

HANDBOOK

REFRIGERATING SYSTEM PROTECTORS

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 **Castel**[®]
Italian technology

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

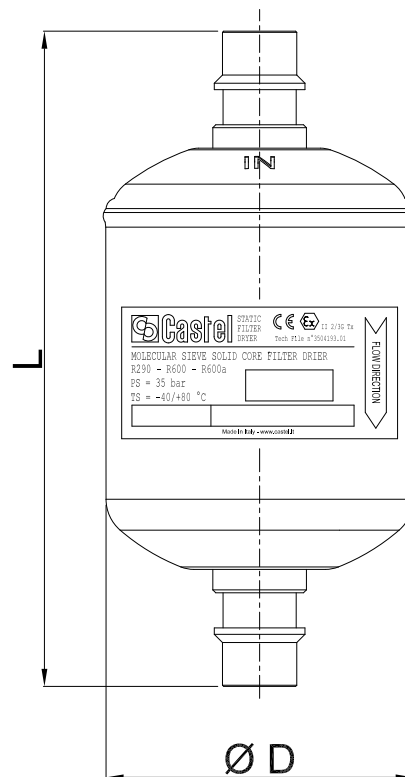
The filters with an “EX” suffix (4303EX, 4305EX, 4308EX, 4316EX, 4330EX and 4375EX), illustrated in this chapter, have been developed by Castel for all those refrigeration applications that use the following HC refrigeration fluids: R290, R600, and R600a, belonging to Group 1, as defined in Article 13, 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	1280	
4330EX/4S	-	1/2"	-					245
4330EX/5S	-	5/8"	16			250	1420	
4330EX/7S	-	7/8"	-	250				
4330EX/9S	-	1.1/8"	-		398	2900		
4375EX/7S	-	7/8"	-				398	3050
4375EX/9S	-	1.1/8"	-					

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