

3-WAYS MANUAL VALVES WITH BALL SHUTTERS



APPLICATIONS

they are designed for installation on commercial refrigeration systems and on civil and industrial air conditioning plants that use the following refrigerant fluids:

- HCFC (R22)
- HFC (R134a, R404A, R407C, R410A, or R507)
- HFO and HFO/HFC mixtures (R1234ze, R448A, R449A, R450A, or R452A)

belonging to Group 2, as defined in Article 13, Chapter 1, Point (b) of Directive 2014/68/EU, with reference to EC Regulation No. 1272/2008.

Furthermore, the same valves, up to DN 25, that is model 6690/9, can also be installed on systems using the following refrigeration fluids:

- HFC (R32)
- HFO (R1234yf)

classified as A2L in the ASHRAE 34-2013 standard, and belonging to Group 1, as defined in Article 13, Chapter 1, Point (a) of Directive 2014/68/EU, with reference to EC Regulation No. 1272/2008.

For specific applications with refrigerant fluids not listed above, please contact Castel Technical Department.

3-way ball valves in series 6690E, 6697E, 6698E: they have been developed by Castel for all the applications that use the sub-critical or trans-critical R744 refrigeration fluid belonging to Group 2, defined in Article 13, Chapter 1, Point (b) of Directive 2014/68/EU, with reference to EC Regulation No. 1272/2008.

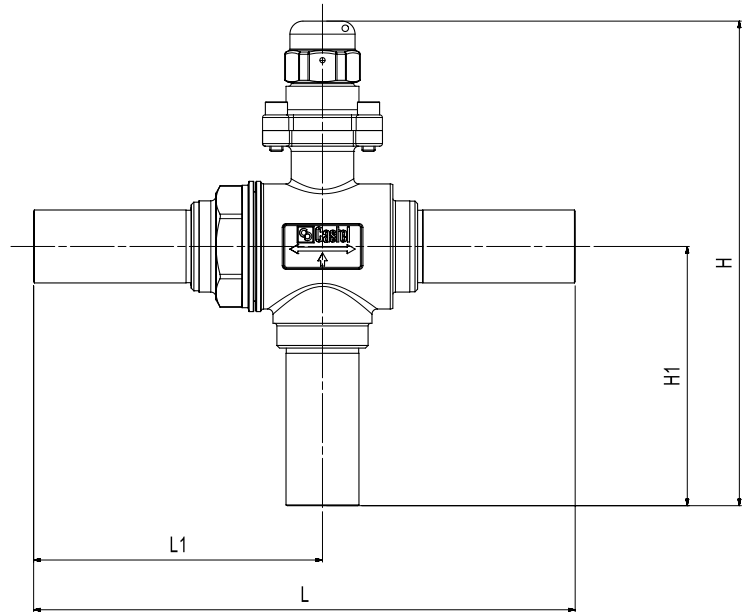
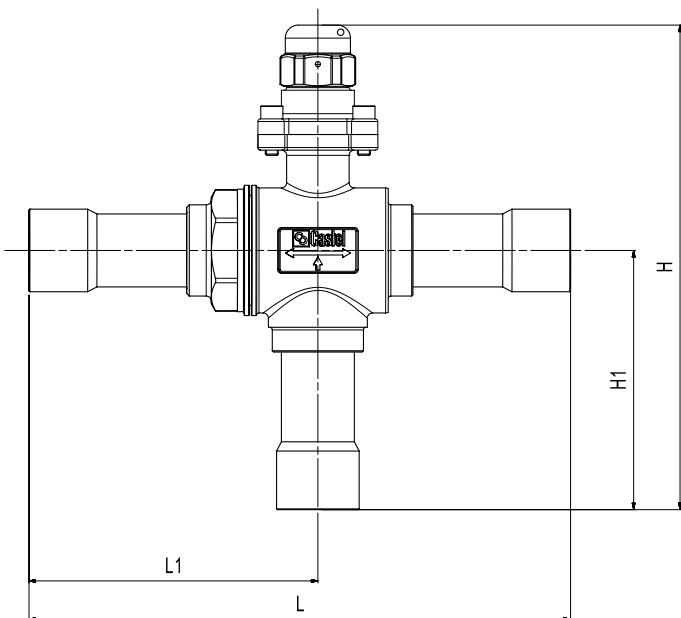
The 3-way valves for plants that operate using refrigerant fluid R744 are the following:

- valves in series 6690E with PS = 80 bar, equipped with copper connections for transcritical plants low and medium pressure sides.
- valves in series 6697E with PS = 120 bar equipped with reinforced copper connections (K65) for transcritical plants high-pressure side.
- valves in series 6698E with PS = 140 bar equipped with stainless steel connections for transcritical plants high-pressure side.

CAUTION! The 3-way valves with ball shutter in this chapter cannot be used with other refrigerant fluids.

CONSTRUCTION

The electric welding of the body and the seal gaskets, assembled on the spindle, ensure perfect hermetic



Dimensions and weights of 3-ways manual valves					
Catalogue Number	Dimensions [mm]				Weight [g]
	H	H1	L	L1	
6690/7	165	82	172	94	121
6690/M28	186	100	208	111	154
6690/9	186	100	208	111	154
6690/11	204	103	211	113	218
6690/13	226	121	240	127	345
6690/M42	226	121	240	127	345

Dimensions and weights of 3-ways manual valves for R744					
Catalogue Number	Dimensions [mm]				Weight [g]
	H	H1	L	L1	
6690E/7	165	82	172	94	121
6690E/M28	186	100	208	111	163
6690E/9	186	100	208	111	163
6690E/11	204	103	211	113	221
6690E/13	226	121	240	127	372
6690E/M42	226	121	240	127	372
6697E/7	165	82	172	94	121
6697E/9	186	100	208	111	163
6697E/11	204	103	211	113	231
6697E/13	226	121	240	127	366
6698E/M22	165	82	172	94	118
6698E/M28	186	100	208	111	160
6698E/M35	204	103	211	113	225
6698E/M42	226	121	240	127	329

General characteristics of 3-ways manual valves										
Catalogue Number	Connections		Ball Port Ø [mm]	Kv Factor [m ³ /h]	PS [bar]	TS [°C]		TA [°C]		Risk Category according to PED Recast
	ODS					min.	max.	min.	max.	
	Ø [in.]	Ø [mm]								
6690/7	7/8"	22	19	11	45	-40	+150	-20	+50	Art. 4.3
6690/M28	-	28	24	16						
6690/9	1.1/8"	-	24	16						
6690/11	1.3/8"	35	28	20,5						
6690/13	1.5/8"	-	37	39						
6690/M42	-	42	37	39						I

General characteristics of 3-ways manual valves for R744											
Catalogue Number	Connections			Ball Port Ø [mm]	Kv Factor [m ³ /h]	PS [bar]	TS [°C]		TA [°C]		Risk Category according to PED Recast
	ODS		W [mm]				min.	max.	min.	max.	
	Ø [in.]	Ø [mm]									
6690E/7	7/8"	22	-	19	11	80	-40	+150	-20	+50	Art. 4.3
6690E/M28	-	28		24	16						
6690E/9	1.1/8"	-		24	16						
6690E/11	1.3/8"	35		28	20,5						
6690E/13	1.5/8"	-		37	39						
6690E/M42	-	42		37	39						I
6697E/7	7/8"	22	19	11	120	-40	+150	-20	+50	Art. 4.3	
6697E/9	1.1/8"	-	24	16							
6697E/11	1.3/8"	35	28	20,5							
6697E/13	1.5/8"	-	37	39						I	
6698E/M22	-	-	22	19	11	140	-40	+150	-20	+50	Art. 4.3
6698E/M28			28	24	16						
6698E/M35			33,4	28	20,5						
6698E/M42			42,2	37	39						I



seal of the valves. The spindle construction eliminates the danger of explosion/expulsion.

The main parts of these valves are made with the following materials:

- Hot forged brass EN 12420 – CW 617N for the body
- Hot forged brass EN 12420 – CW 617N, chromium plated, for the ball
- Stainless steel EN 10088-3 – 1.4305 for spindles
- Chloroprene rubber (CR) for outlet seal gaskets
- Ethylene propylene rubber (EPDM) for outlet seal gaskets
- PTFE for the ball seat gaskets
- Copper pipe EN 12735-1 – Cu-DHP for solder connections in series 6690, 6690E
- Copper pipe EN 12735-1 – CuFe2P (K65) for welded connections in series 6697E
- Stainless steel pipe AISI 304 for welded connections in series 6698E

INSTALLATION

The 3-way ball valves in series 6690, 6690E, 6697E, 6698E act as changeover valves, not allowing for bi-direction flow of the refrigerant fluid. The input is always in the centre position, and the two outputs in

the lateral positions. These valves can be coupled with some actuators at disposal on the market, using a specific flanged adapter between the two parts. To find the adapter to be used with a particular actuator, refer to the specific Castel brochure.

The actuator can be mounted on the valve in four different positions, oriented at 90° to each other. The 3-way ball valves can be mounted in any orientation and any limitations on their mounting must be found on the instructions of the actuator itself.

Copper connections: The brazing of valves with solder connections should be carried out with care, using a low melting point filler material (min.5 Ag). It is important to avoid direct contact between the torch flame and the valve body, which could be damaged and compromise the proper functioning of the entire valve.

Steel connectors: TIG welding recommended, to be performed as quickly as possible according to the method shown in the product instruction sheet. The connection material is AISI 304: it is only possible to use AISI 308 filler material if welding to pipes made from the same type of material. For pipes made from other materials, please contact your welding supplies supplier.



Refrigerant flow capacity of 3-ways manual valves [kW]													
Catalogue Number	Liquid line												
	R134a	R22	R32	R404A	R407C	R410A	R507	R1234yf	R1234ze	R448A	R449A	R450A	R452A
6690/7	187	201	276	131	190	189	127	138	165	172	173	175	133
6690/M28	272	293	402	190	276	275	184	201	241	250	252	255	194
6690/9													
6690/11	349	375		244	353	352	236		308	321	322	326	249
6690/13	663	714		464	672	670	449		587	610	613	620	473
6690/M42													

Refrigerant flow capacity of 3-ways manual valves [kW]													
Catalogue Number	Suction line												
	R134a	R22	R32	R404A	R407C	R410A	R507	R1234yf	R1234ze	R448A	R449A	R450A	R452A
6690/7	20	28	47	24	25	36	25	16	16	26	24	17	23
6690/M28	29	41	68	35	36	53	36	24	23	38	35	25	34
6690/9													
6690/11	37	52		45	47	68	46		29	49	45	33	43
6690/13	71	99		86	89	129	87		55	94	86	62	82
6690/M42													

Refrigerant flow capacity of 3-ways manual valves [kW]													
Catalogue Number	Hot Gas line												
	R134a	R22	R32	R404A	R407C	R410A	R507	R1234yf	R1234ze	R448A	R449A	R450A	R452A
6690/7	94	123	200	106	131	150	105	73	75	130	119	84	110
6690/M28	136	179	291	154	190	218	153	106	110	189	172	122	160
6690/9													
6690/11	174	230		197	244	279	196		140	242	221	157	205
6690/13	332	437		374	464	530	372		267	460	420	298	389
6690/M42													

Standard rating conditions according to AHRI Standard 760-2007

Condensing temperature	110 °F	(43,3 °C)
Liquid temperature	100 °F	(37,8 °C)
Subcooling	10 °R	(5,5 °K)
Evaporating temperature	40 °F	(4,4 °C)
Evaporator superheating	10 °R	(5,5 °K)
Suction line temperature	65 °F	(18,3 °C)
Suction superheating	15 °R	(8,4 °K)
Discharge temperature	160 °F	(71,1 °C)
Discharge temperature	160 °F	(71,1 °C)

Refrigerant flow capacity of 3-ways manual valves for R744 [kW]						
Catalogue Number	Subcritical system			Transcritical system		
	liquid line	suction line	hot gas line	gas cooler line	suction line	hot gas line
6690E/7	295	58,3	222		50,9	
6690E/M28	429	84,8	323		74,1	
6690E/9	429	84,8	323		74,1	
6690E/11	549	108,7	414		94,9	
6690E/13	1045	206,7	787		180,6	
6690E/M42	1045	206,7	787		180,6	
6697E/7				289	50,9	206
6697E/9				420	74,1	299
6697E/11				539	94,9	383
6697E/13				1025	180,6	729
6698E/M22				289	50,9	206
6698E/M28				420	74,1	299
6698E/M35				539	94,9	383
6698E/M42				1025	180,6	729

Standard rating conditions according to AHRI Standard 760-2007 for subcritical system

Condensing temperature	30 °F	(- 1,2 °C)
Liquid temperature	20 °F	(- 6,7 °C)
Subcooling	10 °R	(5,5 °K)
Evaporating temperature	- 20 °F	(- 28,9 °C)
Evaporator outlet temperature	- 10 °F	(- 23,4 °C)
Evaporator superheating	10 °R	(5,5 °K)
Suction line temperature	- 5 °F	(-15 °C)
Suction line superheating	15 °R	(8,4 °K)
Discharge temperature	80 °F	(26,6 °C)

Standard rating conditions according to AHRI Standard 760-2007 for transcritical system

Gas-cooler outlet temperature	95 °F	(35 °C)
Evaporating temperature	14 °F	(- 10 °C)
Evaporator outlet temperature	23 °F	(- 5 °C)
Evaporator superheating	9 °R	(5 °K)
Suction line temperature	32 °F	(0 °C)
Suction line superheating	9 °R	(5 °K)
Discharge temperature	212 °F	(110 °C)



B01-2018_RS66-EN



Castel has always been aware of environmental sustainability issues and gives its contribution to a cleaner environment, supplying the refrigeration and air conditioning industry with state-of-the-art and environment-friendly technology. With its commitment and steady research in its laboratories, Castel has developed a whole range of products using natural refrigerants, which reduce emissions to the minimum. The large range of products belonging to the Castel "GoGreen" line has been developed to be used in CO₂ (R744)- and HC hydrocarbon-filled systems.



Castel can accept no responsibility for any errors or changes in the catalogues, handbooks, brochures and other printed material. Castel reserves the right to make changes and improvements to its products without notice. All trademarks mentioned are the property of their respective owners. The name and Castel logotype are registered trademarks of Castel Srl. All rights reserved.

CASTEL S.r.l.

Via Provinciale, 2-4 (C.P. 67) | 20060 Pessano con Bornago (MI) | Tel. +39 02.957021 | Fax +39 02.95741317 | info@castel.it | www.castel.it