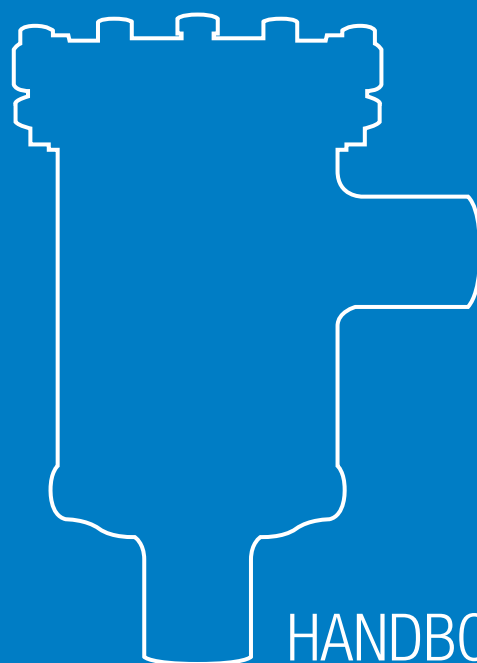




HANDBOOK

REFRIGERATING SYSTEM PROTECTORS

Ed. 2017

 **Castel**[®]
Italian technology

CHAPTER 3 ■

HERMETIC FILTER DRIERS

CERTIFIED BY UNDERWRITERS LABORATORIES INC.
FOR REFRIGERATION PLANTS THAT USE HCFC, HFC OR HFO REFRIGERANTS



APPLICATIONS

The filters in series 42-43, DF2-DF3, illustrated in this chapter 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, and 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.

The filters in series 42-43, DF2-DF3, (with the exception of models 4275/--, 4375/--, DF275/--, and DF375/--) can be installed on systems that use the following refrigeration fluids, too:

- 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.

CONSTRUCTION

Filters in series 42-43: The filter is completely manufactured in steel, with threaded connections, SAE FLARE, in copper-plated steel. The product range also includes types with copper plated solder connections, offering the possibility to solder the copper pipe inside the connections (ODS).

On specific customer request, Castel is also able to supply filters in series 42-43 with connections:

- ORS (O-Ring Seal) according to SAE Standard J 1453.
- ORP (O-Ring Pilot) according to IMACA Standard 305.

Filters in series DF2-DF3: the filter body is made completely from steel with threaded connections, SAE FLARE, made from nickel plated steel. The product range also includes types with copper connections, EN 12735-1 - Cu-DHP, offering the possibility to solder the copper pipe inside the connections (ODS). On specific customer request, Castel can supply filters in series DF2-DF3 with ORS (O-Ring Seal) connections according to SAE Standard J 1453.

Filters in series 42 e DF2: The cartridges are made from moulding a dehydrating filler, made from 80% 3 Å molecular sieves and 20% activated alumina, with a suitable binder. The use of a blend of molecular sieves – activated alumina, grant the cartridges a very high deacidifying capacity maintaining very good moisture adsorption characteristics. The presence of a controlled and defined percentage of activated alumina, lower than the maximum value recommended by ASERCOM, maintains the original concentration of additives in the polyester oil.

Filters in series 43 e DF3: The cartridges are made from moulding a dehydrating filler, made completely from 3 Å molecular sieves, with a suitable binder. The choice of using only 3 Å molecular sieves as the dehydrating material grants the cartridge extraordinary moisture adsorption capacity while maintaining reasonable deacidifying characteristics.

The manufacturing process allows both products to be compact and strong, making them resistant to impact and abrasion. The cartridge is shaped to offer the incoming fluid maximum possible surface area. The internal cavity is positioned in such a way as to ensure a uniform wall thickness. As a result, the fluid encounters constant resistance, flows linearly, ensuring efficient dehydration and minimum charge loss. The cartridge is chemically inert, not

deliquescent, does not react with refrigerating fluids, and is capable of capturing all oil by-products in the circuit. Impurities accumulate in the ring between the metal shell and the cartridge. This prevents the filter from clogging.

APPROVALS

Filters in series 42-43 and DF2-DF3 have been approved by the American certification authority Underwriters Laboratories Inc. Filters in series 42-43 are certified UL Listed for the USA with file SA7054, in compliance with American standard UL 207. Filters in series DF2-DF3 are certified UL-CSA Listed for the USA and Canada with file SA7054, in compliance with American standard UL 207 and Canadian standard CSA C22.2 No. 140.3-15.

FILTER SELECTION BASED ON REFRIGERANT FLOW CAPACITY

Refrigerant flow capacities shown in Table 8 and 15 refer to the following operating conditions according to ARI STANDARD 710-2009:

- Liquid temperature + 30 °C
- Evaporating temperature - 15 °C

Total pressure drop, including inlet and outlet connections, 0.07 bar / 0.14 bar

For different operating conditions apply the following formula:

$$Q = Q_{ref} \times L_1$$

where:

Q = required refrigeration flow capacity [kW]

Q_{ref} = reference refrigeration flow capacity [kW] (see Tables 8 or 15)

L_1 = flow capacity correction factor in presence of operative temperatures different from reference conditions. (See Table 9)

EXAMPLE

Refrigerant: R404A

Required refrigeration flow capacity: 15 [kW]

Liquid temperature: + 40 [°C]

Evaporating temperature: - 10 [°C]

Set pressure drop: 0.14 [bar]

Filter with 100% molecular sieve cartridge and ODF solder connections

$$Q = Q_{ref} \times L_1 \quad 15 = Q_{ref} \times 0.86$$

$$Q_{ref} = 15/0.86 = 17.44 \text{ [kW]}$$

Comparing the reference flow capacity obtained with the values indicated in Table 8, the choice falls on filter model 4305/3S with a flow capacity of 17.8 kW, with a pressure drop of 0.14 bar.

FILTER SELECTION BASED ON DEHYDRATION CAPACITY

System Data:

Refrigerant fluid: R407C

Liquid temperature: +50°C

Refrigerant charge: 34 Kg

According to ARI STANDARD 710-2009 and DIN 8949:2000, the adsorption capacity of the filter drier is given by:

$$(1,050 - 50) \times 34 / 1,000 = 34 \text{ g of H}_2\text{O}$$

1,050 ppm. = moisture in the refrigerant entering the filter according to ARI STANDARD 710-2004 and DIN 8949:2000

50 ppm. = moisture in the refrigerant flowing out the filter according to ARI STANDARD 710-2004 and DIN 8949:2000

Comparing the adsorption capacity required with the values shown in table 10, filter 4341 should be selected, which has an adsorption capacity at 50 °C of 40.5 g of H₂O.

If the manufacturer indicates the drying capacity of their products in water drops, remembered that:

$$1 \text{ g H}_2\text{O} = 20 \text{ water drops.}$$

In this case, and when a molecular sieve filter dryer is selected, the following result is obtained:

$$34 \times 20 = 680 \text{ water drops.}$$

If moisture exceeds the values specified in ARI STANDARD 710-2009 and DIN 8949:2000, a filter with a greater adsorption capacity must be selected.

TABLE 6: General characteristics of hermetic filter driers. SAE Flare connections

Catalogue Number		International Reference	Block Filtering Surface [cm ²]	Nominal Volume [cm ³]	Connections	PS [bar]	TS [°C]		TA [°C]		Risk Category according to PED Recast
100% molecular sieves	80% molecular sieves + 20% activated alumina						min.	max.	min.	max.	
4303/2	4203/2	032	47	50	1/4"	45 (1)	- 40	+ 80	- 20	+ 50	Art. 4.3
4303/3	4203/3	033			3/8"						
4305/2	4205/2	052	70	80	1/4"						
4305/3	4205/3	053			3/8"						
4308/2	4208/2	082	103	130	1/4"						
4308/3	4208/3	083			3/8"						
4308/4	4208/4	084			1/2"						
4316/2	4216/2	162	155	250	1/4"						
4316/3	4216/3	163			3/8"						
4316/4	4216/4	164			1/2"						
4316/5	4216/5	165			5/8"						
4330/3	4230/3	303	310	500	3/8"						
4330/4	4230/4	304			1/2"						
4330/5	4230/5	305			5/8"						
4332/4	4232/4	304	255	500	1/2"						
4332/5	4232/5	305			5/8"						
4341/4	—	414	330	670	1/2"						
4341/5	4241/5	415			5/8"						
4341/6	4241/6	416			3/4"						
4303/2F (2)	—	—	47	50	1/4"	45 (1)	- 40	+ 80	- 20	+ 50	Art. 4.3
4305/2F (2)	—	—	70	80	1/4"						
4308/2F (2)	—	—	103	130	1/4"						
4308/3F (2)	—	—			3/8"						
4316/3F (2)	—	—	155	250	3/8"						

(1) : MWP = 435 psi according to UL approval for filters series 4203 , 4205 , 4216 , 4232, 4303 , 4305 , 4316 , 4332

MWP = 400 psi according to UL approval for filters series 4208 , 4230 , 4341 , 4208 , 4330 , 4341

(2) : Male-female connections (Inlet female)

TABLE 7: General characteristics of hermetic filter driers. ODS connections

Catalogue Number		International Reference	Block Filtering Surface [cm²]	Nominal Volume [cm³]	Connections				PS [bar]	TS [°C]		TA [°C]		Risk Category according to PED Recast
100% molecular sieves	80% molecular sieves + 20% activated alumina				ODS		ODM			min.	max.	min.	max.	
					Ø [in.]	Ø [mm]	Ø [in.]	Ø [mm]						
4303/2S	4203/2S	032S	47	50	1/4"	–	3/8"	–	45 (1)	– 40	+ 80	– 20	+ 50	Art. 4.3
4303/3S	–	033S			3/8"	–	1/2"	–						
4305/2S	4205/2S	052S	70	80	1/4"	–	3/8"	–						
4305/3S	4205/3S	053S			3/8"	–	1/2"	–						
4305/M10S	4205/M10S	–			–	10	–	12						
4308/2S	4208/2S	082S	103	130	1/4"	–	3/8"	–						
4308/3S	4208/3S	083S			3/8"	–	1/2"	–						
4308/M10S	4208/M10S	–			–	10	–	12						
4308/M12S	4208/M12S	–			–	12	–	14						
4308/4S	4208/4S	084S			1/2"	–	5/8"	16						
4316/3S	4216/3S	163S	155	250	3/8"	–	1/2"	–						
4316/M10S	4216/M10S	–			–	10	–	12						
4316/M12S	4216/M12S	–			–	12	–	14						
4316/4S	4216/4S	164S			1/2"	–	5/8"	16						
4316/5S	4216/5S	165S			5/8"	16	3/4"	–						
4316/7S	–	167S			7/8"	–	1.1/8"	–						
4330/3S	4230/3S	303S	310	500	3/8"	–	1/2"	–						
4330/4S	4230/4S	304S			1/2"	–	5/8"	16						
4330/5S	4230/5S	305S			5/8"	16	3/4"	–						
4330/7S	–	307S			7/8"	–	1.1/8"	–						
4330/9S	–	309S			1.1/8"	–	1.3/8"	35						
4332/4S	4232/4S	304S	255	500	1/2"	–	5/8"	16						
4332/5S	4232/5S	305S			5/8"	16	3/4"	–						
4341/4S	–	414S	330	670	1/2"	–	5/8"	16						
4341/5S	4241/5S	415S			5/8"	16	3/4"	–						
4341/6S	4241/6S	416S			3/4"	–	7/8"	–						
4341/7S	4241/7S	417S			7/8"	–	1.1/8"	–						
4375/4S	4275/4S	754S			660	1340	1/2"	–						5/8"
4375/5S	4275/5S	755S	5/8"	16			3/4"	–						
4375/6S	4275/6S	756S	3/4"	–			7/8"	–						
4375/7S	4275/7S	757S	7/8"	–			1.1/8"	–						
4375/9S	4275/9S	759S	1.1/8"	–			1.3/8"	35						

(1) : MWP = 435 psi according to UL approval for filters series 4203 , 4205 , 4216 , 4232, 4275, 4303 , 4305 , 4316 , 4332, 4375
MWP = 400 psi according to UL approval for filters series 4208 , 4230 , 4341, 4208 , 4330 , 4341

TABLE 8: Refrigerant flow capacity of hermetic filter driers

Catalogue Number		Pressure drop 0,07 bar (1) [kW]												
100% molecular sieves	80% molecular sieves + 20% activated alumina	R134a	R22	R32	R404A	R407C	R410A	R507	R1234yf	R1234ze	R448A	R449A	R450A	R452A
4303/2	4203/2	6,4	7,0	30,9	4,6	6,6	6,8	4,4	4,7	5,7	6,1	6,0	5,1	4,6
4303/2F	–	6,4	7,0	30,9	4,6	6,6	6,8	4,4	4,7	5,7	6,1	6,0	5,1	4,6
4303/2S	4203/2S	7,9	8,6	37,9	5,6	8,1	8,3	5,5	5,7	7,0	7,5	7,4	6,3	5,7
4303/3	4203/3	14,8	16,1	71,0	10,5	15,2	15,6	10,2	10,7	13,0	14,0	13,8	11,8	10,7
4303/3S	–	18,6	20,3	89,6	13,3	19,2	19,7	12,9	13,5	16,4	17,7	17,5	14,9	13,4
4305/2	4205/2	6,6	7,2	31,8	4,7	6,8	7,0	4,6	4,8	5,8	6,3	6,2	5,3	4,8
4305/2F	–	6,6	7,2	31,8	4,7	6,8	7,0	4,6	4,8	5,8	6,3	6,2	5,3	4,8
4305/2S	4205/2S	8,2	8,9	39,3	5,8	8,4	8,6	5,7	5,9	7,2	7,8	7,7	6,5	5,9
4305/3	4205/3	15,2	16,6	73,2	10,9	15,7	16,1	10,5	11,0	13,4	14,5	14,3	12,2	11,0
4305/3S	4205/3S	19,3	21,0	92,7	13,7	19,8	20,3	13,3	14,0	17,0	18,3	18,1	15,4	13,9
4305/M10S	–	19,3	21,0	92,7	13,7	19,8	20,3	13,3	14,0	17,0	18,3	18,1	15,4	13,9
4308/2	4208/2	6,9	7,5	33,1	4,9	7,1	7,3	4,8	5,0	6,1	6,5	6,5	5,5	5,0
4308/2F	–	6,9	7,5	33,1	4,9	7,1	7,3	4,8	5,0	6,1	6,5	6,5	5,5	5,0
4308/2S	4208/2S	8,4	9,2	40,6	6,0	8,7	8,9	5,8	6,1	7,5	8,0	7,9	6,7	6,1
4308/3	4208/3	17,9	19,5	86,0	12,8	18,4	18,9	12,4	13,0	15,8	17,0	16,8	14,3	12,9
4308/3F	–	17,9	19,5	86,0	12,8	18,4	18,9	12,4	13,0	15,8	17,0	16,8	14,3	12,9
4308/3S	4208/3S	22,6	24,7	109,0	16,2	23,3	23,9	15,7	16,4	20,0	21,5	21,2	18,1	16,4
4308/M10S	–	22,6	24,7	109,0	16,2	23,3	23,9	15,7	16,4	20,0	21,5	21,2	18,1	16,4
4308/M12S	–	28,7	31,3	138,1	20,5	29,6	30,3	19,9	20,8	25,4	27,3	26,9	22,9	20,7
4308/4	4208/4	23,8	25,9	114,3	16,9	24,5	25,1	16,4	17,2	21,0	22,6	22,3	19,0	17,1
4308/4S	4208/4S	28,7	31,3	138,1	20,5	29,6	30,3	19,9	20,8	25,4	27,3	26,9	22,9	20,7
4316/2	4216/2	6,9	7,5	33,1	4,9	7,1	7,3	4,8	5,0	6,1	6,5	6,5	5,5	5,0
4316/3	4216/3	19,5	21,3	94,0	13,9	20,1	20,6	13,5	14,2	17,3	18,6	18,3	15,6	14,1
4316/3F	–	19,5	21,3	94,0	13,9	20,1	20,6	13,5	14,2	17,3	18,6	18,3	15,6	14,1
4316/3S	4216/3S	24,4	26,6	117,4	17,4	25,1	25,8	16,9	17,7	21,5	23,2	22,9	19,5	17,6
4316/M10S	–	24,4	26,6	117,4	17,4	25,1	25,8	16,9	17,7	21,5	23,2	22,9	19,5	17,6
4316/M12S	–	33,8	36,9	162,8	24,1	34,9	35,8	23,4	24,5	29,9	32,2	31,7	27,0	24,4
4316/4	4216/4	28,0	30,5	134,6	19,9	28,8	29,6	19,4	20,3	24,7	26,6	26,2	22,3	20,2
4316/4S	4216/4S	33,8	36,9	162,8	24,1	34,9	35,8	23,4	24,5	29,9	32,2	31,7	27,0	24,4
4316/5	4216/5	37,2	40,6	179,1	26,6	38,4	39,3	25,8	27,0	32,9	35,4	34,9	29,7	26,9
4316/5S	4216/5S	44,7	48,7	214,9	31,8	46,0	47,2	30,9	32,4	39,4	42,5	41,9	35,6	32,2
4316/7S	–	47,3	51,6	227,7	33,7	48,8	50,0	32,8	34,3	41,8	45,0	44,4	37,8	34,2
4330/3	4230/3	21,5	23,4	103,2	15,3	22,1	22,7	14,9	15,6	19,0	20,4	20,1	17,1	15,5
4330/3S	4230/3S	26,9	29,3	129,3	19,2	27,7	28,4	18,6	19,5	23,7	25,5	25,2	21,4	19,4
4330/4	4230/4	30,6	33,4	147,4	21,8	31,6	32,4	21,2	22,2	27,1	29,1	28,7	24,4	22,1
4330/4S	4230/4S	37,0	40,4	178,2	26,4	38,2	39,1	25,7	26,9	32,7	35,2	34,7	29,6	26,7
4330/5	4230/5	38,4	41,9	184,9	27,4	39,6	40,6	26,6	27,9	33,9	36,5	36,0	30,7	27,7
4330/5S	4230/5S	46,2	50,4	222,4	33,0	47,6	48,8	32,0	33,5	40,8	43,9	43,3	36,9	33,4
4330/7S	–	48,8	53,2	234,7	34,8	50,3	51,6	33,8	35,4	43,1	46,4	45,8	38,9	35,2
4330/9S	–	48,8	53,2	234,7	34,8	50,3	51,6	33,8	35,4	43,1	46,4	45,8	38,9	35,2
4332/4	4232/4	33,3	36,3	160,2	23,7	34,3	35,2	23,1	24,1	29,4	31,7	31,2	26,6	24,0
4332/4S	4232/4S	40,2	43,8	193,2	28,6	41,4	42,4	27,8	29,1	35,5	38,2	37,7	32,1	29,0
4332/5	4232/5	39,5	43,1	190,2	28,2	40,7	41,8	27,4	28,7	34,9	37,6	37,1	31,5	28,5
4332/5S	4232/5S	47,8	52,1	229,9	34,1	49,2	50,5	33,1	34,6	42,2	45,4	44,8	38,1	34,5
4341/4	–	34,3	37,4	165,0	24,5	35,3	36,2	23,7	24,9	30,3	32,6	32,2	27,4	24,8
4341/4S	–	40,9	44,6	196,8	29,2	42,1	43,2	28,3	29,7	36,1	38,9	38,4	32,6	29,5
4341/5	4241/5	40,5	44,2	195,0	28,9	41,8	42,8	28,1	29,4	35,8	38,5	38,0	32,4	29,3
4341/5S	4241/5S	49,1	53,5	236,0	35,0	50,6	51,8	34,0	35,6	43,3	46,7	46,0	39,2	35,4
4341/6	4241/6	66,6	72,6	320,3	47,5	68,6	70,3	46,1	48,3	58,8	63,3	62,4	53,1	48,1
4341/6S	4241/6S	66,6	72,6	320,3	47,5	68,6	70,3	46,1	48,3	58,8	63,3	62,4	53,1	48,1
4341/7S	4241/7S	73,5	80,2	353,8	52,5	75,8	77,7	50,9	53,3	65,0	69,9	69,0	58,7	53,1
4375/4S	4275/4S	52,9	57,7		37,7	54,5	55,9	36,6		46,7	50,3	49,6	42,2	38,2
4375/5S	4275/5S	54,0	58,9		38,5	55,7	57,1	37,4		47,7	51,4	50,7	43,1	39,0
4375/6S	4275/6S	79,9	87,1		57,0	82,3	84,4	55,3		70,6	76,0	74,9	63,8	57,7
4375/7S	4275/7S	92,0	100,3		65,6	94,8	97,2	63,7		81,2	87,5	86,3	73,4	66,4
4375/9S	4275/9S	95,6	104,3		68,2	98,6	101,1	66,2		84,5	90,9	89,7	76,3	69,0

(1) : Maximum values of the refrigerant flow capacity at which the drier can be used when fluid dehydration is not the a major problem, provided that the original moisture is limited before the installation of the drier.

The maximum refrigerant flow capacities are referred to a total pressure drop of 0,07 bar / 0,14 bar , inlet and outlet connections included, (according to ARI STANDARD 710-2009 - with liquid temperature at + 30 °C and evaporating temperature at - 15 °C)

Continued

TABLE 8: Refrigerant flow capacity of hermetic filter driers

Catalogue Number		Pressure drop 0,14 bar (1) [kW]												
100% molecular sieves	80% molecular sieves + 20% activated alumina	R134a	R22	R32	R404A	R407C	R410A	R507	R1234yf	R1234ze	R448A	R449A	R450A	R452A
4303/2	4203/2	7,7	8,4	37,1	5,5	7,9	8,1	5,3	5,6	6,8	7,3	7,2	6,1	5,6
4303/2F	–	7,7	8,4	37,1	5,5	7,9	8,1	5,3	5,6	6,8	7,3	7,2	6,1	5,6
4303/2S	4203/2S	9,5	10,3	45,5	6,7	9,8	10,0	6,6	6,9	8,4	9,0	8,9	7,6	6,8
4303/3	4203/3	17,7	19,3	85,2	12,6	18,3	18,7	12,3	12,8	15,6	16,8	16,6	14,1	12,8
4303/3S	–	22,3	24,4	107,5	15,9	23,0	23,6	15,5	16,2	19,7	21,2	20,9	17,8	16,1
4305/2	4205/2	7,9	8,6	38,1	5,7	8,2	8,4	5,5	5,7	7,0	7,5	7,4	6,3	5,7
4305/2F	–	7,9	8,6	38,1	5,7	8,2	8,4	5,5	5,7	7,0	7,5	7,4	6,3	5,7
4305/2S	4205/2S	10,6	11,6	51,0	7,6	10,9	11,2	7,3	7,7	9,4	10,1	10,0	8,5	7,7
4305/3	4205/3	19,8	21,6	95,2	14,1	20,4	20,9	13,7	14,4	17,5	18,8	18,6	15,8	14,3
4305/3S	4205/3S	25,0	27,3	120,4	17,9	25,8	26,5	17,3	18,2	22,1	23,8	23,5	20,0	18,1
4305/M10S	–	25,0	27,3	120,4	17,9	25,8	26,5	17,3	18,2	22,1	23,8	23,5	20,0	18,1
4308/2	4208/2	8,9	9,8	43,0	6,4	9,2	9,4	6,2	6,5	7,9	8,5	8,4	7,1	6,5
4308/2F	–	8,9	9,8	43,0	6,4	9,2	9,4	6,2	6,5	7,9	8,5	8,4	7,1	6,5
4308/2S	4208/2S	11,0	12,0	52,8	7,8	11,3	11,6	7,6	8,0	9,7	10,4	10,3	8,8	7,9
4308/3	4208/3	23,2	25,4	111,8	16,6	24,0	24,6	16,1	16,9	20,5	22,1	21,8	18,6	16,8
4308/3F	–	23,2	25,4	111,8	16,6	24,0	24,6	16,1	16,9	20,5	22,1	21,8	18,6	16,8
4308/3S	4208/3S	29,4	32,1	141,7	21,0	30,3	31,1	20,4	21,4	26,0	28,0	27,6	23,5	21,3
4308/M10S	–	29,4	32,1	141,7	21,0	30,3	31,1	20,4	21,4	26,0	28,0	27,6	23,5	21,3
4308/M12S	–	37,3	40,7	179,5	26,6	38,5	39,4	25,8	27,1	33,0	35,5	35,0	29,8	26,9
4308/4	4208/4	30,9	33,7	148,6	22,0	31,8	32,6	21,4	22,4	27,3	29,4	29,0	24,6	22,3
4308/4S	4208/4S	37,3	40,7	179,5	26,6	38,5	39,4	25,8	27,1	33,0	35,5	35,0	29,8	26,9
4316/2	4216/2	9,3	10,1	44,7	6,6	9,6	9,8	6,4	6,7	8,2	8,8	8,7	7,4	6,7
4316/3	4216/3	26,4	28,8	126,9	18,8	27,2	27,9	18,3	19,1	23,3	25,1	24,7	21,0	19,0
4316/3F	–	26,4	28,8	126,9	18,8	27,2	27,9	18,3	19,1	23,3	25,1	24,7	21,0	19,0
4316/3S	4216/3S	32,9	35,9	158,4	23,5	33,9	34,8	22,8	23,9	29,1	31,3	30,9	26,3	23,8
4316/M10S	–	32,9	35,9	158,4	23,5	33,9	34,8	22,8	23,9	29,1	31,3	30,9	26,3	23,8
4316/M12S	–	45,7	49,8	219,8	32,6	47,1	48,3	31,6	33,1	40,4	43,4	42,8	36,5	33,0
4316/4	4216/4	37,8	41,2	181,7	26,9	38,9	39,9	26,1	27,4	33,4	35,9	35,4	30,1	27,3
4316/4S	4216/4S	45,7	49,8	219,8	32,6	47,1	48,3	31,6	33,1	40,4	43,4	42,8	36,5	33,0
4316/5	4216/5	50,3	54,8	241,8	35,8	51,8	53,1	34,8	36,4	44,4	47,8	47,1	40,1	36,3
4316/5S	4216/5S	60,3	65,7	290,1	43,0	62,1	63,7	41,7	43,7	53,3	57,3	56,5	48,1	43,5
4316/7S	–	63,9	69,7	307,3	45,6	65,8	67,5	44,2	46,3	56,4	60,7	59,9	51,0	46,1
4330/3	4230/3	29,0	31,6	139,4	20,7	29,9	30,6	20,1	21,0	25,6	27,5	27,2	23,1	20,9
4330/3S	4230/3S	36,3	39,6	174,5	25,9	37,4	38,3	25,1	26,3	32,0	34,5	34,0	29,0	26,2
4330/4	4230/4	41,3	45,1	198,9	29,5	42,6	43,7	28,6	30,0	36,5	39,3	38,8	33,0	29,8
4330/4S	4230/4S	50,0	54,5	240,6	35,7	51,5	52,8	34,6	36,3	44,2	47,6	46,9	39,9	36,1
4330/5	4230/5	51,9	56,6	249,6	37,0	53,5	54,8	35,9	37,6	45,8	49,3	48,6	41,4	37,4
4330/5S	4230/5S	62,4	68,0	300,2	44,5	64,3	65,9	43,2	45,2	55,1	59,3	58,5	49,8	45,0
4330/7S	–	65,9	71,8	316,9	47,0	67,9	69,6	45,6	47,8	58,2	62,6	61,8	52,6	47,5
4330/9S	–	65,9	71,8	316,9	47,0	67,9	69,6	45,6	47,8	58,2	62,6	61,8	52,6	47,5
4332/4	4232/4	46,6	50,8	224,2	33,2	48,0	49,2	32,3	33,8	41,2	44,3	43,7	37,2	33,6
4332/4S	4232/4S	56,2	61,3	270,5	40,1	57,9	59,4	38,9	40,8	49,7	53,5	52,7	44,9	40,6
4332/5	4232/5	55,3	60,3	266,2	39,5	57,0	58,5	38,3	40,1	48,9	52,6	51,9	44,2	39,9
4332/5S	4232/5S	66,9	72,9	321,8	47,7	68,9	70,7	46,3	48,5	59,1	63,6	62,7	53,4	48,3
4341/4	–	51,4	56,1	247,5	36,7	53,0	54,4	35,6	37,3	45,4	48,9	48,2	41,1	37,1
4341/4S	–	61,3	66,9	295,2	43,8	63,2	64,8	42,5	44,5	54,2	58,3	57,5	49,0	44,3
4341/5	4241/5	60,8	66,3	292,5	43,4	62,7	64,2	42,1	44,1	53,7	57,8	57,0	48,5	43,9
4341/5S	4241/5S	73,6	80,3	354,1	52,5	75,8	77,8	51,0	53,4	65,0	70,0	69,0	58,7	53,1
4341/6	4241/6	99,9	108,9	480,5	71,2	102,9	105,5	69,2	72,4	88,2	95,0	93,7	79,7	72,1
4341/6S	4241/6S	99,9	108,9	480,5	71,2	102,9	105,5	69,2	72,4	88,2	95,0	93,7	79,7	72,1
4341/7S	4241/7S	110,3	120,3	530,8	78,7	113,7	116,6	76,4	80,0	97,4	104,9	103,5	88,1	79,6
4375/4S	4275/4S	79,4	86,6	–	56,6	81,8	83,9	55,0	–	70,1	75,5	74,4	63,4	57,3
4375/5S	4275/5S	81,0	88,4	–	57,8	83,5	85,6	56,1	–	71,6	77,0	76,0	64,7	58,5
4375/6S	4275/6S	119,8	130,7	–	85,4	123,5	126,6	83,0	–	105,8	113,9	112,4	95,6	86,5
4375/7S	4275/7S	138,0	150,5	–	98,4	142,2	145,8	95,5	–	121,9	131,2	129,4	110,1	99,6
4375/9S	4275/9S	143,5	156,5	–	102,3	147,8	151,6	99,3	–	126,7	136,4	134,5	114,5	103,6

(1) : Maximum values of the refrigerant flow capacity at which the drier can be used when fluid dehydration is not the a major problem, provided that the original moisture is limited before the installation of the drier.

The maximum refrigerant flow capacities are referred to a total pressure drop of 0,07 bar / 0,14 bar , inlet and outlet connections included, (according to ARI STANDARD 710-2009 - with liquid temperature at + 30 °C and evaporating temperature at - 15 °C)

TABLE 9 - Correction factors of the refrigeration capacity for temperatures different from standard values

Refrigerant	Liquid temperature [°C]	Evaporating temperature [°C]										
		+ 10	+ 5	0	- 5	- 10	- 15	- 20	- 25	- 30	-35	- 40
R134a	15	1,27	1,25	1,23	1,21	1,19	1,17	1,15	1,13	1,11	1,08	1,06
	20	1,21	1,19	1,18	1,15	1,13	1,11	1,09	1,07	1,05	1,03	1,01
	25	1,16	1,14	1,12	1,10	1,08	1,06	1,04	1,01	0,99	0,97	0,95
	30	1,10	1,08	1,06	1,04	1,02	1,00	0,98	0,96	0,94	0,92	0,89
	35	1,04	1,02	1,00	0,98	0,96	0,94	0,92	0,90	0,88	0,86	0,84
	40	0,98	0,96	0,95	0,93	0,91	0,89	0,87	0,84	0,82	0,80	0,78
	45	0,92	0,91	0,89	0,87	0,85	0,83	0,81	0,79	0,77	0,75	0,72
	50	0,87	0,85	0,83	0,81	0,79	0,77	0,75	0,73	0,71	0,69	0,67
	55	0,81	0,79	0,77	0,75	0,73	0,71	0,69	0,67	0,65	0,63	0,61
R22	15	1,20	1,19	1,18	1,17	1,15	1,14	1,13	1,12	1,10	1,09	1,07
	20	1,15	1,14	1,13	1,12	1,11	1,09	1,08	1,07	1,05	1,04	1,03
	25	1,11	1,10	1,08	1,07	1,06	1,05	1,03	1,02	1,01	0,99	0,98
	30	1,06	1,05	1,04	1,02	1,01	1,00	0,99	0,97	0,96	0,95	0,93
	35	1,01	1,00	0,99	0,98	0,96	0,95	0,94	0,93	0,91	0,90	0,88
	40	0,96	0,95	0,94	0,93	0,92	0,90	0,89	0,88	0,86	0,85	0,84
	45	0,91	0,90	0,89	0,88	0,87	0,85	0,84	0,83	0,82	0,80	0,79
	50	0,86	0,85	0,84	0,83	0,82	0,81	0,79	0,78	0,77	0,75	0,74
	55	0,81	0,80	0,79	0,78	0,77	0,76	0,74	0,73	0,72	0,70	0,69
R32	15	1,17	1,16	1,16	1,16	1,15	1,15	1,14	1,13	1,12	1,12	1,11
	20	1,12	1,12	1,11	1,11	1,10	1,10	1,09	1,08	1,08	1,07	1,06
	25	1,07	1,07	1,06	1,06	1,05	1,05	1,04	1,04	1,03	1,02	1,01
	30	1,02	1,02	1,01	1,01	1,01	1,00	0,99	0,99	0,98	0,97	0,96
	35	0,97	0,97	0,96	0,96	0,96	0,95	0,94	0,94	0,93	0,92	0,91
	40	0,92	0,92	0,91	0,91	0,90	0,90	0,89	0,89	0,88	0,87	0,86
	45	0,87	0,86	0,86	0,86	0,85	0,85	0,84	0,83	0,83	0,82	0,81
	50	0,81	0,81	0,81	0,80	0,80	0,79	0,79	0,78	0,77	0,77	0,76
	55	0,76	0,76	0,75	0,75	0,74	0,74	0,73	0,73	0,72	0,71	0,70
R404A	15	1,35	1,33	1,31	1,29	1,26	1,24	1,21	1,19	1,16	1,13	1,11
	20	1,27	1,25	1,23	1,21	1,18	1,16	1,13	1,11	1,08	1,06	1,03
	25	1,19	1,17	1,15	1,13	1,10	1,08	1,06	1,03	1,00	0,98	0,95
	30	1,11	1,09	1,07	1,05	1,02	1,00	0,98	0,95	0,93	0,90	0,87
	35	1,03	1,01	0,99	0,97	0,94	0,92	0,90	0,87	0,85	0,82	0,79
	40	0,95	0,93	0,90	0,88	0,86	0,84	0,81	0,79	0,76	0,74	0,71
	45	0,86	0,84	0,82	0,80	0,78	0,75	0,73	0,71	0,68	0,66	0,63
	50	0,77	0,76	0,74	0,71	0,69	0,67	0,65	0,62	0,60	0,58	0,55
	55	0,69	0,67	0,65	0,63	0,61	0,58	0,56	0,54	0,52	0,49	0,47
R407C	15	1,26	1,24	1,23	1,21	1,19	1,18	1,16	1,14	1,12	1,10	1,08
	20	1,20	1,18	1,17	1,15	1,13	1,12	1,10	1,08	1,06	1,04	1,03
	25	1,14	1,12	1,11	1,09	1,08	1,06	1,04	1,02	1,01	0,99	0,97
	30	1,08	1,06	1,05	1,03	1,02	1,00	0,98	0,97	0,95	0,93	0,91
	35	1,02	1,00	0,99	0,97	0,96	0,94	0,92	0,91	0,89	0,87	0,85
	40	0,96	0,94	0,93	0,91	0,90	0,88	0,86	0,85	0,83	0,81	0,79
	45	0,89	0,88	0,87	0,85	0,84	0,82	0,80	0,79	0,77	0,75	0,73
	50	0,83	0,82	0,80	0,79	0,77	0,76	0,74	0,72	0,71	0,69	0,67
	55	0,77	0,76	0,74	0,73	0,71	0,70	0,68	0,66	0,65	0,63	0,61

Continued

TABLE 9 - Correction factors of the refrigeration capacity for temperatures different from standard values

Refrigerant	Liquid temperature [°C]	Evaporating temperature [°C]										
		+ 10	+ 5	0	- 5	- 10	- 15	- 20	- 25	- 30	-35	- 40
R410A	15	1,24	1,23	1,22	1,21	1,20	1,19	1,17	1,16	1,15	1,13	1,12
	20	1,17	1,17	1,16	1,15	1,14	1,13	1,11	1,10	1,09	1,07	1,06
	25	1,11	1,10	1,09	1,08	1,07	1,06	1,05	1,04	1,02	1,01	1,00
	30	1,05	1,04	1,03	1,02	1,01	1,00	0,99	0,98	0,96	0,95	0,93
	35	0,98	0,97	0,97	0,96	0,95	0,94	0,92	0,91	0,90	0,89	0,87
	40	0,92	0,91	0,90	0,89	0,88	0,87	0,86	0,85	0,83	0,82	0,81
	45	0,85	0,84	0,83	0,82	0,81	0,80	0,79	0,78	0,77	0,75	0,74
	50	0,78	0,77	0,77	0,76	0,75	0,74	0,72	0,71	0,70	0,69	0,67
	55	0,71	0,70	0,69	0,69	0,68	0,67	0,65	0,64	0,63	0,62	0,61
R507	15	1,36	1,34	1,32	1,29	1,27	1,24	1,22	1,19	1,17	1,14	1,11
	20	1,28	1,26	1,24	1,21	1,19	1,16	1,14	1,11	1,09	1,06	1,03
	25	1,20	1,18	1,15	1,13	1,11	1,08	1,06	1,03	1,00	0,98	0,95
	30	1,11	1,09	1,07	1,05	1,02	1,00	0,98	0,95	0,92	0,90	0,87
	35	1,03	1,01	0,99	0,96	0,94	0,92	0,89	0,87	0,84	0,82	0,79
	40	0,94	0,92	0,90	0,88	0,86	0,83	0,81	0,78	0,76	0,73	0,71
	45	0,86	0,84	0,82	0,79	0,77	0,75	0,72	0,70	0,67	0,65	0,62
	50	0,77	0,75	0,73	0,71	0,68	0,66	0,64	0,61	0,59	0,56	0,54
	55	0,68	0,66	0,64	0,62	0,59	0,57	0,55	0,53	0,50	0,48	0,45
R1234yf	15	1,36	1,33	1,30	1,27	1,24	1,21	1,18	1,15	1,12	1,09	1,06
	20	1,29	1,26	1,23	1,20	1,17	1,14	1,11	1,08	1,05	1,02	0,99
	25	1,22	1,19	1,16	1,13	1,10	1,07	1,04	1,01	0,98	0,95	0,92
	30	1,14	1,12	1,09	1,06	1,03	1,00	0,97	0,94	0,91	0,88	0,85
	35	1,07	1,04	1,02	0,99	0,96	0,93	0,90	0,87	0,84	0,81	0,78
	40	1,00	0,97	0,94	0,91	0,89	0,86	0,83	0,80	0,77	0,74	0,71
	45	0,93	0,90	0,87	0,84	0,81	0,78	0,76	0,73	0,70	0,67	0,64
	50	0,85	0,82	0,80	0,77	0,74	0,71	0,68	0,66	0,63	0,60	0,57
	55	0,78	0,75	0,72	0,70	0,67	0,64	0,61	0,58	0,55	0,53	0,50
R1234ze	15	1,31	1,29	1,26	1,23	1,21	1,18	1,15	1,13	1,10	1,07	1,04
	20	1,25	1,23	1,20	1,17	1,15	1,12	1,09	1,07	1,04	1,01	0,98
	25	1,19	1,16	1,14	1,11	1,09	1,06	1,03	1,01	0,98	0,95	0,93
	30	1,13	1,10	1,08	1,05	1,03	1,00	0,97	0,95	0,92	0,89	0,87
	35	1,07	1,04	1,02	0,99	0,97	0,94	0,91	0,89	0,86	0,83	0,81
	40	1,01	0,98	0,96	0,93	0,91	0,88	0,85	0,83	0,80	0,77	0,75
	45	0,95	0,92	0,90	0,87	0,84	0,82	0,79	0,77	0,74	0,71	0,69
	50	0,88	0,86	0,83	0,81	0,78	0,76	0,73	0,71	0,68	0,65	0,63
	55	0,82	0,80	0,77	0,75	0,72	0,70	0,67	0,65	0,62	0,59	0,57
R448A	15	1,27	1,26	1,24	1,22	1,21	1,19	1,17	1,15	1,13	1,11	1,09
	20	1,21	1,19	1,18	1,16	1,14	1,13	1,11	1,09	1,07	1,05	1,03
	25	1,15	1,13	1,12	1,10	1,08	1,06	1,04	1,03	1,01	0,99	0,97
	30	1,08	1,07	1,05	1,03	1,02	1,00	0,98	0,96	0,94	0,92	0,91
	35	1,02	1,00	0,99	0,97	0,95	0,94	0,92	0,90	0,88	0,86	0,84
	40	0,95	0,94	0,92	0,91	0,89	0,87	0,85	0,84	0,82	0,80	0,78
	45	0,89	0,87	0,86	0,84	0,82	0,81	0,79	0,77	0,75	0,73	0,71
	50	0,82	0,80	0,79	0,77	0,76	0,74	0,72	0,71	0,69	0,67	0,65
	55	0,75	0,74	0,72	0,71	0,69	0,67	0,66	0,64	0,62	0,60	0,58

Continued

TABLE 9 - Correction factors of the refrigeration capacity for temperatures different from standard values

Refrigerant	Liquid temperature [°C]	Evaporating temperature [°C]										
		+ 10	+ 5	0	- 5	- 10	- 15	- 20	- 25	- 30	-35	- 40
R449A	15	1,28	1,26	1,24	1,23	1,21	1,19	1,17	1,15	1,13	1,11	1,09
	20	1,21	1,20	1,18	1,16	1,15	1,13	1,11	1,09	1,07	1,05	1,03
	25	1,15	1,13	1,12	1,10	1,08	1,06	1,05	1,03	1,01	0,99	0,97
	30	1,08	1,07	1,05	1,04	1,02	1,00	0,98	0,96	0,94	0,92	0,90
	35	1,02	1,00	0,99	0,97	0,95	0,94	0,92	0,90	0,88	0,86	0,84
	40	0,95	0,94	0,92	0,90	0,89	0,87	0,85	0,83	0,81	0,80	0,78
	45	0,89	0,87	0,85	0,84	0,82	0,80	0,79	0,77	0,75	0,73	0,71
	50	0,82	0,80	0,79	0,77	0,75	0,74	0,72	0,70	0,68	0,66	0,65
	55	0,75	0,73	0,72	0,70	0,69	0,67	0,65	0,63	0,62	0,60	0,58
R450A	15	1,30	1,27	1,25	1,23	1,20	1,18	1,15	1,13	1,10	1,08	1,05
	20	1,24	1,21	1,19	1,17	1,14	1,12	1,09	1,07	1,04	1,02	0,99
	25	1,18	1,15	1,13	1,11	1,08	1,06	1,03	1,01	0,99	0,96	0,94
	30	1,12	1,09	1,07	1,05	1,02	1,00	0,98	0,95	0,93	0,90	0,88
	35	1,06	1,03	1,01	0,99	0,96	0,94	0,92	0,89	0,87	0,84	0,82
	40	1,00	0,97	0,95	0,93	0,90	0,88	0,86	0,83	0,81	0,78	0,76
	45	0,93	0,91	0,89	0,87	0,84	0,82	0,80	0,77	0,75	0,73	0,70
	50	0,87	0,85	0,83	0,81	0,78	0,76	0,74	0,71	0,69	0,67	0,64
	55	0,81	0,79	0,77	0,75	0,72	0,70	0,68	0,65	0,63	0,61	0,58
R452A	15	1,33	1,31	1,29	1,27	1,24	1,22	1,19	1,17	1,14	1,11	1,09
	20	1,26	1,24	1,22	1,19	1,17	1,14	1,12	1,09	1,07	1,04	1,01
	25	1,19	1,17	1,14	1,12	1,10	1,07	1,05	1,02	1,00	0,97	0,94
	30	1,11	1,09	1,07	1,05	1,02	1,00	0,98	0,95	0,92	0,90	0,87
	35	1,04	1,02	1,00	0,98	0,95	0,93	0,90	0,88	0,85	0,83	0,80
	40	0,97	0,95	0,93	0,90	0,88	0,86	0,83	0,81	0,78	0,76	0,73
	45	0,90	0,87	0,85	0,83	0,81	0,78	0,76	0,73	0,71	0,68	0,66
	50	0,82	0,80	0,78	0,76	0,73	0,71	0,69	0,66	0,64	0,61	0,59
	55	0,75	0,73	0,71	0,69	0,66	0,64	0,62	0,59	0,57	0,54	0,52

TABLE 10: Water capacity and dehydratable charge of hermetic filters with core 100% molecular sieves

Catalogue Number	Water Capacity at + 24 °C (1) [g H ₂ O]					Dehydratable Charge at + 24 °C [kg refrigerant]				
	R134a	R22	R404A R507	R407C	R410A	R134a	R22	R404A R507	R407C	R410A
4303/2	4,9	4,4	5,0	4,0	4,3	5,3	4,7	5,4	4,3	4,6
4303/2F										
4303/2S										
4303/3										
4303/3S										
4305/2	7,7	7,1	7,9	6,3	6,9	8,3	7,6	8,5	6,8	7,4
4305/2F										
4305/2S										
4305/3										
4305/3S										
4305/M10S	12,9	11,8	13,2	10,6	11,5	13,9	12,7	14,2	11,4	12,4
4308/2										
4308/2F										
4308/2S										
4308/3										
4308/3F										
4308/3S										
4308/M10S										
4308/M12S										
4308/4										
4308/4S										
4316/2	25,2	23,0	25,7	20,6	22,5	27,1	24,7	27,6	22,2	24,2
4316/3										
4316/3F										
4316/3S										
4316/M10S										
4316/M12S										
4316/4										
4316/4S										
4316/5										
4316/5S										
4316/7S										
4330/3	50,4	46,0	51,5	41,3	44,9	54,2	49,5	55,3	44,3	48,4
4330/3S										
4330/4										
4330/4S										
4330/5										
4330/5S										
4330/7S										
4330/9S										
4332/4	46,6	42,6	47,6	38,2	41,5	50,1	45,8	51,2	41,1	44,6
4332/4S										
4332/5										
4332/5S										
4341/4	63,3	57,8	64,7	51,8	56,4	68,1	62,2	69,6	55,7	60,6
4341/4S										
4341/5										
4341/5S										
4341/6										
4341/6S										
4341/7S										
4375/4S	126,6	115,6	129,4	103,7	112,8	136,1	124,3	139,1	111,4	121,3
4375/5S										
4375/6S										
4375/7S										
4375/9S										

(1) : Water capacity values are referred to the following conditions, fixed in ARI STANDARD 710-2004 and DIN 8949:2000:

- Liquid temperatures: 24 °C and 52 °C
- Equilibrium point dryness, EPD: 60 ppm for R22
- Equilibrium point dryness, EPD: 50 ppm for R134a , R404A , R407C , R410A e R507

Continued

TABLE 10: Water capacity and dehydratable charge of hermetic filters with core 100% molecular sieves

Catalogue Number	Water Capacity at + 52 °C (1) [g H ₂ O]					Dehydratable Charge at + 52 °C [kg refrigerant]				
	R134a	R22	R404A R507	R407C	R410A	R134a	R22	R404A R507	R407C	R410A
4303/2	4,2	3,6	4,6	3,2	3,5	4,5	3,9	4,9	3,4	3,8
4303/2F										
4303/2S										
4303/3										
4303/3S										
4305/2	6,7	5,7	7,3	5,1	5,6	7,2	6,1	7,8	5,5	6,0
4305/2F										
4305/2S										
4305/3										
4305/3S										
4305/M10S	11,1	9,3	12,2	8,5	9,3	11,9	10,0	13,1	9,1	10,0
4308/2										
4308/2F										
4308/2S										
4308/3										
4308/3F										
4308/3S										
4308/M10S										
4308/M12S										
4308/4										
4308/4S										
4316/2	21,7	18,4	23,9	16,6	18,1	23,3	19,8	25,7	17,8	19,5
4316/3										
4316/3F										
4316/3S										
4316/M10S										
4316/M12S										
4316/4										
4316/4S										
4316/5										
4316/5S										
4316/7S										
4330/3	43,5	36,9	47,8	33,2	36,2	46,7	39,6	51,4	35,7	38,9
4330/3S										
4330/4										
4330/4S										
4330/5										
4330/5S										
4330/7S										
4330/9S	40,2	34,1	44,2	30,7	33,4	43,2	36,7	47,5	33,0	35,9
4332/4										
4332/4S										
4332/5										
4341/4	54,6	46,3	60,1	41,7	45,4	58,7	49,8	64,6	44,8	48,8
4341/4S										
4341/5										
4341/5S										
4341/6										
4341/6S										
4341/7S										
4375/4S	109,2	92,7	120,2	83,5	90,8	117,4	99,6	129,2	89,7	97,6
4375/5S										
4375/6S										
4375/7S										
4375/9S										

(1) : Water capacity values are referred to the following conditions, fixed in ARI STANDARD 710-2004 and DIN 8949:2000:

- Liquid temperatures: 24 °C and 52 °C
- Equilibrium point dryness, EPD: 60 ppm for R22
- Equilibrium point dryness, EPD: 50 ppm for R134a , R404A , R407C , R410A e R507

TABLE 11: Water capacity and dehydratable charge of hermetic filters with core 80% molecular sieves + 20% activated alumina

Catalogue Number	Water Capacity at + 24 °C (1) [g H ₂ O]					Dehydratable Charge at + 24 °C [kg refrigerant]				
	R134a	R22	R404A R507	R407C	R410A	R134a	R22	R404A R507	R407C	R410A
4203/2	4,2	3,7	4,3	3,4	3,7	4,5	4,0	4,6	3,7	3,9
4203/2S										
4203/3										
4205/2	6,5	6,0	6,7	5,4	5,9	7,0	6,5	7,2	5,8	6,3
4205/2S										
4205/3										
4205/3S										
4208/2	11,0	10,0	11,2	9,0	9,8	11,8	10,8	12,1	9,7	10,5
4208/2S										
4208/3										
4208/3S										
4208/4										
4216/2	21,4	19,6	21,8	17,5	19,1	23,0	21,0	23,5	18,8	20,6
4216/3										
4216/3S										
4216/4										
4216/4S										
4216/5										
4216/5S										
4230/3	42,8	39,1	43,8	35,1	38,2	46,1	42,0	47,0	37,7	41,1
4230/3S										
4230/4										
4230/4S										
4230/5										
4230/5S										
4232/4	39,6	36,2	40,5	32,5	35,3	42,6	38,9	43,5	34,9	37,9
4232/4S										
4232/5										
4232/5S										
4241/5	53,8	49,1	55,0	44,0	47,9	57,9	52,8	59,1	47,3	51,5
4241/5S										
4241/6										
4241/6S										
4241/7S										
4275/4S	107,6	98,3	110,0	88,1	95,9	115,7	105,7	118,3	94,8	103,1
4275/5S										
4275/6S										
4275/7S										
4275/9S										

(1) : Water capacity values are referred to the following conditions, fixed in ARI STANDARD 710-2004 and DIN 8949:2000:

- Liquid temperatures: 24 °C and 52 °C
- Equilibrium point dryness, EPD: 60 ppm for R22
- Equilibrium point dryness, EPD: 50 ppm for R134a , R404A , R407C , R410A e R507

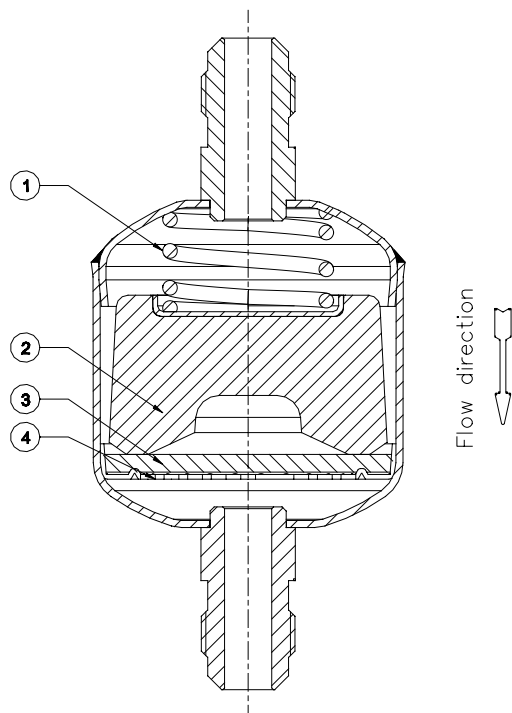
Continued

TABLE 11: Water capacity and dehydratable charge of hermetic filters with core 80% molecular sieves + 20% activated alumina

Catalogue Number	Water Capacity at + 52 °C (1) [g H ₂ O]					Dehydratable Charge at + 52 °C [kg refrigerant]				
	R134a	R22	R404A R507	R407C	R410A	R134a	R22	R404A R507	R407C	R410A
4203/2	3,6	3,1	3,9	2,7	3,0	3,8	3,3	4,2	2,9	3,2
4203/2S										
4203/3										
4205/2	5,7	4,8	6,2	4,3	4,8	6,1	5,2	6,7	4,7	5,1
4205/2S										
4205/3										
4205/3S										
4208/2	9,4	7,9	10,4	7,2	7,9	10,1	8,5	11,2	7,8	8,5
4208/2S										
4208/3										
4208/3S										
4208/4										
4216/2	18,4	15,6	20,3	14,1	15,4	19,8	16,8	21,8	15,2	16,5
4216/3										
4216/3S										
4216/4										
4216/4S										
4216/5										
4216/5S										
4230/3	37,0	31,4	40,6	28,2	30,8	39,7	33,6	43,7	30,3	33,1
4230/3S										
4230/4										
4230/4S										
4230/5										
4232/4	34,2	29,0	37,6	26,1	28,4	36,7	31,2	40,4	28,1	30,5
4232/4S										
4232/5										
4232/5S										
4241/5	46,4	39,4	51,1	35,4	38,6	49,9	42,3	54,9	38,1	41,5
4241/5S										
4241/6										
4241/6S										
4241/7S										
4275/4S	92,8	78,8	102,2	71,0	77,2	99,8	84,7	109,9	76,3	83,0
4275/5S										
4275/6S										
4275/7S										
4275/9S										

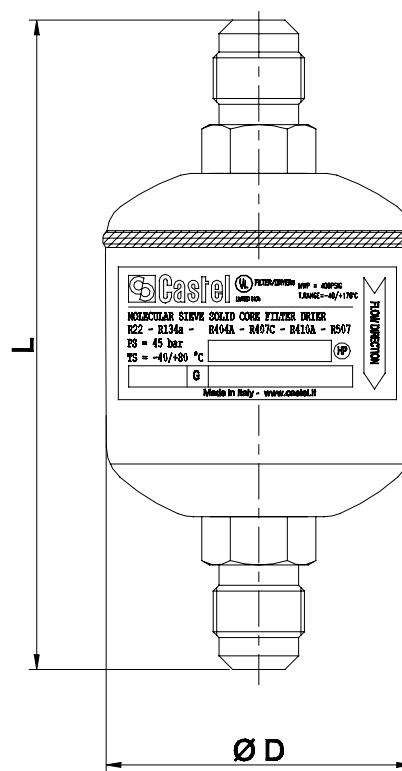
(1) : Water capacity values are referred to the following conditions, fixed in ARI STANDARD 710-2004 and DIN 8949:2000:

- Liquid temperatures: 24 °C and 52 °C
- Equilibrium point dryness, EPD: 60 ppm for R22
- Equilibrium point dryness, EPD: 50 ppm for R134a , R404A , R407C , R410A e R507

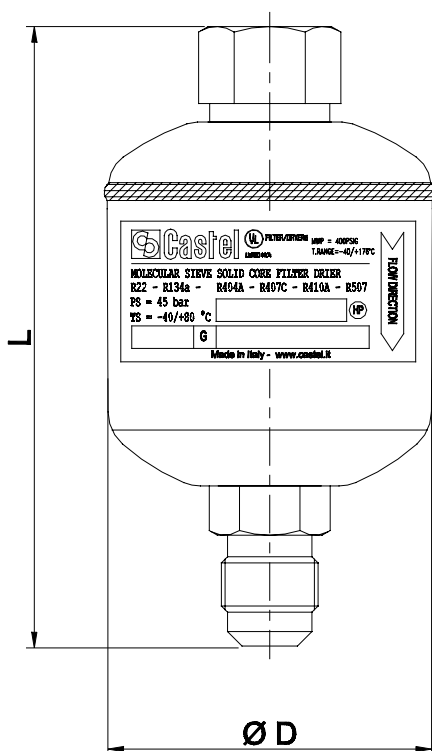


Solid core dehydrator

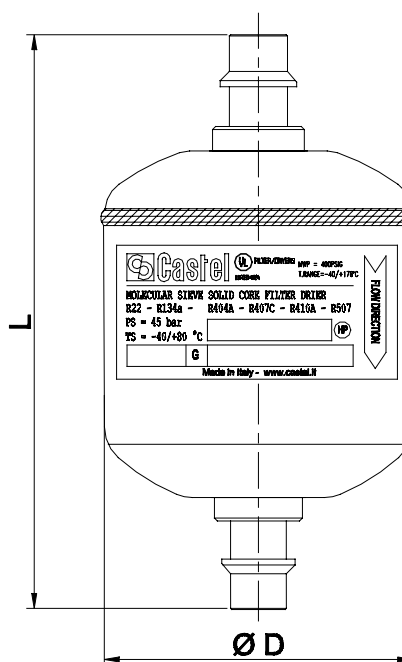
- 1 - Spring
- 2 - Bock
- 3 - Felt
- 4 - Stainless steel mesh



Male connections



**Male - female connections
(female - in)**



Solder connections

TABLE 12: Dimensions and weights of hermetic filters

Catalogue Number		Connections			Dimensions [mm]		Weight [g]
		SAE Flare	ODS				
			Ø [in.]	Ø [mm]	Ø D	L	
4303/2	4203/2	1/4"	—	—	52	103	240
4303/2F	—	1/4"	—	—		92	230
4303/2S	4203/2S	—	1/4"	—		94	220
4303/3	4203/3	3/8"	—	—		111	235
4303/3S	—	—	3/8"	—		96	220
4305/2	4205/2	1/4"	—	—		119	275
4305/2F	—	1/4"	—	—		109	
4305/2S	4205/2S	—	1/4"	—		110	260
4305/3	4205/3	3/8"	—	—		127	295
4305/3S	4205/3S	—	3/8"	—		112	260
4305/M10S	—	—	—	10			
4308/2	4208/2	1/4"	—	—		146	380
4308/2F	—	1/4"	—	—		135	
4308/2S	4208/2S	—	1/4"	—		137	345
4308/3	4208/3	3/8"	—	—		154	395
4308/3F	—	3/8"	—	—		142	380
4308/3S	4208/3S	—	3/8"	—		139	345
4308/M10S	—	—	—	10			
4308/M12S	—	—	—	12		146	380
4308/4	4208/4	1/2"	—	—		162	430
4308/4S	4208/4S	—	1/2"	—		146	380
4316/2	4216/2	1/4"	—	—	73	158	635
4316/3	4216/3	3/8"	—	—		166	690
4316/3F	—	3/8"	—	—		154	680
4316/3S	4216/3S	—	3/8"	—		151	620
4316/M10S	—	—	—	10			
4316/M12S	—	—	—	12		158	640
4316/4	4216/4	1/2"	—	—		174	680
4316/4S	4216/4S	—	1/2"	—		158	640
4316/5	4216/5	5/8"	—	—		183	740
4316/5S	4216/5S	—	5/8"	16		166	640
4316/7S	—	—	7/8"	—		171	650
4330/3	4230/3	3/8"	—	—		245	1380
4330/3S	4230/3S	—	3/8"	—		230	1240
4330/4	4230/4	1/2"	—	—		253	1360
4330/4S	4230/4S	—	1/2"	—		237	1280
4330/5	4230/5	5/8"	—	—		262	1480
4330/5S	4230/5S	—	5/8"	16		245	1370
4330/7S	—	—	7/8"	—		250	1420
4330/9S	—	—	1.1/8"	—		250	1450
4332/4	4232/4	1/2"	—	—	91	187	1300
4332/4S	4232/4S	—	1/2"	—		173	1200
4332/5	4232/5	5/8"	—	—		196	1320
4332/5S	4232/5S	—	5/8"	16		179	1250
4341/4	—	1/2"	—	—		222	1560
4341/4S	—	—	1/2"	—		208	1450
4341/5	4241/5	5/8"	—	—		231	1580
4341/5S	4241/5S	—	5/8"	16		214	1470
4341/6	4241/6	3/4"	—	—		232	1640
4341/6S	4241/6S	—	3/4"	—		219	1560
4341/7S	4241/7S	—	7/8"	—			1600
4375/4S	4275/4S	—	1/2"	—		387	2540
4375/5S	4275/5S	—	5/8"	16		393	2640
4375/6S	4275/6S	—	3/4"	—		398	2820
4375/7S	4275/7S	—	7/8"	—		398	2900
4375/9S	4275/9S	—	1.1/8"	—		398	3050

TABLE 13: General characteristics of hermetic filter driers. SAE Flare connections

Catalogue Number		International Reference	Block Filtering Surface [cm²]	Nominal Volume [cm³]	Connections	PS [bar]	TS [°C]		TA [°C]		Risk Category according to PED Recast
100% molecular sieves	80% molecular sieves + 20% activated alumina						min.	max.	min.	max.	
DF303/2	DF203/2	032	58	50	1/4"	47 (1)	- 40	+ 80	- 20	+ 50	Art. 4.3
DF303/3	DF203/3	033			3/8"						
DF305/2	DF205/2	052	104	80	1/4"						
DF305/3	DF205/3	053			3/8"						
DF308/2	DF208/2	082	141	130	1/4"						
DF308/3	DF208/3	083			3/8"						
DF308/4	DF208/4	084			1/2"						
DF316/2	DF216/2	162	183	250	1/4"						
DF316/3	DF216/3	163			3/8"						
DF316/4	DF216/4	164			1/2"						
DF316/5	DF216/5	165			5/8"						
DF330/3	DF230/3	303	345	500	3/8"						
DF330/4	DF230/4	304			1/2"						
DF330/5	DF230/5	305			5/8"						
DF341/4	—	414	384	670	1/2"						
DF341/5	DF241/5	415			5/8"						
DF341/6	DF241/6	416			3/4"						
DF303/2F (2)	—	—	58	50	1/4"	47 (1)	- 40	+ 80	- 20	+ 50	Art. 4.3
DF305/2F (2)	—	—	104	80	1/4"						
DF308/2F (2)	—	—	141	130	1/4"						
DF308/3F (2)	—	—			3/8"						
DF316/3F (2)	—	—	183	250	3/8"						

(1) : MWP = 680 psi according to UL approval

(2) : Male-female connections (Inlet female)

TABLE 14: General characteristics of hermetic filter driers. ODS connections

Catalogue Number		International Reference	Block Filtering Surface [cm²]	Nominal Volume [cm³]	Connections		PS [bar]	TS [°C]		TA [°C]		Risk Category according to PED Recast
100% molecular sieves	80% molecular sieves + 20% activated alumina				ODS			min.	max.	min.	max.	
					Ø [in.]	Ø [mm]						
DF303/2S	DF203/2S	032S	58	50	1/4"	–	47 (1)	– 40	+ 80	– 20	+ 50	Art. 4.3
DF303/3S	DF203/3S	033S			3/8"	–						
DF305/2S	DF205/2S	052S	104	80	1/4"	–						
DF305/3S	DF205/3S	053S			3/8"	–						
DF305/M10S	DF205/M10S	–			–	10						
DF308/2S	DF208/2S	082S	141	130	1/4"	–						
DF308/3S	DF208/3S	083S			3/8"	–						
DF308/M10S	DF208/M10S	–			–	10						
DF308/M12S	DF208/M12S	–			–	12						
DF308/4S	DF208/4S	084S			1/2"	–						
DF316/3S	DF216/3S	163S	183	250	3/8"	–						
DF316/M10S	DF216/M10S	–			–	10						
DF316/M12S	DF216/M12S	–			–	12						
DF316/4S	DF216/4S	164S			1/2"	–						
DF316/5S	DF216/5S	165S			5/8"	16						
DF316/7S	DF216/7S	167S			7/8"	–						
DF330/3S	DF230/3S	303S	345	500	3/8"	–						
DF330/4S	DF230/4S	304S			1/2"	–						
DF330/5S	DF230/5S	305S			5/8"	16						
DF330/7S	DF230/7S	307S			7/8"	–						
DF330/9S	DF230/9S	309S			1.1/8"	–						
DF341/4S	–	414S	384	670	1/2"	–						
DF341/5S	DF241/5S	415S			5/8"	16						
DF341/6S	DF241/6S	416S			3/4"	–						
DF341/7S	DF241/7S	417S			7/8"	–						
DF375/4S	DF275/4S	754S	768	1340	1/2"	–						
DF375/5S	DF275/5S	755S			5/8"	16						
DF375/6S	DF275/6S	756S			3/4"	–						
DF375/7S	DF275/7S	757S			7/8"	–						
DF375/9S	DF275/9S	759S			1.1/8"	–						

(1) : MWP = 680 psi according to UL approval

TABLE 15: Refrigerant flow capacity of hermetic filter driers

Catalogue Number		Pressure drop 0,07 bar (1) [kW]												
100% molecular sieves	80% molecular sieves + 20% activated alumina	R134a	R22	R32	R404A	R407C	R410A	R507	R1234yf	R1234ze	R448A	R449A	R450A	R452A
DF303/2	DF203/2	7,2	7,8	34,4	5,1	7,4	7,6	5,0	5,2	6,3	6,8	6,7	5,7	5,2
DF303/2F	–	7,2	7,8	34,4	5,1	7,4	7,6	5,0	5,2	6,3	6,8	6,7	5,7	5,2
DF303/2S	DF203/2S	9,3	10,1	44,6	6,6	9,5	9,8	6,4	6,7	8,2	8,8	8,7	7,4	6,7
DF303/3	DF203/3	16,8	18,3	80,7	12,0	17,3	17,7	11,6	12,2	14,8	16,0	15,7	13,4	12,1
DF303/3S	–	17,1	18,7	82,5	12,2	17,7	18,1	11,9	12,4	15,1	16,3	16,1	13,7	12,4
DF305/2	DF205/2	7,5	8,2	36,2	5,4	7,7	7,9	5,2	5,5	6,6	7,2	7,1	6,0	5,4
DF305/2F	–	7,5	8,2	36,2	5,4	7,7	7,9	5,2	5,5	6,6	7,2	7,1	6,0	5,4
DF305/2S	DF205/2S	11,6	12,7	56,0	8,3	12,0	12,3	8,1	8,4	10,3	11,1	10,9	9,3	8,4
DF305/3	DF205/3	17,5	19,1	84,3	12,5	18,0	18,5	12,1	12,7	15,5	16,7	16,4	14,0	12,6
DF305/3S	DF205/3S	18,2	19,8	87,4	12,9	18,7	19,2	12,6	13,2	16,0	17,3	17,0	14,5	13,1
DF305/M10S	–	18,2	19,8	87,4	12,9	18,7	19,2	12,6	13,2	16,0	17,3	17,0	14,5	13,1
DF308/2	DF208/2	7,3	8,0	35,3	5,2	7,6	7,8	5,1	5,3	6,5	7,0	6,9	5,9	5,3
DF308/2F	–	7,3	8,0	35,3	5,2	7,6	7,8	5,1	5,3	6,5	7,0	6,9	5,9	5,3
DF308/2S	DF208/2S	11,2	12,2	53,8	8,0	11,5	11,8	7,7	8,1	9,9	10,6	10,5	8,9	8,1
DF308/3	DF208/3	19,4	21,2	93,5	13,9	20,0	20,5	13,5	14,1	17,2	18,5	18,2	15,5	14,0
DF308/3F	–	19,4	21,2	93,5	13,9	20,0	20,5	13,5	14,1	17,2	18,5	18,2	15,5	14,0
DF308/3S	DF208/3S	19,9	21,7	95,7	14,2	20,5	21,0	13,8	14,4	17,6	18,9	18,7	15,9	14,4
DF308/M10S	–	19,9	21,7	95,7	14,2	20,5	21,0	13,8	14,4	17,6	18,9	18,7	15,9	14,4
DF308/M12S	–	24,9	27,2	120,0	17,8	25,7	26,4	17,3	18,1	22,0	23,7	23,4	19,9	18,0
DF308/4	DF208/4	23,6	25,7	113,4	16,8	24,3	24,9	16,3	17,1	20,8	22,4	22,1	18,8	17,0
DF308/4S	DF208/4S	24,9	27,2	120,0	17,8	25,7	26,4	17,3	18,1	22,0	23,7	23,4	19,9	18,0
DF316/2	DF216/2	8,3	9,0	39,7	5,9	8,5	8,7	5,7	6,0	7,3	7,8	7,7	6,6	6,0
DF316/3	DF216/3	19,5	21,3	94,0	13,9	20,1	20,6	13,5	14,2	17,3	18,6	18,3	15,6	14,1
DF316/3F	–	19,5	21,3	94,0	13,9	20,1	20,6	13,5	14,2	17,3	18,6	18,3	15,6	14,1
DF316/3S	DF216/3S	21,5	23,4	103,2	15,3	22,1	22,7	14,9	15,6	19,0	20,4	20,1	17,1	15,5
DF316/M10S	–	21,5	23,4	103,2	15,3	22,1	22,7	14,9	15,6	19,0	20,4	20,1	17,1	15,5
DF316/M12S	–	29,7	32,4	142,9	21,2	30,6	31,4	20,6	21,5	26,2	28,3	27,9	23,7	21,4
DF316/4	DF216/4	25,2	27,5	121,3	18,0	26,0	26,6	17,5	18,3	22,3	24,0	23,7	20,1	18,2
DF316/4S	DF216/4S	29,7	32,4	142,9	21,2	30,6	31,4	20,6	21,5	26,2	28,3	27,9	23,7	21,4
DF316/5	DF216/5	33,7	36,7	161,9	24,0	34,7	35,6	23,3	24,4	29,7	32,0	31,6	26,9	24,3
DF316/5S	DF216/5S	35,3	38,5	169,9	25,2	36,4	37,3	24,4	25,6	31,2	33,6	33,1	28,2	25,5
DF316/7S	–	45,4	49,5	218,4	32,4	46,8	48,0	31,4	32,9	40,1	43,2	42,6	36,2	32,8
DF330/3	DF230/3	20,4	22,3	98,4	14,6	21,1	21,6	14,2	14,8	18,1	19,4	19,2	16,3	14,8
DF330/3S	DF230/3S	22,2	24,2	106,8	15,8	22,9	23,4	15,4	16,1	19,6	21,1	20,8	17,7	16,0
DF330/4	DF230/4	28,7	31,3	138,1	20,5	29,6	30,3	19,9	20,8	25,4	27,3	26,9	22,9	20,7
DF330/4S	DF230/4S	37,1	40,5	178,7	26,5	38,3	39,2	25,7	26,9	32,8	35,3	34,8	29,6	26,8
DF330/5	DF230/5	37,2	40,6	179,1	26,6	38,4	39,3	25,8	27,0	32,9	35,4	34,9	29,7	26,9
DF330/5S	DF230/5S	43,6	47,5	209,6	31,1	44,9	46,0	30,2	31,6	38,5	41,4	40,9	34,8	31,4
DF330/7S	–	50,1	54,6	240,9	35,7	51,6	52,9	34,7	36,3	44,2	47,6	47,0	40,0	36,1
DF330/9S	–	50,1	54,6	240,9	35,7	51,6	52,9	34,7	36,3	44,2	47,6	47,0	40,0	36,1
DF341/4	–	36,5	39,8	175,6	26,0	37,6	38,6	25,3	26,5	32,2	34,7	34,2	29,1	26,3
DF341/4S	–	38,1	41,5	183,1	27,1	39,2	40,2	26,4	27,6	33,6	36,2	35,7	30,4	27,5
DF341/5	DF241/5	42,2	46,0	203,0	30,1	43,5	44,6	29,2	30,6	37,3	40,1	39,6	33,7	30,5
DF341/5S	DF241/5S	49,1	53,5	236,0	35,0	50,6	51,8	34,0	35,6	43,3	46,7	46,0	39,2	35,4
DF341/6	DF241/6	66,6	72,6	320,3	47,5	68,6	70,3	46,1	48,3	58,8	63,3	62,4	53,1	48,1
DF341/6S	DF241/6S	66,6	72,6	320,3	47,5	68,6	70,3	46,1	48,3	58,8	63,3	62,4	53,1	48,1
DF341/7S	DF241/7S	71,1	77,5	341,9	50,7	73,2	75,1	49,2	51,5	62,8	67,6	66,7	56,7	51,3
DF375/4S	DF275/4S	52,9	57,7		37,7	54,5	55,9	36,6		46,7	50,3	49,6	42,2	38,2
DF375/5S	DF275/5S	88,7	96,7		63,2	91,4	93,7	61,4		78,3	84,3	83,2	70,8	64,0
DF375/6S	DF275/6S	99,0	108,0		70,6	102,1	104,7	68,6		87,5	94,2	92,9	79,1	71,5
DF375/7S	DF275/7S	103,6	113,0		73,9	106,8	109,5	71,8		91,5	98,5	97,2	82,7	74,8
DF375/9S	DF275/9S	105,5	115,0		75,2	108,7	111,4	73,0		93,2	100,3	98,9	84,2	76,1

(1) : Maximum values of the refrigerant flow capacity at which the drier can be used when fluid dehydration is not the a major problem, provided that the original moisture is limited before the installation of the drier.

The maximum refrigerant flow capacities are referred to a total pressure drop of 0,07 bar / 0,14 bar , inlet and outlet connections included, (according to ARI STANDARD 710-2009 - with liquid temperature at + 30 °C and evaporating temperature at - 15 °C)

NOTE: for temperatures different from standard values use correction factors L1 listed on TABLE 8

Continued

TABLE 15: Refrigerant flow capacity of hermetic filter driers

Catalogue Number		Pressure drop 0,14 bar (1) [kW]												
100% molecular sieves	80% molecular sieves + 20% activated alumina	R134a	R22	R32	R404A	R407C	R410A	R507	R1234yf	R1234ze	R448A	R449A	R450A	R452A
DF303/2	DF203/2	8,6	9,4	41,3	6,1	8,8	9,1	5,9	6,2	7,6	8,2	8,0	6,9	6,2
DF303/2F	—	8,6	9,4	41,3	6,1	8,8	9,1	5,9	6,2	7,6	8,2	8,0	6,9	6,2
DF303/2S	DF203/2S	11,1	12,1	53,5	7,9	11,5	11,7	7,7	8,1	9,8	10,6	10,4	8,9	8,0
DF303/3	DF203/3	20,1	22,0	96,9	14,4	20,8	21,3	13,9	14,6	17,8	19,1	18,9	16,1	14,5
DF303/3S	—	20,6	22,4	99,0	14,7	21,2	21,7	14,2	14,9	18,2	19,6	19,3	16,4	14,9
DF305/2	DF205/2	9,0	9,8	43,4	6,4	9,3	9,5	6,2	6,5	8,0	8,6	8,5	7,2	6,5
DF305/2F	—	9,0	9,8	43,4	6,4	9,3	9,5	6,2	6,5	8,0	8,6	8,5	7,2	6,5
DF305/2S	DF205/2S	15,1	16,5	72,8	10,8	15,6	16,0	10,5	11,0	13,4	14,4	14,2	12,1	10,9
DF305/3	DF205/3	22,8	24,8	109,5	16,2	23,5	24,1	15,8	16,5	20,1	21,7	21,4	18,2	16,4
DF305/3S	DF205/3S	23,6	25,7	113,6	16,8	24,3	24,9	16,3	17,1	20,8	22,4	22,1	18,8	17,0
DF305/M10S	—	23,6	25,7	113,6	16,8	24,3	24,9	16,3	17,1	20,8	22,4	22,1	18,8	17,0
DF308/2	DF208/2	9,5	10,4	45,9	6,8	9,8	10,1	6,6	6,9	8,4	9,1	8,9	7,6	6,9
DF308/2F	—	9,5	10,4	45,9	6,8	9,8	10,1	6,6	6,9	8,4	9,1	8,9	7,6	6,9
DF308/2S	DF208/2S	14,5	15,9	70,0	10,4	15,0	15,4	10,1	10,5	12,8	13,8	13,6	11,6	10,5
DF308/3	DF208/3	25,3	27,6	121,6	18,0	26,0	26,7	17,5	18,3	22,3	24,0	23,7	20,2	18,2
DF308/3F	—	25,3	27,6	121,6	18,0	26,0	26,7	17,5	18,3	22,3	24,0	23,7	20,2	18,2
DF308/3S	DF208/3S	25,9	28,2	124,5	18,4	26,7	27,3	17,9	18,8	22,9	24,6	24,3	20,6	18,7
DF308/M10S	—	25,9	28,2	124,5	18,4	26,7	27,3	17,9	18,8	22,9	24,6	24,3	20,6	18,7
DF308/M12S	—	32,4	35,4	156,0	23,1	33,4	34,3	22,5	23,5	28,6	30,8	30,4	25,9	23,4
DF308/4	DF208/4	30,6	33,4	147,4	21,9	31,6	32,4	21,2	22,2	27,1	29,1	28,7	24,5	22,1
DF308/4S	DF208/4S	32,4	35,4	156,0	23,1	33,4	34,3	22,5	23,5	28,6	30,8	30,4	25,9	23,4
DF316/2	DF216/2	11,1	12,2	53,6	7,9	11,5	11,8	7,7	8,1	9,8	10,6	10,4	8,9	8,0
DF316/3	DF216/3	26,4	28,8	126,9	18,8	27,2	27,9	18,3	19,1	23,3	25,1	24,7	21,0	19,0
DF316/3F	—	26,4	28,8	126,9	18,8	27,2	27,9	18,3	19,1	23,3	25,1	24,7	21,0	19,0
DF316/3S	DF216/3S	29,0	31,6	139,4	20,7	29,9	30,6	20,1	21,0	25,6	27,5	27,2	23,1	20,9
DF316/M10S	—	29,0	31,6	139,4	20,7	29,9	30,6	20,1	21,0	25,6	27,5	27,2	23,1	20,9
DF316/M12S	—	40,1	43,7	193,0	28,6	41,3	42,4	27,8	29,1	35,4	38,1	37,6	32,0	29,0
DF316/4	DF216/4	34,0	37,1	163,8	24,3	35,1	36,0	23,6	24,7	30,1	32,4	31,9	27,2	24,6
DF316/4S	DF216/4S	40,1	43,7	193,0	28,6	41,3	42,4	27,8	29,1	35,4	38,1	37,6	32,0	29,0
DF316/5	DF216/5	45,4	49,5	218,6	32,4	46,8	48,0	31,5	32,9	40,1	43,2	42,6	36,3	32,8
DF316/5S	DF216/5S	47,7	52,0	229,3	34,0	49,1	50,4	33,0	34,6	42,1	45,3	44,7	38,0	34,4
DF316/7S	—	61,3	66,8	294,8	43,7	63,1	64,8	42,4	44,4	54,1	58,3	57,5	48,9	44,2
DF330/3	DF230/3	27,6	30,1	132,8	19,7	28,4	29,2	19,1	20,0	24,4	26,3	25,9	22,0	19,9
DF330/3S	DF230/3S	30,0	32,7	144,1	21,4	30,9	31,7	20,7	21,7	26,5	28,5	28,1	23,9	21,6
DF330/4	DF230/4	38,7	42,3	186,4	27,6	39,9	40,9	26,8	28,1	34,2	36,8	36,3	30,9	28,0
DF330/4S	DF230/4S	50,1	54,7	241,2	35,8	51,7	53,0	34,7	36,4	44,3	47,7	47,0	40,0	36,2
DF330/5	DF230/5	50,3	54,8	241,8	35,8	51,8	53,1	34,8	36,4	44,4	47,8	47,1	40,1	36,3
DF330/5S	DF230/5S	58,8	64,1	282,9	41,9	60,6	62,1	40,7	42,6	51,9	55,9	55,1	46,9	42,5
DF330/7S	—	67,6	73,7	325,2	48,2	69,7	71,4	46,8	49,0	59,7	64,3	63,4	54,0	48,8
DF330/9S	—	67,6	73,7	325,2	48,2	69,7	71,4	46,8	49,0	59,7	64,3	63,4	54,0	48,8
DF341/4	—	54,7	59,7	263,4	39,0	56,4	57,8	37,9	39,7	48,4	52,1	51,3	43,7	39,5
DF341/4S	—	57,1	62,3	274,6	40,7	58,8	60,3	39,5	41,4	50,4	54,3	53,5	45,6	41,2
DF341/5	DF241/5	63,3	69,0	304,4	45,1	65,2	66,9	43,8	45,9	55,9	60,2	59,3	50,5	45,7
DF341/5S	DF241/5S	73,6	80,3	354,1	52,5	75,8	77,8	51,0	53,4	65,0	70,0	69,0	58,7	53,1
DF341/6	DF241/6	99,9	108,9	480,5	71,2	102,9	105,5	69,2	72,4	88,2	95,0	93,7	79,7	72,1
DF341/6S	DF241/6S	99,9	108,9	480,5	71,2	102,9	105,5	69,2	72,4	88,2	95,0	93,7	79,7	72,1
DF341/7S	DF241/7S	106,6	116,3	512,9	76,0	109,9	112,6	73,8	77,3	94,2	101,4	100,0	85,1	77,0
DF375/4S	DF275/4S	79,4	86,6	—	56,6	81,8	83,9	55,0	—	70,1	75,5	74,4	63,4	57,3
DF375/5S	DF275/5S	133,0	145,1	—	94,9	137,1	140,6	92,1	—	117,5	126,5	124,7	106,2	96,0
DF375/6S	DF275/6S	148,6	162,0	—	105,9	153,1	157,0	102,9	—	131,2	141,3	139,3	118,6	107,2
DF375/7S	DF275/7S	155,4	169,5	—	110,9	160,2	164,2	107,6	—	137,3	147,8	145,8	124,1	112,2
DF375/9S	DF275/9S	158,2	172,5	—	112,8	163,0	167,2	109,5	—	139,7	150,4	148,4	126,3	114,2

(1) : Maximum values of the refrigerant flow capacity at which the drier can be used when fluid dehydration is not the a major problem, provided that the original moisture is limited before the installation of the drier.

The maximum refrigerant flow capacities are referred to a total pressure drop of 0,07 bar / 0,14 bar , inlet and outlet connections included, (according to ARI STANDARD 710-2009 - with liquid temperature at + 30 °C and evaporating temperature at - 15 °C)

NOTE: for temperatures different from standard values use correction factors L1 listed on TABLE 8

TABLE 16: Water capacity and dehydratable charge of hermetic filters with core 100% molecular sieves

Catalogue Number	Water Capacity at + 24 °C (1) [g H ₂ O]					Dehydratable Charge at + 24 °C [kg refrigerant]				
	R134a	R22	R404A R507	R407C	R410A	R134a	R22	R404A R507	R407C	R410A
DF303/2	5,2	4,7	5,3	4,2	4,6	5,6	5,1	5,7	4,5	4,9
DF303/2F										
DF303/2S										
DF303/3										
DF303/3S										
DF305/2	13,4	12,2	13,6	10,9	11,9	14,4	13,1	14,6	11,7	12,8
DF305/2F										
DF305/2S										
DF305/3										
DF305/3S										
DF305/M10S	22,8	20,8	23,3	18,6	20,3	24,5	22,4	25,1	20,0	21,8
DF308/2										
DF308/2F										
DF308/2S										
DF308/3										
DF308/3F										
DF308/3S										
DF308/M10S										
DF308/M12S										
DF308/4										
DF308/4S	30,4	27,7	31,0	24,9	27,1	32,7	29,8	33,3	26,8	29,1
DF316/2										
DF316/3										
DF316/3F										
DF316/3S										
DF316/M10S										
DF316/M12S										
DF316/4										
DF316/4S										
DF316/5										
DF316/5S	71,3	65,1	72,9	58,4	63,6	76,7	70,0	78,4	62,8	68,4
DF316/7S										
DF316/9S										
DF330/3										
DF330/3S										
DF330/4										
DF330/4S										
DF330/5										
DF330/5S	98,7	90,1	100,0	80,8	87,9	106,1	96,9	107,5	86,9	94,5
DF330/7S										
DF330/9S										
DF341/4										
DF341/4S										
DF341/5										
DF341/5S										
DF341/6	197,3	180,2	201,6	161,6	175,9	212,3	193,8	215,1	173,8	189,0
DF341/6S										
DF341/7S										
DF375/4S										
DF375/5S										
DF375/6S	197,3	180,2	201,6	161,6	175,9	212,3	193,8	215,1	173,8	189,0
DF375/7S										
DF375/9S										

(1) : Water capacity values are referred to the following conditions, fixed in ARI STANDARD 710-2004 and DIN 8949:2000:

- Liquid temperatures: 24 °C and 52 °C
- Equilibrium point dryness, EPD: 60 ppm for R22
- Equilibrium point dryness, EPD: 50 ppm for R134a , R404A , R407C , R410A e R507

Continued

TABLE 16: Water capacity and dehydratable charge of hermetic filters with core 100% molecular sieves

Catalogue Number	Water Capacity at + 52 °C (1) [g H ₂ O]					Dehydratable Charge at + 52 °C [kg refrigerant]				
	R134a	R22	R404A R507	R407C	R410A	R134a	R22	R404A R507	R407C	R410A
DF303/2	4,5	3,8	4,9	3,4	3,7	4,8	4,1	5,3	3,7	4,0
DF303/2F										
DF303/2S										
DF303/3										
DF303/3S										
DF305/2	11,5	9,8	12,7	8,8	9,6	12,4	10,5	13,7	9,5	10,3
DF305/2F										
DF305/2S										
DF305/3										
DF305/3S										
DF305/M10S	19,6	16,7	21,6	15,0	16,3	21,1	18,0	23,2	16,1	17,5
DF308/2										
DF308/2F										
DF308/2S										
DF308/3										
DF308/3F										
DF308/3S										
DF308/M10S										
DF308/M12S										
DF308/4										
DF308/4S	26,2	22,2	28,8	20,0	21,8	28,2	23,9	31,0	21,5	23,4
DF316/2										
DF316/3										
DF316/3F										
DF316/3S										
DF316/M10S										
DF316/M12S										
DF316/4										
DF316/4S										
DF316/5										
DF316/5S	61,5	52,2	67,7	47,0	51,2	66,1	56,1	72,8	50,5	55,1
DF316/7S										
DF316/9S										
DF330/3										
DF330/3S										
DF330/4										
DF330/4S										
DF341/4	85,1	72,2	93,7	65,1	70,8	91,5	77,6	100,8	70,0	76,1
DF341/4S										
DF341/5										
DF341/5S										
DF341/6										
DF341/6S										
DF341/7S										
DF375/4S	109,2	170,2	144,4	187,3	130,1	141,6	155,3	201,5	140,0	152,3
DF375/5S										
DF375/6S										
DF375/7S										
DF375/9S										

(1) : Water capacity values are referred to the following conditions, fixed in ARI STANDARD 710-2004 and DIN 8949:2000:

- Liquid temperatures: 24 °C and 52 °C
- Equilibrium point dryness, EPD: 60 ppm for R22
- Equilibrium point dryness, EPD: 50 ppm for R134a , R404A , R407C , R410A e R507

TABLE 17: Water capacity and dehydratable charge of hermetic filters with core 80% molecular sieves + 20% activated alumina

Catalogue Number	Water Capacity at + 24 °C (1) [g H ₂ O]					Dehydratable Charge at + 24 °C [kg refrigerant]				
	R134a	R22	R404A R507	R407C	R410A	R134a	R22	R404A R507	R407C	R410A
DF203/2	4,4	4,0	4,5	3,6	3,9	4,7	4,3	4,8	3,9	4,2
DF203/2S										
DF203/3										
DF203/3S										
DF205/2	11,4	10,4	11,6	9,3	10,1	12,3	11,2	12,5	10,0	10,9
DF205/2S										
DF205/3										
DF205/3S										
DF205/M10S										
DF208/2	19,4	17,7	19,8	15,8	17,3	20,9	19,0	21,3	17,0	18,6
DF208/2S										
DF208/3										
DF208/3S										
DF208/M10S										
DF208/M12S										
DF208/4										
DF216/2	25,8	23,6	26,4	21,1	23,0	27,7	25,4	28,4	22,7	24,7
DF216/3										
DF216/3S										
DF216/M10S										
DF216/M12S										
DF216/4										
DF216/4S										
DF216/5										
DF216/5S										
DF216/7S										
DF216/9S										
DF230/3	60,6	55,4	62,0	49,7	54,1	65,2	59,6	66,7	53,4	58,2
DF230/3S										
DF230/4										
DF230/4S										
DF230/5										
DF230/5S										
DF230/7S										
DF230/9S										
DF241/5	83,9	76,6	85,7	68,7	74,8	90,2	82,4	92,2	73,9	80,4
DF241/5S										
DF241/6										
DF241/6S										
DF241/7S										
DF275/4S	167,7	153,2	171,4	137,4	149,6	180,4	164,7	184,3	147,7	160,9
DF275/5S										
DF275/6S										
DF275/7S										
DF275/9S										

(1) : Water capacity values are referred to the following conditions, fixed in ARI STANDARD 710-2004 and DIN 8949:2000:

- Liquid temperatures: 24 °C and 52 °C
- Equilibrium point dryness, EPD: 60 ppm for R22
- Equilibrium point dryness, EPD: 50 ppm for R134a , R404A , R407C , R410A e R507

Continued

TABLE 17: Water capacity and dehydratable charge of hermetic filters with core 80% molecular sieves + 20% activated alumina

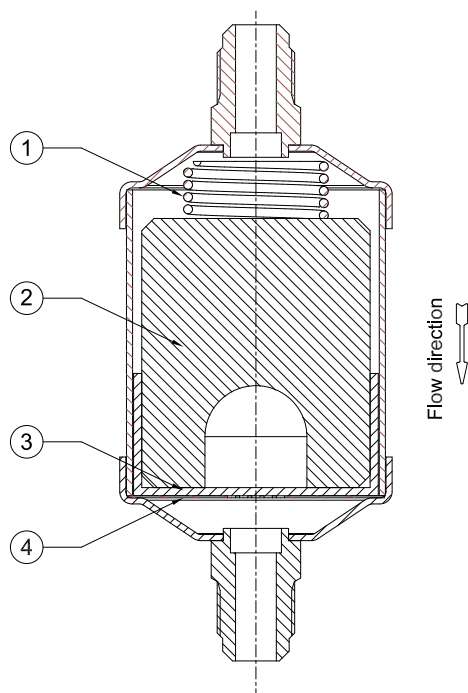
Catalogue Number	Water Capacity at + 52 °C (1) [g H ₂ O]					Dehydratable Charge at + 52 °C [kg refrigerant]				
	R134a	R22	R404A R507	R407C	R410A	R134a	R22	R404A R507	R407C	R410A
DF203/2	3,8	3,2	4,2	2,9	3,1	4,1	3,4	4,5	3,1	3,3
DF203/2S										
DF203/3										
DF203/3S										
DF205/2	9,8	8,3	10,8	7,5	8,1	10,5	8,9	11,6	8,1	8,7
DF205/2S										
DF205/3										
DF205/3S										
DF205/M10S										
DF208/2	16,7	14,2	18,4	12,8	13,9	18,0	15,3	19,8	13,8	14,9
DF208/2S										
DF208/3										
DF208/3S										
DF208/M10S										
DF208/M12S										
DF208/4										
DF208/4S										
DF216/2	22,3	18,9	24,5	17,0	18,5	24,0	20,3	26,3	18,3	19,9
DF216/3										
DF216/3S										
DF216/M10S										
DF216/M12S										
DF216/4										
DF216/4S										
DF216/5										
DF216/5S										
DF216/7S										
DF216/9S										
DF230/3	52,3	44,4	57,6	40,0	43,5	56,2	47,7	61,9	43,0	46,8
DF230/3S										
DF230/4										
DF230/4S										
DF230/5										
DF230/5S										
DF230/7S										
DF230/9S										
DF241/5	72,3	61,4	79,6	55,3	60,2	77,7	66,0	85,6	59,5	64,7
DF241/5S										
DF241/6										
DF241/6S										
DF241/7S										
DF275/4S	144,6	122,8	159,2	110,6	120,3	141,6	132,0	171,2	118,9	129,5
DF275/5S										
DF275/6S										
DF275/7S										
DF275/9S										

(1) : Water capacity values are referred to the following conditions, fixed in ARI STANDARD 710-2004 and DIN 8949:2000:

- Liquid temperatures: 24 °C and 52 °C
- Equilibrium point dryness, EPD: 60 ppm for R22
- Equilibrium point dryness, EPD: 50 ppm for R134a , R404A , R407C , R410A e R507

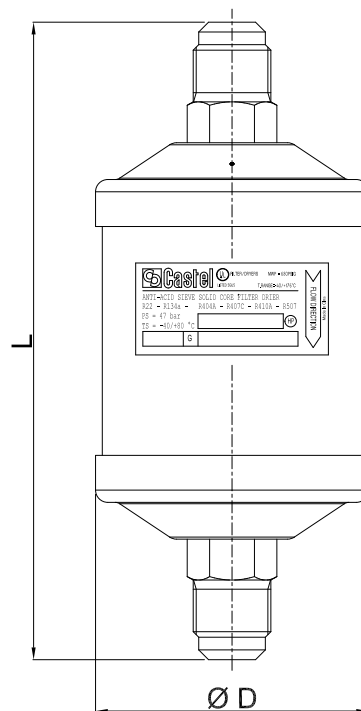
TABLE 18: Dimensions and weights of hermetic filters

Catalogue Number		Connections			Dimensions [mm]		Weight [g]
		SAE Flare	ODS				
			Ø [in.]	Ø [mm]	Ø D	L	
DF303/2	DF203/2	1/4"	—	—	42	109	168
DF303/2F	—	1/4"	—	—		101	168
DF303/2S	DF203/2S	—	1/4"	—		101	152
DF303/3	DF203/3	3/8"	—	—		119	202
DF303/3S	—	—	3/8"	—		105	186
DF305/2	DF205/2	1/4"	—	—	64	120	420
DF305/2F	—	1/4"	—	—		112	420
DF305/2S	DF205/2S	—	1/4"	—		112	406
DF305/3	DF205/3	3/8"	—	—		130	450
DF305/3S	DF205/3S	—	3/8"	—		116	414
DF305/M10S	DF205/M10S	—	—	10	120	414	
DF308/2	DF208/2	1/4"	—	—	64	141	526
DF308/2F	—	1/4"	—	—		133	526
DF308/2S	DF208/2S	—	1/4"	—		133	502
DF308/3	DF208/3	3/8"	—	—		151	556
DF308/3F	—	3/8"	—	—		140	556
DF308/3S	DF208/3S	—	3/8"	—		137	514
DF308/M10S	DF208/M10S	—	—	10		141	520
DF308/M12S	DF208/M12S	—	—	12		141	520
DF308/4	DF208/4	1/2"	—	—		156	578
DF308/4S	DF208/4S	—	1/2"	—		137	514
DF316/2	DF216/2	1/4"	—	—	64	161	635
DF316/3	DF216/3	3/8"	—	—		171	648
DF316/3F	—	3/8"	—	—		160	648
DF316/3S	DF216/3S	—	3/8"	—		157	616
DF316/M10S	DF216/M10S	—	—	10		161	616
DF316/M12S	DF216/M12S	—	—	12		161	616
DF316/4	DF216/4	1/2"	—	—		176	684
DF316/4S	DF216/4S	—	1/2"	—		157	626
DF316/5	DF216/5	5/8"	—	—		186	748
DF316/5S	DF216/5S	—	5/8"	16		163	628
DF316/7S	—	—	7/8"	—	177	650	
DF316/9S	—	—	1.1/8"	—	177	650	
DF330/3	DF230/3	3/8"	—	—	76	244	1490
DF330/3S	DF230/3S	—	3/8"	—		230	1450
DF330/4	DF230/4	1/2"	—	—		249	1504
DF330/4S	DF230/4S	—	1/2"	—		230	1450
DF330/5	DF230/5	5/8"	—	—		259	1568
DF330/5S	DF230/5S	—	5/8"	16		236	1500
DF330/7S	—	—	7/8"	—		250	1482
DF330/9S	—	—	1.1/8"	—		258	1366
DF341/4	—	1/2"	—	—	89	254	1850
DF341/4S	—	—	1/2"	—		235	1775
DF341/5	DF241/5	5/8"	—	—		264	1976
DF341/5S	DF241/5S	—	5/8"	16		241	1886
DF341/6	DF241/6	3/4"	—	—		273	2076
DF341/6S	DF241/6S	—	3/4"	—		247	1914
DF341/7S	DF241/7S	—	7/8"	—		255	1890
DF375/4S	DF275/4S	—	1/2"	—	89	373	2920
DF375/5S	DF275/5S	—	5/8"	16		379	2930
DF375/6S	DF275/6S	—	3/4"	—		385	2950
DF375/7S	DF275/7S	—	7/8"	—		393	2950
DF375/9S	DF275/9S	—	1.1/8"	—		401	2990

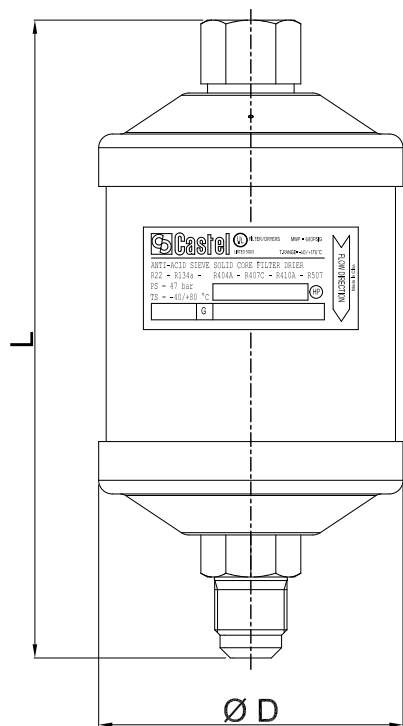


Solid core dehydrator

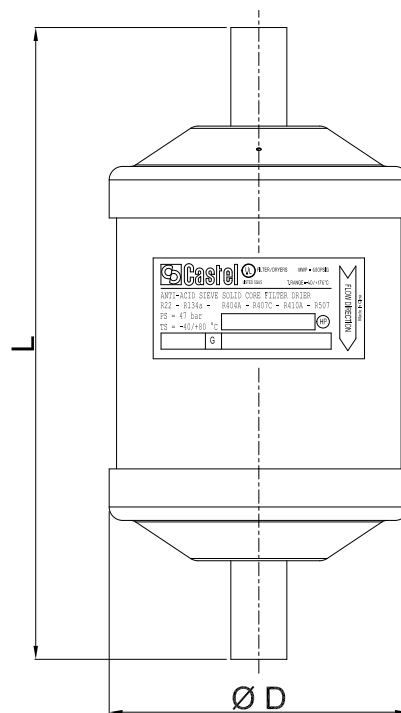
- 1 – Spring
- 2 – Bock
- 3 – Felt
- 4 – Stainless steel mesh



Male connections



Male - female
connection
(female in)



Solder connection

CHAPTER 4

HERMETIC FILTER DRIERS

FOR REFRIGERATION PLANTS THAT USE THE R744 REFRIGERANT



APPLICATIONS

Castel has developed filters DF303E , DF305E , DF308E , DF316E , DF330E and DF341E illustrated in this chapter, for all the applications that use 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.

CONSTRUCTION

The filter body is made completely from steel with copper connections, EN 12735-1 – Cu-DHP, offering the possibility to solder the copper pipe inside the connections (ODS). The cartridges are made from moulding a dehydrating filler made completely from 3 Å molecular sieves, with a suitable binder. The choice of using only 3 Å molecular sieves as the dehydrating material grants the cartridge extraordinary moisture adsorption capacity while maintaining reasonable deacidifying characteristics.

TABLE 19: General characteristics of hermetic filter driers for R744

Catalogue Number	International Reference	Block Filtering Surface [cm ²]	Nominal Volume [cm ³]	Connections		PS [bar]	TS [°C]		TA [°C]		Risk Category according to PED Recast
				ODS			min.	max.	min.	max.	
				Ø [in.]	Ø [mm]						
DF303E/2S	032S	58	50	1/4"	–	80	– 40	+ 80	– 20	+ 50	Art. 4.3
DF303E/3S	033S			3/8"	–						
DF305E/2S	052S	104	80	1/4"	–						
DF305E/3S	053S			3/8"	–						
DF305E/M10S	–			–	10						
DF308E/2S	082S	141	130	1/4"	–						
DF308E/3S	083S			3/8"	–						
DF308E/M10S	–			–	10						
DF308E/M12S	–			–	12						
DF308E/4S	084S			1/2"	–						
DF316E/3S	163S	183	250	3/8"	–						
DF316E/M10S	–			–	10						
DF316E/M12S	–			–	12						
DF316E/4S	164S			1/2"	–						
DF316E/5S	165S			5/8"	16						
DF330E/3S	303S	345	500	3/8"	–						
DF330E/4S	304S			1/2"	–						
DF330E/5S	305S			5/8"	16						
DF341E/4S	414S	384	670	1/2"	–						
DF341E/5S	415S			5/8"	16						

TABLE 20: Refrigerant flow capacity of hermetic filter driers for R744

Catalogue Number	Pressure drop 0,07 bar (1) [kW]	Pressure drop 0,14 bar (1) [kW]
DF303E/2S	5,8	7,0
DF303E/3S	10,8	12,9
DF305E/2S	7,3	9,5
DF305E/3S	11,4	14,9
DF305E/M10S	11,4	14,9
DF308E/2S	7,0	9,2
DF308E/3S	12,5	16,3
DF308E/M10S	12,5	16,3
DF308E/M12S	15,7	20,4
DF308E/4S	15,7	20,4
DF316E/3S	13,5	18,2
DF316E/M10S	13,5	18,2
DF316E/M12S	18,7	25,2
DF316E/4S	18,7	25,2
DF316E/5S	22,2	30,0
DF330E/3S	14,0	18,9
DF330E/4S	23,4	31,5
DF330E/5S	27,4	37,0
DF341E/4S	23,9	35,9
DF341E/5S	30,9	46,3

(1) : Maximum values of the refrigerant flow capacity at which the drier can be used when fluid dehydration is not the a major problem, provided that the original moisture is limited before the installation of the drier.

The maximum refrigerant flow capacities are referred to a total pressure drop of 0,07 bar / 0,14 bar , inlet and outlet connections included, (according to ARI STANDARD 710-2009 - with liquid temperature at -5 °C and evaporating temperature at - 40 °C)

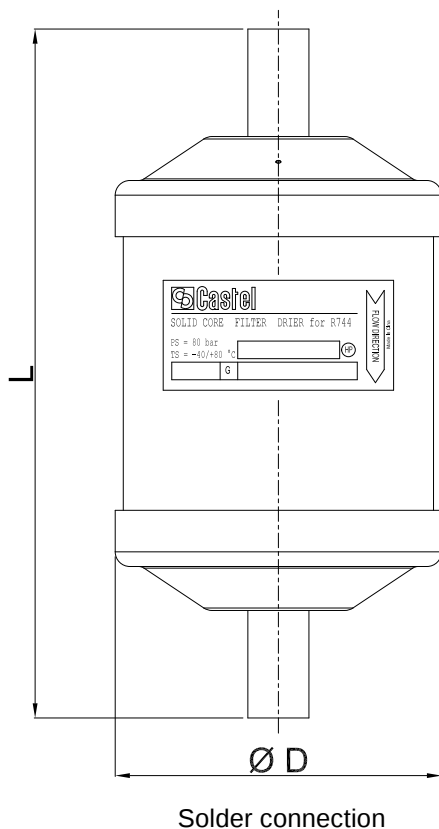


TABLE 21- Correction factors of the refrigeration capacity for temperatures different from standard values

Refrigerant	Liquid temperature [°C]	Evaporating temperature [°C]										
		-20	-25	-30	-35	-40	-45	-50	-55	-60	-65	-70
R744	-25	1,23	1,24	1,23	1,23	1,23	1,22	1,22	1,21			
	-20	1,18	1,18	1,18	1,17	1,17	1,17	1,16	1,15			
	-15	1,12	1,12	1,12	1,12	1,11	1,11	1,10	1,10			
	-10	1,06	1,06	1,06	1,06	1,05	1,05	1,04	1,04			
	-5	1,00	1,00	1,00	1,00	0,99	0,99	0,98	0,98			
	0	0,94	0,94	0,94	0,94	0,93	0,93	0,92	0,92			
	5	0,88	0,88	0,88	0,87	0,87	0,87	0,86	0,85			
	10	0,81	0,81	0,81	0,81	0,81	0,80	0,80	0,79			
	15	0,75	0,75	0,75	0,74	0,74	0,74	0,73	0,72			

TABLE 22: Dimensions and weights of hermetic filters for R744

Catalogue Number	Connections		Dimensions [mm]		Weight [g]
	ODS				
	Ø [in.]	Ø [mm]	Ø D	L	
DF303E/2S	1/4"	—	42	101	152
DF303E/3S	3/8"	—		105	186
DF305E/2S	1/4"	—	64	112	406
DF305E/3S	3/8"	—		116	414
DF305E/M10S	—	10		120	414
DF308E/2S	1/4"	—	64	133	502
DF308E/3S	3/8"	—		137	514
DF308E/M10S	—	10		141	520
DF308E/M12S	—	12		141	520
DF308E/4S	1/2"	—		137	514
DF316E/3S	3/8"	—	64	157	616
DF316E/M10S	—	10		161	616
DF316E/M12S	—	12		161	616
DF316E/4S	1/2"	—		157	626
DF316E/5S	5/8"	16		163	628
DF330E/3S	3/8"	—	76	230	1450
DF330E/4S	1/2"	—		230	1450
DF330E/5S	5/8"	16		236	1500
DF341E/4S	1/2"	—	89	235	1775
DF341E/5S	5/8"	16		241	1886

CHAPTER 5

HERMETIC FILTER DRIERS

ATEX-CERTIFIED

FOR REFRIGERATION PLANTS THAT USE HC REFRIGERANTS



binder. The choice of using only 3 Å molecular sieves as the dehydrating material grants the cartridge extraordinary moisture adsorption capacity while maintaining reasonable deacidifying characteristics.



N.B.: PRODUCT SUITABLE FOR HYDROCARBON REFRIGERANTS

The products in this chapter can be used with HC refrigerants classified as flammable fluids and that are in Safety Group A3 according to Standard EN 378-1:2016. These products must be used exclusively in refrigeration systems that comply with the current regulations for flammable refrigerant fluids (series EN 60335).

Installation, maintenance and repair operations must be performed only by authorized personnel, qualified to work on flammable refrigeration systems.

Note: In the specific case of filters with an “EX” suffix, the personnel must carefully follow the operating instructions provided in the packaging of said filters.

APPLICATIONS

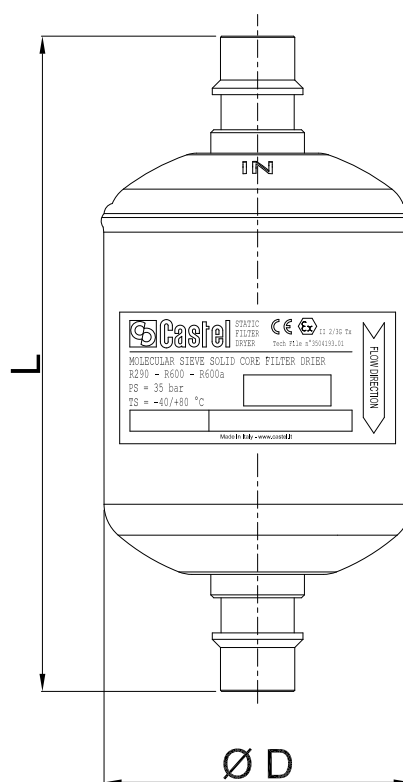
The filters with an “EX” suffix (4303EX, 4305EX, 4308EX, 4316EX, 4330EX and 4375EX), illustrated in this chapter, have been developed by Castel for all those refrigeration applications that use the following HC refrigeration fluids: R290, R600, and R600a, belonging to Group 1, as defined in Article 13, Chapter 1, Point (a) of Directive 2014/68/EU, with reference to EC Regulation No. 1272/2008.

The filters with an “EX” suffix comply with the European Standard EN 13463-1:2009 and, therefore, comply with the ESR of Directive 2014/34/EU – ATEX. This equipment is suitable for use on refrigeration systems located in areas classified as “Zone 2” risk of explosion, according to the definition in Annex I of Directive 1999/92/EC.

CONSTRUCTION

The filter body is made completely from steel with copper plated solder connections, offering the possibility to solder the copper pipe inside the connections (ODS).

The cartridges are made from moulding a dehydrating filler made completely from 3 Å molecular sieves, with a suitable



4303EX
4305EX
4308EX
4316EX
4330EX
4375EX

TABLE 23: General characteristics of hermetic filter driers for HC refrigerants

Catalogue Number	International Reference	Block Filtering Surface [cm ²]	Nominal Volume [cm ³]	Connections		Connections		PS [bar]	TS [°C]		TA [°C]		Risk Category according to PED Recast				
				ODS		ODM			min.	max.	min.	max.					
				Ø [in.]	Ø [mm]	Ø [in.]	Ø [mm]										
4303EX/2S	032S	47	50	1/4"	–	3/8"	–	45	– 40	+ 80	– 20	+ 50	Art. 4.3				
4305EX/3S	053S	70	80	3/8"	–	1/2"	–										
4305EX/M10S	–			–	10	–	12										
4308EX/3S	083S	103	130	3/8"	–	1/2"	–										
4308EX/M10S	–			–	10	–	12										
4308EX/M12S	–			–	12	–	14										
4308EX/4S	084S			1/2"	–	5/8"	16										
4316EX/3S	163S	155	250	3/8"	–	1/2"	–										
4316EX/M10S	–			–	10	–	12										
4316EX/M12S	–			–	12	–	14										
4316EX/4S	164S			1/2"	–	5/8"	16										
4316EX/5S	165S			5/8"	16	3/4"	–										
4330EX/4S	304S	310	500	1/2"	–	5/8"	16	24									
4330EX/5S	305S			5/8"	16	3/4"	–										
4330EX/7S	307S			7/8"	–	1.1/8"	–										
4330EX/9S	309S			1.1/8"	–	1.3/8"	35										
4375EX/7S	757S	600	1340	7/8"	–	1.1/8"	–										I
4375EX/9S	759S			1.1/8"	–	1.3/8"	35										

TABLE 24: Refrigerant flow capacity of hermetic filter driers for HC refrigerants

Catalogue Number	Pressure drop 0,07 bar (1) [kW]			Pressure drop 0,14 bar (1) [kW]		
	R290	R600	R600a	R290	R600	R600a
4303EX/2S	9,5	10,8	9,5	11,4	12,9	11,4
4305EX/3S	23,2	26,3	23,2	30,1	34,2	30,1
4305EX/M10S	23,2	26,3	23,2	30,1	34,2	30,1
4308EX/3S	27,3	30,9	27,2	35,4	40,2	35,4
4308EX/M10S	27,3	30,9	27,2	35,4	40,2	35,4
4308EX/M12S	34,6	39,2	34,5	44,9	50,9	44,9
4308EX/4S	34,6	39,2	34,5	44,9	50,9	44,9
4316EX/3S	29,4	33,3	29,3	39,6	45,0	39,6
4316EX/M10S	29,4	33,3	29,3	39,6	45,0	39,6
4316EX/M12S	40,7	46,2	40,7	55,0	62,4	54,9
4316EX/4S	40,7	46,2	40,7	55,0	62,4	54,9
4316EX/5S	53,8	61,0	53,7	72,6	82,3	72,5
4330EX/4S	44,6	50,6	44,6	60,2	68,3	60,2
4330EX/5S	55,6	63,1	55,6	75,1	85,2	75,0
4330EX/7S	58,7	66,6	58,7	79,3	89,9	79,2
4330EX/9S	58,7	66,6	58,7	79,3	89,9	79,2
4375EX/7S	110,7	125,6	110,6	166,1	188,4	165,9
4375EX/9S	115,1	130,6	115,0	172,7	195,9	172,6

(1) : Maximum values of the refrigerant flow capacity at which the drier can be used when fluid dehydration is not the a major problem, provided that the original moisture is limited before the installation of the drier.

The maximum refrigerant flow capacities are referred to a total pressure drop of 0,07 bar / 0,14 bar , inlet and outlet connections included, (according to ARI STANDARD 710-2009 - with liquid temperature at + 30 °C and evaporating temperature at - 15 °C)

TABLE 25 - Correction factors of the refrigeration capacity for temperatures different from standard values

Refrigerant	Liquid temperature [°C]	Evaporating temperature [°C]										
		+ 10	+ 5	0	- 5	- 10	- 15	- 20	- 25	- 30	-35	- 40
R290	15	1,27	1,25	1,23	1,21	1,19	1,17	1,15	1,13	1,11	1,09	1,06
	20	1,22	1,20	1,18	1,16	1,14	1,11	1,09	1,07	1,05	1,03	1,01
	25	1,16	1,14	1,12	1,10	1,08	1,06	1,04	1,02	0,99	0,97	0,95
	30	1,10	1,08	1,06	1,04	1,02	1,00	0,98	0,96	0,94	0,92	0,89
	35	1,04	1,02	1,00	0,98	0,96	0,94	0,92	0,90	0,88	0,86	0,84
	40	0,98	0,96	0,94	0,92	0,90	0,88	0,86	0,84	0,82	0,80	0,78
	45	0,92	0,90	0,88	0,86	0,84	0,82	0,80	0,78	0,76	0,74	0,72
	50	0,86	0,84	0,82	0,80	0,78	0,76	0,74	0,72	0,70	0,68	0,66
	55	0,80	0,78	0,76	0,74	0,72	0,70	0,68	0,66	0,64	0,62	0,60
R600	15	1,27	1,24	1,22	1,19	1,17	1,14	1,12	1,09	1,07	1,04	1,02
	20	1,22	1,19	1,17	1,14	1,12	1,09	1,07	1,05	1,02	1,00	0,97
	25	1,17	1,15	1,12	1,10	1,07	1,05	1,02	1,00	0,98	0,95	0,93
	30	1,12	1,10	1,07	1,05	1,02	1,00	0,98	0,95	0,93	0,90	0,88
	35	1,07	1,05	1,02	1,00	0,98	0,95	0,93	0,90	0,88	0,86	0,83
	40	1,02	1,00	0,98	0,95	0,93	0,90	0,88	0,86	0,83	0,81	0,79
	45	0,98	0,95	0,93	0,90	0,88	0,86	0,83	0,81	0,79	0,76	0,74
	50	0,93	0,90	0,88	0,86	0,83	0,81	0,78	0,76	0,74	0,71	0,69
	55	0,88	0,85	0,83	0,81	0,78	0,76	0,74	0,71	0,69	0,67	0,64
R600a	15	1,29	1,26	1,23	1,21	1,18	1,16	1,13	1,11	1,08	1,06	1,03
	20	1,23	1,21	1,18	1,16	1,13	1,11	1,08	1,05	1,03	1,00	0,98
	25	1,18	1,16	1,13	1,10	1,08	1,05	1,03	1,00	0,98	0,95	0,93
	30	1,13	1,10	1,08	1,05	1,03	1,00	0,97	0,95	0,92	0,90	0,87
	35	1,07	1,05	1,02	1,00	0,97	0,95	0,92	0,90	0,87	0,85	0,82
	40	1,02	0,99	0,97	0,94	0,92	0,89	0,87	0,84	0,82	0,79	0,77
	45	0,97	0,94	0,92	0,89	0,87	0,84	0,82	0,79	0,77	0,74	0,72
	50	0,91	0,89	0,86	0,84	0,81	0,79	0,76	0,74	0,71	0,69	0,66
	55	0,86	0,83	0,81	0,78	0,76	0,73	0,71	0,68	0,66	0,64	0,61

TABLE 26: Dimensions and weights of hermetic filters for HC

Catalogue Number	Connections			Dimensions [mm]		Weight [g]	
	SAE Flare	ODS					
		Ø [in.]	Ø [mm]	Ø D	L		
4303EX/2S	—	1/4"	—	52	94	220	
4305EX/3S	—	3/8"	—		112	260	
4305EX/M10S	—	—	10		139	345	
4308EX/3S	—	3/8"	—		146	380	
4308EX/M10S	—	—	10		146	380	
4308EX/M12S	—	—	12		73	151	620
4308EX/4S	—	1/2"	—			151	630
4316EX/3S	—	3/8"	—	158		640	
4316EX/M10S	—	—	10	158		640	
4316EX/M12S	—	—	12	166		640	
4316EX/4S	—	1/2"	—	237		1280	
4316EX/5S	—	5/8"	16	245		1370	
4330EX/4S	—	1/2"	—	250		1420	
4330EX/5S	—	5/8"	16	250		1450	
4330EX/7S	—	7/8"	—	91		398	2900
4330EX/9S	—	1.1/8"	—		398	3050	
4375EX/7S	—	7/8"	—				
4375EX/9S	—	1.1/8"	—				

CHAPTER 6 ■ HERMETIC FILTER DRIERS WITH MOISTURE INDICATOR

CERTIFIED BY UNDERWRITERS LABORATORIES INC.

FOR REFRIGERATION PLANTS THAT USE HCFC, HFC OR HFO REFRIGERANTS



APPLICATIONS

The filters illustrated in this chapter 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, and 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.

The filters can be installed on systems that use the following refrigerant 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.

CONSTRUCTION

The filters in series 41 are drying filters for the liquid line with a moisture/liquid indicator brazed directly onto the outlet of the filter. This unit reduces the amount of field brazing required and the potential risk for refrigerant fluid leaks. The indicators ensure fast safe inspection of the conditions of the refrigerant fluid in the circuit regarding regular flow and the presence of moisture. The filter is completely manufactured in steel, with threaded SAE FLARE or ODS soldered connections in copper plated steel. The indicator is manufactured with the glass “lens” directly fused onto a steel metallic ring, with proper surface protection.

The cartridges are made from moulding a dehydrating filler made completely from 3 Å molecular sieves, with a suitable binder. The choice of using only 3 Å molecular sieves as the dehydrating material grants the cartridge extraordinary moisture adsorption capacity while maintaining reasonable deacidifying characteristics. The manufacturing process allows the product to be compact and strong, making it resistant to impact and abrasion.

OPERATION

The moisture/liquid indicators consist of a sensitive ring element that changes colour, from green to yellow, according to the percent moisture in the system.

The moisture content values that correspond to the “green” colour can be considered admissible for the proper operation of the system. When the sensitive element starts to yellow, “Chartreuse green”, the threshold value has been reached and operating conditions could become difficult. When the sensitive element becomes “yellow”, it's time to replace the filter dryer.

If the charge and operating conditions of the plant are normal, the refrigerant fluid appears perfectly liquid underneath the “lens” of the indicator. The presence of bubbles indicates that the refrigerant fluid is partially evaporating along the liquid line.

INSTALLATION

At start-up, the colour of the sensitive element may be yellow, due to exposure to air humidity or due to moisture in the circuit. When the moisture of the refrigerant is returned to acceptable levels by the filter drier, the indicator colour turns green again. This is evidence that equilibrium has been re-established. If the yellow colour persists, measures must be taken to eliminate moisture. Only when the

sensitive element turns green again, is there evidence that measures adopted were effective. About 12 hours of system operation are required to achieve equilibrium. In any case, the moisture indication is usually read when the plant is in function and the fluid is flowing

Brazing of the filter/indicator with solder connections should be carried out with care, using a low melting point filler material (min. 5% Ag). Avoid direct contact between the torch flame and the indicator body or glass, which could

be damaged and compromise the proper functioning of the indicator.

APPROVALS

Filters in series 41 have been approved by the American certification authority Underwriters Laboratories Inc. These filters are certified **UL Listed** for the USA with file SA7054, in compliance with American standard UL 207.

TABLE 27: General characteristics of hermetic filter driers with sight glass

Catalogue Number		International Reference	Block Filtering Surface [cm²]	Nominal Volume [cm³]	Connections					PS [bar]	TS [°C]		TA [°C]		Risk Category according to PED Recast
					ODS			ODM			min.	max.	min.	max.	
SAE Flare	ODS				SAE Flare	Ø [in.]	Ø [mm]	Ø [in.]	Ø [mm]						
4105/2	–	052	70	80	1/4"	–				45 (1)	– 40	+ 80	– 20	+ 50	Art. 4.3
–	4105/2S	052S			–	1/4"	–	3/8"	–						
4105/3	–	053			3/8"	–									
–	4105/3S	053S			–	3/8"	–	1/2"	–						
4108/2	–	082	103	130	1/4"	–									
–	4108/2S	082S			–	1/4"	–	3/8"	–						
4108/3	–	083			3/8"	–									
–	4108/3S	083S			–	3/8"	–	1/2"	–						
–	4108/M10S	–			–	–	10	–	12						
–	4108/M12S	–			–	–	12	–	14						
4108/4	–	084			1/2"	–									
–	4108/4S	084S			–	1/2"	–	5/8"	16						
4116/3	–	163	155	250	3/8"	–									
–	4116/3S	163S			–	3/8"	–	1/2"	–						
–	4116/M10S	–			–	–	10	–	12						
–	4116/M12S	–			–	–	12	–	14						
4116/4	–	164			1/2"	–									
–	4116/4S	164S			–	1/2"	–	5/8"	16						
4116/5	–	165			5/8"	–									
–	4116/5S	165S			–	5/8"	16	3/4"	–						
41326/6	–	306	255	500	3/4"	–									
–	4132/6S	306S			–	3/4"		7/8"	–						
–	4132/7S	307S			–	7/8"		1.1/8"	–						

(1) : MWP = 435 psi according to UL approval for filters series 4105 , 4132
MWP = 400 psi according to UL approval for filters series 4108 , 4116

TABLE 28: Refrigerant flow capacity of hermetic filter driers with sight glass

Catalogue Number	Pressure drop 0,07 bar (1) [kW]												
	R134a	R22	R32	R404A	R407C	R410A	R507	R1234yf	R1234ze	R448A	R449A	R450A	R452A
4105/2	6,6	7,2	31,8	4,7	6,8	7,0	4,6	4,8	5,8	6,3	6,2	5,3	4,8
4105/2S	8,2	8,9	39,3	5,8	8,4	8,6	5,7	5,9	7,2	7,8	7,7	6,5	5,9
4105/3	15,2	16,6	73,2	10,9	15,7	16,1	10,5	11,0	13,4	14,5	14,3	12,2	11,0
4105/3S	19,3	21,0	92,7	13,7	19,8	20,3	13,3	14,0	17,0	18,3	18,1	15,4	13,9
4108/2	6,9	7,5	33,1	4,9	7,1	7,3	4,8	5,0	6,1	6,5	6,5	5,5	5,0
4108/2S	8,4	9,2	40,6	6,0	8,7	8,9	5,8	6,1	7,5	8,0	7,9	6,7	6,1
4108/3	17,9	19,5	86,0	12,8	18,4	18,9	12,4	13,0	15,8	17,0	16,8	14,3	12,9
4108/3S	22,6	24,7	109,0	16,2	23,3	23,9	15,7	16,4	20,0	21,5	21,2	18,1	16,4
4108/M10S	22,6	24,7	109,0	16,2	23,3	23,9	15,7	16,4	20,0	21,5	21,2	18,1	16,4
4108/M12S	28,7	31,3	138,1	20,5	29,6	30,3	19,9	20,8	25,4	27,3	26,9	22,9	20,7
4108/4	23,8	25,9	114,3	16,9	24,5	25,1	16,4	17,2	21,0	22,6	22,3	19,0	17,1
4108/4S	28,7	31,3	138,1	20,5	29,6	30,3	19,9	20,8	25,4	27,3	26,9	22,9	20,7
4116/3	19,5	21,3	94,0	13,9	20,1	20,6	13,5	14,2	17,3	18,6	18,3	15,6	14,1
4116/3S	24,4	26,6	117,4	17,4	25,1	25,8	16,9	17,7	21,5	23,2	22,9	19,5	17,6
4116/M10S	24,4	26,6	117,4	17,4	25,1	25,8	16,9	17,7	21,5	23,2	22,9	19,5	17,6
4116/M12S	33,8	36,9	162,8	24,1	34,9	35,8	23,4	24,5	29,9	32,2	31,7	27,0	24,4
4116/4	28,0	30,5	134,6	19,9	28,8	29,6	19,4	20,3	24,7	26,6	26,2	22,3	20,2
4116/4S	33,8	36,9	162,8	24,1	34,9	35,8	23,4	24,5	29,9	32,2	31,7	27,0	24,4
4116/5	37,2	40,6	179,1	26,6	38,4	39,3	25,8	27,0	32,9	35,4	34,9	29,7	26,9
4116/5S	44,7	48,7	214,9	31,8	46,0	47,2	30,9	32,4	39,4	42,5	41,9	35,6	32,2
4132/6	51,4	56,0	247,1	36,6	52,9	54,3	35,6	37,2	45,4	48,8	48,2	41,0	37,1
4132/6S	62,1	67,7	298,7	44,3	64,0	65,6	43,0	45,0	54,8	59,0	58,2	49,6	44,8
4132/5S	62,1	67,7	298,7	44,3	64,0	65,6	43,0	45,0	54,8	59,0	58,2	49,6	44,8

(1) : Maximum values of the refrigerant flow capacity at which the drier can be used when fluid dehydration is not the a major problem, provided that the original moisture is limited before the installation of the drier.
The maximum refrigerant flow capacities are referred to a total pressure drop of 0,07 bar / 0,14 bar , inlet and outlet connections included, (according to ARI STANDARD 710-2009 - with liquid temperature at + 30 °C and evaporating temperature at - 15 °C)

Continued

NOTE: for temperatures different from standard values use correction factors L1 listed on TABLE 8

TABLE 28: Refrigerant flow capacity of hermetic filter driers with sight glass

Catalogue Number	Pressure drop 0,14 bar (1) [kW]												
	R134a	R22	R32	R404A	R407C	R410A	R507	R1234yf	R1234ze	R448A	R449A	R450A	R452A
4105/2	7,9	8,6	38,1	5,7	8,2	8,4	5,5	5,7	7,0	7,5	7,4	6,3	5,7
4105/2S	10,6	11,6	51,0	7,6	10,9	11,2	7,3	7,7	9,4	10,1	10,0	8,5	7,7
4105/3	19,8	21,6	95,2	14,1	20,4	20,9	13,7	14,4	17,5	18,8	18,6	15,8	14,3
4105/3S	25,0	27,3	120,4	17,9	25,8	26,5	17,3	18,2	22,1	23,8	23,5	20,0	18,1
4108/2	8,9	9,8	43,0	6,4	9,2	9,4	6,2	6,5	7,9	8,5	8,4	7,1	6,5
4108/2S	11,0	12,0	52,8	7,8	11,3	11,6	7,6	8,0	9,7	10,4	10,3	8,8	7,9
4108/3	23,2	25,4	111,8	16,6	24,0	24,6	16,1	16,9	20,5	22,1	21,8	18,6	16,8
4108/3S	29,4	32,1	141,7	21,0	30,3	31,1	20,4	21,4	26,0	28,0	27,6	23,5	21,3
4108/M10S	29,4	32,1	141,7	21,0	30,3	31,1	20,4	21,4	26,0	28,0	27,6	23,5	21,3
4108/M12S	37,3	40,7	179,5	26,6	38,5	39,4	25,8	27,1	33,0	35,5	35,0	29,8	26,9
4108/4	30,9	33,7	148,6	22,0	31,8	32,6	21,4	22,4	27,3	29,4	29,0	24,6	22,3
4108/4S	37,3	40,7	179,5	26,6	38,5	39,4	25,8	27,1	33,0	35,5	35,0	29,8	26,9
4116/3	26,4	28,8	126,9	18,8	27,2	27,9	18,3	19,1	23,3	25,1	24,7	21,0	19,0
4116/3S	32,9	35,9	158,4	23,5	33,9	34,8	22,8	23,9	29,1	31,3	30,9	26,3	23,8
4116/M10S	32,9	35,9	158,4	23,5	33,9	34,8	22,8	23,9	29,1	31,3	30,9	26,3	23,8
4116/M12S	45,7	49,8	219,8	32,6	47,1	48,3	31,6	33,1	40,4	43,4	42,8	36,5	33,0
4116/4	37,8	41,2	181,7	26,9	38,9	39,9	26,1	27,4	33,4	35,9	35,4	30,1	27,3
4116/4S	45,7	49,8	219,8	32,6	47,1	48,3	31,6	33,1	40,4	43,4	42,8	36,5	33,0
4116/5	50,3	54,8	241,8	35,8	51,8	53,1	34,8	36,4	44,4	47,8	47,1	40,1	36,3
4116/5S	60,3	65,7	290,1	43,0	62,1	63,7	41,7	43,7	53,3	57,3	56,5	48,1	43,5
4132/6	71,9	78,4	345,9	51,3	74,1	76,0	49,8	52,1	63,5	68,4	67,4	57,4	51,9
4132/6S	86,9	94,8	418,2	62,0	89,6	91,8	60,2	63,0	76,8	82,6	81,5	69,4	62,7
4132/5S	86,9	94,8	418,2	62,0	89,6	91,8	60,2	63,0	76,8	82,6	81,5	69,4	62,7

(1) : Maximum values of the refrigerant flow capacity at which the drier can be used when fluid dehydration is not the a major problem, provided that the original moisture is limited before the installation of the drier.

The maximum refrigerant flow capacities are referred to a total pressure drop of 0,07 bar / 0,14 bar , inlet and outlet connections included, (according to ARI STANDARD 710-2009 - with liquid temperature at + 30 °C and evaporating temperature at - 15 °C)

NOTE: for temperatures different from standard values use correction factors L1 listed on TABLE 8

TABLE 29: Water capacity and dehydratable charge of hermetic filter driers with sight glass

Catalogue Number	Water Capacity at + 24 °C (1) [g H ₂ O]					Dehydratable Charge at + 24 °C [kg refrigerant]				
	R134a	R22	R404A R507	R407C	R410A	R134a	R22	R404A R507	R407C	R410A
4105/2	7,7	7,1	7,9	6,3	6,9	8,3	7,6	8,5	6,8	7,4
4105/2S										
4105/3										
4105/3S										
4108/2	12,9	11,8	13,2	10,6	11,5	13,9	12,7	14,2	11,4	12,4
4108/2S										
4108/3										
4108/3S										
4108/M10S										
4108/M12S										
4108/4	25,2	23,0	25,7	20,6	22,5	27,1	24,7	27,6	22,2	24,2
4108/4S										
4116/3										
4116/3S										
4116/M10S										
4116/M12S										
4116/4										
4116/4S										
4116/5	46,6	42,6	47,6	38,2	41,5	50,1	45,8	51,2	41,1	44,6
4116/5S										
4132/6										
4132/6S										
4132/7S										

Continued

TABLE 29: Water capacity and dehydratable charge of hermetic filter driers with sight glass

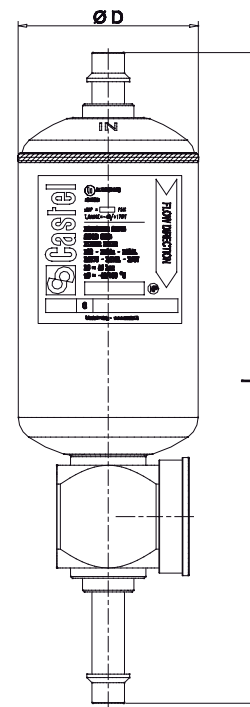
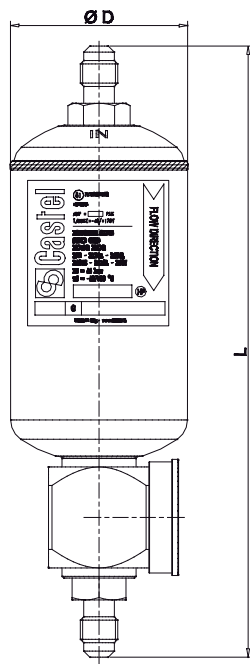
Catalogue Number	Water Capacity at + 52 °C (1) [g H ₂ O]					Dehydratable Charge at + 52 °C [kg refrigerant]				
	R134a	R22	R404A R507	R407C	R410A	R134a	R22	R404A R507	R407C	R410A
4105/2	6,7	5,7	7,3	5,1	5,6	7,2	6,1	7,8	5,5	6,0
4105/2S										
4105/3										
4105/3S										
4108/2	11,1	9,3	12,2	8,5	9,3	11,9	10,0	13,1	9,1	10,0
4108/2S										
4108/3										
4108/3S										
4108/M10S										
4108/M12S										
4108/4	21,7	18,4	23,9	16,6	18,1	23,3	19,8	25,7	17,8	19,5
4108/4S										
4116/3										
4116/3S										
4116/M10S										
4116/M12S										
4116/4										
4116/4S										
4116/5	40,2	34,1	44,2	30,7	33,4	43,2	36,7	47,5	33,0	35,9
4116/5S										
4132/6										
4132/6S										
4132/7S										

(1) : Water capacity values are referred to the following conditions, fixed in ARI STANDARD 710-2004 and DIN 8949:2000:

- Liquid temperatures: 24 °C and 52 °C
- Equilibrium point dryness, EPD: 60 ppm for R22
- Equilibrium point dryness, EPD: 50 ppm for R134a , R404A , R407C , R410A e R507

TABLE 30: Dimensions and weights of filters with sight glass

Catalogue Number	Connections			Dimensions [mm]		Weight [g]
	SAE Flare	ODS				
		Ø [in.]	Ø [mm]	Ø D	L	
4105/2	1/4"	—	—	52	155	520
4105/2S	—	1/4"	—		163	520
4105/3	3/8"	—	—		163	550
4105/3S	—	3/8"	—		165	550
4108/2	1/4"	—	—		182	530
4108/2S	—	1/4"	—		190	530
4108/3	3/8"	—	—		192	550
4108/3S	—	3/8"	—		192	530
4108/M10S	—	—	10		200	540
4108/M12S	—	—	12		200	540
4108/4	1/2"	—	—		198	580
4108/4S	—	1/2"	—		200	540
4116/3	3/8"	—	—	73	202	795
4116/3S	—	3/8"	—		204	835
4116/M10S	—	—	10		212	850
4116/M12S	—	—	12		210	880
4116/4	1/2"	—	—		212	850
4116/4S	—	1/2"	—		219	940
4116/5	5/8"	—	—		221	870
4116/5S	—	5/8"	16			
4132/6	3/4"	—	—	91	233	1400
4132/6S	—	3/4"	—		238	1380
4132/7S	—	7/8"	—		238	1400



CHAPTER 7

HERMETIC FILTER DRIERS WITH MOISTURE INDICATOR

FOR REFRIGERATION PLANTS THAT USE THE R744 REFRIGERANT



APPLICATIONS

Filters 4108E and 4116E illustrated in this chapter have been developed by Castel for all the applications that use the sub-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.

CONSTRUCTION

The filters in series 4108E and 4116E are drying filters for the liquid line with a moisture/liquid indicator brazed directly onto the outlet of the filter. This unit reduces the amount of field brazing required and the potential risk for refrigerant fluid leaks. The indicators ensure fast safe inspection of the conditions of the refrigerant fluid in the circuit regarding regular flow and the presence of moisture. The filter is completely manufactured from steel with ODS soldering connection in copper-plated steel. The indicator is manufactured with the glass “lens” directly fused onto a steel metallic ring, with proper surface protection.

OPERATION

The moisture/liquid indicators consist of a sensitive ring element that changes colour, from green to yellow, according to the percent moisture in the system. The moisture content values that correspond to the

“green” colour can be considered admissible for the proper operation of the system. When the sensitive element starts to yellow, “Chartreuse green”, the threshold value has been reached and operating conditions could become difficult. When the sensitive element becomes “yellow”, it's time to replace the filter dryer.

If the charge and operating conditions of the plant are normal, the refrigerant fluid appears perfectly liquid underneath the “lens” of the indicator. The presence of bubbles indicates that the refrigerant fluid is partially evaporating along the liquid line.

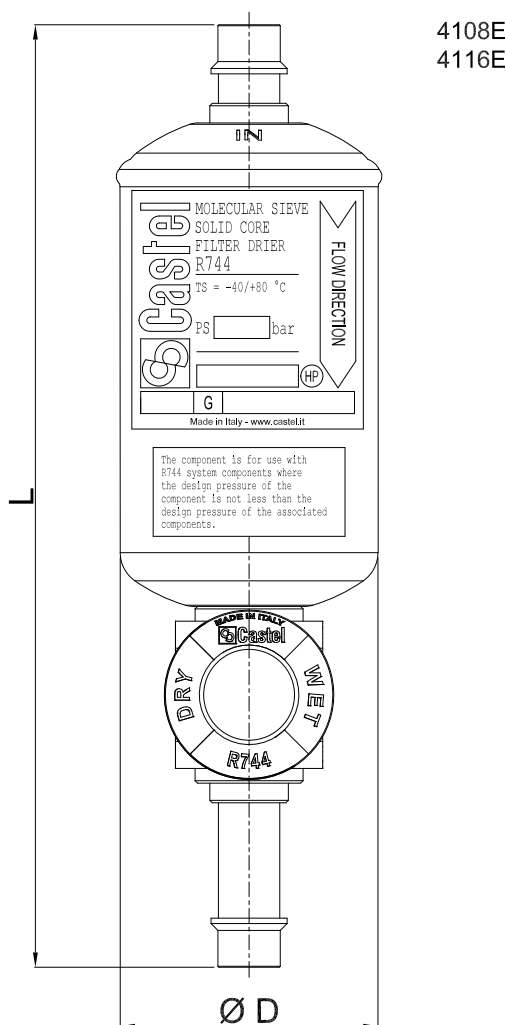


TABLE 31: General characteristics of hermetic filter driers with sight glass for R744

Catalogue Number	International Reference	Block Filtering Surface [cm²]	Nominal Volume [cm³]	Connections				PS [bar]	TS [°C]		TA [°C]		Risk Category according to PED Recast					
				ODS		ODM			min.	max.	min.	max.						
				Ø [in.]	Ø [mm]	Ø [in.]	Ø [mm]											
4108E/3S	083S	103	130	3/8"	—	1/2"	—	52	-40	+80	-20	+50	Art. 4.3					
4108E/M10S	—			—	10	—	12											
4108E/M12S	—			—	12	—	14											
4108E/4S	084S	155	250	1/2"	—	5/8"	16											
4116E/M12S	—			—	12	—	14											
4116E/4S	164S			1/2"	—	5/8"	16											
4116E/5S	165S			5/8"	16	3/4"	—											

TABLE 32: Refrigerant flow capacity of filters with sight glass

Catalogue Number	Pressure drop 0,07 bar (1) [kW]	Pressure drop 0,14 bar (1) [kW]
4108E/3S	14,3	18,5
4108E/M10S	14,3	18,5
4108E/M12S	18,1	23,5
4108E/4S	18,1	23,5
4116E/M12S	21,3	28,7
4116E/4S	21,3	28,7
4116E/5S	28,1	37,9

(1) : Maximum values of the refrigerant flow capacity at which the drier can be used when fluid dehydration is not the a major problem, provided that the original moisture is limited before the installation of the drier.

The maximum refrigerant flow capacities are referred to a total pressure drop of 0,07 bar / 0,14 bar , inlet and outlet connections included, (according to ARI STANDARD 710-2009 - with liquid temperature at -5 °C and evaporating temperature at - 40 °C)

NOTE: for temperatures different from standard values use correction factors L1 listed on TABLE 21

TABLE 33: Dimensions and weights of filters with sight glass for R744

Catalogue Number	Connections		Dimensions [mm]		Weight [g]
	ODS		Ø D	L	
	Ø [in.]	Ø [mm]			
4108E/3S	3/8"	–	52	192	530
4108E/M10S	–	10		200	540
4108E/M12S	–	12			
4108E/4S	1/2"	–			
4116E/M12S	–	12	73	212	850
4116E/4S	1/2"	–		212	850
4116E/5S	5/8"	16		221	870

INSTALLATION

At start-up, the colour of the sensitive element may be yellow, due to exposure to air humidity or due to moisture in the circuit. When the moisture of the refrigerant is returned to acceptable levels by the filter dryer, the indicator colour turns green again. This is evidence that equilibrium has been re-established. If the yellow colour persists, measures must be taken to eliminate moisture. Only when the sensitive element turns green again, is there evidence that measures adopted were effective. About 12 hours of system

operation are required to achieve equilibrium. In any case, the moisture indication is usually read when the plant is in function and the fluid is flowing

Brazing of the filter/indicator with solder connections should be carried out with care, using a low melting point filler material (min. 5% Ag). Avoid direct contact between the torch flame and the indicator body or glass, which could be damaged and compromise the proper functioning of the indicator.

BI-FLOW HERMETIC FILTER DRIERS

CERTIFIED BY UNDERWRITERS LABORATORIES INC.

FOR REFRIGERATION PLANTS THAT USE HCFC, HFC OR HFO REFRIGERANTS



APPLICATIONS

The filters in series DB3 illustrated in this chapter are designed to be installed on the liquid line of air conditioning systems with reverse-cycle, heat pumps, and refrigeration 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, and 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.

The filters can be installed on systems that use the following refrigerant 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.

CONSTRUCTION

The filter body is made completely from steel with threaded connections, SAE FLARE, made from nickel plated steel. The product range also includes types with copper connections, EN 12735-1 - Cu-DHP; offering the possibility to solder the copper pipe inside the connections (ODS). Bi-flow filters have two built-in check valves, inserted inside on both sides of the filter, which ensure that the refrigerant liquid always flows correctly from the outside of the cartridge to its core, regardless of the flow direction. Thus, all dirt particles in the circuit are trapped by the filter, regardless of the flow direction.

The cartridges are made from moulding a dehydrating filler made completely from 3 Å molecular sieves, with a suitable binder. The choice of using only 3 Å molecular sieves as the dehydrating material grants the cartridge extraordinary moisture adsorption capacity while maintaining reasonable deacidifying characteristics. The manufacturing process allows both products to be compact and strong, making them resistant to impact and abrasion. The cartridges are symmetrical and are designed to offer the maximum possible surface area to the incoming fluid, while the core hole guarantees a uniform wall thickness. As a result, the fluid encounters constant resistance, flows linearly, ensuring efficient dehydration and minimum charge loss. The cartridge is chemically inert, not deliquescent, does not react with refrigerating fluids, and is capable of capturing all oil by-products in the circuit.

When building heat pump systems or air conditioning systems with reverse-cycle, the use of bi-flow filter driers eliminates the need for external check valves and reduces external piping and brazing.

APPROVALS

Filters in series DB3 have been approved by the American certification authority Underwriters Laboratories Inc. Filters in series DB3 are certified **UL-CSA Listed** for the USA and Canada with file SA7054, in compliance with American Standard UL 207 and Canadian Standard CSA C22.2 No. 140.3-15.

TABLE 34: General characteristics of bi-flow hermetic filter driers. SAE Flare connections

Catalogue Number	International Reference	Block Filtering Surface [cm²]	Nominal Volume [cm³]	Connections	PS [bar]	TS [°C]		TA [°C]		Risk Category according to PED Recast
100% molecular sieves						min.	max.	min.	max.	
DB305/2	052	47	80	1/4"	47 (1)	- 40	+ 80	- 20	+ 50	Art. 4.3
DB308/3	083	78	130	3/8"						
DB308/4	084			1/2"						
DB316/3	163	134	250	3/8"						
DB316/4	164			1/2"						
DB316/5	165			5/8"						
DB330/5	305	274	500	5/8"						

(1) : MWP = 680 psi according to UL approval

TABLE 35: General characteristics of hermetic bi-flow filter driers. ODS connections

Catalogue Number	International Reference	Block Filtering Surface [cm²]	Nominal Volume [cm³]	Connections		PS [bar]	TS [°C]		TA [°C]		Risk Category according to PED Recast
100% molecular sieves				ODS			min.	max.	min.	max.	
				Ø [in.]	Ø [mm]						
DB305/2S	052S	47	80	1/4"	–	47 (1)	– 40	+ 80	– 20	+ 50	Art. 4.3
DB308/3S	083S	78	130	3/8"	–						
DB308/4S	084S			1/2"	–						
DB316/3S	163S	134	250	3/8"	–						
DB316/4S	164S			1/2"	–						
DB316/5S	165S			5/8"	16						
DB316/7S	167S			7/8"	–						
DB330/5S	305S	274	500	5/8"	16						
DB330/7S	307S			7/8"	–						
DB330/9S	309S			1.1/8"	–						

(1) : MWP = 680 psi according to UL approval

TABLE 36: Refrigerant flow capacity of hermetic bi-flow filter driers

Catalogue Number	Pressure drop 0,07 bar (1) [kW]												
100% molecular sieves	R134a	R22	R32	R404A	R407C	R410A	R507	R1234yf	R1234ze	R448A	R449A	R450A	R452A
DB305/2	5,3	5,8	25,6	3,8	5,5	5,6	3,7	3,9	4,7	5,1	5,0	4,2	3,8
DB305/2S	8,3	9,1	40,1	6,0	8,6	8,8	5,8	6,1	7,4	7,9	7,8	6,7	6,0
DB308/3	11,3	12,3	54,3	8,0	11,6	11,9	7,8	8,2	10,0	10,7	10,6	9,0	8,1
DB308/3S	12,6	13,7	60,4	9,0	12,9	13,3	8,7	9,1	11,1	11,9	11,8	10,0	9,1
DB308/4	15,2	16,6	73,2	10,9	15,7	16,1	10,5	11,0	13,4	14,5	14,3	12,2	11,0
DB308/4S	17,0	18,5	81,6	12,1	17,5	17,9	11,7	12,3	15,0	16,1	15,9	13,5	12,2
DB316/3	15,7	17,1	75,5	11,2	16,2	16,6	10,9	11,4	13,9	14,9	14,7	12,5	11,3
DB316/3S	17,6	19,2	84,7	12,6	18,1	18,6	12,2	12,8	15,6	16,7	16,5	14,1	12,7
DB316/4	26,0	28,3	124,9	18,5	26,7	27,4	18,0	18,8	22,9	24,7	24,3	20,7	18,7
DB316/4S	27,9	30,4	134,1	19,9	28,7	29,5	19,3	20,2	24,6	26,5	26,1	22,3	20,1
DB316/5	31,9	34,8	153,5	22,8	32,9	33,7	22,1	23,1	28,2	30,3	29,9	25,5	23,0
DB316/5S	34,3	37,4	165,0	24,5	35,3	36,2	23,7	24,9	30,3	32,6	32,2	27,4	24,8
DB316/7S	37,7	41,1	181,3	26,9	38,8	39,8	26,1	27,3	33,3	35,8	35,3	30,1	27,2
DB330/5	34,0	37,1	163,7	24,3	35,1	35,9	23,6	24,7	30,1	32,4	31,9	27,2	24,6
DB330/5S	36,7	40,0	176,5	26,2	37,8	38,8	25,4	26,6	32,4	34,9	34,4	29,3	26,5
DB330/7S	40,3	44,0	194,1	28,8	41,6	42,6	27,9	29,3	35,6	38,4	37,8	32,2	29,1
DB330/9S	43,1	47,0	207,4	30,7	44,4	45,5	29,8	31,3	38,1	41,0	40,4	34,4	31,1

Continued

TABLE 36: Refrigerant flow capacity of hermetic bi-flow filter driers

Catalogue Number	Pressure drop 0,14 bar (1) [kW]												
100% molecular sieves	R134a	R22	R32	R404A	R407C	R410A	R507	R1234yf	R1234ze	R448A	R449A	R450A	R452A
DB305/2	6,6	7,3	32,0	4,7	6,9	7,0	4,6	4,8	5,9	6,3	6,2	5,3	4,8
DB305/2S	10,4	11,4	50,2	7,4	10,7	11,0	7,2	7,6	9,2	9,9	9,8	8,3	7,5
DB308/3	14,1	15,4	67,8	10,1	14,5	14,9	9,8	10,2	12,5	13,4	13,2	11,3	10,2
DB308/3S	15,7	17,1	75,6	11,2	16,2	16,6	10,9	11,4	13,9	14,9	14,7	12,5	11,3
DB308/4	19,0	20,8	91,5	13,6	19,6	20,1	13,2	13,8	16,8	18,1	17,8	15,2	13,7
DB308/4S	21,2	23,1	102,0	15,1	21,9	22,4	14,7	15,4	18,7	20,2	19,9	16,9	15,3
DB316/3	19,6	21,4	94,4	14,0	20,2	20,7	13,6	14,2	17,3	18,7	18,4	15,7	14,2
DB316/3S	22,0	24,0	105,9	15,7	22,7	23,3	15,2	16,0	19,4	20,9	20,6	17,6	15,9
DB316/4	32,4	35,4	156,1	23,1	33,4	34,3	22,5	23,5	28,7	30,8	30,4	25,9	23,4
DB316/4S	34,8	38,0	167,7	24,9	35,9	36,8	24,1	25,3	30,8	33,1	32,7	27,8	25,2
DB316/5	39,9	43,5	191,9	28,4	41,1	42,2	27,6	28,9	35,2	37,9	37,4	31,8	28,8
DB316/5S	42,9	46,8	206,3	30,6	44,2	45,3	29,7	31,1	37,9	40,8	40,2	34,2	30,9
DB316/7S	47,1	51,4	226,7	33,6	48,5	49,8	32,6	34,2	41,6	44,8	44,2	37,6	34,0
DB330/5	42,5	46,4	204,6	30,3	43,8	44,9	29,4	30,8	37,6	40,4	39,9	33,9	30,7
DB330/5S	45,9	50,0	220,6	32,7	47,3	48,5	31,8	33,3	40,5	43,6	43,0	36,6	33,1
DB330/7S	50,4	55,0	242,7	36,0	52,0	53,3	34,9	36,6	44,6	48,0	47,3	40,3	36,4
DB330/9S	53,9	58,8	259,2	38,4	55,5	56,9	37,3	39,1	47,6	51,2	50,5	43,0	38,9

(1) : Maximum values of the refrigerant flow capacity at which the drier can be used when fluid dehydration is not the a major problem, provided that the original moisture is limited before the installation of the drier.

The maximum refrigerant flow capacities are referred to a total pressure drop of 0,07 bar / 0,14 bar , inlet and outlet connections included, (according to ARI STANDARD 710-2009 - with liquid temperature at + 30 °C and evaporating temperature at - 15 °C)

NOTE: for temperatures different from standard values use correction factors L1 listed on TABLE 9

TABLE 37: Water capacity and dehydratable charge of hermetic bi-flow filter driers

Catalogue Number	Water Capacity at + 24 °C (1) [g H ₂ O]					Dehydratable Charge at + 24 °C [kg refrigerant]				
	R134a	R22	R404A R507	R407C	R410A	R134a	R22	R404A R507	R407C	R410A
DB305/2	6,4	5,8	6,5	5,2	5,7	6,9	6,2	7,0	5,6	6,1
DB305/2S										
DB308/3	11,4	10,4	11,6	9,3	10,1	12,3	11,2	12,5	10,0	10,9
DB308/3S										
DB308/4										
DB308/4S										
DB316/3	24,7	22,6	25,3	20,3	22,1	26,6	24,3	27,2	21,8	23,8
DB316/3S										
DB316/4										
DB316/4S										
DB316/5										
DB316/5S										
DB316/7S										
DB330/5	51,3	46,8	52,4	42,0	45,7	55,2	50,3	56,3	45,2	49,1
DB330/5S										
DB330/7S										
DB330/9S										

Continued

TABLE 37: Water capacity and dehydratable charge of hermetic bi-flow filter driers

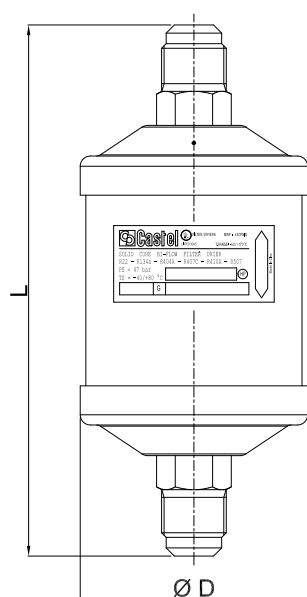
Catalogue Number	Water Capacity at + 52 °C (1) [g H ₂ O]					Dehydratable Charge at + 52 °C [kg refrigerant]				
	R134a	R22	R404A R507	R407C	R410A	R134a	R22	R404A R507	R407C	R410A
DB305/2	5,5	4,7	6,1	4,2	4,6	5,9	5,1	6,6	4,5	4,9
DB305/2S										
DB308/3	9,8	8,3	10,8	7,5	8,2	10,5	8,9	11,6	8,1	8,8
DB308/3S										
DB308/4										
DB308/4S										
DB316/3	21,3	18,1	23,5	16,3	17,8	22,9	19,5	25,3	17,5	19,1
DB316/3S										
DB316/4										
DB316/4S										
DB316/5										
DB316/5S										
DB316/7S										
DB330/5	44,2	37,6	48,7	33,8	36,8	47,5	40,4	52,4	36,3	39,6
DB330/5S										
DB330/7S										
DB330/9S										

(1) : Water capacity values are referred to the following conditions, fixed in ARI STANDARD 710-2004 and DIN 8949:2000:

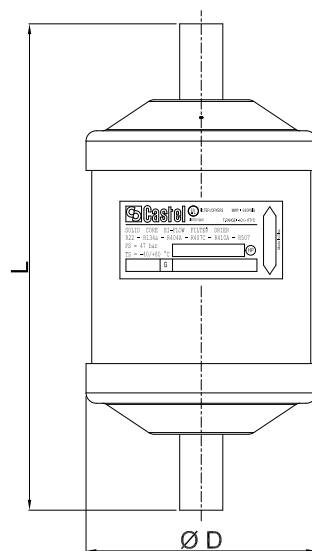
- Liquid temperatures: 24 °C and 52 °C
- Equilibrium point dryness, EPD: 60 ppm for R22
- Equilibrium point dryness, EPD: 50 ppm for R134a , R404A , R407C , R410A e R507

TABLE 38: Dimensions and weights of bi-flow filters

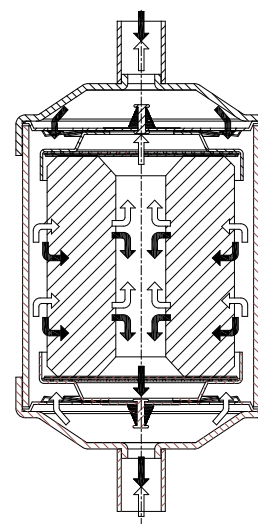
Catalogue Number	Connections			Dimensions [mm]		Weight [g]
	SAE Flare	ODS		Ø D	L	
		Ø [in.]	Ø [mm]			
DB305/2	1/4"	—	—	64	121	
DB305/2S	—	1/4"	—		113	
DB308/3	3/8"	—	—	64	152	
DB308/3S	—	3/8"	—		138	
DB308/4	1/2"	—	—		157	
DB308/4S	—	1/2"	—		138	
DB316/3	3/8"	—	—	64	171	
DB316/3S	—	3/8"	—		157	
DB316/4	1/2"	—	—		176	
DB316/4S	—	1/2"	—		157	
DB316/5	5/8"	—	—		186	
DB316/5S	—	5/8"	16		163	
DB316/7S	—	7/8"	—		177	
DB330/5	5/8"	—	—	76	260	
DB330/5S	—	5/8"	16		237	
DB330/7S	—	7/8"	—		251	
DB330/9S	—	1.1/8"	—		259	



Male connections



Solder connections



REPLACEABLE SOLID CORE FILTER DRIERS

FOR REFRIGERATION PLANTS THAT USE HCFC, HFC OR HFO REFRIGERANTS



APPLICATIONS

The filters in series 44 illustrated in this chapter 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, R507)
- HFO and HFO/HFC mixtures (R1234ze, R448A, R449A, R450A, and 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.

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

OPERATION

In the case of filters with more than one cartridge, the fluid passage takes place in parallel. As a result, the pressure drop does not increase in proportion with the number of cartridges. A large ring area between the cartridge and the inner surface of the filter allows for the accumulation of solid particles and prevents clogging. Before leaving the filter, the refrigerant fluid must pass through the mesh sieve

in which cartridges are mounted. This eliminates the danger that small particles of drying material be dragged into circulation. Furthermore, at the filter outlet, a plastic cup, the edge of which closely adheres to the inner surface of the filter, prevents dirt from reaching the outlet connection during normal operation and cartridge change.

CONSTRUCTION

Filters in series 4410: these are built with an aluminium cover, zinc plated screws, and the steel body is equipped with brazing connections:

- made from copper pipe EN 12735-1 – Cu-DHP. (No suffix after the connection code)
- Machined from a steel bar EN 10025 S355JR. (“F” suffix after connection code)

They are sold in the following two configurations:

- Codes with an “A” suffix, equipped with 1/4” NPT threaded cover for mounting an access fitting with valve core (for example G9150/R05)
- Codes with a “B” suffix, equipped with blind cover

Filters in series 4420: these filters are manufactured with: zinc plated steel cover, stainless steel screws, steel body equipped with brazing connections machined from steel bar EN 10025 S355JR.

Sold only in the configuration of codes with an “A” suffix, equipped with 1/4” NPT threaded cover for mounting an access fitting with valve core (for example kit G9150/R05)

Cartridges in series 4490, type A and type B, and 4491: are made from moulding a dehydrating filler, made completely from 3 Å molecular sieves, with a suitable binder. The choice of using only 3 Å molecular sieves as the dehydrating material grants the cartridge extraordinary moisture adsorption capacity while maintaining reasonable deacidifying characteristics.

Cartridges in series 4490, type AA and type AB, and 4491, type AA: are made from moulding a dehydrating filler, made from 80% 3 Å molecular sieves and 20% activated alumina, with a suitable binder. The use of a blend of molecular sieves – activated alumina, grant the cartridges a very high deacidifying capacity maintaining very good moisture adsorption characteristics.

The presence of a controlled and defined percentage of activated alumina, lower than the maximum value

recommended by ASERCOM, maintains the original concentration of additives in the polyester oil.

The cartridges in series 4490 have volume of 48 cubic inches, equivalent to about 800 cm³, and are suitable for being used with filters in series 4411, 4412, 4413 and 4414. The cartridges in series 4491 have volume of 96 cubic inches, equivalent to about 1600 cm³, and are suitable for being used with filters in series 4421, 4423, and 4424.

Both have a hollow cylinder shape and are of the same size as the corresponding products of the main international brands. Consequently they are interchangeable. The hollow cylinder shape provides a large surface area to the fluid which to cross it in a radial direction. As a result, drying is highly efficient with a minimum loss of charge.

CARTRIDGE REPLACEMENT

Cartridges must be ordered separately from the filter. They are supplied in individual packages, which are hermetically sealed in metal containers (type 4490), and in special bags (type 4491). Both types of packaging are suitable for long-term storage of the cartridge.

Each cartridge is supplied with two synthetic gaskets to be used as a seal between the two cartridges and between the cartridge and its covers.

If the filter is installed in a system without a by-pass, the cartridge replacement must be done following these instructions:

1. Close the valve on the liquid outlet line.
2. Start the compressor and its auxiliaries in order to transfer the refrigerant charge to the high pressure side of the plant (liquid vessel);

3. Stop the compressor at a sufficiently high suction pressure above atmospheric pressure;
4. Close the service valve on the suction side of the compressor.

NOTE: if during the transfer of the refrigerant to the high-pressure side of the plant, the discharge pressures reach values that are too high (the condenser is flooded due to insufficient capacity of the liquid vessel), shut off the valve on the suction side of the compressor and immediately stop the compressor.

5. Quickly replace the filter cartridge. During preparation for installation of the new cartridge, wrap the filter in a clean rag. The slight over-pressure in the filter and the technician's skill will prevent air from getting into the plant.
6. The cleanliness of the inside of the body is guaranteed by the scraping effect of the cup, which is characteristic of Castel filters.
If it is assumed that air has entered the plant during filter cartridge replacement, put the low-pressure side of the plant under vacuum. Always do this to the circuit involved in the operation.
7. Open the valve on the liquid outlet line.
8. Slowly open the compressor's suction valve and start the compressor and its auxiliaries.
9. Top the charge up, if necessary.

APPROVALS

Filters in series 4410 and 4420 have been approved by the American certification authority Underwriters Laboratories Inc. Filters in series 4410 and 4420 are certified **UL Listed** for the USA with file SA7054, in compliance with American standard UL 207.

TABLE 39: General characteristics of filter driers with replaceable solid core

Catalogue Number			Core Cat. Number	Number of Cores	Core Filtering Surface [cm²]	Nominal Volume		Connections			PS [bar]	TS [°C]		TA [°C]		Risk Category according to PED Recast	
Copper connections		Steel connections						ODS		W (2)		min.	max.	min.	max.		
Theaded cover	Blind cover	Theaded cover				[cu.in]	[cm³]	Ø [in.]	Ø [mm]	Ø [mm]							
4411/5A	4411/5B	4411/5AF			4490/A - 4490/B ; 4490/AA - 4490/AB	1	420	48	800	5/8"							16
4411/7A	4411/7B	4411/7AF	7/8"	22						26,9							
4411/M28A	4411/M28B	—	—	28						33,7							
4411/9A	4411/9B	4411/9AF	1.1/8"	—						33,7							
4411/11A	4411/11B	4411/11AF	1.3/8"	35						42,4							
4411/13A	4411/13B	4411/13AF	1.5/8"	—						48,3							
4411/M42A	4411/M42B	4411/M42AF	—	42						48,3							
4411/17A	4411/17B	4411/17AF	2.1/8"	54						60,3							
4411/21A	4411/21B	4411/21AF	2.5/8"	—						76,1							
4412/7A	4412/7B	4412/7AF	2	840		96	1600	7/8"	22	26,9							
4412/M28A	4412/M28B	0,05 cm						—	28	33,7							
4412/9A	4412/9B	4412/9AF						1.1/8"	—	33,7							
4412/11A	4412/11B	4412/11AF						1.3/8"	35	42,4							
4412/M42A	4412/M42B	4412/M42AF						—	42	48,3							
4412/17A	4412/17B	4412/17AF						2.1/8"	54	60,3							
4413/7A	4413/7B	4413/7AF	3	1260		144	2400	7/8"	22	26,9							
4413/9A	4413/9B	4413/9AF						1.1/8"	—	33,7							
4413/11A	4413/11B	4413/11AF						1.3/8"	35	42,4							
4413/13A	4413/13B	4413/13AF						1.5/8"	—	48,3							
4413/M42A	4413/M42B	4413/M42AF						—	42	48,3							
4414/11A	4414/11B	4414/11AF	4	1680		192	3200	1.3/8"	35	42,4	35 (1)						
4414/13A	4414/13B	4414/13AF						1.5/8"	—	48,3							
4414/M42A	4414/M42B	4414/M42AF						—	42	48,3							
4414/17A	4414/17B	4414/17AF						2.1/8"	54	60,3							
—	—	4423/17A	4491/A ; 4491/AA	3	1890	300	4800	2.1/8"	54	60,3	32 (1)					II	
		4423/21A						2.5/8"	67	76,1							
		4423/25A						3.1/8"	80	88,9							
		4424/25A						3.1/8"	80	88,9							
		4424/34A		4.1/4"	108	114,3											

(1) : MWP = 470 psi according to UL approval

(2) : only for shells with steel connections

TABLE 40: Refrigerant flow capacity of filter driers with replaceable solid core

Catalogue Number			Pressure drop 0,07 bar (1) [kW]										
Copper connections		Steel connections											
Theaded cover	Blind cover	Theaded cover	R134a	R22	R404A	R407C	R410A	R507	R1234ze	R448A	R449A	R450A	R452A
4411/5A	4411/5B	4411/5AF	83	90	59	85	87	57	73	78	77	66	60
4411/7A	4411/7B	4411/7AF	145	158	103	149	153	100	128	138	136	116	105
4411/M28A	4411/M28B	—	198	216	141	204	209	137	175	188	186	158	143
4411/9A	4411/9B	4411/9AF	198	216	141	204	209	137	175	188	186	158	143
4411/11A	4411/11B	4411/11AF	231	252	165	238	244	160	204	220	217	184	167
4411/13A	4411/13B	4411/13AF	248	270	177	255	262	171	219	235	232	198	179
4411/M42A	4411/M42B	4411/M42AF	248	270	177	255	262	171	219	235	232	198	179
4411/17A	4411/17B	4411/17AF	248	270	177	255	262	171	219	235	232	198	179
4411/21A	4411/21B	4411/21AF	248	270	177	255	262	171	219	235	232	198	179
4412/7A	4412/7B	4412/7AF	145	158	103	149	153	100	128	138	136	116	105
4412/9A	4412/9B	4412/9AF	224	244	160	231	236	155	198	213	210	179	162
4412/11A	4412/11B	4412/11AF	304	331	216	313	321	210	268	289	285	242	219
4412/M42A	4412/M42B	4412/M42AF	331	361	236	341	350	229	292	315	310	264	239
4412/17A	4412/17B	4412/17AF	331	361	236	341	350	229	292	315	310	264	239
4413/7A	4413/7B	4413/7AF	145	158	103	149	153	100	128	138	136	116	105
4412/M28A	4412/M28B	—	224	244	160	231	236	155	198	213	210	179	162
4413/9A	4413/9B	4413/9AF	224	244	160	231	236	155	198	213	210	179	162
4413/11A	4413/11B	4413/11AF	325	354	232	335	343	225	287	309	304	259	234
4413/13A	4413/13B	4413/13AF	359	391	256	369	379	248	317	341	336	286	259
4413/M42A	4413/M42B	4413/M42AF	359	391	256	369	379	248	317	341	336	286	259
4414/11A	4414/11B	4414/11AF	376	410	268	387	397	260	332	358	353	300	271
4414/13A	4414/13B	4414/13AF	422	460	301	435	446	292	373	401	396	337	305
4414/M42A	4414/M42B	4414/M42AF	422	460	301	435	446	292	373	401	396	337	305
4414/17A	4414/17B	4414/17AF	422	460	301	435	446	292	373	401	396	337	305
—	—	4423/17A	443	483	316	456	468	307	391	421	415	354	320
		4423/21A	488	532	348	503	516	338	431	464	458	389	352
		4423/25A	665	725	474	685	703	460	587	632	624	531	480
		4424/25A	731	797	521	753	772	506	646	695	685	583	528
		4424/34A	1170	1276	835	1206	1236	810	1034	1113	1097	934	845

(1) : Maximum values of the refrigerant flow capacity at which the drier can be used when fluid dehydration is not the a major problem, provided that the original moisture is limited before the installation of the drier.

The maximum refrigerant flow capacities are referred to a total pressure drop of 0,07 bar / 0,14 bar , inlet and outlet connections included, (according to ARI STANDARD 710-2009 - with liquid temperature at + 30 °C and evaporating temperature at - 15 °C)

Continued

TABLE 40: Refrigerant flow capacity of filter driers with replaceable solid core

Catalogue Number			Pressure drop 0,14 bar (1) [kW]										
Copper connections		Steel connections											
Theaded cover	Blind cover	Theaded cover	R134a	R22	R404A	R407C	R410A	R507	R1234ze	R448A	R449A	R450A	R452A
4411/5A	4411/5B	4411/5AF	99	108	71	102	105	69	87	94	93	79	71
4411/7A	4411/7B	4411/7AF	188	205	134	194	199	130	166	179	177	150	136
4411/M28A	4411/M28B	—	257	281	184	265	272	178	227	245	241	206	186
4411/9A	4411/9B	4411/9AF	257	281	184	265	272	178	227	245	241	206	186
4411/11A	4411/11B	4411/11AF	300	328	214	310	317	208	265	286	282	240	217
4411/13A	4411/13B	4411/13AF	322	351	230	332	340	223	284	306	302	257	232
4411/M42A	4411/M42B	4411/M42AF	322	351	230	332	340	223	284	306	302	257	232
4411/17A	4411/17B	4411/17AF	322	351	230	332	340	223	284	306	302	257	232
4411/21A	4411/21B	4411/21AF	322	351	230	332	340	223	284	306	302	257	232
4412/7A	4412/7B	4412/7AF	188	205	134	194	199	130	166	179	177	150	136
4412/9A	4412/9B	4412/9AF	291	317	207	300	307	201	257	277	273	232	210
4412/11A	4412/11B	4412/11AF	395	430	281	407	417	273	349	375	370	315	285
4412/M42A	4412/M42B	4412/M42AF	447	487	319	461	472	309	395	425	419	357	323
4412/17A	4412/17B	4412/17AF	447	487	319	461	472	309	395	425	419	357	323
4413/7A	4413/7B	4413/7AF	196	213	139	202	207	135	173	186	183	156	141
4412/M28A	4412/M28B	—	302	329	215	311	319	209	267	287	283	241	218
4413/9A	4413/9B	4413/9AF	302	329	215	311	319	209	267	287	283	241	218
4413/11A	4413/11B	4413/11AF	438	478	313	452	463	303	387	417	411	350	316
4413/13A	4413/13B	4413/13AF	484	528	345	499	511	335	428	460	454	386	349
4413/M42A	4413/M42B	4413/M42AF	484	528	345	499	511	335	428	460	454	386	349
4414/11A	4414/11B	4414/11AF	526	574	375	542	556	364	465	501	494	420	380
4414/13A	4414/13B	4414/13AF	591	644	421	609	624	409	522	562	554	471	426
4414/M42A	4414/M42B	4414/M42AF	591	644	421	609	624	409	522	562	554	471	426
4414/17A	4414/17B	4414/17AF	591	644	421	609	624	409	522	562	554	471	426
—	—	4423/17A	620	676	442	639	655	429	548	590	582	495	448
		4423/21A	683	745	487	704	722	473	603	649	641	545	493
		4423/25A	931	1015	664	959	984	645	822	885	873	743	672
		4424/25A	1023	1116	730	1054	1081	709	904	973	960	817	739
		4424/34A	1638	1786	1168	1688	1731	1134	1447	1558	1536	1308	1183

(1) : Maximum values of the refrigerant flow capacity at which the drier can be used when fluid dehydration is not the a major problem, provided that the original moisture is limited before the installation of the drier.

The maximum refrigerant flow capacities are referred to a total pressure drop of 0,07 bar / 0,14 bar , inlet and outlet connections included, (according to ARI STANDARD 710-2009 - with liquid temperature at + 30 °C and evaporating temperature at - 15 °C)

TABLE 41: General characteristics, dimensions and weights of solid cores

Catalogue Number	Batch characteristic	Filtering Surface [cm ²]	Nominal Volume		Dimensions [mm]			Weight [g]
			[cu.in]	[cm ³]	Ø D ₁	Ø D ₂	H	
4490/A (1)	High moisture adsorption (100% molecular sieve)	420	48	800	47	96	140	730
4490/B (2)								
4490/AA (1)	Moisture and acid adsorption (80% molecular sieve + 20% activated alumina)	630	100	1600	53	122	165	1560
4490/AB (2)								
4491/A (3)	High moisture adsorption (100% molecular sieve)	630	100	1600	53	122	165	1560
4491/AA (3)	Moisture and acid adsorption (80% molecular sieve + 20% activated alumina)							

(1): Supplied with cover gaskets as spare part, either for Castel filters or for competitors ones

(2): Supplied without cover gasket as part part

(3): Supplied with cover gasket as spare part

TABLE 42: Water capacity and dehydratable charge of one solid core

Catalogue Number	Nominal Volume		Water Capacity at + 24 °C (1) [g H ₂ O]					Dehydratable Charge at + 24 °C [kg refrigerant]				
	[cu.in]	[cm ³]	R134a	R22	R404A R507	R407C	R410A	R134a	R22	R404A R507	R407C	R410A
4490/A 4490/B	48	800	82	75	84	67	73	88	81	90	72	79
4490/AA 4490/AB			70	64	71	57	62	75	69	77	61	67
4491/A	100	1600	216	197	220	177	192	232	212	237	190	207
4491/AA			183	167	187	150	163	197	180	201	161	176

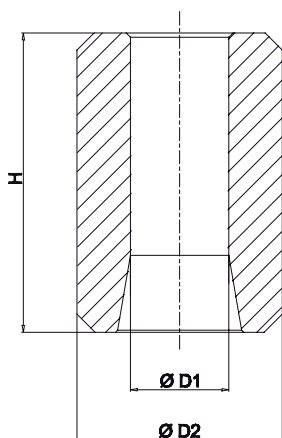
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TABLE 42: Water capacity and dehydratable charge of one solid core

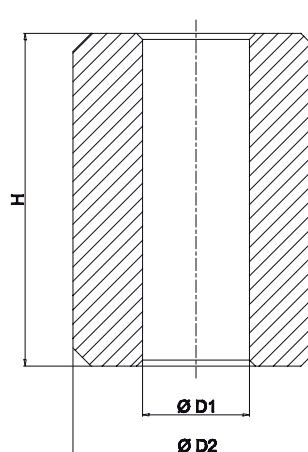
Catalogue Number	Nominal Volume		Water Capacity at + 52 °C (1) [g H ₂ O]					Dehydratable Charge at + 52 °C [kg refrigerant]				
	[cu.in]	[cm ³]	R134a	R22	R404A R507	R407C	R410A	R134a	R22	R404A R507	R407C	R410A
4490/A 4490/B	48	800	71	60	78	54	59	76	65	84	58	63
4490/AA 4490/AB			60	51	66	46	50	65	55	71	50	54
4491/A	100	1600	186	158	205	142	155	200	170	220	153	166
4491/AA			158	134	174	121	131	170	144	187	130	141

(1) : Water capacity values are referred to the following conditions, fixed in ARI STANDARD 710-2004 and DIN 8949:2000:

- Liquid temperatures: 24 °C and 52 °C
- Equilibrium point dryness, EPD: 60 ppm for R22
- Equilibrium point dryness, EPD: 50 ppm for R134a , R404A , R407C , R410A e R507



4490



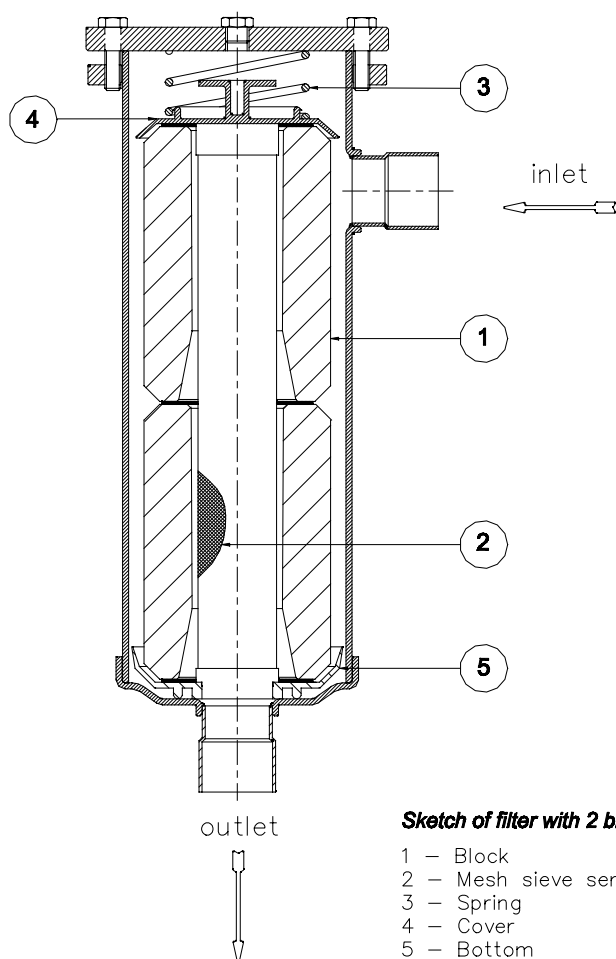
4491

TABLE 43: Dimensions and weights of filters with copper connections

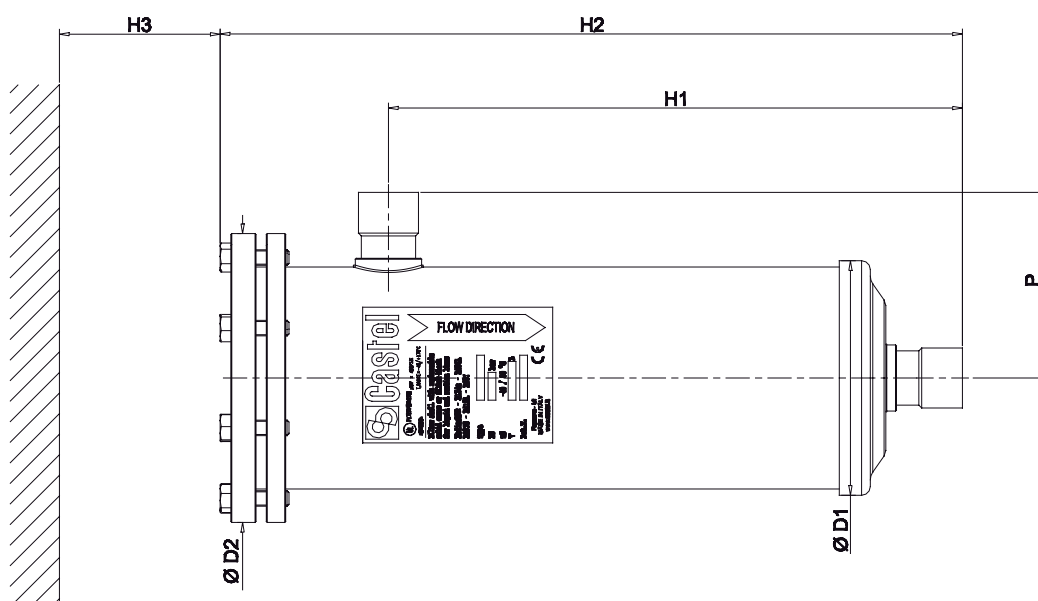
Catalogue Number	Connections		Dimensions [mm]						Weight [g]				
	ODS		Ø D ₁	Ø D ₂	H ₁	H ₂	H ₃	P					
	Ø [in.]	Ø [mm]											
4411/5 (A-B)	5/8"	16	121	149	144	231	185	89	3800				
4411/7 (A-B)	7/8"	22			150	237		95	3800				
4411/M28 (A-B)	—	28							3850				
4411/9 (A-B)	1.1/8"								155	242	100	3900	
4411/11 (A-B)	1.3/8"	35			167	254		112				3990	
4411/13 (A-B)	1.5/8"	—										158	245
4411/M42 (A-B)	—	42							182	269	127		
4411/17 (A-B)	2.1/8"	54			324	292		379					
4411/21 (A-B)	2.5/8"	—											
4412/7 (A-B)	7/8"	22											
4412/M28 (A-B)	—	28											
4412/9 (A-B)	1.1/8"	—											
4412/11 (A-B)	1.3/8"	35											
4412/M42 (A-B)	—	42											
4412/17 (A-B)	2.1/8"	54											
4413/7 (A-B)	7/8"	22											
4413/9 (A-B)	1.1/8"	—											
4413/11 (A-B)	1.3/8"	35											
4413/13 (A-B)	1.5/8"	—											
4413/M42 (A-B)	—	42											
4414/11 (A-B)	1.3/8"	35											
4414/13 (A-B)	1.5/8"	—											
4414/M42 (A-B)	—	42											
4414/17 (A-B)	2.1/8"	54											

TABLE 44: Dimensions and weights of filters with steel connections

Catalogue Number	Connections			Dimensions [mm]						Weight [g]
	ODS		W	Ø D ₁	Ø D ₂	H ₁	H ₂	H ₃	P	
	Ø [in.]	Ø [mm]	Ø [mm]							
4411/5AF	5/8"	16	21,3	121	149	144	231	185	90	3810
4411/7AF	7/8"	22	26,9			150	237		95	3860
4411/9AF	1.1/8"	–	33,7			155	242		100	3920
4411/11AF	1.3/8"	35	42,4			167	254		112	4050
4411/13AF	1.5/8"	–	48,3			158	245		103	4190
4411/M42AF	–	42	48,3			152	239		95	4150
4411/17AF	2.1/8"	54	60,3			292	379	324	95	4350
4411/21AF	2.5/8"	–	76,1			297	384		100	5280
4412/7AF	7/8"	22	26,9			309	396		112	5320
4412/9AF	1.1/8"	–	33,7			300	387		103	5380
4412/11AF	1.3/8"	35	42,4			433	520		95	5400
4412/M42AF	–	42	48,3			438	525		100	6400
4412/17AF	2.1/8"	54	60,3			450	537		112	6600
4413/7AF	7/8"	22	26,9			580	667		100	6770
4413/9AF	1.1/8"	–	33,7			592	679		112	7700
4413/11AF	1.3/8"	35	42,4			583	670		103	7900
4413/13AF	1.5/8"	–	48,3							
4413/M42AF	–	42	48,3							
4414/11AF	1.3/8"	35	42,4							
4414/13AF	1.5/8"	–	48,3							
4414/M42AF	–	42	48,3							
4414/17AF	2.1/8"	54	60,3							
4423/17A	2.1/8"	54	60,3	163	200	518	641	600	142	18450
4423/21A	2.5/8"	67	76,1			538	661		162	17370
4423/25A	3.1/8"	80	88,9			705	829	760	162	18720
4424/25A	3.1/8"	80	88,9			715	839		172	21600
4424/34A	4.1/4"	108	114,3							24300



Sketch of filter with 2 blocks



CHAPTER 10

REPLACEABLE SOLID CORE FILTER DRIERS

FOR REFRIGERATION PLANTS THAT USE THE R744 REFRIGERANT



APPLICATIONS

Filters 4411E and 4412E illustrated in this chapter have been developed by Castel for all the applications that use the sub-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.

OPERATION

In the case of filters with more than one cartridge, the fluid passage takes place in parallel. As a result, the pressure drop does not increase in proportion with the number of cartridges. A large ring area between the cartridge and the inner surface of the filter allows for the accumulation of solid particles and prevents clogging. Before leaving the filter, the refrigerant fluid must pass through the mesh sieve in which cartridges are mounted. This eliminates the danger that small particles of drying material be dragged into

circulation. Furthermore, at the filter outlet, a plastic cup, the edge of which closely adheres to the inner surface of the filter, prevents dirt from reaching the outlet connection during normal operation and cartridge change.

CONSTRUCTION

Filters in series 4411E and 4412E: these filters are manufactured with: aluminium cover, high-strength screws, steel body equipped with brazing connections machined from steel bar EN 10025 S355JR.

They are sold in the following two configurations:

- Codes with an “A” suffix, equipped with 1/4” NPT threaded cover for mounting an access fitting with valve core (for example G9150/R05)
- Codes with a “B” suffix, equipped with blind cover

Cartridges in series 4490, type A and type B: are made from moulding a dehydrating filler, made completely from 3 Å molecular sieves, with a suitable binder. The choice of using only 3 Å molecular sieves as the dehydrating material grants the cartridge extraordinary moisture adsorption capacity while maintaining reasonable deacidifying characteristics.

Cartridges in series 4490, type AA and type AB: are made from moulding a dehydrating filler, made from 80% 3 Å molecular sieves and 20% activated alumina, with a suitable binder. The use of a blend of molecular sieves – activated alumina, grant the cartridges a very high deacidifying capacity maintaining very good moisture adsorption characteristics.

The cartridges in series 4490 have volume of 48 cubic inches, equivalent to about 800 cm³, and are suitable for being used with filters in series 4411E and 4412E. Both have a hollow cylinder shape and are of the same size as the corresponding products of the main international brands. Consequently they are interchangeable. The hollow cylinder shape provides a large surface area to the fluid which to cross it in a radial direction. As a result, drying is highly efficient with a minimum loss of charge.

TABLE 45: General characteristics of filter driers with replaceable solid core for R744

Catalogue Number		Core Cat. Number	Number of Cores	Core Filtering Surface [cm ²]	Nominal Volume		Connections			PS [bar]	TS [°C]		TA [°C]		Risk Category according to PED Recast
Steel connections							ODS		W		min.	max.	min.	max.	
Theaded cover	Blind cover				[cu.in]	[cm³]	Ø [in.]	Ø [mm]	Ø [mm]						
4411E/5AF	4411E/5BF	4490/B : 4490/AB	1	420	48	800	5/8"	16	21,3	62	- 40	+ 80	- 20	+ 50	I
4411E/7AF	4411E/7BF						7/8"	22	26,9						
4411E/9AF	4411E/9BF						1.1/8"	—	33,7						
4411E/11AF	4411E/11BF						1.3/8"	35	42,4						
4411E/13AF	4411E/13BF						1.5/8"	—	48,3						
4411E/M42AF	4411E/M42BF						—	42	48,3						
4411E/17AF	4411E/17BF						2.1/8"	54	60,3						
4412E/7AF	4412E/7BF		2	840	96	1600	7/8"	22	26,9						
4412E/9AF	4412E/9BF						1.1/8"	—	33,7						
4412E/11AF	4412E/11BF						1.3/8"	35	42,4						
4412E/13AF	4412E/13BF						1.3/8"	35	42,4						
4412E/M42AF	4412E/M42BF						—	42	48,3						
4412E/17AF	4412E/17BF						2.1/8"	54	60,3						

TABLE 46: Refrigerant flow capacity of filters with replaceable core for R744

Catalogue Number		Pressure drop 0,07 bar (1) [kW]	Pressure drop 0,14 bar (1) [kW]
Steel connections			
Theaded cover	Blind cover		
4411E/5AF	4411E/5BF	52	62
4411E/7AF	4411E/7BF	91	119
4411E/9AF	4411E/9BF	125	162
4411E/11AF	4411E/11BF	145	189
4411E/13AF	4411E/13BF	156	203
4411E/M42AF	4411E/M42BF	156	203
4411E/17AF	4411E/17BF	156	203
4412E/7AF	4412E/7BF	91	119
4412E/9AF	4412E/9BF	141	183
4412E/11AF	4412E/11BF	191	248
4412E/13AF	4412E/13BF	208	281
4412E/M42AF	4412E/M42BF	208	281
4412E/17AF	4412E/17BF	208	281

(1) : Maximum values of the refrigerant flow capacity at which the drier can be used when fluid dehydration is not the a major problem, provided that the original moisture is limited before the installation of the drier.

The maximum refrigerant flow capacities are referred to a total pressure drop of 0,07 bar / 0,14 bar , inlet and outlet connections included, (according to ARI STANDARD 710-2009 - with liquid temperature at -5 °C and evaporating temperature at - 40 °C)

NOTE: for temperatures different from standard values use correction factors L1 listed on TABLE 21

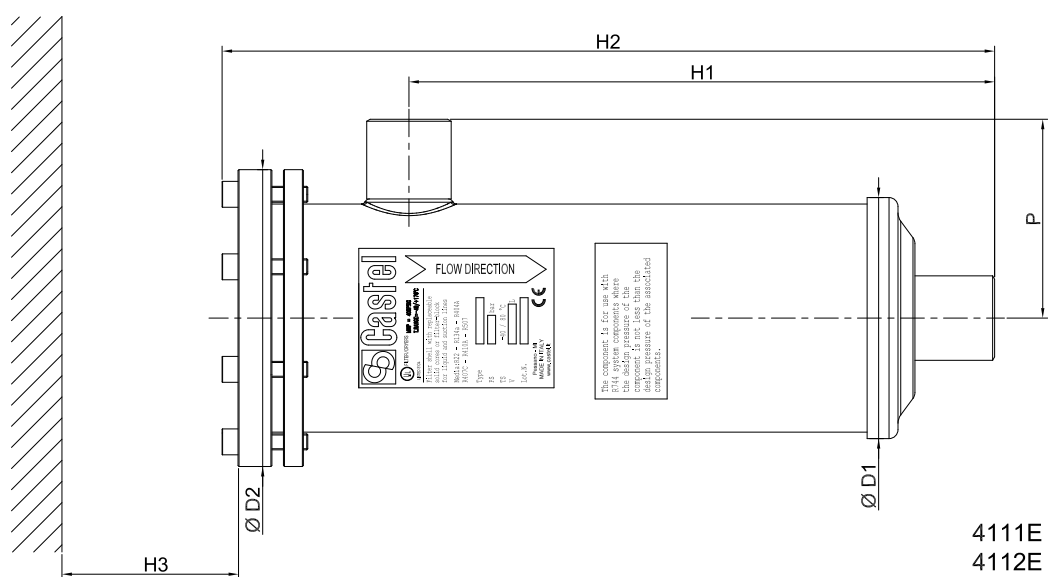
TABLE 47: General characteristics, dimensions and weights of solid cores for R744

Catalogue Number	Batch characteristic	Filtering Surface [cm²]	Nominal Volume		Dimensions [mm]			Weight [g]
			[cu.in]	[cm³]	Ø D ₁	Ø D ₂	H	
4490/B (1)	High moisture adsorption (100% molecular sieve)	420	48	800	47	96	140	730
4490/AB (1)	Moisture and acid adsorption (80% molecular sieve + 20% activated alumina)							
111135	Gasket for filter cover							

(1): Supplied without cover gasket as part part

TABLE 48: Dimensions and weights of filters for R744

Catalogue Number		Connections			Dimensions [mm]						Weight [g]
Steel connections		ODS		W	Ø D ₁	Ø D ₂	H ₁	H ₂	H ₃	P	
Theaded cover	Blind cover	Ø [in.]	Ø [mm]	Ø [mm]							
4411E/5AF	4411E/5BF	5/8"	16	21,3	121	149	144	231	185	90	5158
4411E/7AF	4411E/7BF	7/8"	22	26,9			150	237		95	5300
4411E/9AF	4411E/9BF	1.1/8"	–	33,7			155	242		100	5400
4411E/11AF	4411E/11BF	1.3/8"	35	42,4			167	254		112	5450
4411E/13AF	4411E/13BF	1.5/8"	–	48,3			158	245		103	5500
4411E/M42AF	4411E/M42BF	–	42	48,3			292	379	324	95	6600
4411E/17AF	4411E/17BF	2.1/8"	54	60,3			297	384		100	6800
4412E/7AF	4412E/7BF	7/8"	22	26,9			309	396		112	6950
4412E/9AF	4412E/9BF	1.1/8"	–	33,7			300	387		103	7000
4412E/11AF	4412E/11BF	1.3/8"	35	42,4							
4412E/13AF	4412E/13BF	1.5/8"	–	48,3							
4412E/M42AF	4412E/M42BF	–	42	48,3							
4412E/17AF	4412E/17BF	2.1/8"	54	60,3							



4411E
4412E

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