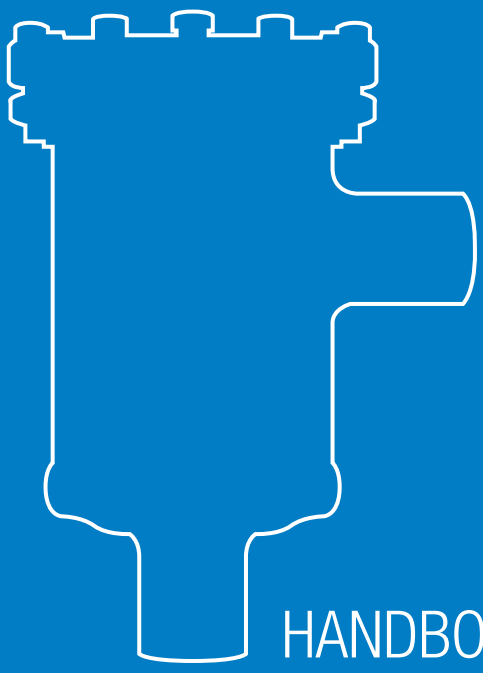

HANDBOOK

REFRIGERATING SYSTEM PROTECTORS

Castel®
Italian technology

Ed. 2017

CHAPTER 7
HERMETIC FILTER DRIERS WITH MOISTURE INDICATOR
FOR REFRIGERATION PLANTS THAT USE THE R744 REFRIGERANT

APPLICATIONS
Filters 4108E and 4116E illustrated in this chapter have been developed by Castel for all the applications that use the sub-critical R744 refrigeration fluid belonging to Group 2, defined in Article 13, Chapter 1, Point (b) of Directive 2014/68/EU, with reference to EC Regulation No. 1272/2008.

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

OPERATION
The moisture/liquid indicators consist of a sensitive ring element that changes colour, from green to yellow, according to the percent moisture in the system.
The moisture content values that correspond to the "green" colour can be considered admissible for the proper operation of the system. When the sensitive element starts to yellow, "Chartreuse green", the threshold value has been reached and operating conditions could become difficult. When the sensitive element becomes "yellow", it's time to replace the filter dryer.
If the charge and operating conditions of the plant are normal, the refrigerant fluid appears perfectly liquid underneath the "lens" of the indicator. The presence of bubbles indicates that the refrigerant fluid is partially evaporating along the liquid line.

4108E
4116E

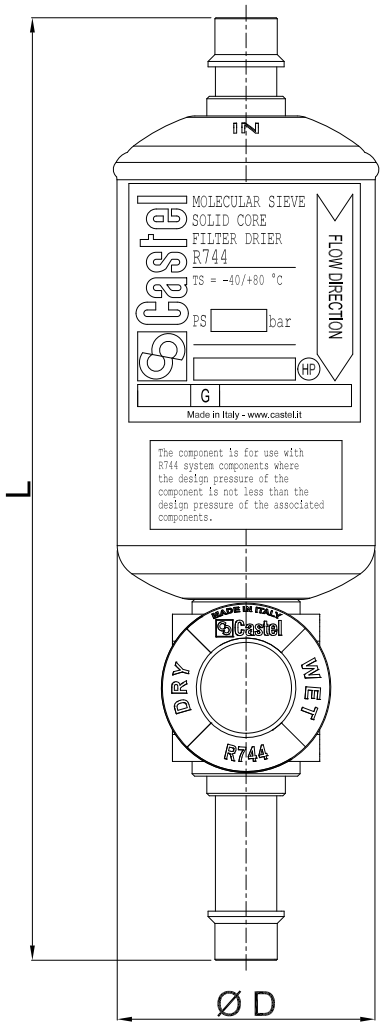

TABLE 31: General characteristics of hermetic filter driers with sight glass for R744												
Catalogue Number	International Reference	Block Filtering Surface [cm²]	Nominal Volume [cm³]	Connections				PS [bar]	TS [°C]		TA [°C]		Risk Category according to PED Recast
				ODS		ODM			min.	max.	min.	max.	
				Ø [in.]	Ø [mm]	Ø [in.]	Ø [mm]						
4108E/3S	083S	103	130	3/8"	–	1/2"	–	52	-40	+80	-20	+50	Art. 4.3
4108E/M10S	–			–	10	–	12						
4108E/M12S	–			–	12	–	14						
4108E/4S	084S			1/2"	–	5/8"	16						
4116E/M12S	–	155	250	–	12	–	14						
4116E/4S	164S			1/2"	–	5/8"	16						
4116E/5S	165S			5/8"	16	3/4"	–						

TABLE 32: Refrigerant flow capacity of filters with sight glass		
Catalogue Number	Pressure drop 0,07 bar (1) [kW]	Pressure drop 0,14 bar (1) [kW]
4108E/3S	14,3	18,5
4108E/M10S	14,3	18,5
4108E/M12S	18,1	23,5
4108E/4S	18,1	23,5
4116E/M12S	21,3	28,7
4116E/4S	21,3	28,7
4116E/5S	28,1	37,9

(1) : Maximum values of the refrigerant flow capacity at which the drier can be used when fluid dehydration is not the a major problem, provided that the original moisture is limited before the installation of the drier.
The maximum refrigerant flow capacities are referred to a total pressure drop of 0,07 bar / 0,14 bar , inlet and outlet connections included, (according to ARI STANDARD 710-2009 - with liquid temperature at -5 °C and evaporating temperature at - 40 °C)

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

TABLE 33: Dimensions and weights of filters with sight glass for R744					
Catalogue Number	Connections		Dimensions [mm]		Weight [g]
	ODS				
	Ø [in.]	Ø [mm]	Ø D	L	
4108E/3S	3/8"	–	52	192	530
4108E/M10S	–	10			
4108E/M12S	–	12		200	540
4108E/4S	1/2"	–		200	540
4116E/M12S	–	12	73	212	850
4116E/4S	1/2"	–		212	850
4116E/5S	5/8"	16		221	870

INSTALLATION

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

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

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