

HANDBOOK

REFRIGERATING SYSTEM PROTECTORS

Ed. 2017

 **Castel**[®]
Italian technology

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THE NATURAL DEVELOPMENT OF QUALITY

Having achieved the goal of fifty-five years working in the Refrigeration and Air Conditioning Industry, Castel's range of quality products is well known and highly appreciated around the world. Quality is the product of our Company philosophy and marks every step of the production cycle. It is certified by the company's Quality Management System (certified by TUV SUD in accordance with the UNI EN ISO 9001:2008 standard), as well as by the various product certifications of compliance with European Directives and European and extra-European Quality Marks.

Product quality is connected with the quality of manufacturing. We produce on high-tech machinery and updated automatic production lines, operating in compliance with the current safety and environmental protection standards.

Castel offers the Refrigeration and Air Conditioning Market and Manufacturers tested certified products suitable for use with the HCF and HFO refrigerants currently used in the Refrigeration & Air Conditioning Industry.

Based on the experience gained in the refrigeration field using fluorinated fluids, Castel is proud to present the Refrigeration and Air Conditioning Market and Manufacturers two complete lines of products developed and proven for use in systems using natural refrigerants: hydrocarbons (HC fluids) and carbon dioxide (R744).

REFRIGERATING SYSTEM PROTECTORS



DIRECTIVE 2014/68/EU ISSUED OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL OF 15 MAY 2014 ON PRESSURE EQUIPMENT

Directive 2014/68/EU (PED Recast) applies to the design, manufacture and evaluation of compliance of pressure equipment and assemblies with a maximum allowable pressure, PS, greater than 0.5 bar excluding the cases listed in Article 1, Paragraph 2 of the Directive.

Directive 2014/68/EU was transposed into the Italian legal system by Legislative Decree No. 26 dated 15 February 2016, published in the Official Journal of the Republic of Italy No. 53 of 4 March 2016.

The revised PED Recast Directive repeals previous Directive 97/23/EC. More specifically:

- Article 13 of the PED Recast Directive, regarding the classification of pressure equipment, came into force as of 1 June 2015, and repeals Article 9 of the previous PED Directive.
- All other articles of the PED Recast Directive are in force as of 19 July 2016, repealing all articles of the previous PED directive.

All indicators and inspectional strainers in series 4727E and 4728E illustrated in this technical handbook are considered "Pressure Accessories" according to the definition provided in Article 2, Point 5 of said Directive and are subject to the classification indicated in Article 4, Points 1.c) and 3 of the same Directive. The indicators in series 3680, 3780, and 3781 are excluded from the scope of this Directive as specified in the Guidelines 1/8 and 1/9, because they are piping components.

All other filters illustrated in this technical handbook are considered "Pressure Vessels" according to the definition provided in Article 2, Point 2 of said Directive and are subject to the classification indicated in Article 4, Points 1.a) and 3 of the same Directive.

EXTERNAL LEAKAGE

All the products illustrated in this Handbook are submitted, one by one, to tightness tests as well as specific functional tests. The allowable external leakage, measurable during the test, complies with the requirements of standards:

- EN 12178:2003 – Refrigerating systems and heat pumps Liquid-level indicators - Requirements, testing and marking
- EN 12284:2003 – Refrigerating systems and heat pumps Valves - Requirements, testing and marking
- EN 14276-1:2011 – Pressure equipment for refrigerating systems and heat pumps. Part 1: Vessels - General requirements
- EN 16084:2011 – Refrigerating systems and heat pumps Qualification of tightness of components and joints

PRESSURE CONTAINMENT

All the products illustrated in this Handbook, if submitted to hydrostatic testing, guarantee a pressure strength at least equal to 1.43 x PS in compliance with Directive 2014/68/EU.

All the products illustrated in this Handbook, if submitted to burst test, guarantee a pressure strength at least equal to 3 x PS according to EN 378-2: 2016 Standard.

All the UL-certified products illustrated in this Handbook, if submitted to burst testing, guarantee a pressure strength at least equal to 5 x MWP in compliance with standard UL 207.

WEIGHT

The weights of the items listed in this Handbook include packaging and are not binding.

WARRANTY

All Castel products are covered by a 12-month warranty. This warranty covers all products or parts thereof that turn out to be defective within the warranty period. In this case, at his own expenses, the customer shall return the defective item with a detailed description of the claimed defects. The warranty does not apply if the defect of the Castel product is due to mistakes by the customer or by third parties, such as incorrect installation, use contrary to Castel instructions, or tampering. In the event of defects found in its products, Castel will only replace the defective goods and will not refund damages of any kind. Castel reserves the right to make changes or modifications to its products at any time without prior notice.

The products listed in this handbook are protected according to law.

DRYING REFRIGERANT FLUIDS

Among contaminating agents that can cause serious damages to refrigerating systems, moisture plays a major role. Its presence, always a possibility in refrigerating systems, is due to many factors:

- Inadequate or insufficient vacuum before refrigerant charging
- Topping up using oil that has been exposed to the humidity in the air
- Refrigerant used for subsequent additions stored in vessels that have not been dried
- Sealing defects, especially in systems not designed for operation at low temperatures

High temperatures combined with humidity give rise to complex phenomena that promote acid formation both in the lubricating oil and the refrigerant. Organic acids of the oils react with metals, promoting the formation of sludge, which are viscous clots consisting of insoluble metal salts and large molecules of polymerized oil. In the long term, in addition to reducing lubrication of the moving parts of the compressor, sludge can clog valves and filters, causing serious damage.

Acids produced by the hydrolysis of the refrigerant (in compressors iron and aluminium act as catalysts) are particularly corrosive, especially hydrofluoric acid. Acids attack metal surfaces with the consequent formation of crystal salts, penalizing the total heat exchange coefficient in the condenser and in the evaporator. In particular, in hermetic and semi-hermetic units, these salts damage the windings of electric motors, cooled by direct contact with the cold gas.

Water solubility in refrigerants in the liquid phase is quite low, especially at low temperatures. Consequently, when water in the system exceeds the very low limits of solubility allowed at low temperature, the excess water turns into ice, and partially or totally blocks expansion valves and capillaries.

Therefore, it is absolutely necessary to equip refrigeration systems with effective filters for drying the fluid.

In terms of concept and construction, the filter driers available on the market consist of two types: loose molecular sieve and solid core.

In the loose molecular sieve type, consisting of non-agglomerating product, the dehydrating mass is pressed using a spring between two metal fine-mesh wires, or two filter separators that can be constructed from various materials.

In solid core driers, the core is made from specifically dosed dehydrating and deacidifying products with binders. Water adsorption combines with the neutralization of acids that may be present in the refrigerant, and with a strong filtering action.

Castel has set up both its hermetic filter product lines based on the latter construction, which eliminates the danger of abrasion during loading and consequent formation of dust, and it allows the filter to be positioned at any location in the system.

It is always advisable to install a humidity indicator downstream from the filter. It will show the refrigerant's moisture content and the degree of efficiency of the filter. Remember, the drying capacity of Castel filters refers to the refrigerant charge and not the refrigeration potential of the system. As a matter of fact, with the same refrigerant potential and the same type of refrigerant fluid, there may be different refrigerant charges based on the type, design and partialization range of the plant, as well as to the operating conditions.

The data shown in the following tables are deduced from the test results of the present Castel production.

It is important to note that, in the event of a high oil level in the circuit (> 5%), the data shown in the tables will be reduced considerably.

CHAPTER 1 ■ LIQUID INDICATORS & MOISTURE/LIQUID INDICATORS CERTIFIED BY UNDERWRITERS LABORATORIES INC.

FOR REFRIGERATION PLANTS THAT USE HCFC, HFC, HC OR HFO REFRIGERANTS



APPLICATIONS

The liquid indicators and moisture/liquid indicators illustrated in this chapter ensure fast, safe inspection of the refrigerant fluid conditions in the liquid circuit in terms of its regular flow and the presence of moisture. They are designed for installation on commercial refrigeration systems and on civil and industrial air conditioning plants that use the following refrigerant fluids:

- HCFC (R22)
- HFC (R134a, R404A, R407C, R410A, 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.

Furthermore, the indicators of the series 3840 and 3940 can also be installed on systems that use the following refrigeration fluids:

- HFC (R32) and HFO (R1234yf), classified as A2L in the ASHRAE 34-2013 standard
- HC (R290, R600, or R600a), classified as A3 in the ASHRAE 34-2013 standard

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.

Note: The indicator series 3680, 3780, and 3781 are excluded from the scope of application of Directive 2014/68/EU as they are piping components.

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.

CONSTRUCTION

The liquid indicators in series 38 and moisture/liquid indicators in series 39 are manufactured in a sealed hermetic unit to avoid any possible refrigerant leaks. The glass “lens”, with suitable gasket, is housed inside the brass body and is fixed in its seat with an edge calking operation. The main parts of these indicators are made from the following materials:

- Hot forged brass EN 12420 – CW 617N for the body
- Copper tube EN 12735-1 – Cu-DHP for solder connections
- Glass for lens
- PTFE for outlet gaskets

Liquid/moisture indicators series 36 and 37 are manufactured with the glass "lens" directly fused onto a steel metallic ring, with proper surface protection. This metallic ring, screwed on the indicator body, is equipped with a gasket:

- Hydrogenated nitrile butadiene (HNBR) for series 36
- Chloroprene (CR) for series 37

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 indicators 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.

For indicators in series 3680, 3780 and 3781, the ring must be disassembled before brazing. Note: the PS declared in Table 1 for saddle-type indicators in series 3680 and 3780, refers only to the body plus the ring (with its o-ring), which the customer must tighten to the torque indicated on the product instruction handbook. The aforesaid declaration doesn't cover any possible leakage or malfunctions due to brazing the body on the copper pipe. The customer is totally responsible for the success of this operation.

APPROVALS

The liquid indicators in series 3810, 3840, and 3850 and the moisture/liquid indicators 3910 3940, and 3950 (excluding indicators p/n 3940/X01 and 3940/X02) are approved by the American certification authority, Underwriters Laboratories Inc. These indicators are certified **UL Listed** for the USA with file SA33318, in compliance with American standard UL 207.

TABLE 1: General characteristics of liquid indicators

Catalogue Nr.	Type	Connections					PS [bar]	TS [°C]		TA [°C]		Risk Category according to PED Recast
		SAE Flare	ODS		for pipe			min	max	min	max	
			Ø [in.]	Ø [mm]	Ø [in.]	Ø [mm]						
3810/22	male - male	1/4"	-	-								
3810/33		3/8"	-	-								
3810/44		1/2"	-	-								
3810/55		5/8"	-	-								
3810/66		3/4"	-	-								
3840/2	brazing	-	1/4"	-	-	-	45 (1)	-40	+120	-40	+50	Art. 4.3
3840/3		-	3/8"	-								
3840/M10		-	-	10								
3840/M12		-	-	12								
3840/4		-	1/2"	-								
3840/5		-	5/8"	16								
3840/M18		-	-	18								
3840/6		-	3/4"	-								
3840/7		-	7/8"	22								
3840/9		-	1.1/8"	-								
3850/22		male - female	1/4"	-								
3850/33	3/8"		-	-								
3850/44	1/2"		-	-								
3850/55	5/8"		-	-								
3850/66	3/4"		-	-								
3680/7	saddle type	-	-	-	7/8"	22	45	-40	+150	-30	50	excluded
3680/9		-	-	-	1.1/8"	28						
3680/11		-	-	-	1.3/8"	35						

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

TABLE 2: General characteristics of liquid / moisture indicators

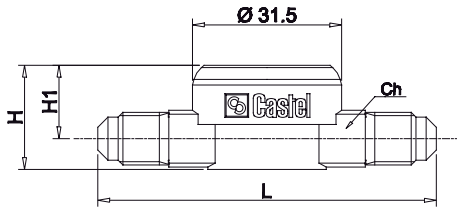
Catalogue Nr.	Type	Connections								PS [bar]	TS [°C]		TA [°C]		Risk Category according to PED Recast
		SAE Flare	ODS		ODM		for pipe				min	max	min	max	
			Ø [in.]	Ø [mm]	Ø [in.]	Ø [mm]	Ø [in.]	Ø [mm]	Hole Ø [mm]						
3910/22	male - male	1/4"	-	-	-	-				45 (1)	-40	+120	-40	+50	Art. 4.3
3910/33		3/8"	-	-	-	-									
3910/44		1/2"	-	-	-	-									
3910/55		5/8"	-	-	-	-									
3910/66		3/4"	-	-	-	-									
3940/2	brazing	-	1/4"	-	-	-				45 (1)	-40	+120	-40	+50	Art. 4.3
3940/3		-	3/8"	-	-	-									
3940/M10		-	-	10	-	-									
3940/M12		-	-	12	-	-									
3940/4		-	1/2"	-	-	-									
3940/5		-	5/8"	16	-	-	-	-	-						
3940/M18		-	-	18	-	-									
3940/6		-	3/4"	-	-	-									
3940/7		-	7/8"	22	-	-									
3940/9		-	1.1/8"	-	-	-									
3940/X01		-	-	-	-	6									
3940/X02		-	-	-	-	6									
3950/22		male - female	1/4"	-	-	-	-								
3950/33	3/8"		-	-	-	-									
3950/44	1/2"		-	-	-	-									
3950/55	5/8"		-	-	-	-									
3950/66	3/4"		-	-	-	-									
3770/M28	soldering	-	-	-	-	28				45 (1)	-30	+110	-30	+50	Art. 4.3
3770/11		-	-	-	1.3/8"	35									I
3770/13		-	-	-	1.5/8"	-									Art. 4.3
3770/M42		-	-	-	-	42									I
3771/11			1.3/8"	35	-	-									
3771/M42			-	42	-	-									
3771/17			2.1/8"	-	-	-									
3780/5	saddle tyoe						5/8"	16		45 (1)	-30	+110	-30	+50	excluded
3780/M18							-	18							
3780/7							7/8"	22							
3780/9							1.1/8"	28							
3780/11							1.3/8"	35							
3781/M28	level glass						-	-	28						

(1) : MWP = 500 psi according to UL approval

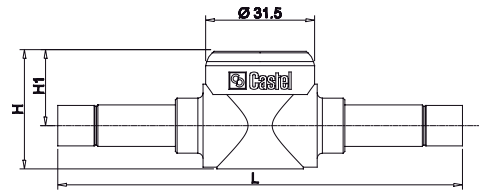
TABLE 3: Dimensions and weights

Catalogue Number		Dimensions [mm]				Weight [g]				
Liquid Indicators	Moisture Liquid Indicators	H	H1	L	Ch					
3810/22	3910/22	22	16,5	71,5	12	110				
3810/33	3910/33	26,5	17,5	77,5	17	150				
3810/44	3910/44	30	18,5	81,5	22	196				
3810/55	3910/55	34	21,5	89,5	24	238				
3810/66	3910/66	37,5	23,5	90	28	298				
3840/2	3940/2	22	15,5	113	-	116				
3840/3	3940/3	34	21,5	117		-	185			
3840/M10	3940/M10									
3840/M12	3940/M12									
3840/4	3940/4									
3840/5	3940/5	34	21,5	131			-	195		
3840/M18	3940/M18									
3840/6	3940/6									
3840/7	3940/7	37,5	23,5	151				-	306	
3840/9	3940/9	43,5	26	186					501	
-	3940/X01	22	15,5	242					155	
	3940/X02	-	15,5	121					122	
3850/22	3950/22	26,5	17,5	68					17	140
3850/33	3950/33	30	18,5	74					22	185
3850/44	3950/44	34	21,5	77	24				231	
3850/55	3950/55	37,5	23,5	82	28	288				
3850/66	3950/66	43,5	26	92	35	517				
-	3770/M28	-	38	150	-	300				
	3770/11		41,5	160		349				
	3770/13		45	170		516				
	3770/M42		-	41,5		160	378			
	3771/11			45		170	516			
	3771/M42			-		30	-	90		
	3771/17					31				
	3780/5		33							
3780/M18	36									
3680/7	3780/7	39,5								
3680/9	3780/9	-	-	-	-	107				
3680/11	3780/11	-	-	-	-	-				
-	3781/M28	-	-	-	-	-				

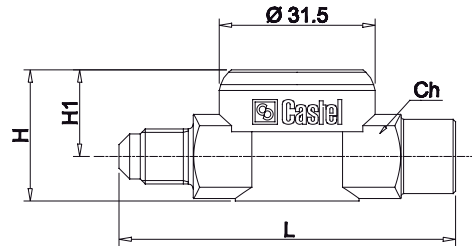
3810
3910



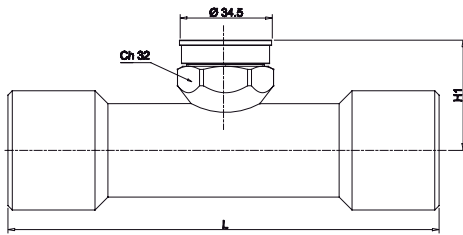
3840
3940



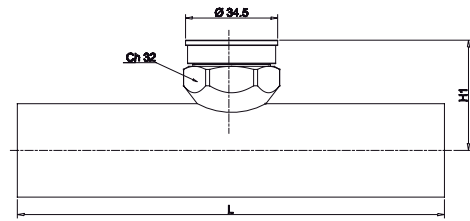
3850
3950



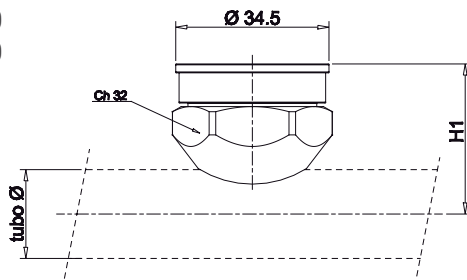
3771



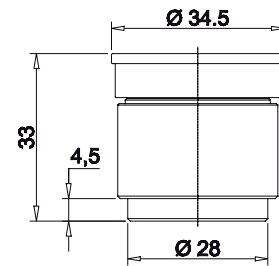
3770



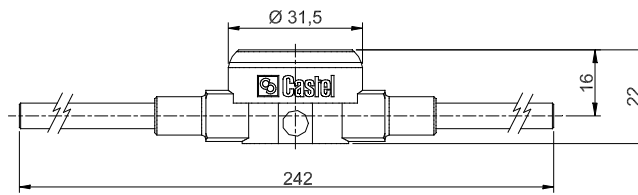
3680
3780



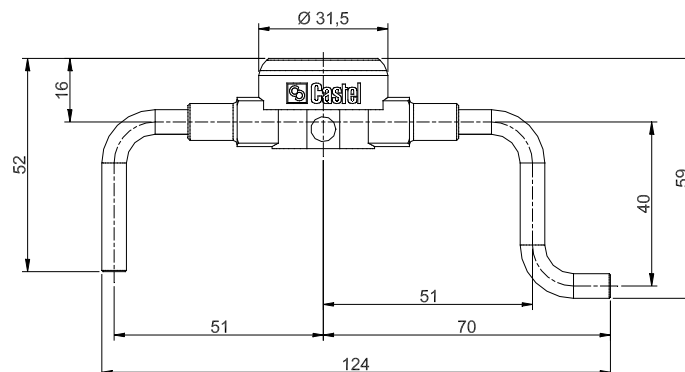
3781



3940/X01



3940/X02



CHAPTER 2

MOISTURE/LIQUID INDICATORS

FOR REFRIGERATION PLANTS THAT USE THE R744 REFRIGERANT



APPLICATIONS

Castel has developed the moisture/liquid indicators, illustrated in this chapter, for all applications that use subcritical or transcritical R744 refrigeration fluid belonging to Group 2, defined in Article 13, Chapter 1, Point (b) of Directive 2014/68/EU, with reference to EC Regulation No. 1272/2008.

The moisture/liquid indicators for plants that operate using refrigerant fluid R744 are the following:

- Indicators in series 3940EL with PS = 60 bar, equipped with copper connections for subcritical plants.
- Indicators in series 3740E with PS = 80 bar, equipped with copper connections for transcritical plants low and medium pressure sides.
- Indicators in series 3747E with PS = 120 bar equipped with reinforced copper connections (K65) for transcritical plants high-pressure side.
- Indicators in series 3748E with PS = 140 bar equipped with stainless steel connections for transcritical plants high-pressure side.

CAUTION!: the indicators in this chapter cannot be used with other refrigerant fluids.

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.

CONSTRUCTION

Liquid indicators in series 3940EL are manufactured in a total hermetic construction to avoid any possible leaks. The glass “lens”, with suitable gasket, is housed inside the brass body and is fixed in its seat with an edge calking operation. The main parts of these indicators are made from the following materials:

- Hot forged brass EN 12420 – CW 617N for the body
- Copper tube EN 12735-1 – Cu-DHP for solder connections
- Glass for lens
- PTFE for outlet gaskets

Indicators in series 3740E, 3747E, and 3748E are manufactured with the glass “lens” directly fused onto a steel metallic ring, with proper surface protection. This metallic ring, screwed on the indicator body, is equipped with an EPDM (ethylene-propylene) gasket. The main parts of these three series of indicators are manufactured with the following materials:

- Hot forged brass EN 12420 – CW 617N for the body
- Copper pipe EN 12735-1 – Cu-DHP for welded connections in series 3740EL
- Copper pipe EN 12735-1 – CuFe2P (K65) for welded connections in series 3747E
- Stainless steel pipe AISI 304 for welded connections in series 3748E

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.

Copper connections: The brazing of indicators with copper connections should be carried out with care, using a low melting point filler material (min. 5% Ag). It is important to avoid direct contact between the torch flame

TABLE 4: General characteristics of liquid / moisture indicators for R744

Catalogue Nr.	Type	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.]						
3940EL/M6	brazing	–	6	–	60	– 40	+120	– 40	+50	Art. 4.3
3940EL/2		1/4"	–	–						
3940EL/3		3/8"	–	–						
3940EL/M10		–	10	–						
3940EL/M12		–	12	–						
3940EL/4		1/2"	–	–						
3940EL/5		5/8"	16	–						
3940EL/M18		–	18	–						
3940EL/6		3/4"	–	–						
3940EL/7		7/8"	22	–						
3940EL/9		1.1/8"	–	–						
3740E/M6	brazing	–	6	–	80	– 40	+120	– 40	+50	Art. 4.3
3740E/2		1/4"	–	–						
3740E/3		3/8"	–	–						
3740E/M10		–	10	–						
3740E/M12		–	12	–						
3740E/4		1/2"	–	–						
3740E/5		5/8"	16	–						
3740E/M18		–	18	–						
3740E/6		3/4"	–	–						
3740E/7		7/8"	22	–						
3740E/9		1.1/8"	–	–						
3747E/2	brazing	1/4"	–	–	120	– 40	+120	– 40	+50	Art. 4.3
3747E/3		3/8"	–	–						
3747E/4		1/2"	–	–						
3747E/5		5/8"	16	–						
3747E/6		3/4"	–	–						
3747E/7		7/8"	22	–						
3747E/9		1.1/8"	–	–						
3777E/11		1.3/8"	35	–						
3748E/M6	welding	–	–	6	120	– 40	+120	– 40	+50	Art. 4.3
3748E/M10		–	–	10						
3748E/M12		–	–	12						
3748E/M16		–	–	16						
3748E/M18		–	–	18						
3748E/M22		–	–	22						
3748E/M28		–	–	28						

and the body, which could be damaged and compromise the proper functioning of the indicator.

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

With indicators series 3740EL, 3747E and 3748E, it is necessary to disassemble the ring before starting to braze/weld.

APPROVALS

The American certification authority Underwriters Laboratories Inc. has approved indicators in series 3940EL. These indicators are certified **UL Listed** for the USA with file SA33318, in compliance with American standard UL 207.

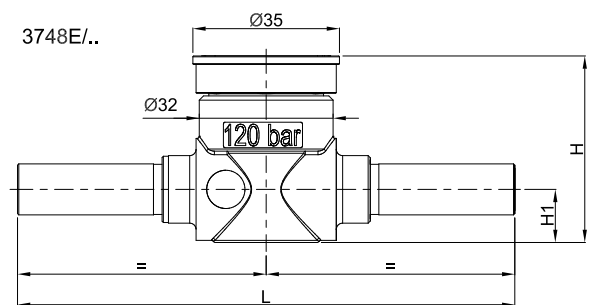
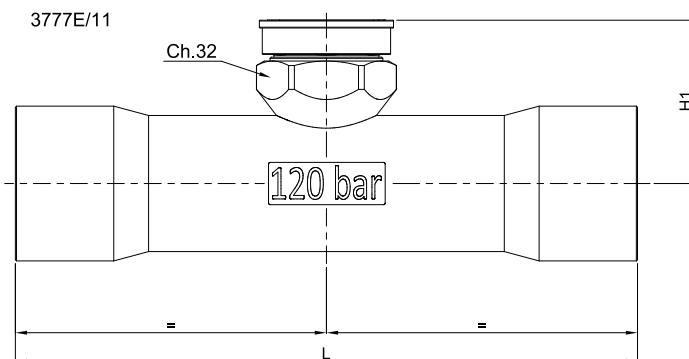
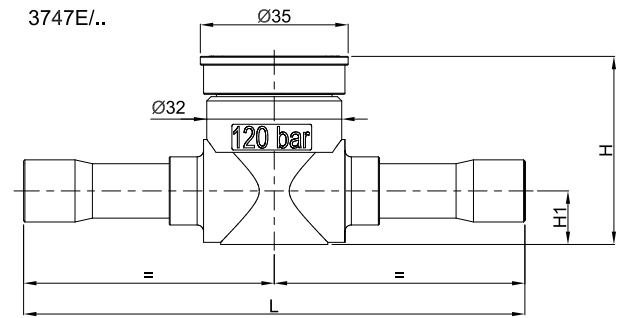
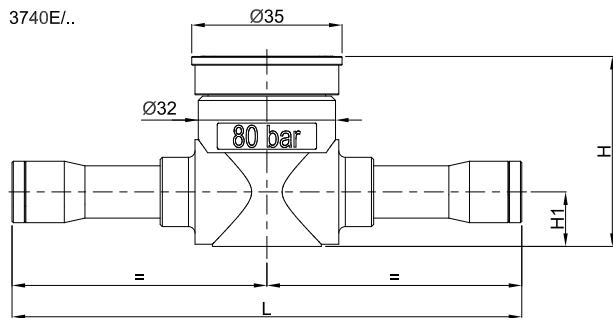
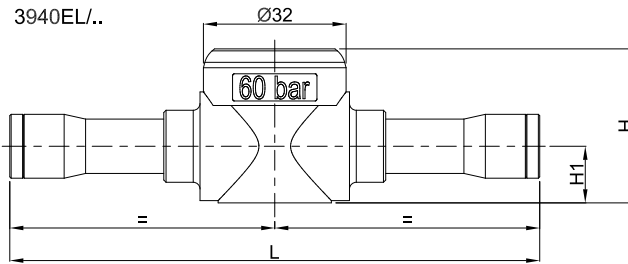


TABLE 5: Dimensions and weights

Catalogue Number	Dimensions [mm]			Weight [g]
	H	H1	L	
3940EL/M6	22	15,5	113	120
3940EL/2				
3940EL/3	34	21,5	117	185
3940EL/M10				
3940EL/M12				
3940EL/4				
3940EL/5	34	21,5	131	195
3940EL/M18				
3940EL/6				
3940EL/7	37,5	23,5	151	306
3940EL/9	43,5	26	186	500
3740E/M6	43,5	31	117	140
3740E/2				200
3740E/3				
3740E/M10				
3740E/M12				
3740E/4				
3740E/5	43,5	31	131	215
3740E/M18				
3740E/6				
3740E/7	42,5	28,5	151	325
3740E/9	48,5	31	186	518
3747E/2	43,5	31	117	200
3747E/3				
3747E/4				
3747E/5	43,5	31	131	215
3747E/6				
3747E/7	42,5	28,5	151	325
3747E/9	48,5	31	186	575
3777E/11	-	41,5	160	378
3748E/M6	43,5	31	113	200
3748E/M10			117	
3748E/M12				
3748E/M16	43,5	31	131	234
3748E/M18				
3748E/M22	42,5	28,5	151	304
3748E/M28	48,5	31	186	530

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									
4305/2	4205/2	052	70	80	1/4"						
4305/3	4205/3	053									
4308/2	4208/2	082	103	130	1/4"						
4308/3	4208/3	083									
4308/4	4208/4	084									
4316/2	4216/2	162	155	250	1/4"						
4316/3	4216/3	163									
4316/4	4216/4	164									
4316/5	4216/5	165									
4330/3	4230/3	303	310	500	3/8"						
4330/4	4230/4	304									
4330/5	4230/5	305									
4332/4	4232/4	304	255	500	1/2"						
4332/5	4232/5	305									
4341/4	-	414	330	670	1/2"						
4341/5	4241/5	415									
4341/6	4241/6	416									
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 [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				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"	16						
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										
4308/2	12,9	11,8	13,2	10,6	11,5	13,9	12,7	14,2	11,4	12,4
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										
4308/2	11,1	9,3	12,2	8,5	9,3	11,9	10,0	13,1	9,1	10,0
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										
4332/4	40,2	34,1	44,2	30,7	33,4	43,2	36,7	47,5	33,0	35,9
4332/4S										
4332/5										
4332/5S										
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										
4208/4S										
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

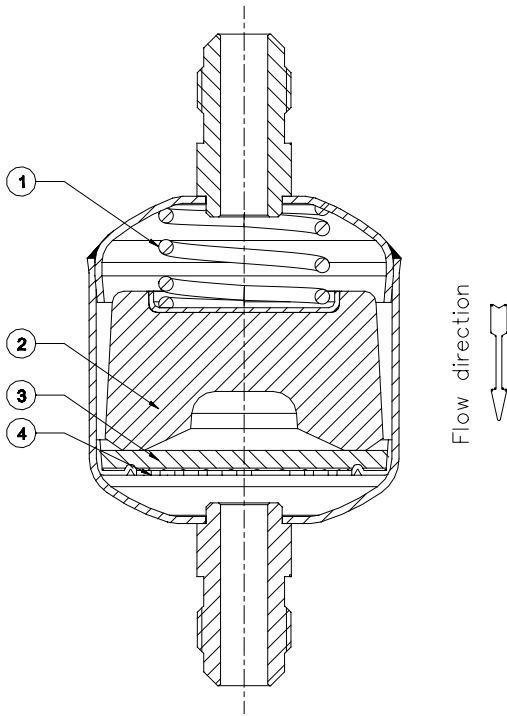
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TABLE 11: Water capacity and dehydratable charge of hermetic filters with core 80% molecular sieves + 20% activated alumina

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										
4208/4S										
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										
4230/5S										
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	92,8	78,8	102,2	71,0	77,2	99,8	84,7	109,9	76,3	83,0
4275/4S										
4275/5S										
4275/6S										
4275/7S										
4275/9S										

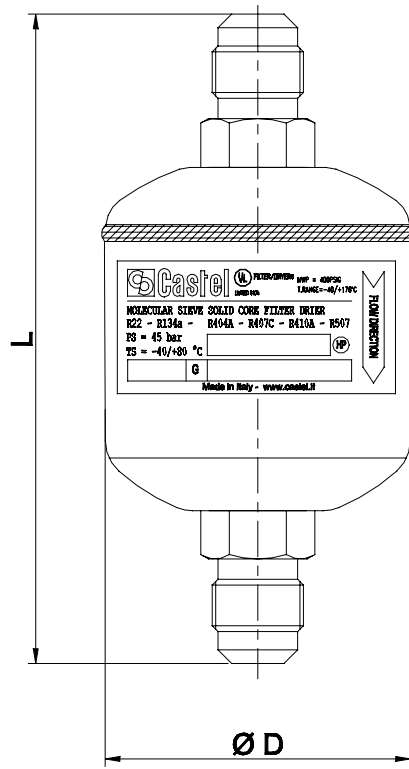
(1) : Water capacity values are referred to the following conditions, fixed in ARI STANDARD 710-2004 and DIN 8949:2000:

- 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

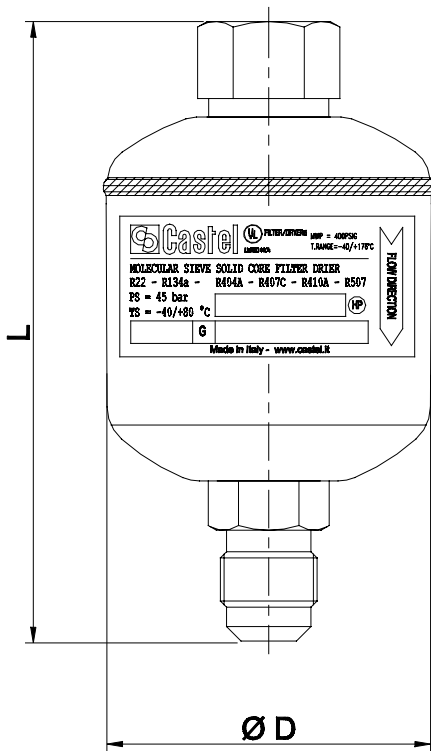


Solid core dehydrator

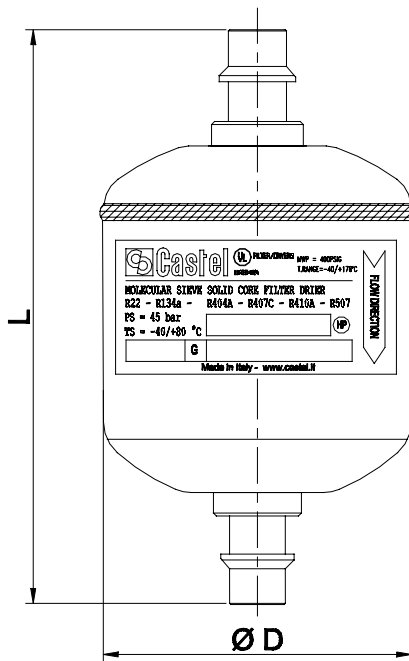
- 1 - Spring
- 2 - Bock
- 3 - Felt
- 4 - Stainless steel mesh



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 D	L	
			Ø [in.]	Ø [mm]			
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"	-	-		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			630
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"	-	-	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 [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.							
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 [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				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										
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										
DF308/2	22,8	20,8	23,3	18,6	20,3	24,5	22,4	25,1	20,0	21,8
DF308/2F										
DF308/2S										
DF308/3										
DF308/3F										
DF308/3S										
DF308/M10S										
DF308/M12S										
DF308/4										
DF308/4S										
DF316/2	30,4	27,7	31,0	24,9	27,1	32,7	29,8	33,3	26,8	29,1
DF316/3										
DF316/3F										
DF316/3S										
DF316/M10S										
DF316/M12S										
DF316/4										
DF316/4S										
DF316/5										
DF316/5S										
DF316/7S										
DF316/9S										
DF330/3	71,3	65,1	72,9	58,4	63,6	76,7	70,0	78,4	62,8	68,4
DF330/3S										
DF330/4										
DF330/4S										
DF330/5										
DF330/5S										
DF330/7S										
DF330/9S										
DF341/4	98,7	90,1	100,0	80,8	87,9	106,1	96,9	107,5	86,9	94,5
DF341/4S										
DF341/5										
DF341/5S										
DF341/6										
DF341/6S										
DF341/7S										
DF375/4S	197,3	180,2	201,6	161,6	175,9	212,3	193,8	215,1	173,8	189,0
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

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										
DF308/2	19,6	16,7	21,6	15,0	16,3	21,1	18,0	23,2	16,1	17,5
DF308/2F										
DF308/2S										
DF308/3										
DF308/3F										
DF308/3S										
DF308/M10S										
DF308/M12S										
DF308/4										
DF308/4S										
DF316/2	26,2	22,2	28,8	20,0	21,8	28,2	23,9	31,0	21,5	23,4
DF316/3										
DF316/3F										
DF316/3S										
DF316/M10S										
DF316/M12S										
DF316/4										
DF316/4S										
DF316/5										
DF316/5S										
DF316/7S										
DF316/9S										
DF330/3	61,5	52,2	67,7	47,0	51,2	66,1	56,1	72,8	50,5	55,1
DF330/3S										
DF330/4										
DF330/4S										
DF330/5										
DF330/5S										
DF330/7S										
DF330/9S										
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										
DF208/4S										
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

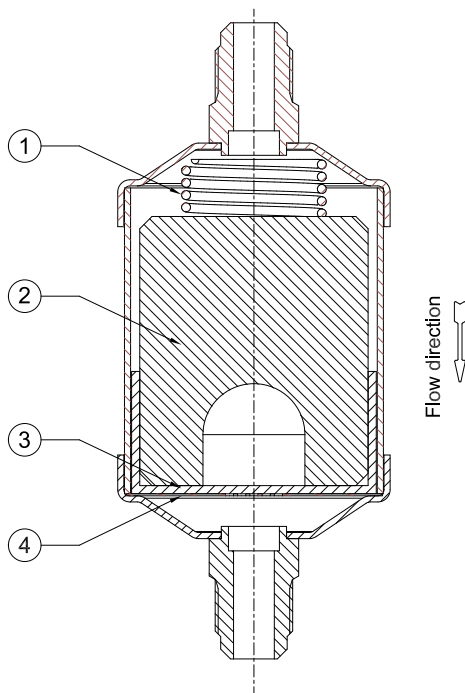
Catalogue Number	Water Capacity at + 52 °C (1) [g H ₂ O]					Dehydratable Charge at + 52 °C [kg refrigerant]				
	R134a	R22	R404A R507	R407C	R410A	R134a	R22	R404A R507	R407C	R410A
DF203/2	3,8	3,2	4,2	2,9	3,1	4,1	3,4	4,5	3,1	3,3
DF203/2S										
DF203/3										
DF203/3S										
DF205/2	9,8	8,3	10,8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

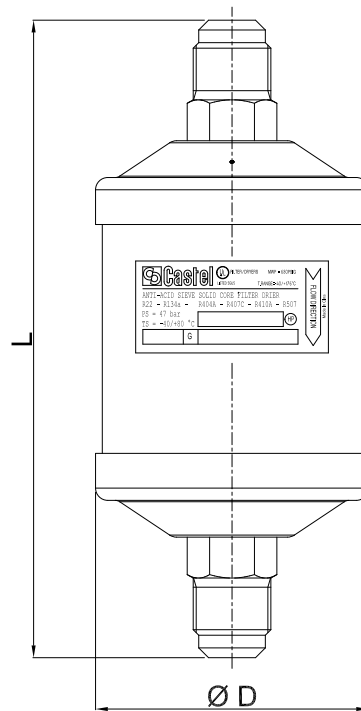
TABLE 18: Dimensions and weights of hermetic filters

Catalogue Number		Connections			Dimensions [mm]		Weight [g]
		SAE Flare	ODS		Ø D	L	
			Ø [in.]	Ø [mm]			
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
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

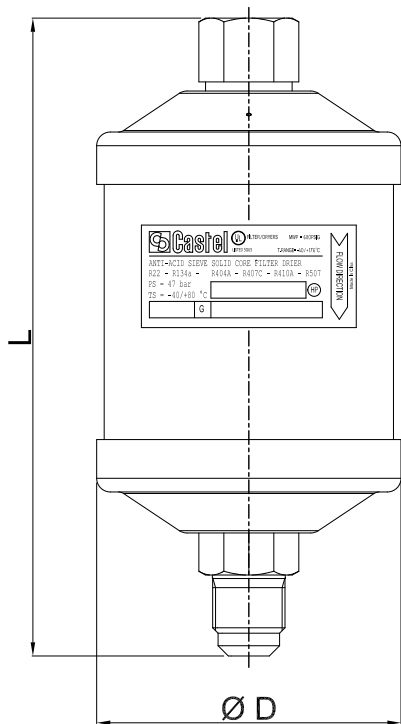


Solid core dehydrator

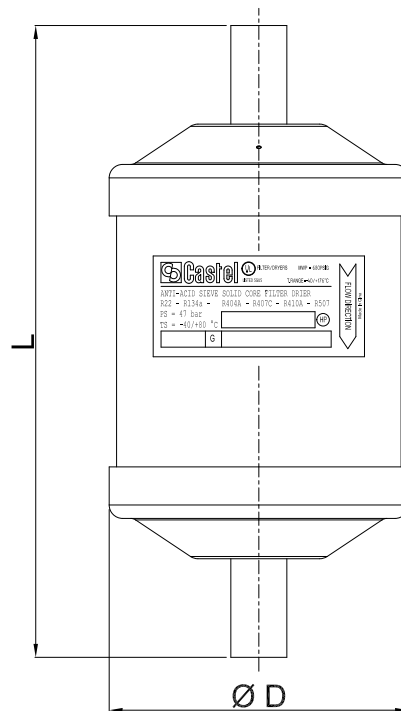
- 1 - Spring
- 2 - Bock
- 3 - Felt
- 4 - Stainless steel mesh



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

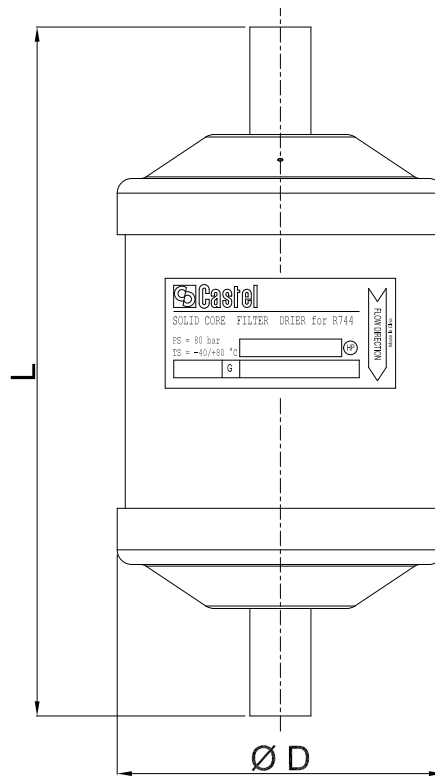
Catalogue Number	International Reference	Block Filtering Surface [cm ²]	Nominal Volume [cm ³]	Connections		PS [bar]	TS [°C]		TA [°C]		Risk Category according to PED Recast																																																																																
				ODS			min.	max.	min.	max.																																																																																	
				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
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)



Solder connection

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 D	L	
	Ø [in.]	Ø [mm]			
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

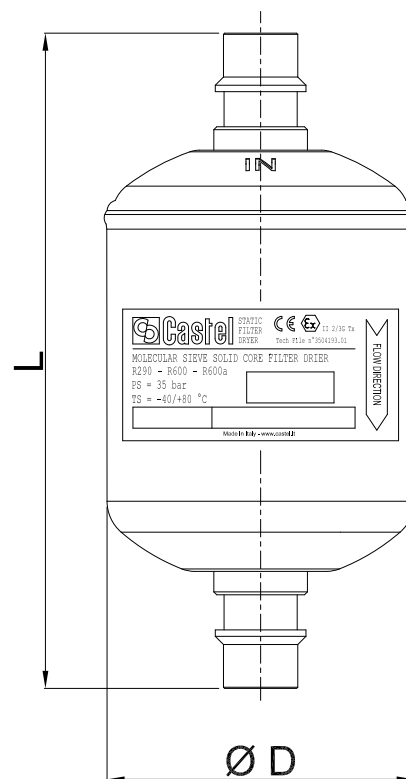
The filters with an “EX” suffix (4303EX, 4305EX, 4308EX, 4316EX, 4330EX and 4375EX), illustrated in this chapter, have been developed by Castel for all those refrigeration applications that use the following HC refrigeration fluids: R290, R600, and R600a, belonging to Group 1, as defined in Article 13, 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						
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"	–	24					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 D	L		
		Ø [in.]	Ø [mm]				
4303EX/2S	-	1/4"	-	52	94	220	
4305EX/3S	-	3/8"	-		112		
4305EX/M10S	-	-	10		139	345	
4308EX/3S	-	3/8"	-				
4308EX/M10S	-	-	10				
4308EX/M12S	-	-	12				
4308EX/4S	-	1/2"	-		146	380	
4316EX/3S	-	3/8"	-		73	151	620
4316EX/M10S	-	-	10	158			630
4316EX/M12S	-	-	12			158	640
4316EX/4S	-	1/2"	-				166
4316EX/5S	-	5/8"	16			237	
4330EX/4S	-	1/2"	-				245
4330EX/5S	-	5/8"	16			250	
4330EX/7S	-	7/8"	-	250			
4330EX/9S	-	1.1/8"	-		91	398	
4375EX/7S	-	7/8"	-	398		3050	
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 [cm ²]	Nominal Volume [cm ³]	Connections					PS [bar]	TS [°C]		TA [°C]		Risk Category according to PED Recast
SAE Flare	ODS				ODS			ODM			min.	max.	min.	max.	
					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	155	250	1/2"	–									
–	4108/4S	084S			–	1/2"	–	5/8"	16						
4116/3	–	163			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

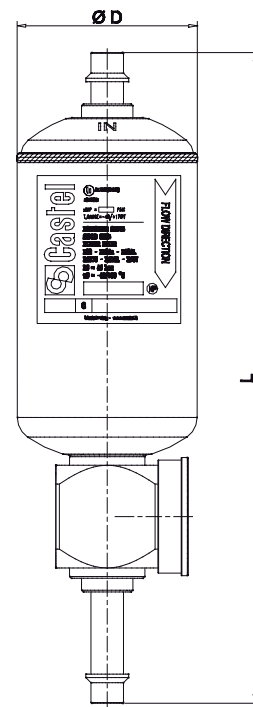
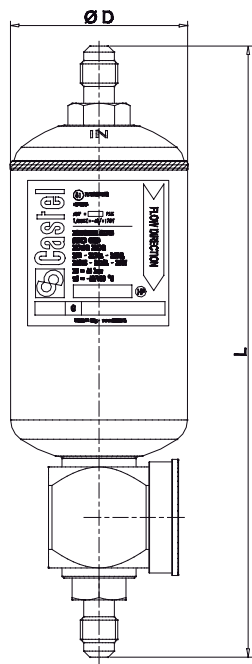
Catalogue Number	Water Capacity at + 52 °C (1) [g H ₂ O]					Dehydratable Charge at + 52 °C [kg refrigerant]				
	R134a	R22	R404A R507	R407C	R410A	R134a	R22	R404A R507	R407C	R410A
4105/2	6,7	5,7	7,3	5,1	5,6	7,2	6,1	7,8	5,5	6,0
4105/2S										
4105/3										
4105/3S										
4108/2	11,1	9,3	12,2	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 D	L	
		Ø [in.]	Ø [mm]			
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		198	580
4108/4	1/2"	-	-		200	540
4108/4S	-	1/2"	-		202	795
4116/3	3/8"	-	-		204	835
4116/3S	-	3/8"	-		212	850
4116/M10S	-	-	10	210	880	
4116/M12S	-	-	12	212	850	
4116/4	1/2"	-	-	219	940	
4116/4S	-	1/2"	-	221	870	
4116/5	5/8"	-	-	233	1400	
4116/5S	-	5/8"	16	238	1380	
4132/6	3/4"	-	-	238	1400	
4132/6S	-	3/4"	-			
4132/7S	-	7/8"	-			



CHAPTER 7

HERMETIC FILTER DRIERS WITH MOISTURE INDICATOR

FOR REFRIGERATION PLANTS THAT USE THE R744 REFRIGERANT



“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.

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.

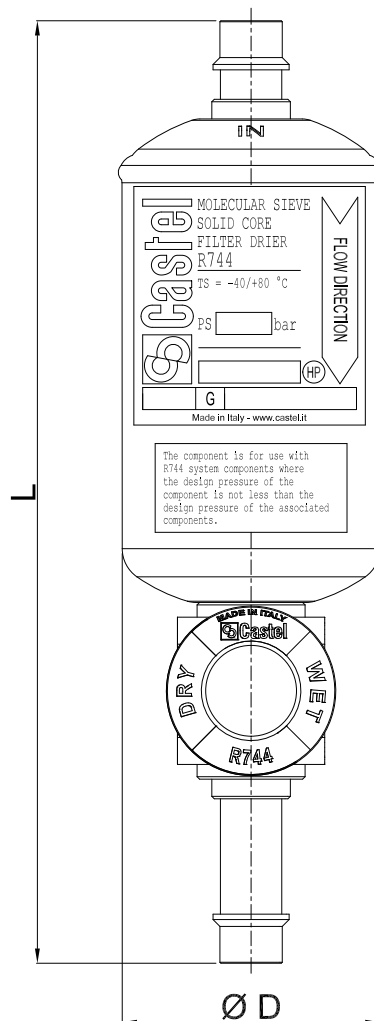
CONSTRUCTION

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



4108E
4116E

TABLE 31: General characteristics of hermetic filter driers with sight glass 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		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			1/2"	–	5/8"	16						
4116E/M12S	–	155	250	–	12	–	14	52	-40	+80	-20	+50	Art. 4.3
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	
4108E/M12S	–	12		200	
4108E/4S	1/2"	–		212	
4116E/M12S	–	12	73	212	850
4116E/4S	1/2"	–		221	
4116E/5S	5/8"	16		221	

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 [cm ²]	Nominal Volume [cm ³]	Connections	PS [bar]	TS [°C]		TA [°C]		Risk Category according to PED Recast
						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 [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]						
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	274	500	7/8"	-						
DB330/5S	305S			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
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
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

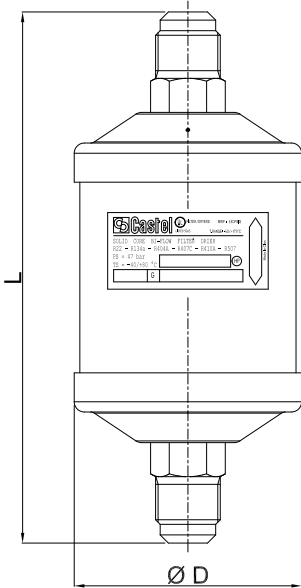
Catalogue Number	Water Capacity at + 52 °C (1) [g H ₂ O]					Dehydratable Charge at + 52 °C [kg refrigerant]				
	R134a	R22	R404A R507	R407C	R410A	R134a	R22	R404A R507	R407C	R410A
DB305/2	5,5	4,7	6,1	4,2	4,6	5,9	5,1	6,6	4,5	4,9
DB305/2S										
DB308/3	9,8	8,3	10,8	7,5	8,2	10,5	8,9	11,6	8,1	8,8
DB308/3S										
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:

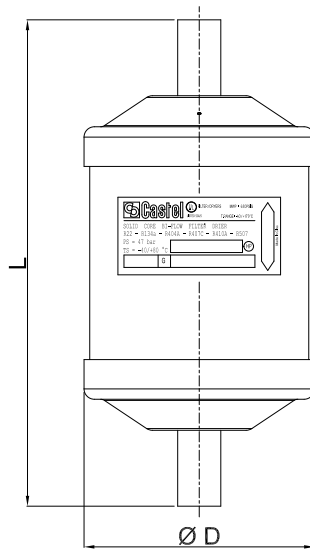
- Liquid temperatures: 24 °C and 52 °C
- Equilibrium point dryness, EPD: 60 ppm for R22
- Equilibrium point dryness, EPD: 50 ppm for R134a , R404A , R407C , R410A e R507

TABLE 38: Dimensions and weights of bi-flow filters

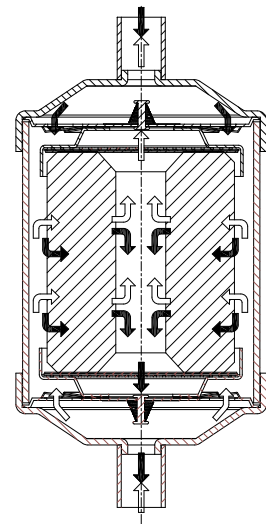
Catalogue Number	Connections		Dimensions [mm]		Weight [g]	
	SAE Flare	ODS		Ø D		L
		Ø [in.]	Ø [mm]			
DB305/2	1/4"	–	–	64	121	
DB305/2S	–	1/4"	–		113	
DB308/3	3/8"	–	–	64	152	
DB308/3S	–	3/8"	–		138	
DB308/4	1/2"	–	–		157	
DB308/4S	–	1/2"	–		138	
DB316/3	3/8"	–	–	64	171	
DB316/3S	–	3/8"	–		157	
DB316/4	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 [cm ²]	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]	[cm ³]	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	21,3	45 (1)	- 40	+ 80	- 20	+ 50	I
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							
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

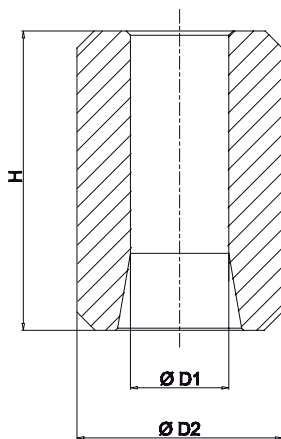
Catalogue Number	Nominal Volume		Water Capacity at + 24 °C (1) [g H ₂ O]					Dehydratable Charge at + 24 °C [kg refrigerant]				
	[cu.in]	[cm ³]	R134a	R22	R404A R507	R407C	R410A	R134a	R22	R404A R507	R407C	R410A
4490/A 4490/B	48	800	82	75	84	67	73	88	81	90	72	79
4490/AA 4490/AB			70	64	71	57	62	75	69	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

Continued

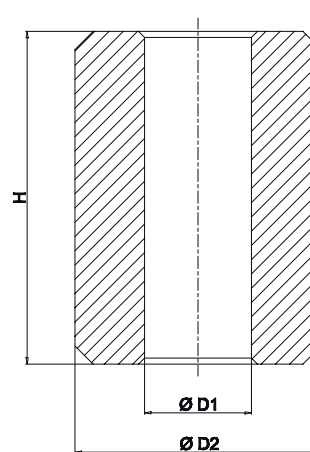
TABLE 42: Water capacity and dehydratable charge of one solid core

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									3800
4411/M28 (A-B)	–	28			150	237		95	3850		
4411/9 (A-B)	1.1/8"										
4411/11 (A-B)	1.3/8"	35			155	242		100	3900		
4411/13 (A-B)	1.5/8"	–									
4411/M42 (A-B)	–	42			167	254		112	3990		
4411/17 (A-B)	2.1/8"	54			158	245		103	4130		
4411/21 (A-B)	2.5/8"	–									
4412/7 (A-B)	7/8"	22									
4412/M28 (A-B)	–	28			292	379	95	5050			
4412/9 (A-B)	1.1/8"	–									
4412/11 (A-B)	1.3/8"	35			297	384	100	5150			
4412/M42 (A-B)	–	42			309	396	112	5270			
4412/17 (A-B)	2.1/8"	54			300	387	103	5400			
4413/7 (A-B)	7/8"	22									
4413/9 (A-B)	1.1/8"	–									
4413/11 (A-B)	1.3/8"	35			433	520	95	6350			
4413/13 (A-B)	1.5/8"	–									
4413/M42 (A-B)	–	42			438	525	100	6480			
4414/11 (A-B)	1.3/8"	35	450	537	112	6520					
4414/13 (A-B)	1.5/8"	–									
4414/M42 (A-B)	–	42	580	667	100	7780					
4414/17 (A-B)	2.1/8"	54	592	679	112	7960					
			583	670	103	7900					

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	4050		
4411/11AF	1.3/8"	35	42,4			167	254		112	4190		
4411/13AF	1.5/8"	–	48,3			158	245		103	4150		
4411/M42AF	–	42	48,3			152	239		95	4350		
4411/17AF	2.1/8"	54	60,3			292	379		95	5280		
4411/21AF	2.5/8"	–	76,1			297	384		100	5320		
4412/7AF	7/8"	22	26,9			309	396	112	5380			
4412/9AF	1.1/8"	–	33,7			300	387	103	5400			
4412/11AF	1.3/8"	35	42,4			433	520	95	6400			
4412/M42AF	–	42	48,3			438	525	100	6600			
4412/17AF	2.1/8"	54	60,3			450	537	112	6770			
4413/7AF	7/8"	22	26,9			580	667	100	7700			
4413/9AF	1.1/8"	–	33,7			592	679	112	7900			
4413/11AF	1.3/8"	35	42,4			583	670	103	8000			
4413/13AF	1.5/8"	–	48,3			518	641	600	142	18450		
4413/M42AF	–	42	48,3			538	661	600	162	17370		
4414/11AF	1.3/8"	35	42,4			163	200	705	829	760	172	18720
4414/13AF	1.5/8"	–	48,3									21600
4414/M42AF	–	42	48,3	24300								
4414/17AF	2.1/8"	54	60,3	715	839			760	172	24300		
4423/17A	2.1/8"	54	60,3									
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									

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]	[cm ³]	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

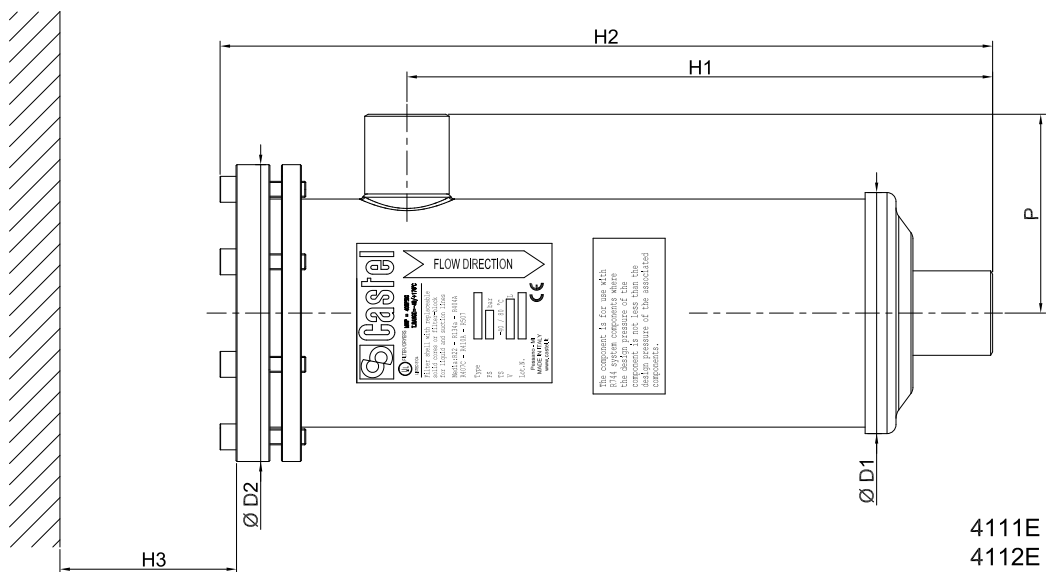
TABLE 47: General characteristics, dimensions and weights of solid cores for R744

Catalogue Number	Batch characteristic	Filtering Surface [cm ²]	Nominal Volume		Dimensions [mm]			Weight [g]
			[cu.in]	[cm ³]	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		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		324	396	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

CHAPTER 11

MECHANICAL FILTERS WITH REPLACEABLE FILTERING BLOCK

CERTIFIED BY UNDERWRITERS LABORATORIES INC.

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, 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.

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

OPERATION

Good filtering of the refrigerant on the low-pressure side of the system is an absolute guarantee of protection for the compressor. System cleanliness is ensured by micro filtering cores, which filter out every kind of impurities derived from manufacture and assembly of the refrigerating system.

CONSTRUCTION

Filters in series 4411: these are built with an aluminium cover, stainless steel 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)

Sold only in the configuration of codes with a “C” suffix, equipped with 1/4” NPT threaded cover for mounting access fitting with valve core kit G9150/R05 included in the supply.

Filters in series 4421: 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 a “C” suffix, equipped with 1/4” NPT threaded cover for mounting access fitting with valve core kit G9150/R05 included in the supply.

Cartridge 4495 and 4496: characterized by a large filter surface, these consist of metal mesh fabric with a controlled porosity filter sieve insert, which can retain solid particles to 20 microns. At both ends, soft felt gaskets ensure perfect seal with the plastic cups.

APPROVALS

Filters in series 4411 and 4421 have been approved by the American certification authority Underwriters Laboratories Inc. Filters in series 4411 and 4421 are certified **UL Listed** for the USA with file SA7054, in compliance with American standard UL 207.

TABLE 49: General characteristics of mechanical block filters

Catalogue Number		Number of Cores	Filtering block		Connections			PS [bar]	TS [°C]		TA [°C]		Risk Category according to PED Recast
Copper connections	Steel connections		Cat. Number	Filtering Surface [cm ²]	ODS		W (2)		min.	max.	min.	max.	
					Ø [in.]	Ø [mm]	Ø [mm]						
4411/5C	4411/57CF	1	4495/C	820	5/8"	16	21,3	- 40	+ 80	- 20	+ 50	I	
4411/7C	4411/7CF				7/8"	22	26,9						
4411/9C	4411/9CF				1.1/8"	-	33,7						
4411/11C	4411/11CF				1.3/8"	35	42,4						
4411/13C	4411/13CF				1.5/8"	-	48,3						
4411/M42C	4411/M42CF				-	42	48,3						
4411/17C	4411/17CF				2.1/8"	54	60,3						
4411/21C	4411/21CF				2.5/8"	-	76,1						
-	4411/25CF				3.1/8"	80	88,9						
	4421/21C				4496/C	1850	2.5/8"						67
	4421/25C	3.1/8"	80	88,9									
	4421/34C	4.1/4"	108	114,3									

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

(2) : only for shells with steel connections

TABLE 50: Refrigerant flow capacity of filtering block (4495/C - 4496/C) [kW]

Refrigerant	Evaporating Temperature [°C]	Pressure drop [bar]	Catalogue Number													Copper connections
			4411/5C	4411/7C	4411/9C	4411/11C	4411/13C	4411/M42C	4411/17C	4411/21C						
			4411/5CF	4411/7CF	4411/9CF	4411/11CF	4411/13CF	4411/M42CF	4411/17CF	4411/21CF	4411/25CF	4421/21C	4421/25C	4421/34C	Steel connections	
R134a	4,4	0,14	9,9	22,8	40,6	54,2	61,6	61,6	83,3	83,3	83,3	155,5	202,1	202,1		
	-6,7	0,10	6,6	15,2	26,7	35,7	41,1	41,1	54,8	54,8	54,8	98,6	128,2	128,2		
	-18	0,07	4,3	9,8	16,9	22,6	26,5	26,5	34,7	34,7	34,7	60,2	78,2	78,2		
	-29	0,03	2,2	4,8	8,1	10,9	13,0	13,0	16,7	16,7	16,7	27,0	35,1	35,1		
R22	4,4	0,21	15,5	36,1	65,1	87,0	97,3	97,3	133,5	133,5	133,5	259,1	336,9	336,9		
	-6,7	0,14	10,4	24,1	42,9	57,3	65,0	65,0	88,0	88,0	88,0	164,4	213,7	213,7		
	-18	0,10	7,1	16,3	28,6	38,2	44,1	44,1	58,7	58,7	58,7	105,9	137,6	137,6		
	-29	0,07	4,7	10,8	18,6	24,9	29,1	29,1	38,2	38,2	38,2	66,2	86,1	86,1		
	-40	0,03	2,4	5,4	9,1	12,2	14,7	14,7	18,8	18,8	18,8	18,8	24,4	24,4		
R404A	4,4	0,21	13,8	32,3	58,9	78,7	87,2	87,2	120,8	120,8	120,8	239,6	311,5	311,5		
	-6,7	0,14	9,1	21,1	37,8	50,4	56,8	56,8	77,4	77,4	77,4	147,9	192,2	192,2		
	-18	0,10	6,1	14,1	25,0	33,4	38,1	38,1	51,3	51,3	51,3	94,6	123,0	123,0		
	-29	0,07	3,9	9,0	15,7	20,9	24,3	24,3	32,2	32,2	32,2	57,1	74,2	74,2		
	-40	0,03	1,9	4,4	7,4	9,9	11,8	11,8	15,2	15,2	15,2	15,2	19,7	19,7		
R407C	4,4	0,21	14,7	34,2	61,6	82,2	92,1	92,1	126,3	126,3	126,3	244,3	317,6	317,6		
	-6,7	0,14	9,7	22,3	39,6	52,9	60,2	60,2	81,2	81,2	81,2	151,0	196,3	196,3		
	-18	0,10	6,4	14,7	25,7	34,3	39,7	39,7	52,7	52,7	52,7	94,4	122,7	122,7		
	-29	0,07	4,1	9,4	16,2	21,7	25,4	25,4	33,3	33,3	33,3	57,2	74,4	74,4		
	-40	0,03	2,1	4,6	7,7	10,3	12,5	12,5	15,9	15,9	15,9	15,9	20,6	20,6		
R410A	4,4	0,21	18,7	43,8	79,5	106,2	118,0	118,0	163,1	163,1	163,1	322,1	418,7	418,7		
	-6,7	0,14	12,7	29,4	52,6	70,2	79,2	79,2	107,8	107,8	107,8	204,9	266,4	266,4		
	-18	0,10	8,6	19,9	35,2	47,0	53,7	53,7	72,1	72,1	72,1	132,2	171,9	171,9		
	-29	0,07	5,8	13,2	23,0	30,7	35,6	35,6	47,1	47,1	47,1	83,1	108,0	108,0		
	-40	0,03	3,0	6,7	11,3	15,1	18,0	18,0	23,2	23,2	23,2	23,2	30,2	30,2		
R507	4,4	0,21	13,2	30,9	56,2	75,1	83,3	83,3	115,3	115,3	115,3	228,3	296,8	296,8		
	-6,7	0,14	8,7	20,2	36,2	48,3	54,5	54,5	74,2	74,2	74,2	141,5	184,0	184,0		
	-18	0,10	5,8	13,3	23,6	31,5	36,0	36,0	48,4	48,4	48,4	89,0	115,7	115,7		
	-29	0,07	3,8	8,6	14,9	20,0	23,2	23,2	30,6	30,6	30,6	54,3	70,6	70,6		
	-40	0,03	1,9	4,2	7,1	9,5	11,4	11,4	14,7	14,7	14,7	14,7	19,0	19,0		
R442A	4,4	0,21	15,6	36,3	65,5	87,5	97,8	97,8	134,3	134,3	134,3	260,9	339,1	339,1		
	-6,7	0,14	10,3	23,8	42,4	56,6	64,2	64,2	86,9	86,9	86,9	162,3	211,0	211,0		
	-18	0,10	6,9	15,8	27,7	36,9	42,6	42,6	56,7	56,7	56,7	102,0	132,7	132,7		
	-29	0,07	4,5	10,2	17,6	23,5	27,5	27,5	36,0	36,0	36,0	62,3	81,0	81,0		
	-40	0,03	2,2	5,0	8,4	11,3	13,5	13,5	17,3	17,3	17,3	17,3	22,5	22,5		
R448A	4,4	0,21	14,6	34,1	61,6	82,3	92,0	92,0	126,4	126,4	126,4	245,8	319,5	319,5		
	-6,7	0,14	9,7	22,3	39,7	53,0	60,2	60,2	81,5	81,5	81,5	152,4	198,1	198,1		
	-18	0,10	6,4	14,8	25,9	34,6	39,9	39,9	53,1	53,1	53,1	95,8	124,5	124,5		
	-29	0,07	4,2	9,5	16,4	22,0	25,7	25,7	33,7	33,7	33,7	58,4	75,9	75,9		
	-40	0,03	2,1	4,7	7,8	10,5	12,6	12,6	16,1	16,1	16,1	16,1	20,9	20,9		

Standard rating conditions according to AHRI Standard 730-2013

Condensing temperature	100 °F	(37,8 °C)	Temperature leaving evaporator	50 °F	(9,9 °C)
Liquid temperature	90 °F	(32,3 °C)	Evaporator superheating	10 °R	(5,5 °K)
Subcooling	10 °R	(5,5 °K)	Temperature entering filter	65 °F	(18,3 °C)
			Suction superheating	15 °R	(8,4 °K)
Evaporating temperature	40 °F	(4,4 °C)	Discharge temperature	150 °F	(65,5 °C)

Continued

TABLE 50: Refrigerant flow capacity of filtering block (4495/C - 4496/C) [kW]

Refrigerant	Evaporating Temperature [°C]	Pressure drop [bar]	Catalogue Number													Copper connections
			4411/5C	4411/7C	4411/9C	4411/11C	4411/13C	4411/M42C	4411/17C	4411/21C						
			4411/5CF	4411/7CF	4411/9CF	4411/11CF	4411/13CF	4411/M42CF	4411/17CF	4411/21CF	4411/25CF	4421/21C	4421/25C	4421/34C	Steel connections	
R449A	4,4	0,21	14,5	33,8	61,2	81,7	91,3	91,3	125,4	125,4	125,4	244,2	317,4	317,4		
	-6,7	0,14	9,6	22,2	39,4	52,7	59,8	59,8	80,9	80,9	80,9	151,4	196,8	196,8		
	-18	0,10	6,4	14,6	25,7	34,3	39,5	39,5	52,7	52,7	52,7	95,0	123,5	123,5		
	-29	0,07	4,1	9,4	16,3	21,8	25,5	25,5	33,4	33,4	33,4	58,0	75,4	75,4		
	-40	0,03	2,1	4,6	7,8	10,4	12,5	12,5	16,0	16,0	16,0	16,0	20,8	20,8		
R450A	4,4	0,21	10,9	25,3	45,3	60,4	68,2	68,2	92,8	92,8	92,8	176,1	228,9	228,9		
	-6,7	0,14	7,0	16,2	28,5	38,0	43,6	43,6	58,3	58,3	58,3	106,4	138,3	138,3		
	-18	0,10	4,6	10,4	18,1	24,1	28,1	28,1	37,1	37,1	37,1	65,1	84,6	84,6		
	-29	0,07	2,9	6,5	11,1	14,8	17,6	17,6	22,8	22,8	22,8	38,4	49,9	49,9		
	-40	0,03	1,4	3,1	5,2	6,9	8,4	8,4	10,6	10,6	10,6	10,6	13,7	13,7		
R452A	4,4	0,21	12,8	29,9	54,4	72,6	80,7	80,7	111,5	111,5	111,5	220,0	286,0	286,0		
	-6,7	0,14	8,4	19,4	34,8	46,5	52,4	52,4	71,4	71,4	71,4	135,5	176,1	176,1		
	-18	0,10	5,5	12,8	22,5	30,1	34,5	34,5	46,2	46,2	46,2	84,6	110,0	110,0		
	-29	0,07	3,6	8,2	14,2	18,9	22,0	22,0	29,1	29,1	29,1	51,2	66,6	66,6		
	-40	0,03	1,8	4,0	6,7	9,0	10,7	10,7	13,8	13,8	13,8	13,8	17,9	17,9		
R1234ze	4,4	0,21	10,0	23,2	41,5	55,4	62,7	62,7	85,1	85,1	85,1	160,5	208,6	208,6		
	-6,7	0,14	6,4	14,8	25,9	34,6	39,8	39,8	53,2	53,2	53,2	96,4	125,3	125,3		
	-18	0,10	4,1	9,5	16,4	21,8	25,5	25,5	33,5	33,5	33,5	58,5	76,0	76,0		
	-29	0,07	2,6	5,9	10,0	13,3	15,8	15,8	20,4	20,4	20,4	34,2	44,5	44,5		
	-40	0,03	1,2	2,8	4,6	6,1	7,5	7,5	9,4	9,4	9,4	9,4	12,2	12,2		

Standard rating conditions according to AHRI Standard 730-2013

Condensing temperature	100 °F	(37,8 °C)	Temperature leaving evaporator	50 °F	(9,9 °C)
Liquid temperature	90 °F	(32,3 °C)	Evaporator superheating	10 °R	(5,5 °K)
Subcooling	10 °R	(5,5 °K)	Temperature entering filter	65 °F	(18,3 °C)
			Suction superheating	15 °R	(8,4 °K)
Evaporating temperature	40 °F	(4,4 °C)	Discharge temperature	150 °F	(65,5 °C)

Correction factor x condensing temperature ≠ T rif. 37,8 °C

Condensing temperature	20 °C	25 °C	30 °C	35 °C	40 °C	45 °C	50 °C	55 °C	60 °C
Correction factor	0,84	0,87	0,92	0,97	1,02	1,07	1,13	1,19	1,25

TABLE 51: 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]							
4411/5C	5/8"	16	121	149	150	237	185	95	3780
4411/7C	7/8"	22							3810
4411/9C	1.1/8"	–							3850
4411/11C	1.3/8"	35			155	242		100	3950
4411/13C	1.5/8"	–			167	254		112	4000
4411/M42C	–	42			158	245		103	4140
4411/17C	2.1/8"	54			182	269		127	4500
4411/21C	2.5/8"	–							

TABLE 52: 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]							
4411/5CF	5/8"	16	21,3	121	149	150	237	185	95	3810
4411/7CF	7/8"	22	26,9							3860
4411/9CF	1.1/8"	–	33,7							3920
4411/11CF	1.3/8"	35	42,4			155	242		100	4050
4411/13CF	1.5/8"	–	48,3			167	254		112	4190
4411/M42CF	–	42	48,3			158	245		103	4150
4411/17CF	2.1/8"	54	60,3			152	239		95	4350
4411/21CF	2.5/8"	–	76,1			172	259		103	4540
4411/25CF	3.1/8"	80	88,9							
4421/21C	2.5/8"	67	76,1	163	200	187	308	200	142	12450
4421/25C	3.1/8"	80	88,9			205	328		162	13100
4421/34C	4.1/4"	108	114,3			215	338		172	13100

TABLE 53: General Characteristic, dimensions and weights of mechanical block

Catalogue Number	Filtering Surface		Dimensions [mm]			Weight [g]
	[sq.in]	[cm ²]	Ø D ₁	Ø D ₂	H	
4495/C	127	820	60	87	138	480
4496/C	287	1850	80	113	168	750

CHAPTER 12

HERMETIC STRAINERS

FOR REFRIGERATION PLANTS THAT USE HCFC, HFC OR HFO REFRIGERANTS



Point (b) of Directive 2014/68/EU, with reference to EC Regulation No. 1272/2008.

The filters in series 45 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 completely manufactured in steel, with SAE FLARE copper-plated steel threaded connections. The product range also includes versions with copper plated solder connections, offering the possibility to solder the copper pipe inside the connections (ODS).

Inside the filters there is a screen basket, with large filter surface, made of austenitic stainless steel AISI 304. The mesh filters in series 45 are not inspectionable and therefore cannot be cleaned.

APPLICATIONS

The filters in series 45 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)

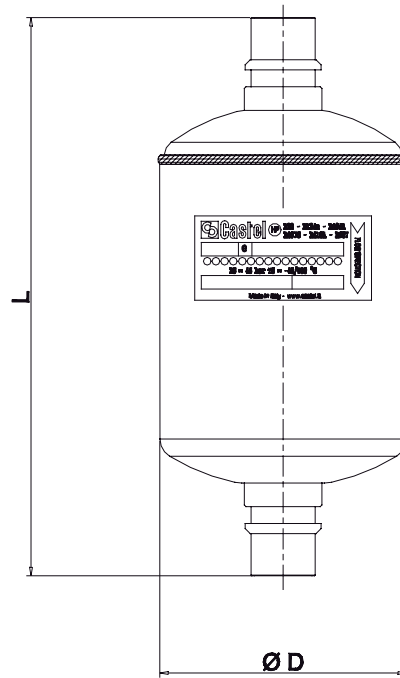
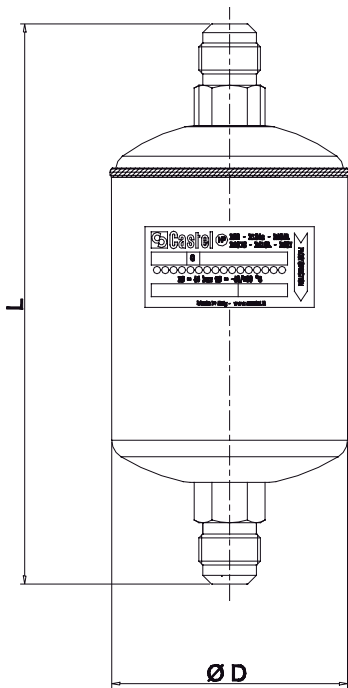
belonging to Group 2, as defined in Article 13, Chapter 1,

TABLE 54: General characteristics of strainers

Catalogue Number	Filtering Surface [cm ²]	Useful Passage Surface [%]	Mesh Opening [mm]	Connections				Kv Factor [m ³ /h]	PS [bar]	TS [°C]		TA [°C]		Risk Category according to PED Recast		
				SAE Flare	ODS		ODM			min.	max.	min.	max.			
					∅ [in.]	∅ [mm]	∅ [in.]								∅ [mm]	
4510/3	58	36,6	0,166	3/8"	–	–	–	–	45	–40	+80	–20	+50	Art. 4.3		
4510/4	142			1/2"	–	–	–	–								
4520/2	58			–	1/4"	–	3/8"	–							2,4	
4520/3				–	3/8"	–	1/2"	–								
4520/M10				–	–	10	–	12								3,4
4520/M12				–	–	12	–	14								
4520/4				–	1/2"	–	5/8"	16								
4520/5				–	5/8"	16	3/4"	–								8,0
4520/M18				142	–	–	18	–								

TABLE 55: Dimensions and weights of strainers

Catalogue Number	Dimensions [mm]		Weight [g]
	Ø D	L	
4510/3	52	110	195
4510/4	76	174	515
4520/2	52	109	195
4520/3			
4520/M10			
4520/M12			
4520/4			
4520/5	76	170	495



CHAPTER 13 ■ HERMETIC STRAINERS

FOR REFRIGERATION PLANTS THAT USE THE R744 REFRIGERANT



APPLICATIONS

Filters 4520E 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

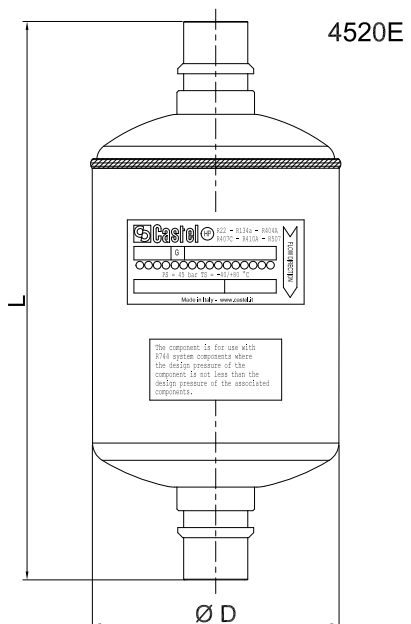
The filter body is made completely from steel with copper plated solder connections, offering the possibility to solder the copper pipe inside the connections (ODS). Inside the filters there is a screen basket, with large filter surface, made of austenitic stainless steel AISI 304. The mesh filters in series 4520E are not inspectionable and therefore cannot be cleaned.

TABLE 56: General characteristics of strainers for R744

Catalogue Number	Filtering Surface [cm ²]	Useful Passage Surface [%]	Mesh Opening [mm]	Connections				Kv Factor [m ³ /h]	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]							
4520E/M10	58	36,6	0,166	–	10	–	12	2,4	60	– 40	+80	– 20	+50	Art. 4.3
4520E/M12				–	12	–	14	3,4						
4520E/5				5/8"	16	3/4"	–							

TABLE 57: Dimensions and weights of strainers for R744

Catalogue Number	Dimensions [mm]		Weight [g]
	Ø D	L	
4520E/M10	52	109	195
4520E/M12		113	205
4520E/5		126	245



CHAPTER 14 ■ INSPECTIONABLE STRAINERS

FOR REFRIGERATION PLANTS THAT USE THE R744 REFRIGERANT



APPLICATIONS

Castel has developed the inspectional strainers illustrated in this chapter for all applications that use transcritical R744 refrigeration fluid belonging to Group 2, defined in Article 13, Chapter 1, Point (b) of Directive 2014/68/EU, with reference to EC Regulation No. 1272/2008.

The inspectionable mesh filters for plants that operate using refrigerant fluid R744 are the following:

- Filters in series 4727E with PS = 120 bar, equipped with reinforced copper connections (K65).
- Filters in series 4728E with PS = 140 bar, equipped with stainless steel connections.

CAUTION!: the filters in this chapter cannot be used with other refrigerant fluids.

CONSTRUCTION

The main parts of the inspectionable mesh filters are made with the following materials:

- Hot forged brass EN 12420 – CW 617N for body and cover
- Austenitic stainless steel AISI 304 for the mesh filter
- Unsintered PTFE for the sealing gasket of the mesh filter
- Ethylene propylene rubber (EPDM) for outlet seal gaskets
- Copper pipe EN 12735-1 – CuFe2P (K65) for welded connections in series 4274E
- Stainless steel pipe AISI 304 for welded connections in series 4278E

INSTALLATION

The inspectional strainers can be installed on all branches of a refrigeration plant where it is necessary to avoid the

accumulation of dirt and sludge inside a highly delicate component (for example the backpressure valve). Table 57 shows the following operational characteristics of an inspectionable mesh filter:

- PS
- TS
- Kv factor

Copper connections: The brazing of filters with solder connections should be carried out with care, using a low melting point filler material (min.5 Ag). It is not necessary to disassemble the filters. However, avoid direct contact between the torch flame and the body, which could be damaged and compromise the proper functioning of the filter.

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

The allowed operating positions are the following:

- With horizontal piping axis, removable cover facing downward.
- With vertical piping axis, arrow and removable cover facing downward.

NOTE: Filters 4727E and 4728E cannot be installed with the cover facing upward, in order to avoid that the dirt accumulated return into the plant when the filter is inspected/cleaned.

TABLE 58: General characteristics of inspectable strainer for R744

Catalogue Number	Filtering Surface [cm ²]	Useful Passage Surface [%]	Mesh Opening [mm]	Connections		Kv Factor [m ³ /h]	PS [bar]	TS [°C]		TA [°C]		Risk Category according to PED Recast
				ODS				min.	max.	min.	max.	
				Ø [in.]	Ø [mm]							
4727E/3	13	26	0,1	3/8"	–	2,0	120	– 40	+140	– 40	+50	Art. 4.3
4727E/4				1/2"	–	2,5						
4727E/5				5/8"	16	3,0						
4727E/6	18		0,2	3/4"	–	6,0						
4727E/7				7/8"	22	6,0						
4727E/9				1.1/8"	–	6,0						
4727E/11	31			1.3/8"	35	7,0						
4728E/M10	13	26	0,1	–	10	2,0	140	– 40	+140	– 40	+50	Art. 4.3
4728E/M12				–	12	2,5						
4728E/M16				–	16	3,0						
4728E/M18	18		0,2	–	18	6,0						
4728E/M22				–	22	6,0						
4728E/M28				–	28	6,0						
4728E/M35	31			–	33,4	7,0						

TABLE 59: Refrigerant flow capacity of inspectable strainer for R744[kW]

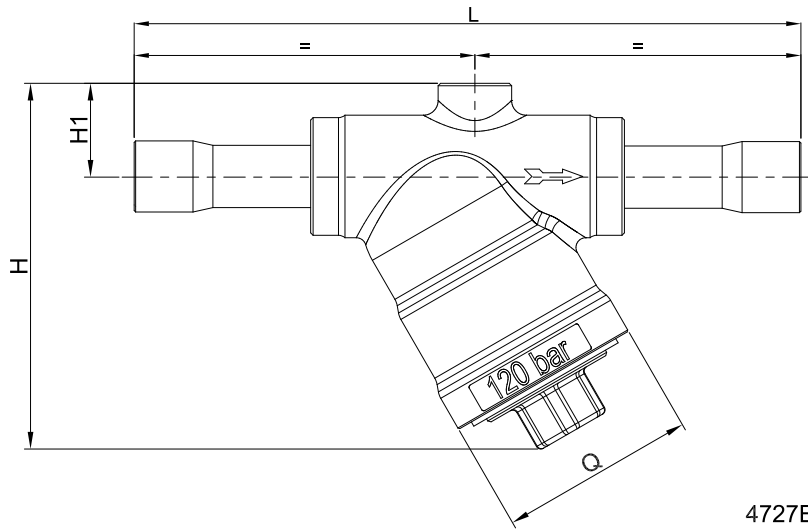
Catalogue Number	Transcritical system		
	Gas-cooling line	Suction line	Hot gas line
4727E/3	54,5	9,3	37,4
4727E/4	65,7	11,6	46,7
4727E/5	78,8	13,9	56,1
4727E/6	157,6	27,8	112,1
4727E/7	157,6	27,8	112,1
4727E/9	157,6	27,8	112,1
4727E/11	183,9	32,4	130,8
4728E/M10	52,5	9,3	37,4
4728E/M12	65,7	11,6	46,7
4728E/M16	78,8	13,9	56,1
4728E/M18	157,6	27,8	112,1
4728E/M22	157,6	27,8	112,1
4728E/M28	157,6	27,8	112,1
4728E/M35	183,9	32,4	130,8

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

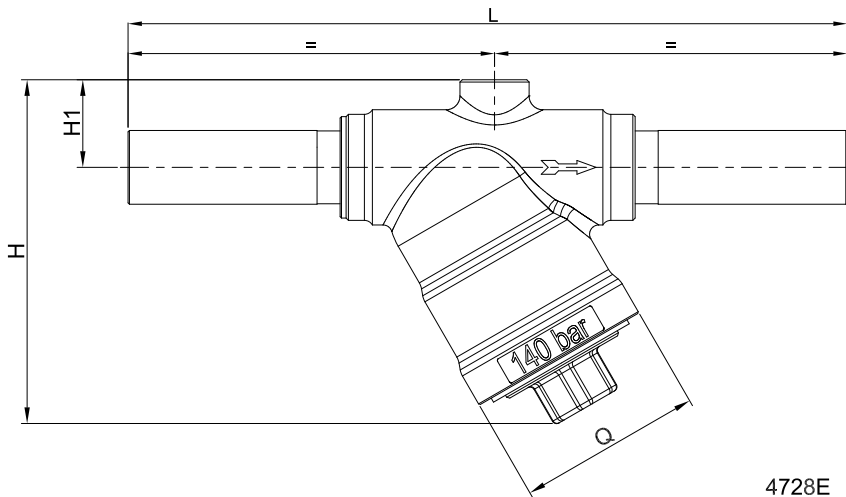
Gas-cooler outlet temperature	95 °F (35 °C)	Suction line temperature	32 °F (0 °C)
Evaporating temperature	14 °F (- 10 °C)	Suction line superheating	9 °R (5 °K)
Evaporator outlet temperature	23 °F (- 5 °C)	Discharge temperature	212 °F (110 °C)
Evaporator superheating	9 °R (5 °K)		

TABLE 60: Dimensions and weights of inspectable strainerst for R744

Catalogue Number	Dimensions [mm]				Weight [g]
	H	H ₁	L	Q	
4727E/3	74	19	140	40	505
4727E/4			136		505
4727E/5			148		520
4727E/6	96	24	164	50	1005
4727E/7			170		1024
4727E/9			201		1084
4727E/11	115	29	208	56	1480
4728E/M10	74	19	146	40	500
4728E/M12			142		500
4728E/M16			156		510
4728E/M18	96	24	164	50	1005
4728E/M22			170		1020
4728E/M28			201		1080
4728E/M35	115	29	208	56	1510



4727E



4728E

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