

**Dry All**<sup>®</sup>

Full Range of HVAC&R Line Products



File No. SA33181



**LIQUID LINE FILTER DRIER DCHSG SERIES  
(WITH SIGHT GLASS)**

## Introduction

The DRY ALL DCHSG type filter drier plays a crucial role in refrigeration and air conditioning systems by removing moisture and contaminants from the refrigerant, making it an essential component. The DCHSG filter drier is designed to ensure even distribution of the refrigerant flow, efficient moisture removal and filtration with minimum pressure drop. The choice of using a DCHSG type filter drier in a refrigeration and air conditioning system depends on the specific requirements and characteristics of the system. Systems which are operating under varied conditions, and different contamination levels may benefit from DCHSG types of filter driers.

### Filter Drier Core:

The DCHSG filter drier core is constructed from a composite of selected desiccant materials, comprising molecular sieves and activated alumina. These desiccants are bonded together with a low-content binder, then molded and baked at a specific temperature to create a robust and porous core structure. One of its notable characteristics is its resilience to attrition, it can withstand wear and tear caused by the flow of refrigerant and other system factors more effectively.

The Solid Core in DCHSG series filter drier is consisting of 80% molecular sieve and 20% activated alumina. These materials are engineered to excel in applications requiring high flow rates, efficient moisture removal, and effective acid absorption.

**80% Molecular Sieve:** Molecular sieves are crystalline materials with uniform pores that selectively adsorb water molecules. In this context, the 80% molecular sieve component is tailored for moisture removal by targeting water molecules.

**20% Activated Alumina:** Activated alumina, with its extensive porosity, is adept at adsorbing various substances, including acids and moisture. The 20% activated alumina content enhances the material's capacity to absorb acids.

## Features

### DCHSG Type

- Compatible with all types of CFC, HCFC, HFO, HFC, and HC refrigerants.
- Compatible with mineral oil and POE lubricants.
- 80% molecular sieve and 20% activated alumina provide high drying capacity & acid removal.
- Greater than 99% filtration efficiency.
- High water adsorption and acid absorption capacity.
- Filter drier can be installed horizontally or vertically, provided flow direction is considered.
- Available with flare, solder, zoom lock, O-Ring Flare, and Rotolock connection of various sizes.
- Internal and external components i.e., springs, perforated disc, and dish end, are cleaned, degreased, iron phosphate coated, and passivated for rust prevention.

### Applications

The market is coming up daily with new refrigerants to tackle modern-day problems such as low GWP, ODP, Energy Efficiency, etc.

- Dry ALL filter driers are compatible with almost all the refrigerants available in the market, can install the Dry All filter drier in any HFC, HCFC, HFO, or HC system.
- The High working pressure enables the Dry All filter drier ready for new Refrigerants like R32, R410, etc. Dry All filter driers can also be used with flammable refrigerants such as R600a, R600, R290, etc. For new refrigerants compatibility please consult to Dry All technical team.

### Drier with Sight glass - Inbuilt moisture indicator features:

The DRY ALL The DCHSG Liquid Line Filter Drier is a unique combination of filter drier with the convenience of a sight glass/moisture indicator in one compact, easy to install package.

### The DCHSG Filter Drier has following Features:

- The Filter Driers gives upto 20 micron of final filtration.
- The sight glass with indicator helps to detect the moisture present in the system.
- The indicator basically is a porous filter paper impregnated with a chemical salt that is sensitive to moisture.
- The salt changes color according to the moisture content (relative saturation) in the refrigerant.
- Pre-assembled combination of filter drier and sight glass reduces the amount of field brazing required, saving both time and reducing the potential for leaks.

### Working of Sight Glass

- A.** The color change in the indication paper on the sight glass indicate the following:
- Dark Green = Dry (Moisture free system/moisture at the lowest level), Light Green = Caution (Means that the moisture content is increasing and the technician must keep an eye on the status of the drier) Yellow = Wet (Time to change the drier immediately/moisture level in the system reach to extremities)
  - The difference in Indicator colors between the wet and dry condition can be easily distinguished by all technicians and at all times.
- B.** Apart the indication of bubbles in the sight-glass indicates:
- Pressure drops across the filter drier too high
  - No sub-cooling
  - Insufficient refrigerant in whole system

### Why Filter Driers are required in HVAC&R systems:

#### Moisture: A major problem in the system:

Moisture is a common concern in refrigeration systems and can have several detrimental effects on system performance and longevity. Following are detailed explanation of the problems & issues associated with moisture in refrigeration systems:

**Corrosion problem:** Moisture can lead to corrosion of metallic components within the refrigeration system. This includes the evaporator coils, condenser coils, and various piping and tubing. Corrosion weakens these components over time, potentially leading to refrigerant leaks and reduced system efficiency.

**Acid's formation:** When moisture is present in a refrigeration system, it can react with refrigerant and lubricating oil, leading to the formation of acids. These acids can be highly corrosive and further accelerate the deterioration of metal components. Acid formation is a significant concern, particularly in systems using chlorine-containing refrigerants, as it can lead to the breakdown of these refrigerants and the release of chlorine, which is harmful to the environment.

**Lubricant Degradation:** Moisture in the system can also cause the lubricating oil, often polyolester (POE) oil, to degrade. This degradation can produce organic acids, which contribute to the acidity of the system. Acidic lubricating oil can lead to increased corrosion and reduced compressor life.

**Reduced Efficiency:** Moisture can reduce the efficiency of the refrigeration system. When moisture mixes with the refrigerant, it can change the refrigerant's properties, including its boiling point. This alters the system's cooling capacity and efficiency, potentially leading to inadequate cooling or heating performance.

**Contaminants** - Metallic particle scale, sludges, wax-like substances and dirt are frequently found in refrigeration systems. All these contaminants can cause decrease in efficiency and sometimes even the failure of compressor, expansion valve, etc.

To mitigate these issues, it's crucial to maintain low moisture levels within the refrigeration system. This is typically achieved through installation of filter driers.

### **Important Functions of Filter drier in HVAC&R Systems**

Filter-driers are an essential component in refrigeration and air conditioning systems, and they serve several important functions:

**Moisture Removal:** One of the primary functions of a filter-drier is to remove moisture from the refrigerant and the system. Moisture is a common problem in these systems, as it can lead to the formation of acids and corrosion, as mentioned earlier. The filter-drier contains a desiccant material (a molecular sieve or activated alumina) that absorbs moisture as the refrigerant flows through it.

**Acid Removal:** Filter-driers can neutralize acids that may be present in the system. As mentioned earlier, acids can form due to moisture and lubricant degradation. The desiccant material in the filter-drier can react with and neutralize these acids, preventing them from causing corrosion and damage to system components.

**Particle Filtration:** Filter-driers act as filters, trapping and removing particles and debris that could clog or damage system components such as expansion valves and capillary tubes. This helps maintain the efficiency of the system and prevents blockages.

**Contaminant Removal:** In addition to moisture, filter-driers also help remove contaminants from the refrigerant. Contaminants can include dirt, debris, oil, and acids. These impurities can negatively impact the performance and efficiency of the system and may lead to compressor damage if not removed.

**Protection for the Compressor:** One of the critical components in a refrigeration or air conditioning system is the compressor. Filter-driers play a crucial role in protecting the compressor by removing contaminants, moisture, and acids from the refrigerant before it enters the compressor. This extends the life of the compressor and helps maintain system efficiency.

**System Performance:** By maintaining clean and dry refrigerant, filter-driers help ensure that the system operates at its designed capacity and efficiency. This is essential for achieving proper cooling or heating in refrigeration and air conditioning applications.

**Product Conformity/Testing:**

The DRY ALL ensures the filter drier functions by doing filtration efficiency test, acid removal test and water drying test in DRY ALL laboratory. The DCHSG type filter drier provides the filtration up to 20µ particle size with greater than 98% efficiency, absorb acids and moisture. Testing helps in ensuring that these components are functioning well.

**Standard Ratings**

Liquid-line filter driers shall be rated by their water capacity in drops and refrigerant flow capacity at 1.0 psi pressure drop. DRY ALL follow to technical standards for testing and rating to filter driers. The filter driers are tested for water capacity and flow capacity at DRY ALL research center as per standard ASHRAE 63.1 “Methods of Testing Liquid Line Refrigerant Driers, and rated for water and flow capacity as per AHRI 710 standards.

**Water Capacity**

The mass of water a drier will collect and hold in equilibrium with a specified refrigerant at a given temperature and a specified equilibrium dewpoint dryness. DRY ALL filter drier water holding capacity is expressed in drops of water. 20drops equals to 1grams.

$$\text{Drop of water} = \frac{\text{Kg of refrigerant (Initial PPM - Final PPM)}}{50}$$

All ratings are in accordance with ANSI/AHRI Standard 710-2009 Water Capacities are based on following standard rating conditions:

Water in refrigerant at EPD for:

Initial PPM: R134a: 1050, R404A, R507/ R407C: 1020, R32: 990, R404A, R410A/ R22: 1050.

Final PPM: R-134a/R-407C/R-410A/R-404A/R-507A is 50 PPM, R-22 is 60 PPM.

Initial PPM: R-32: 990 PPM, R134a, R410A, R22: 1050

Initial PPM: R404A, R507, R407C: 1020

Refrigerant Flow Capacity

The maximum flow of liquid refrigerant (in tons) that a drier will pass at a 1 psi/0.07 bar pressure drop is the refrigerant flow capacity. The “ton” ratings are based on 86°F/30°C liquid temperature and refrigerant flow rate per Ton of Refrigeration at 86°F Liquid & 5.0°F Saturated Vapor for:

R-134a is 3.1 lb/min/ton,

R-407C is 3.0 lb/min/ton,

R-410A is 2.8 lb/min/ton,

R-404A is 4.1 lb/min/ton,

R-507A is 4.2 lb/min/ton,

R-22 is 3.0 lb/min/ton.

### **Safety**

DRY ALL filter drier tested for burst pressure to comply with the safety DRY ALL manufacturing standard under AHRI Standard 710 meet the requirements of Underwriters' Laboratories, Inc., Standard 207 (UL), “Refrigerant Containing Components and Accessories, Nonelectrical.”

**LIQUID LINE FILTER DRIER DCHSG SERIES  
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Filter Drier with SAE connection & Sight Glass

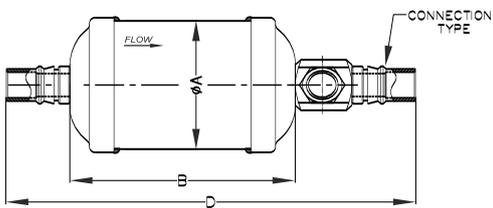


Filter Drier with ODF connection & Sight Glass

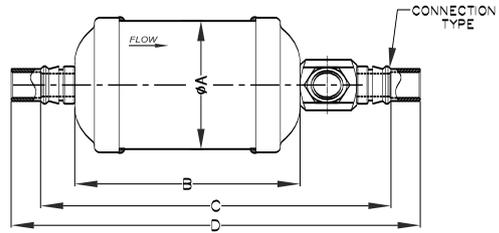


Internal View

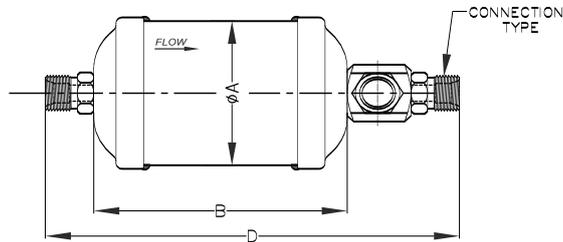
**DIMENSIONAL DATA**



DRAWING - 1



DRAWING - 2



DRAWING - 3

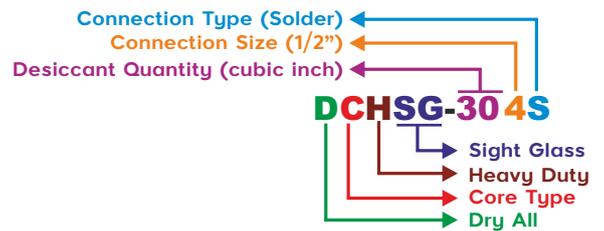
# LIQUID LINE FILTER DRIER DCHSG SERIES (WITH SIGHT GLASS)



## Available Models

Sr No.	Model	Connection Type	OUTER DIA ØA		BODY LENGTH B		STOPPER TO STOPPER LENGTH C		OVERALL LENGTH D		REFER DRAWING NO.
			mm	inch	mm	inch	mm	inch	mm	inch	
1	DCHSG-052F	1/4" SAE	Ø63.5	Ø2.5	78	3.07	--	--	162	6.38	DRAWING - 1
2	DCHSG-052S*	1/4" ODF					146	5.75	166	6.54	DRAWING - 2
3	DCHSG-053F	3/8" SAE					--	--	170	6.69	DRAWING - 1
4	DCHSG-053S*	3/8" ODF					146	5.75	166	6.54	DRAWING - 2
5	DCHSG-082F	1/4" SAE					99	3.90	--	--	183
6	DCHSG-082S*	1/4" ODF			167	6.57			187	7.36	DRAWING - 2
7	DCHSG-083F	3/8" SAE			--	--			191	7.52	DRAWING - 1
8	DCHSG-083S*	3/8" ODF			167	6.57			187	7.36	DRAWING - 2
9	DCHSG-084F	1/2" SAE			--	--			197	7.76	DRAWING - 1
10	DCHSG-084S*	1/2" ODF			167	6.57	193	7.60	DRAWING - 2		
11	DCHSG-163F	3/8" SAE			122	4.80	--	--	214	8.43	DRAWING - 1
12	DCHSG-163S*	3/8" ODF					190	7.48	210	8.27	DRAWING - 2
13	DCHSG-164F	1/2" SAE					--	--	220	8.66	DRAWING - 1
14	DCHSG-164S*	1/2" ODF					190	7.48	216	8.50	DRAWING - 2
15	DCHSG-164-ORN	1/2" O-Ring					--	--	205	8.07	DRAWING - 3
16	DCHSG-165F	5/8" SAE	--	--			228	8.98	DRAWING - 1		
17	DCHSG-165S*	5/8" ODF	190	7.48			220	8.66	DRAWING - 2		
18	DCHSG-303F	5/8" ODF	Ø76.2	Ø3			129	5.07	190	7.48	220
19	DCHSG-303F	3/8" SAE			--	--	282	11.10	DRAWING - 1		
20	DCHSG-303S*	3/8" ODF			258	10.16	278	10.94	DRAWING - 2		
21	DCHSG-304F	1/2" SAE			--	--	288	11.34	DRAWING - 1		
22	DCHSG-304S*	1/2" ODF			258	10.16	284	11.18	DRAWING - 2		
23	DCHSG-305F	5/8" SAE			--	--	296	11.65	DRAWING - 1		
24	DCHSG-305S*	5/8" ODF			258	10.16	288	11.34	DRAWING - 2		
25	DCHSG-306F	3/4" SAE			--	--	302	12.13	DRAWING - 1		
26	DCHSG-306S*	3/4" ODF			258	10.16	296	11.65	DRAWING - 2		
27	DCHSG-307S*	7/8" ODF			260	10.24	304	11.97	DRAWING - 2		
28	DCHSG-309S*	1-1/8" ODF			260	10.24	314	12.36	DRAWING - 2		
29	DCHSG-414F	1/2" SAE			Ø88.9	Ø4	196	7.80	--	--	296
30	DCHSG-414S*	1/2" ODF	266	10.47					292	11.50	DRAWING - 2
31	DCHSG-415F	5/8" SAE	--	--					304	11.97	DRAWING - 1
32	DCHSG-415S*	5/8" ODF	266	10.47					296	11.65	DRAWING - 2
33	DCHSG-417S*	7/8" ODF	268	10.55					312	12.28	DRAWING - 2
34	DCHSG-419S*	1-1/8" ODF	268	10.55					322	12.66	DRAWING - 2

- 1) Internal Assembly - Solid Core Type
- 2) Maximum Working Pressure - 45 bar ( 653 psig)
- 3) SAE, ORFS & 'O'Ring Type Connection are in Steel, Nickel Plated
- 4) ODF Type Connection is in Steel & Nickel Plated
- 5) \*Mark Connection Steel Plated



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Sr No.	Model	Connection Type	Flow Capacity Ton @ 1psi ΔP (for kw multiply Ton by 3.5 )				Water Capacity drops of water																													
			R-134a	R-22 & R-410A	R-407C	R-404A & R-507	R-134a		R-22		R-407C		R-410A		R-404A & R-507																					
							75°F	125°F	75°F	125°F	75°F	125°F	75°F	125°F	75°F	125°F																				
1	DCHSG - 052F	1/4" SAE	2	2.28	2.28	1.42	201	186	186	136	156	126	131	101	206	196																				
2	DCHSG - 052S	1/4" ODF																																		
3	DCHSG - 053F	3/8" SAE	5.14	5.42	5.42	4																														
4	DCHSG - 053S	3/8" ODF																																		
5	DCHSG - 082F	1/4" SAE	2	2.28	2.28	1.42	265	245	250	225	205	165	170	130	275	260																				
6	DCHSG - 082S	1/4" ODF																																		
7	DCHSG - 083F	3/8" SAE	5.42	6	6	4																														
8	DCHSG - 083S	3/8" ODF																																		
9	DCHSG - 084F	1/2" SAE	7.42	8.28	8.28	5.71																														
10	DCHSG - 084S	1/2" ODF																																		
11	DCHSG - 163F	3/8" SAE	6.2	6.8	6.8	4.57											396	366	271	336	306	246	256	196	406	286										
12	DCHSG - 163S	3/8" ODF																																		
13	DCHSG - 164F	1/2" SAE	8.5	9.4	9.4	6.2																														
14	DCHSG - 164S	1/2" ODF																																		
15	DCHSG - 164-ORN	13/16-16ORFS	12.2	13.4	13.4	8.57																														
16	DCHSG - 165F	5/8" SAE																																		
17	DCHSG - 165S	5/8" ODF																																		
18	DCHLDSGLL - 163R	11/16-16 ORFS																																		
19	DCHSG - 303F	3/8" SAE	6	6.57	6.57	4.28	490	463	360	342	400	364	350	314	672	364																				
20	DCHSG - 303S	3/8" ODF																																		
21	DCHSG - 304F	1/2" SAE	8.85	9.71	9.71	6.28																														
22	DCHSG - 304S	1/2" ODF																																		
23	DCHSG - 305F	5/8" SAE	12.85	14	14	9.42											877	812	822	752	687	552	567	432	907	857										
24	DCHSG - 305S	5/8" ODF																																		
25	DCHSG - 306F	3/4" SAE	17.71	19.42	19.42	12.85																														
26	DCHSG - 306S	3/4" ODF																																		
27	DCHSG - 307S*	7/8" ODF	17.71	19.42	19.42	12.85																														
28	DCHSG - 309S*	1-1/8" ODF																																		
29	DCHSG - 414F	1/2" SAE	9.14	10	10	6.57																					1216	1106	1146	1016	951	746	786	586	1266	1162
30	DCHSG - 414S	1/2" ODF																																		
31	DCHSG - 415F	5/8" SAE	15.14	16.57	16.57	10.57																														
32	DCHSG - 415S	5/8" ODF																																		
33	DCHSG-417S*	7/8" ODF	26	28.57	28.57	18.57																														
34	DCHSG-419*	1-1/8" ODF																																		

All ratings are in accordance with ANSI/AHRI Standard 710-2009

1. Water in refrigerant at EPD for :

R-134a/R-407C/R-410A/R-404A/R-507A is 50 ppm,

R-22 is 60 ppm.

2. Flow Capacities are based on following standard rating

Flow Rate per Ton of Refrigeration at 86°F Liquid & 5.0°F Saturated Vapor for :

R-134a is 3.1 lb/min/ton,

R-407C is 3.0 lb/min/ton,

R-410A is 2.8 lb/min/ton,

R-404A is 4.1 lb/min/ton,

R-507A is 4.2 lb/min/ton,

R-22 is 3.0 lb/min/ton.

### Selection Parameters

Select the appropriate filter drier based on refrigerants and oil compatibility. Then select the filter drier size for the required drying and flow capacity.

The filter drier drying capacity is rated in drops, determined by the drops of water to be absorbed by the filter drier.

$$\text{The drop of water} = \frac{(\text{Initial PPM of water} - \text{Final PPM of water}) \times \text{kg of refrigerant}}{50}$$

#### System input data:

- Refrigerant: R134a,
- Condensing temperature: 50°C,
- Weight of refrigerant: 12 Kg,
- Cooling capacity: 5 Ton,

$$\text{The drop of water} = \frac{(\text{Initial PPM of water} - \text{Final PPM of water}) \times \text{kg of refrigerant}}{50}$$

$$\text{The drop of water} = \frac{(1050 - 50) \times 12}{50}$$

#### • Drops of water = 240

Where,

- Moisture in the R134a refrigerant at the inlet of the filter drier according to ARI standard 710:86 is 1050 ppm.
- Moisture in the R134a refrigerant at the outlet of the filter drier according to ARI standard 710:86 is 50 ppm.

- For calculated water capacity, DCHSG 08 series is considered the exact model selection. For 5 Ton capacity, DCHSG – 084F or DCHSG – 084S model is to be selected as per connection.
- For required drying capacity or liquid capacity, one should always choose a slightly larger filter drier.

**Note:** Dry All reserves the right to alter its products without notice and will not accept any responsibility for possible errors in catalogues, brochures and other printed materials. Imitation / reproduction of information from this catalogue in part or whole cannot be done without prior approval in writing from our company.

Check Hologram for  
Genuine Product

**Dry All**  
Full Range of HVAC&R Line Products

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