

Dry All

Full Range of HVAC&R Line Products



Liquid Line Filter Driers

Introduction

A filter drier in refrigeration system is used to adsorb system contaminants which includes moisture, acids etc. and provide physical separation. The filtration has become more acute with the advent of HFC refrigerants and POE oils because of their high hygroscopic nature. The DMHSG Liquid Line Filter Driers are unique combination of filter drier with sight glass/moisture indicator in one compact unit. They provide all features of DMH series filter drier functionally. The DMHSG series All filter driers are similar to our DMH series compact bead type driers designed to protect the refrigerant system from liquid and solid contaminants. In addition, at the outlet of the filter drier a sight glass with a built-in moisture/liquid indicator gives a visual indication of the refrigerant flow. It gives both the moisture content and the state of refrigerant flow.

Liquid/moisture indicator is manufactured with glass lens directly sealed onto a metallic ring. The moisture/liquid indicators consist of a sensitive element as a ring which changes its color based on moisture content in the system refrigerant.

Usually, DMH type series filter driers are replaced when major component of the refrigeration system. (e.g., compressor replacement) or pressure drop across the filter drier is significant.

Sight Glass - Inbuilt Moisture Indicator Features:

The **DRY ALL** The DMHSG 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 DMHSG filter drier has following features:

- 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.

The color 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.

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.
- 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.

Problems in the systems:

Moisture

Water or moisture is always present in refrigeration systems, especially with the use of hygroscopic polyolester (POE) lubricants. Moisture is trapped through the air due to improper lubricating oil handling and system evacuation. This moisture may react with refrigerant and cause the formation of acids and corrosion of metallic parts. Also, the organic acid produced due to lubricant degradation is a significant additional source of acidity in the refrigeration systems. Since moisture levels must be kept to a low level to prevent corrosion and acid formation.

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, solenoid valve etc.

Acids

Refrigerants by themselves are very stable, even when heated to high temperature. However, under some conditions, reactions do occur which can result in the formation of hydrochloric and hydrofluoric acids. These acids are usually present as a gas in the system and are highly corrosive. So, to keep the system safe the filter drier has to perform the filtration and drying function.

Filter Drier Functions - The solution of HVAC&R system problems

The purpose of a filter drier in a refrigeration system is to remove the moisture and filter the undesirable contaminant to keep the refrigerant clean.

Moisture & Acids Removal

The **DRY ALL** DMHSG type filter drier consists of blends of adsorbent. The molecular sieve and activated alumina used as adsorbent to remove the moisture and acids. As per technical standards the chemical and mechanical properties of molecular sieve and activated alumina are being tested in **DRY ALL** laboratory. The highly activated molecular sieve and activated alumina hold the maximum moisture and absorb the acids. It ensures that the dry and clean refrigerant circulate through the system. The honeycomb structure of molecular sieves and activated alumina allow the free flow of refrigerant with minimal pressure drop.

Filtration

The important function of the filter drier is to filter the contaminants and act as safeguard to compressor, expansion valve and other critical parts of HVAC&R systems. The **DRY ALL** is manufacturing the highly efficient filter drier ensuring greater than 98% filtration efficiency. The series of glass wool provide the large surface area for contaminant filtration while the fabric media provide surface filtration. The DMHSG type filter drier provides the filtration up to 20 μ particle size with 98% efficiency.

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 The **DRY ALL** filter drier water holding capacity is expressed in drops of water. 20drops equals to 1grams.

$$\text{Drop of Water} = \frac{1 \text{ kg of refrigerant} \times (\text{Initial PPM} - \text{Final PPM})}{50}$$

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:

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 3.1lb/min/ton,

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

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

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

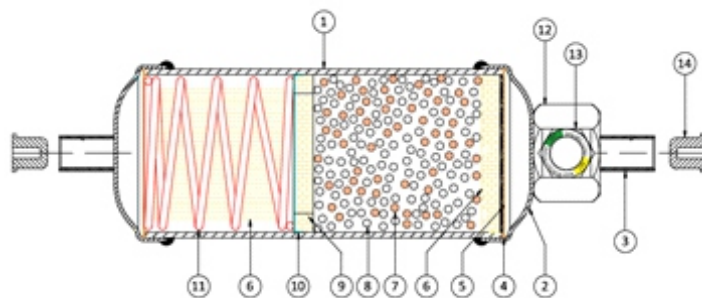
R-507A is 4.2 lb/min/ton,

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, "Refrigerant Containing Components and Accessories, Nonelectrical."

Filter-Drier Internal Structure



- | | |
|---------------------------------|--------------------------------------|
| 1. Shell | 8. Activated Alumina |
| 2. Dish | 9. Glass Wool (Ring Type) |
| 3. Inlet /Outlet Conn. | 10. Perforated emboss disk |
| 4. Perforated disk plain fabric | 11. Cylindrical Spring |
| 5. Non-Woven Fabric | 12. Slight glass connector |
| 6. Glass Wool | 13. Sight Glass with indicator paper |
| 7. Molecular Sieve | 14. Rubber Button. |

Features

DMHSG Type

- Compatible with all type of CFC, HCFC, and HFC, and HC refrigerant.
- Compatible with mineral oil, and POE lubricants.
- 70% molecular sieve and 30% activated alumina that provides high drying capacity.
- > than 98% filtration efficiency.
- High water adsorption and acid absorption capacity.
- Available with flare, solder, zoom lock, O-Ring Flare, Rotolock connection of various size.
- Internal and external components i.e., springs, perforated disc, dish end, tubes are cleaned, degreased, iron phosphate coated and passivized for rust prevention.

Shell

- Oven baked, corrosion resistant, epoxy powdered coated.
- Available in size 1.5 to 75 In³.
- Sustainable to all environmental and adverse condition.
- Shock resistance.

Filtration/Filter

- 20 µm filter provides high filtration and dirt retention with minimal pressure drop.

Specification

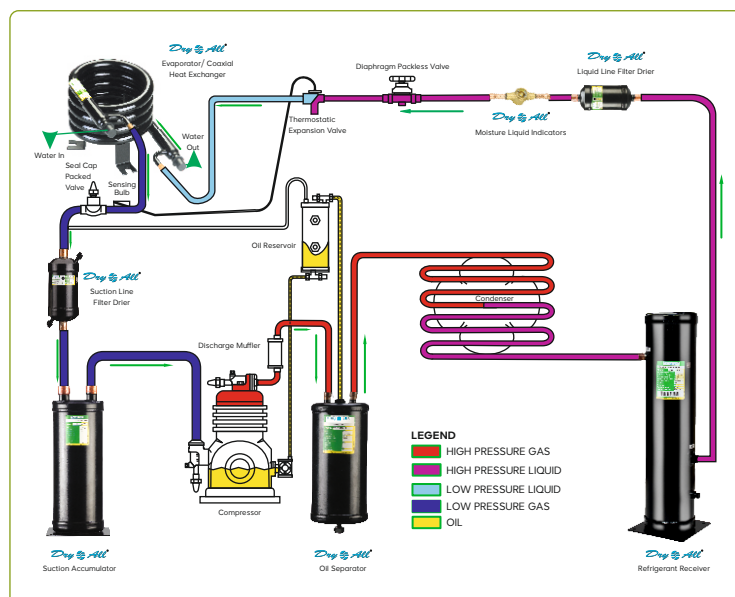
- Maximum working pressure of 45 bar i.e., 653psig.
- Sustainable temperature range -40° C to +70° C.
- Burst pressure-five times of MWP.
- SAE, ORFS & 'O'RING Type Connection are in Steel, Nickel Plated.

Applications

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

- DRY ALL filter driers are compatible with almost all the refrigerants available in the market. It can install the DRY ALL filter drier in any HFC, HCFC, HFO, HC system.
- The High working pressure enables the DRY ALL filter drier ready for new Refrigerants like R32, R410 and CO₂ etc. DRY ALL filter drier can also be used with flammable refrigerants such as R600a, R600, R290 etc.
- For new refrigerants compatibility please consult to DRY ALL technical team.

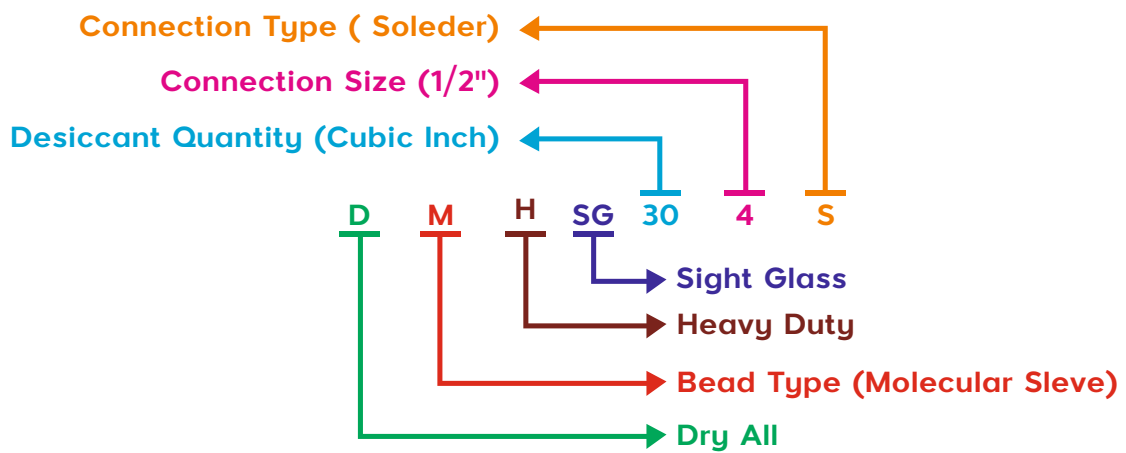
Fundamentals of Refrigeration Cycle



Certificate/Compliances

- UL listed File no. SA33181 [UL 207]
- RoHS Compliance [ROHS-3.0 2015/863/EU Directive]
- REACH COMPLIANCE [EC 1907/2006]
- CE Marking [Upto 7/8" ODF connection size CE marking is not required according to article 4, Paragraph 3 of PED 2014/68/EU].

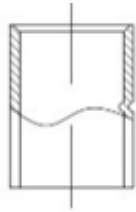
Nomenclature



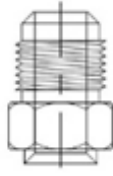
Nomenclature Table

Type	Nomenclature	
Brand	D	Dry All
Desiccant Types	M	Bead Type
	C	Core Type
Vessel Type	H	Heavy Duty
Connection Size (in ³)	2	1/4"
	2.5	5/16"
	3	3/8"
	4	1/2"
	5	5/8"
	6	3/4"
	7	7/8"
	9	1 1/8"
Desiccant Quantity (in ³)	1.5	1.5 in ³
	3	3 in ³
	5	5 in ³
	8	8 in ³
	16	16 in ³
	30	30 in ³
	41	41 in ³
	75	75 in ³
Connection Types	S	Solder connection
	F	Flare connection
	ORN	O" ring connection
	R	Rotolock (ORFS) Connection

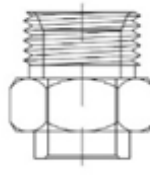
Filter-Drier Connections



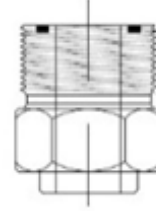
Solder



Flare



O' ring

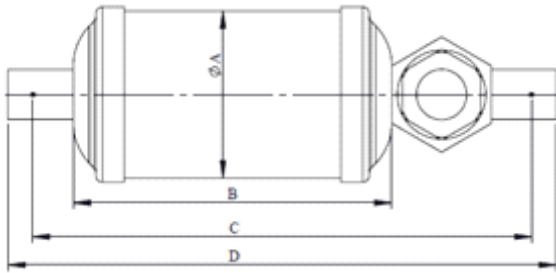


Rotolock

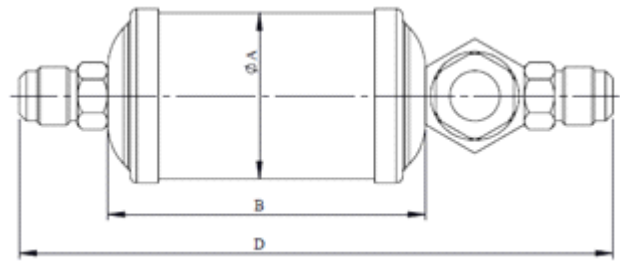


Zoom Lock

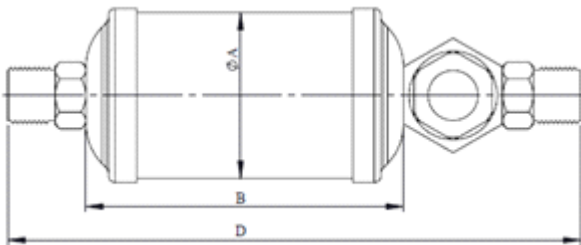
DIMENSIONAL DATA



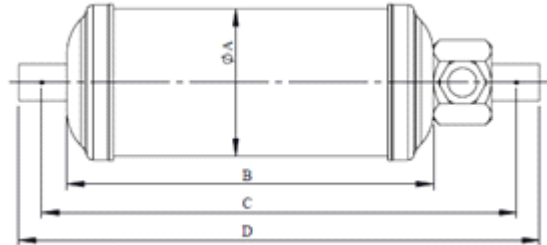
DRAWING 1



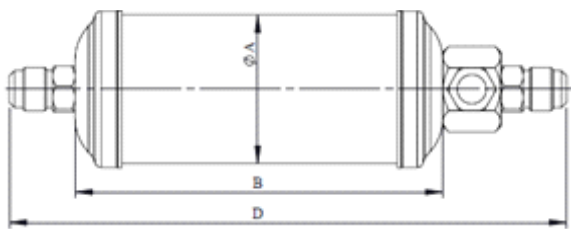
DRAWING 2



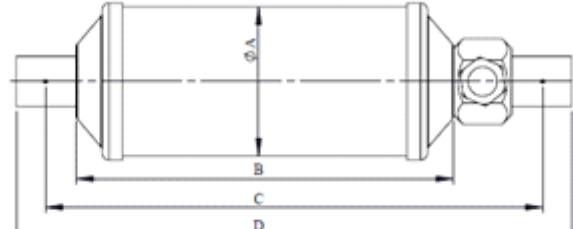
DRAWING 3



DRAWING 4



DRAWING 5



DRAWING 6

Dimensional Data (DMHSG Filter Drier)

Description	Connections Inlet / outlet	ØA		B		C		D		Drawing No.
		mm	Inch	mm	Inch	mm	Inch	mm	Inch	
DMHSG-052F	1/4" SAE	Ø63.5	Ø2.5	78	3.07	-	-	162	6.38	Drawing 2
DMHSG-052S	1/4" ODF	Ø63.5	Ø2.5	78	3.07	146	5.75	166	6.54	Drawing 1
DMHSG-053F	3/8" SAE	Ø63.5	Ø2.5	78	3.07	-	-	164	6.46	Drawing 2
DMHSG-053S	3/8" ODF	Ø63.5	Ø2.5	78	3.07	146	5.75	166	6.54	Drawing 1
DMHSG-082F	1/4" SAE	Ø63.5	Ø2.5	99	3.90	-	-	183	7.20	Drawing 2
DMHSG-082S	1/4" ODF	Ø63.5	Ø2.5	99	3.90	167	6.57	187	7.36	Drawing 1
DMHSG-083F	3/8" SAE	Ø63.5	Ø2.5	99	3.90	-	-	185	7.28	Drawing 2
DMHSG-083S	3/8" ODF	Ø63.5	Ø2.5	99	3.90	167	6.57	187	7.36	Drawing 1
DMHSG-084F	1/2" SAE	Ø63.5	Ø2.5	99	3.90	-	-	197	7.76	Drawing 2
DMHSG-084S	1/2" ODF	Ø63.5	Ø2.5	99	3.90	167	6.57	187	7.36	Drawing 1
DMHSG-163F	3/8" SAE	Ø63.5	Ø2.5	122	4.80	-	-	208	8.19	Drawing 2
DMHSG-163S	3/8" ODF	Ø63.5	Ø2.5	122	4.80	190	7.48	210	8.27	Drawing 1
DMHSG-164F	1/2" SAE	Ø63.5	Ø2.5	122	4.80	-	-	220	8.66	Drawing 2
DMHSG-164S	1/2" ODF	Ø63.5	Ø2.5	122	4.80	190	7.48	210	8.27	Drawing 1
DMHSG-164-ORN	1/2" O-Ring	Ø63.5	Ø2.5	122	4.80	-	-	220	8.66	Drawing 3
DMHSG-165F	5/8" SAE	Ø63.5	Ø2.5	122	4.80	-	-	228	8.98	Drawing 2
DMHSG-165S	5/8" ODF	Ø63.5	Ø2.5	122	4.80	190	7.48	210	8.27	Drawing 1
DMHSG-303F	3/8" SAE	Ø76.2	Ø3	190	7.48	-	-	268	10.55	Drawing 5
DMHSG-303S	3/8" ODF	Ø76.2	Ø3	190	7.48	250	9.84	270	10.63	Drawing 4
DMHSG-304F	1/2" SAE	Ø76.2	Ø3	190	7.48	-	-	280	11.02	Drawing 5
DMHSG-304S	1/2" ODF	Ø76.2	Ø3	190	7.48	250	9.84	270	10.63	Drawing 4
DMHSG-305F	5/8" SAE	Ø76.2	Ø3	190	7.48	-	-	288	11.34	Drawing 5
DMHSG-305S	5/8" ODF	Ø76.2	Ø3	190	7.48	250	9.84	270	10.63	Drawing 4
DMHSG-306F	3/4" SAE	Ø76.2	Ø3	190	7.48	-	-	294	11.57	Drawing 5
DMHSG-306S	3/4" ODF	Ø76.2	Ø3	190	7.48	250	9.84	270	10.63	Drawing 4
DMHSG-307S	7/8" ODF	Ø76.2	Ø3	196	7.72	258	10.16	288	11.34	Drawing 6
DMHSG-309S	1-1/8" ODF	Ø76.2	Ø3	196	7.72	258	10.16	288	11.34	Drawing 6
DMHSG-414F	1/2" SAE	Ø88.9	Ø3.5	196	7.72	-	-	286	11.26	Drawing 5
DMHSG-414S	1/2" ODF	Ø88.9	Ø3.5	196	7.72	256	10.08	276	10.87	Drawing 4
DMHSG-415F	5/8" SAE	Ø88.9	Ø3.5	196	7.72	-	-	294	11.57	Drawing 5
DMHSG-415S	5/8" ODF	Ø88.9	Ø3.5	196	7.72	256	10.08	276	10.87	Drawing 4
DMHSG-417S	7/8" ODF	Ø88.9	Ø3.5	208	8.19	270	10.63	300	11.81	Drawing 6
DMHSG-419S	1-1/8" ODF	Ø88.9	Ø3.5	208	8.19	270	10.63	300	11.81	Drawing 6

Filter-Drier Liquid/Flow and Drying Capacity

Description	Flow capacity TR @ 1psi ΔP (For Kw multiply TR by 3.5)						Water Capacity Drops of Water									
							R134a		R22		R407c		R410A		R404A & R507	
	R134a	R22	R407C	R410A	R404A	R507	75°F	125°F	75°F	125°F	75°F	125°F	75°F	125°F	75°F	125°F
DMHSG-052F	1.8	1.94	1.8	1.8	1.2	1.21	121	110	119	110	119	106	116	104	123	115
DMHSG-052S	2.2	2.39	2.2	2.2	1.5	1.49	121	110	119	110	119	106	116	104	123	115
DMHSG-053F	5.2	5.74	5.2	5.4	3.7	3.58	121	110	119	110	119	106	116	104	123	115
DMHSG-053S	5.4	6.13	5.6	5.8	3.9	3.82	121	110	119	110	119	106	116	104	123	115
DMHSG-082F	1.6	1.78	1.6	1.7	1.1	1.11	243	225	239	225	241	215	234	211	249	235
DMHSG-082S	2.0	2.20	2.0	2.1	1.4	1.37	243	225	239	225	241	215	234	211	249	235
DMHSG-083F	4.6	5.05	4.6	4.7	3.2	3.15	243	225	239	225	241	215	234	211	249	235
DMHSG-083S	4.7	5.43	5.0	5.1	3.5	3.38	243	225	239	225	241	215	234	211	249	235
DMHSG-084F	6.7	7.46	6.8	7.0	4.8	4.65	243	225	239	225	241	215	234	211	249	235
DMHSG-084S	8.7	9.79	8.9	9.2	6.2	6.10	243	225	239	225	241	215	234	211	249	235
DMHSG-163F	4.8	5.26	4.8	4.9	3.4	3.28	370	335	364	335	366	298	384	292	378	351
DMHSG-163S	4.9	5.62	5.1	5.3	3.6	3.50	370	335	364	335	366	298	384	292	378	351
DMHSG-164F	6.9	7.73	7.1	7.3	4.9	4.81	370	335	364	335	366	298	384	292	378	351
DMHSG-164S	9.6	10.87	9.9	10.2	6.9	6.77	370	335	364	335	366	298	384	292	378	351
DMHSG-164-ORN	9.6	10.87	9.9	10.2	6.9	6.77	370	335	364	335	366	298	384	292	378	351
DMHSG-165F	12.5	11.9	10.8	11.13	7.57	7.39	370	335	364	335	366	298	384	292	378	351
DMHSG-165S	14.2	15.66	14.3	14.7	10.0	9.76	370	335	364	335	366	298	384	292	378	351

For new refrigerants compatibility please consult to DRY ALL technical team.

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

1. Water Capacities are based on following standard rating conditions:

Water in refrigerant at EPD for:

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

R-22 is 60 ppm.

Flow Capacities are based on following standard rating conditions:

2. 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.

Filter-Drier Liquid/Flow and Drying Capacity

Description	Flow capacity TR @ 1psi ΔP (For Kw multiply TR by 3.5)						Water Capacity Drops of Water									
							R134a		R22		R407c		R410A		R404A & R507	
	R134a	R22	R407C	R410A	R404A	R507	75°F	125°F	75°F	125°F	75°F	125°F	75°F	125°F	75°F	125°F
DMHSG-303F	4.2	4.84	4.4	4.5	3.1	3.01	831	766	816	766	822	731	801	719	849	802
DMHSG-303S	4.7	5.58	5.1	5.2	3.6	3.47	831	766	816	766	822	731	801	719	849	802
DMHSG-304F	9.5	8.00	7.3	7.5	5.1	4.98	831	766	816	766	822	731	801	719	849	802
DMHSG-304S	10.4	11.47	10.5	10.8	7.3	7.15	831	766	816	766	822	731	801	719	849	802
DMHSG-305F	11.8	12.96	11.8	12.2	8.3	8.07	831	766	816	766	822	731	801	719	849	802
DMHSG-305S	12.3	13.63	12.5	12.8	8.7	8.49	831	766	816	766	822	731	801	719	849	802
DMHSG-306F	15.4	17.12	15.7	16.1	10.9	10.67	831	766	816	766	822	731	801	719	849	802
DMHSG-306S	18.0	20.00	18.3	18.8	12.8	12.46	831	766	816	766	822	731	801	719	849	802
DMHSG-307S	18.6	20.52	18.8	19.3	13.1	12.79	831	766	816	766	822	731	801	719	849	802
DMHSG-309S	24.34	32.86	30.00	30.86	21.06	20.54	831	766	816	766	822	731	801	719	849	802
DMHSG-414F	9.46	8.00	7.31	7.51	5.11	4.98	914	833	898	833	904	796	880	782	934	872
DMHSG-414S	10.41	11.47	10.48	10.77	7.32	7.15	914	833	898	833	904	796	880	782	934	872
DMHSG-415F	11.76	12.96	11.85	12.16	8.27	8.07	914	833	898	833	904	796	880	782	934	872
DMHSG-415S	12.34	13.63	12.46	12.80	8.70	8.49	914	833	898	833	904	796	880	782	934	872
DMHSG-417S	20.5	20.52	21.8	22.5	14.9	12.79	914	833	898	833	904	796	880	782	934	872
DMHSG-419S	27.8	32.86	29.8	30.5	20.5	20.54	914	877	898	833	904	796	880	782	934	872

For New Refrigerants Compatibility Please Consult to DRY ALL Technical Team.

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

1. Water Capacities are based on following standard rating conditions:

Water in refrigerant at EPD for:

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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.

Sight Glass Size

Model Series	Sight Glass Thread Size
3	M24
5	M24
8	M24
16	M24
30	M18
41	M18
71	M18

Filter Drier Volume

Model Series	Shell Volume (L)	Net Volume (L)
3	0.071	0.043
5	0.212	0.115
8	0.28	0.167
16	0.356	0.204
30	0.721	0.48
75	1.65	1.125

Filter-Drier Acid Absorption capacity

Sr. No	Drier type	Series	Weight of Activated Alumina	Acid capacity in gm at Tan 0.005
1	DMHSG (Bead type)	03	5	0.60
2		05	9	1.08
3		08	16	1.92
4		16	22	2.65
5		30	52	6.2
6		41	66	7.92
7		75	180	21.80

Packaging Data

Model	Series (Desiccant Quantity)	Total Quantity in 1 Master box
DMHSG	03	30
	05	30
	08	30
	16	30
	30	10
	41	10
	75	10

Filter Drier Selection Criteria

- Select the appropriate filter drier based on refrigerants and oil compatibility. Then select the filter drier size for required drying and flow capacity.
- The filter drier drying capacity is rated in drops, determined the drops of water to be absorbed by the filter drier.
- 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,
- Drop of water =
$$\frac{(\text{Initial PPM of water} - \text{final PPM of water}) \times \text{kg of refrigerant}}{50}$$
- Drop of water =
$$\frac{(1050-50) \times 12}{50}$$
- Drops of water = 240

Where,

- Moisture in the R134a refrigerant at the inlet of filter drier according to ARI standard 710:86 is 1050 ppm.
- Moisture in the R134a refrigerant at the outlet of filter drier according to ARI standard 710:86 is 50 ppm.
- For calculated water capacity, DMHSG 08 series is considered the exact model selection. For 5 Ton capacity, DMHSG – 084F or DMHSG – 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.

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