

HANDBOOK

# REFRIGERATING SYSTEM PROTECTORS

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Ed. 2017

 **Castel**<sup>®</sup>  
Italian technology

# 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 <sup>2</sup> ] | Nominal Volume [cm <sup>3</sup> ] | 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<br>(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 <sup>2</sup> ] | Nominal Volume [cm <sup>3</sup> ] | 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<br>(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 <sub>2</sub> 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**

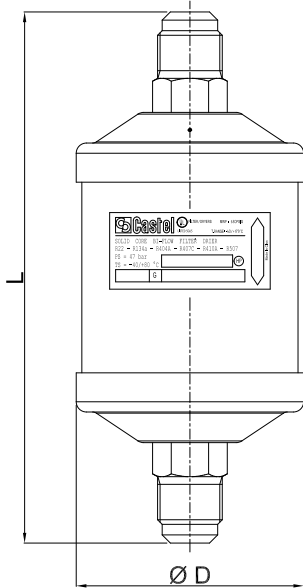
| Catalogue Number | Water Capacity at + 52 °C (1) [g H <sub>2</sub> O] |      |            |       |       | Dehydratable Charge at + 52 °C [kg refrigerant] |      |            |       |       |
|------------------|--|------|------------|-------|-------|---|------|------------|-------|-------|
|                  | 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:

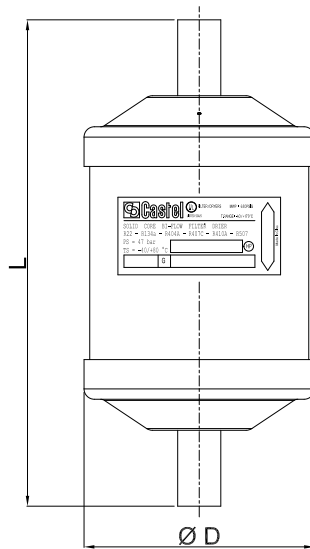
- Liquid temperatures: 24 °C and 52 °C
- Equilibrium point dryness, EPD: 60 ppm for R22
- Equilibrium point dryness, EPD: 50 ppm for R134a , R404A , R407C , R410A e R507

**TABLE 38: Dimensions and weights of bi-flow filters**

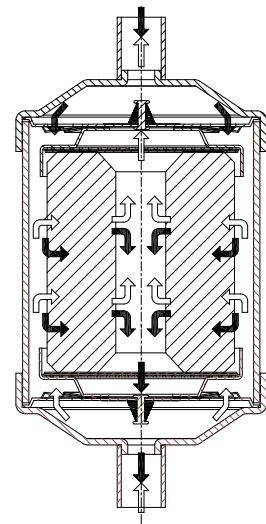
| Catalogue Number | Connections |         | Dimensions [mm] |     | Weight [g] |     |
|------------------|-------------|---------|-----------------|-----|------------|-----|
|                  | SAE Flare   | ODS     |                 | Ø D |            | L   |
|                  |             | Ø [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



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