFKH500. Our ball valves are designed for switching under full differential pressure. On request, our ball valves can be supplied as a complete unit with assembled and tested actuator. These ball valves already meet the endurance requirements of the new ISO 23826 and can probably be used for TPED-relevant areas starting mid of 2022.



Transport & fuelling systems for hydrogen

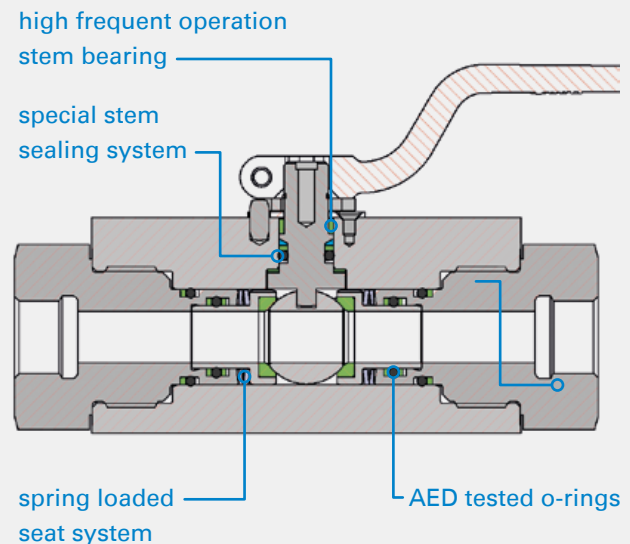
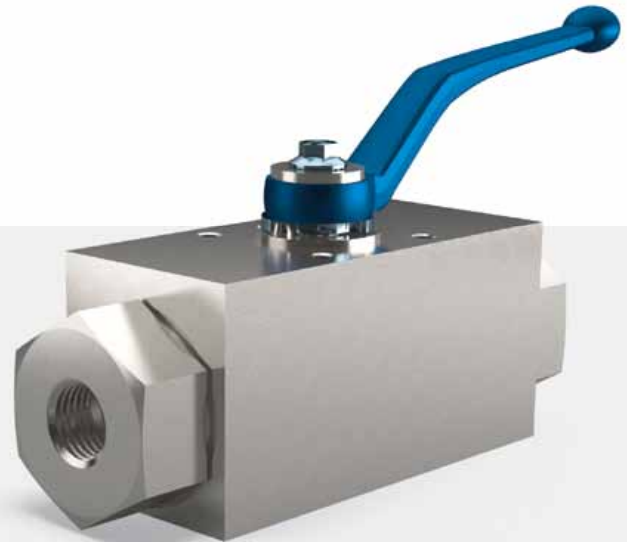
HFKH650

Transport and storage up to 650 bar

Higher compression of hydrogen during transport and storage improves the efficiency of the systems, saves installation space and, last but not least, reduces costs. Considering the temperature influence, State of the Art Type 4 Technology Cylinders are designed for pressures up to 650 bar.

With the new HFKH650 ball valve, **MHA** offers a reliable solution for this kind of application. Additionally, it has a torque-optimized design so it can be conveniently switched by hand even at full differential pressure.

The new ball valve series already meets the endurance requirements of the new ISO 23826 standard and can probably be used for TPED-relevant applications starting mid of 2022.





Hydrogen dispenser stations

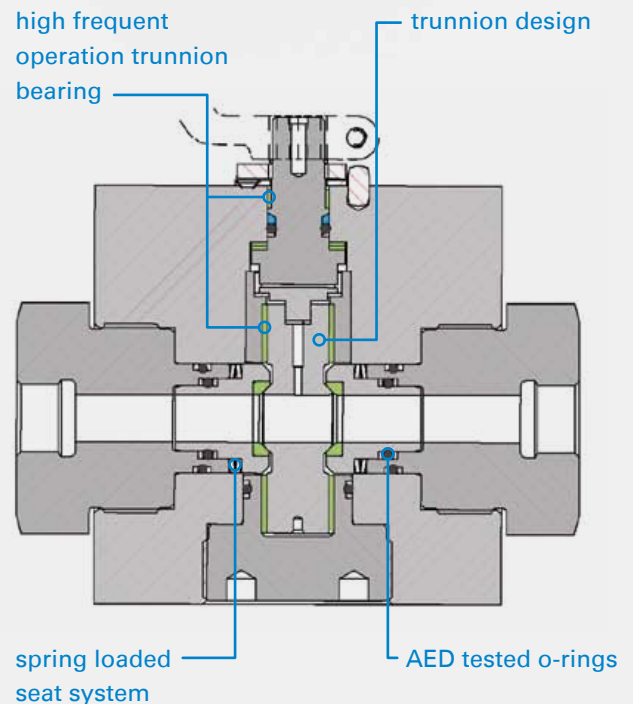
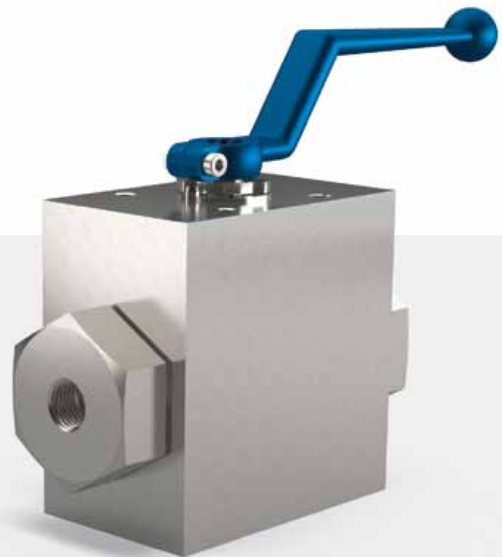
HFKH1000

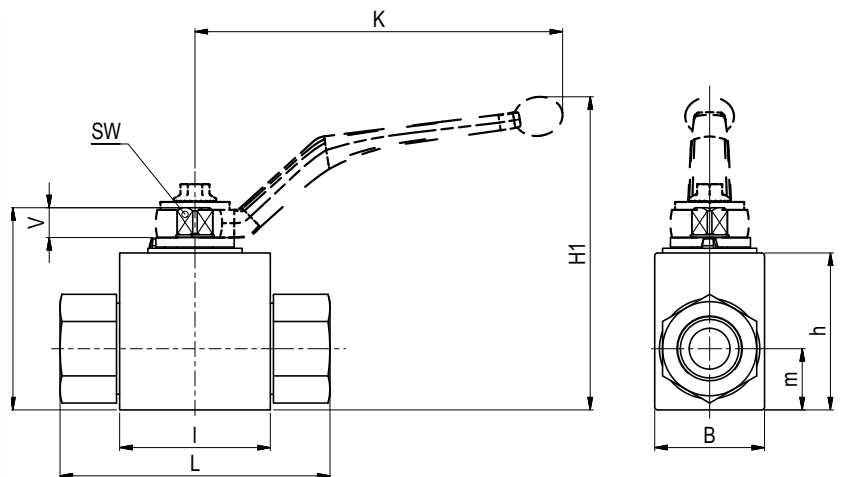
H₂ fuelling at pressures up to 1000 bar

At 700 bar fuelling of passenger cars, hydrogen is compressed and stored at pressures up to 1000 bar. Latest developments reveal a tendency to 700 bar technology also for commercial vehicles such as trucks and busses.

ISO 19880-3 Standard (Gaseous Hydrogen – Fuelling Stations – Part 3: Valves) differs between valves for maintenance (Class B) and operation (Class A) purpose. While Class B Valves are only meant to withstand 100 cycles of operation at room temperature, Class A Valves shall withstand 102000 cycles (100000 at RT, 1000 at -40 °C and another 1000 at +85 °C) without losing integrity of the seal system. **MHA** aims to qualify its HFKH1000 valve acc. to ISO 19880-3, Class A.

To enable up to 102000 actuations under full differential pressure, the HFKH1000 trunnion valve was designed with special attention to reduced wear and friction. This ensures a maximal level of reliability and sustainability even under harshest conditions.





AVAILABLE SIZES

DN6 (1/4") to DN20 (3/4")

CONNECTIONS

DIN ISO 228 Female thread, ANSI B1.20.1 NPT Female thread, others on request

ACCESSORIES ON REQUEST

- Locking devices
- Actuators
- Mounting holes
- Position switches
- Combinations
- Detent

MATERIAL CODE DESCRIPTION

Materials	44m8
Body	1.4571
Ball	1.4571
Stem	Nitronic-50
Ball seats	PEEK
Body and stem sealing	FKM
Tmin /Tmax	-40°C / +150°C

Other seal materials like EPDM on request depending on the application conditions.

GENERAL DIMENSIONS

Type	l	B	H	h	m	Vmin	SW	K	H1	Lever
HFKH500-DN6	40	32	47	38	13,5	5,5	7	76	70	Zn
HFKH500-DN13	48	35	64,5	50	19,5	9,5	9	117	100	Zn
HFKH500-DN20	82	60	90	70	30	14	14	200	93,5	Zn

CONNECTION TYPE	DIMENSIONS						ORDER CODE PER MATERIAL COMBINATION	
DIN ISO 228 FEMALE THREAD	Type	LW	L	i	d	Weight [Kg]	PN [bar]	44m8
	HFKH500-DN6-G 1/4	6	70	14	G 1/4	0,48	500	on request
	HFKH500-DN13-G 1/2	13	86	16,3	G 1/2	0,77	500	on request
	HFKH500-DN20-G 3/4	20	113	18	G 3/4	3,02	500	on request

	Type	LW	L	i	d	Weight [Kg]	PN [bar]	44m8
	HFKH500-DN6-1/4" NPT	6	70	13,7	1/4" NPT	0,48	500	on request
	HFKH500-DN13-1/2" NPT	13	86	17	1/2" NPT	0,77	500	on request
	HFKH500-DN20-3/4" NPT	20	113	18,3	3/4" NPT	3,02	500	on request

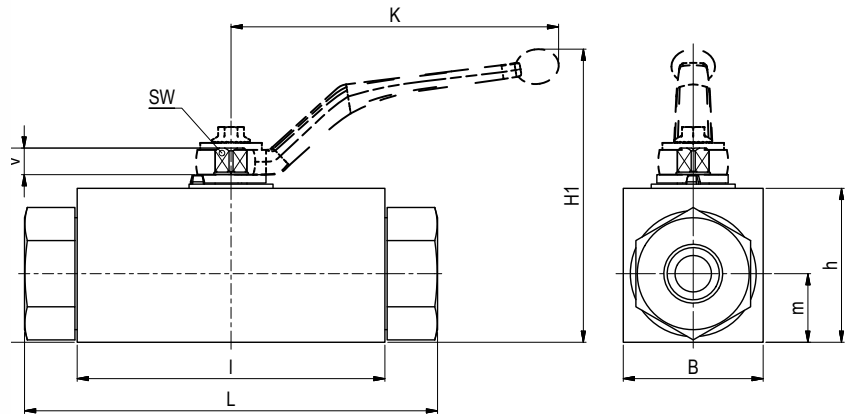
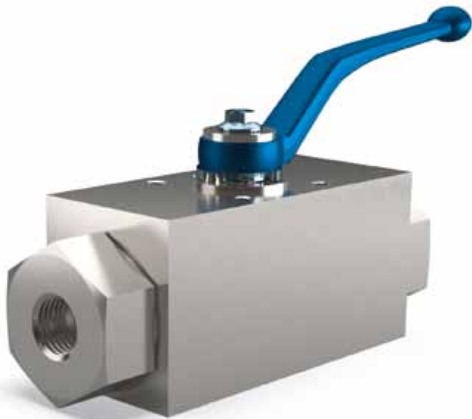
Please note the pressure ratings of the tube connections!

HFKH500 also available as automated version

Your ball valve shall be automated? No problem! Upon request, you can have your ball valve equipped with a pneumatic, electric or hydraulic actuator. By adding accessories such as limit switch boxes or solenoid valves, the actuators can be individually adapted to your control technology. Even 3-position solutions for e.g. multi-way ball valves can be realized.

We adapt the drive design individually to your application. When sizing actuators, we pay attention to the inclusion of the appropriate safety factors so that the smooth operation of your system will be guaranteed at all times.





AVAILABLE SIZES

DN6 (1/4") to DN20 (3/4")

CONNECTIONS

DIN ISO 228 Female thread, ANSI B1.20.1 NPT Female thread, others on request

ACCESSORIES ON REQUEST

- Locking devices
- Actuators
- Mounting holes
- Position switches
- Combinations
- Detent

Materials	44m8
Body	1.4571
Ball	1.4571
Stem	Nitronic-50
Ball seats	PEEK
Body and stem sealing	FKM
Tmin /Tmax	-40°C / +150°C

Other seal materials like EPDM on request depending on the application conditions.

GENERAL DIMENSIONS

Type	l	B	H	h	m	Vmin	SW	K	H1	Lever
HFKH650-DN6	100	38	55	46	21,5	5,5	7	76	78	Zn
HFKH650-DN13	110	50	69,4	55	24,5	9,5	9	117	105	Al
HFKH650-DN20	125	80	100	80	40	14	14	200	105	Zn

CONNECTION TYPE	DIMENSIONS						ORDER CODE PER MATERIAL COMBINATION	
DIN ISO 228 FEMALE THREAD	Type	LW	L	i	d	Weight [Kg]	PN [bar]	44m8
	HFKH650-DN6-G 1/4	m	130	14	G 1/4	1,58	650	on request
	HFKH650-DN13-G 1/2	13	148	16,3	G 1/2	2,75	650	on request
	HFKH650-DN20-G 3/4	20	164,6	18	G 3/4	7,47	650	on request

ANSI B1.20.1 NPT FEMALE THREAD	Type	LW	L	i	d	Weight [Kg]	PN [bar]	44m8
	HFKH650-DN6-1/4" NPT	6	130	13,7	1/4" NPT	1,58	650	on request
	HFKH650-DN13-1/2" NPT	13	148	17	1/2" NPT	2,75	650	on request
	HFKH650-DN20-3/4" NPT	20	164,6	18,3	3/4" NPT	7,47	650	on request

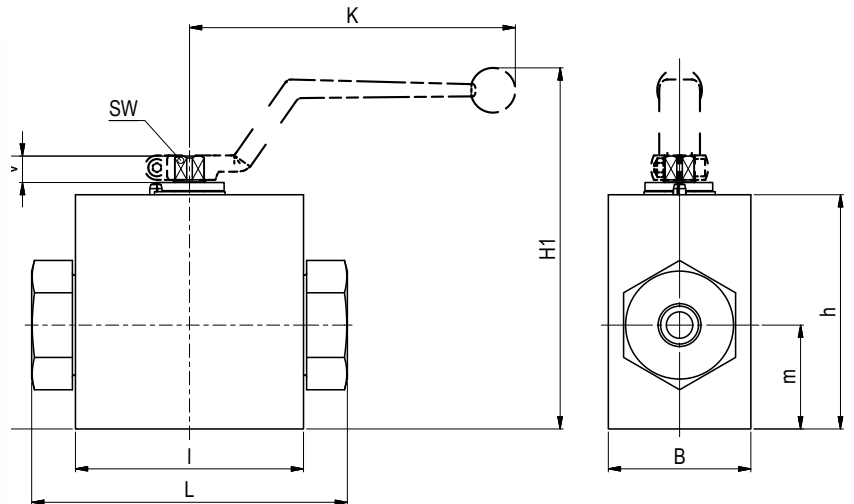
Please note the pressure ratings of the tube connections!

HFKH650 also available as automated version

Your ball valve shall be automated? No problem! Upon request, you can have your ball valve equipped with a pneumatic, electric or hydraulic actuator. By adding accessories such as limit switch boxes or solenoid valves, the actuators can be individually adapted to your control technology. Even 3-position solutions for e.g. multi-way ball valves can be realized.

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AVAILABLE SIZES

DN6 (1/4") to DN20 (3/4")

CONNECTIONS

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ACCESSORIES ON REQUEST

- Locking devices
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- Mounting holes
- Position switches
- Combinations
- Detent

MATERIAL CODE DESCRIPTION

Materials	44m8
Body	1.4571
Trunnion	Nitronic-50
Ball seats	PEEK
Body and stem sealing	FKM
Tmin /Tmax	-40°C / +150°C

Other seal materials like EPDM on request depending on the application conditions.

GENERAL DIMENSIONS

Type	L	B	H	h	m	Vmin	SW	K	H1	Lever
HFKH1000-DN6	105	65	110	100	49	6,3	7	76	132	Zn
HFKH1000-DN13	112	70	134	115	51	13	12	160	177,3	Al
HFKH1000-DN20	150	100	180	160	70	14	14	200	183,5	Zn

CONNECTION TYPE	DIMENSIONS						ORDER CODE PER MATERIAL COMBINATION	
DIN ISO 228 FEMALE THREAD	Type	LW	L	i	d	Weight [Kg]	PN [bar]	44m8
	HFKH1000-DN6-G 1/4	6	138	14	G 1/4	5,92	1000	on request
	HFKH1000-DN13-G 1/2	13	155	16,3	G 1/2	7,93	1000	on request
	HFKH1000-DN20-G 3/4	20	193	18	G 3/4	20,76	1000	on request

ANSI B1.20.1 NPT FEMALE THREAD	Type	LW	L	i	d	Weight [Kg]	PN [bar]	44m8
	HFKH1000-DN6-1/4" NPT	6	138	13,7	1/4" NPT	5,92	1000	on request
	HFKH1000-DN13-1/2" NPT	13	155	17	1/2" NPT	7,93	1000	on request
	HFKH1000-DN20-3/4" NPT	20	193	18,3	3/4" NPT	20,76	1000	on request

Please note the pressure ratings of the tube connections!

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