

SANHUA



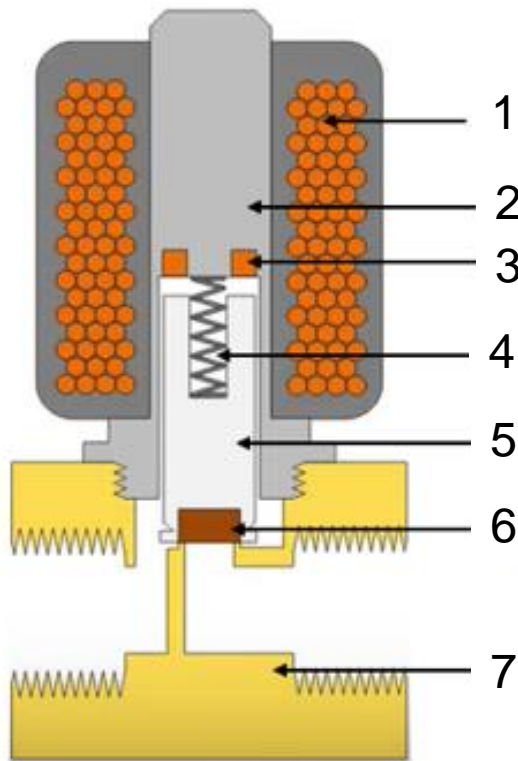
Solenoid valves

SOLENOID VALVES

AGENDA:

- Working principle, main parts, terminology
- Principle of operation – direct or pilot
- Main applications
- Special applications
- Product Range (MDF, FDF, LDF, HDF, MDF-RH, MDF Compact)
- Principle of certification
- Sizing and Selection
- Supporting materials

Solenoid Valve – main parts



A solenoid valve consists of two main components: a solenoid coil (1) and a valve body (7). A solenoid has an electromagnetically inductive coil (1) around an armature (2) and iron core at the center called the plunger (5). It can be normally open (NO) or normally closed (NC). In the de-energized state, a normally open valve is open, and a normally closed valve is closed. When power is ON coil is energized and creates a magnetic field. This creates a magnetic attraction with the plunger, moving it and overcoming the spring (4) force. If the valve is normally closed, the plunger is lifted so that the seal (6) opens the orifice and allows the flow of the media through the valve. If the valve is normally open, the plunger moves downward so that the seal (6) blocks the orifice and stops the flow of the media through the valve. The shading ring (3) prevents vibration and humming in AC coils.

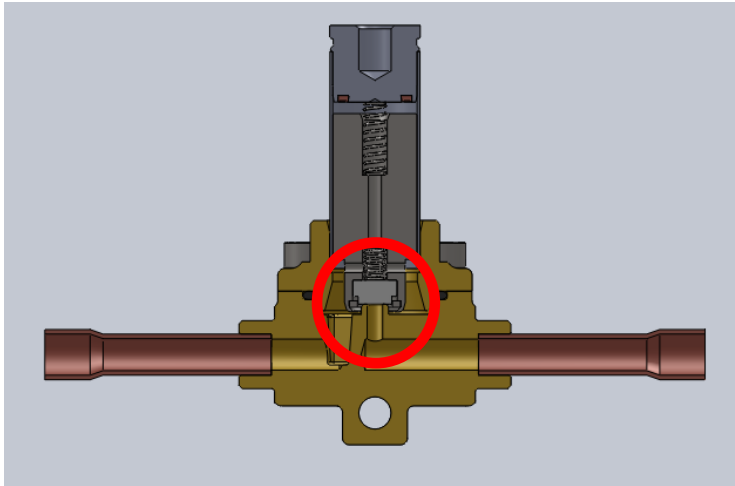
Solenoid Valve - terminology



- **Maximum Operating Pressure (MOP)** – maximum pressure which solenoid valve can withstand during permanent work without any impact on product safety, functionality and performance aspects.
MOP is too high – risk for safety, damage or malfunctioning of valve
- **Maximum Operating Pressure Difference (Max OPD)** - the highest possible pressure difference between inlet and outlet pressure of the valve at other conditions at worst limit (85% of U_n , maximum/minimum medium and ambient temperatures) at which solenoid valve can normally open/close. **Max OPD is too high – not able to open main or pilot port by electromagnetic force of coil**
- **Minimum Operating Pressure Difference (Min OPD)** - the lowest possible pressure difference between inlet and outlet pressure of the valve at other conditions at worst limit (85% of U_n , maximum/minimum medium and ambient temperatures) at which solenoid valve can normally open/close:
 - Direct - 0 bar
 - Pilot (membrane) – 0,05 ÷ 0,2 bar (depending on the type)
 - Pilot (piston) – 0,07 ÷ 0,2 bar (depending on the type)**Min OPD is too low => Not able to keep the diaphragm or piston open**
- **Kv** – water flow (at 20 °C) across the valve [m³/hour] at a pressure differential at 1 bar. **Criteria for valve size selection**

- **Direct Operated Solenoid Valves**
- **Pilot Operated Solenoid Valves with membrane**
- **Pilot Operated Solenoid Valves with piston**

Direct operated valves



Opening and closing the valve directly due to electromagnetic force of the coil.
OPEN: When the coil is energized the armature moves up into the magnetic field of the coil and the valve opens direct for full flow.
CLOSED: When the coil is then de-energized the spring force and the weight of the armature act to close the valve.

Conditions for normal operation:

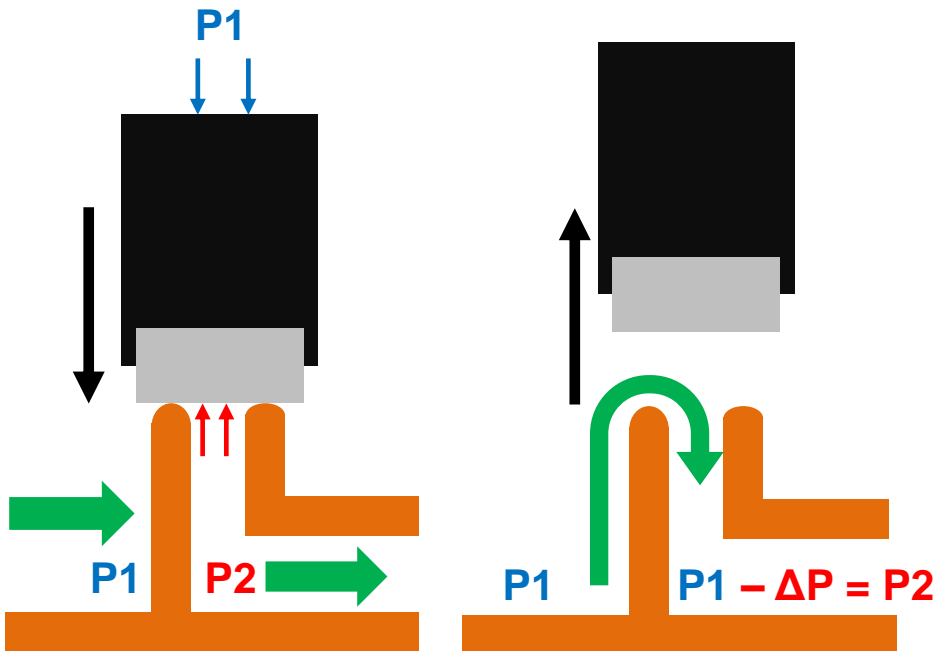
$$P1 - P2 \leq \text{Max. OPD}$$

$$P1 - P2 \geq 0 \text{ bar (no limitation due to Min OPD)}$$

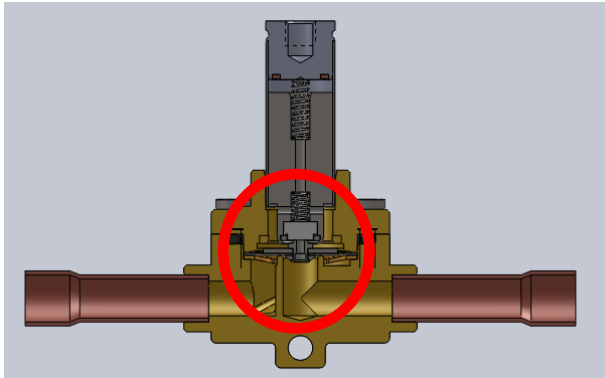
$$P1 \text{ \& } P2 \leq \text{MOP}$$

NOTE:

- As opening/closing of direct-acting solenoid valve depends on the power of the coil size of the port and therefore size of the valve is limited by practical limitations of the coil size.
- MDF2 and MDF3 are direct operated solenoid valves



Pilot operated - membrane type

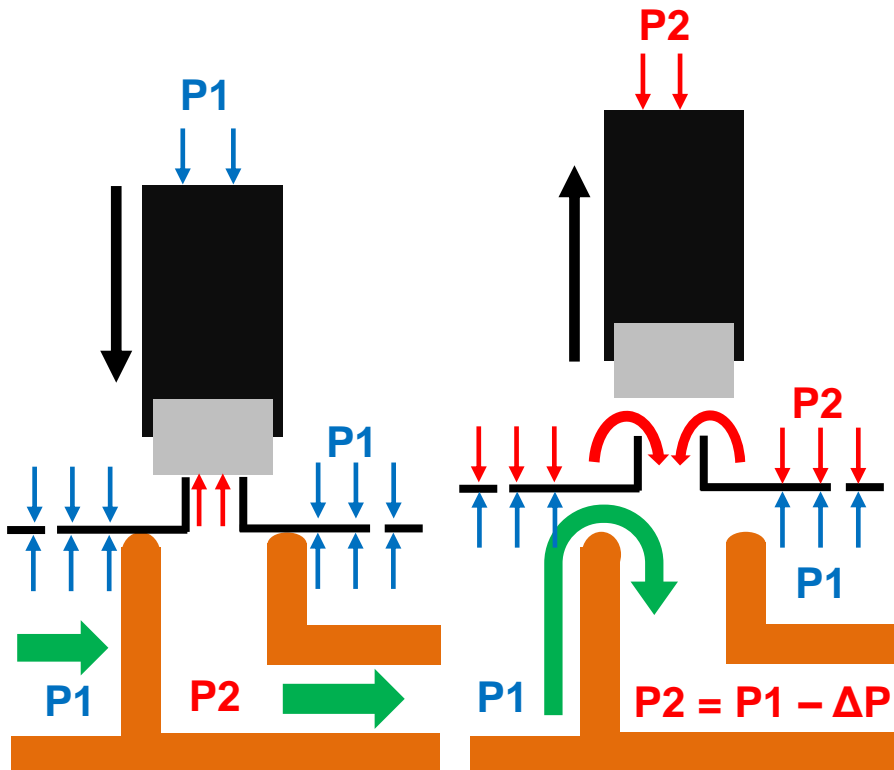


1. When coil is de-energized pilot port is closed by plunger sealing. Pressure above the membrane is increased until P1 due to small (equalizing) holes in the membrane and therefore membrane is moved down, and main port is closed.

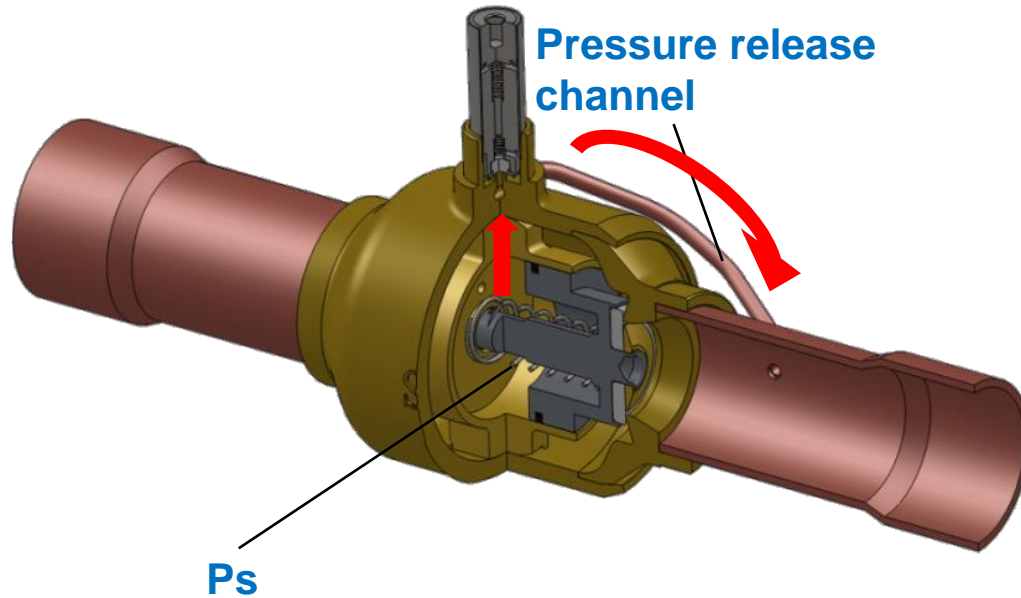
2. When the coil is energized the plunger moves up into the magnetic field of the coil and the refrigerant flow starts to pass through pilot port placed in the middle of the membrane. In this condition there is a pressure difference between upper and lower side of the membrane: $P1 > P2$.

Conditions for normal operation:
 $\text{Min OPD} \leq P1 - P2 \leq \text{Max. OPD}$
 $P1 \ \& \ P2 \leq \text{MOP}$

There is limitation of Minimum and Maximum pressure drop across the valve!



Pilot operated - pistone type



Inside the valve body is present a spring that acts to maintain close the piston when the coil is de-energized

$P_s = \text{Spring Pressure}$

$P_1 = P_2$

$P_1 < P_2 + P_s$

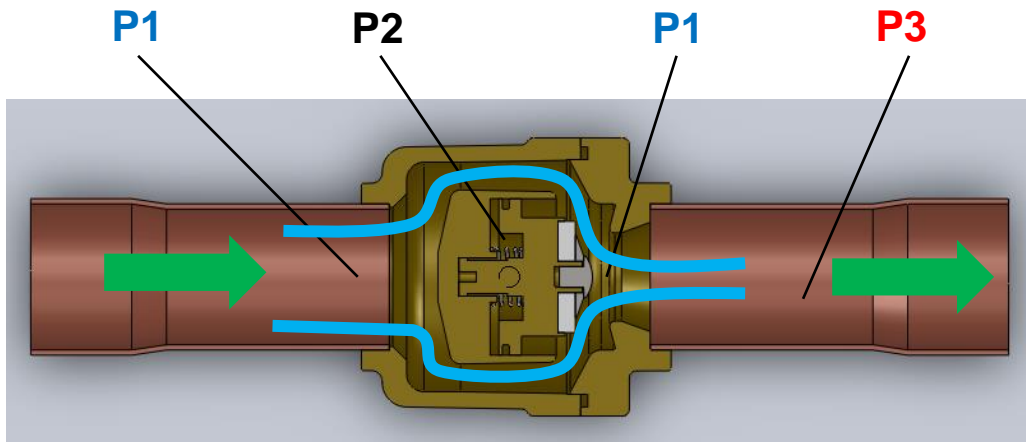
When the coil is energized the armature moves up into the magnetic field of the coil and the refrigerant flow starts to pass from piston chamber through pilot orifice placed above the piston and through pressure release channel to outlet tube of the valve. In this condition there is a pressure difference between the right and the left side of the piston.

$P_1 > P_2 + P_s$

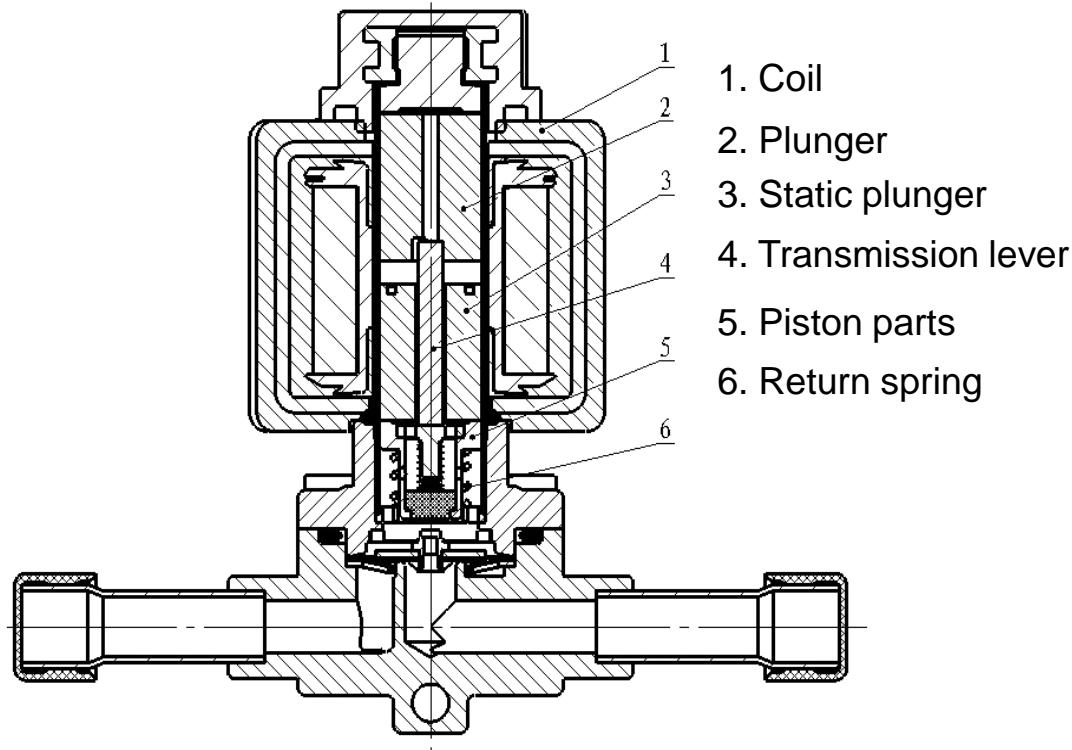
When the pressure P_1 is able to win the sum of the pressures acting on the piston ($P_2 + P_s$) the piston moves on the left and the flow can pass through the valve.

$P_2 \approx P_3$

$P_2 < P_1$



Normally Open (NO) valves



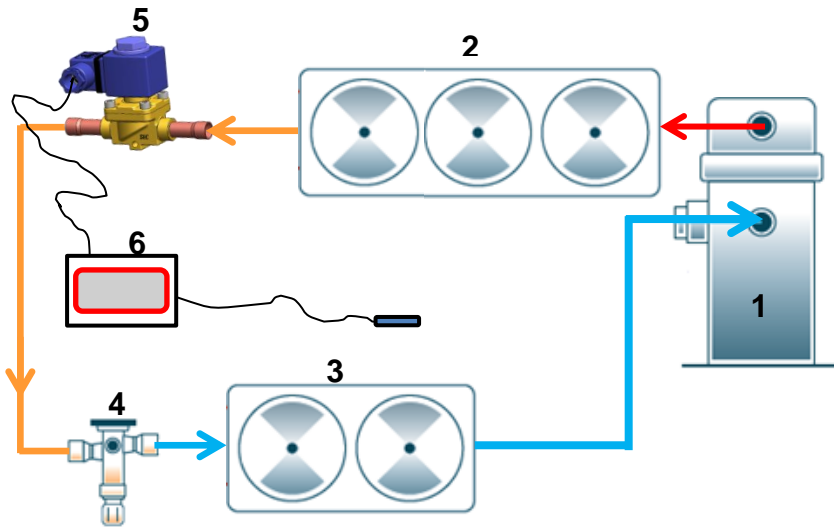
Action principle:

When coil is energized, the core iron and static plunger are pulled-in, drive the piston to seal the pilot valve port by transmission lever.

When de-energize the coil, the return spring jack up the piston parts to open the pilot valve port.

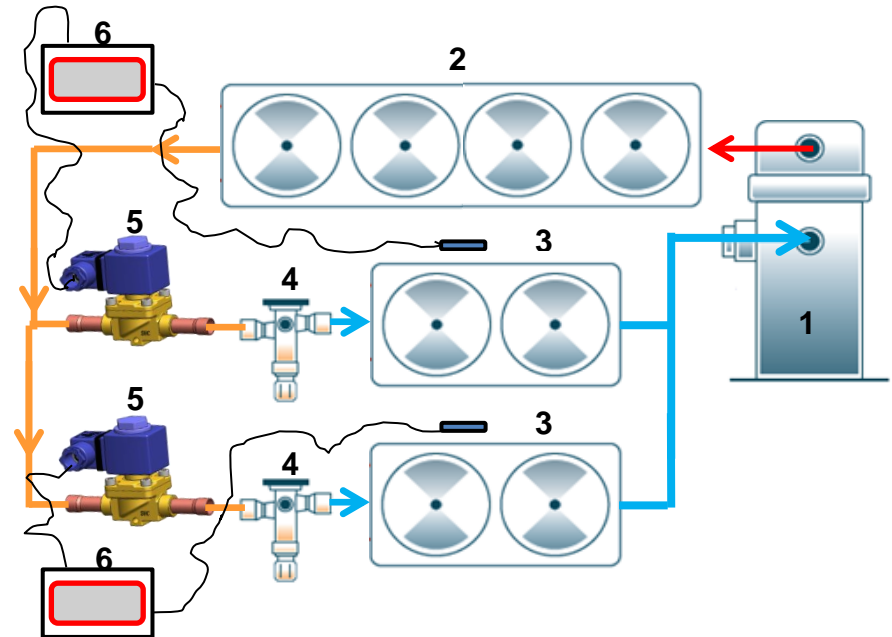
Application examples

Pump down cycle



The solenoid valve is installed in the main liquid line and wired so that it closes by thermostat signal. A low-pressure control switch allows the refrigerant in the evaporator to be “pumped down”

Multiple evaporators

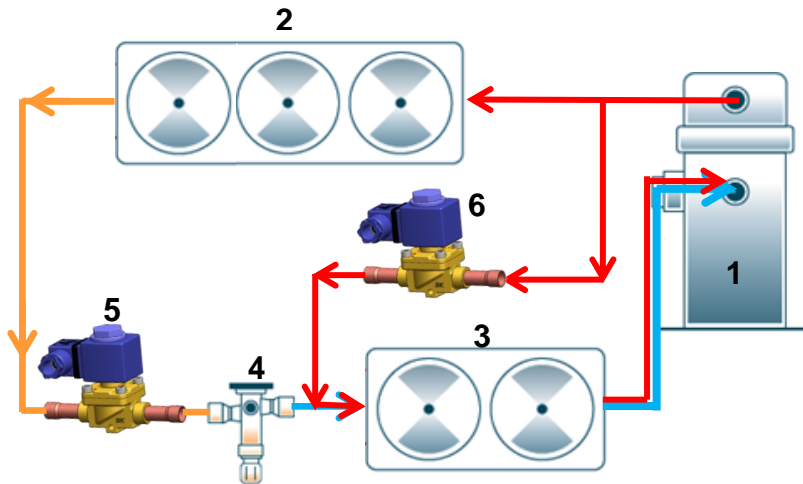


In a multiple system it is installed one solenoid valve for each evaporator. Acting on the solenoid valve it is possible to exclude one or more independent evaporators and control the room temperature in independent volumes while compressor (s) is (are) running

1. Compressor 2. Condenser 3. Evaporator 4. TXV 5. Solenoid Valve 6. Thermostat

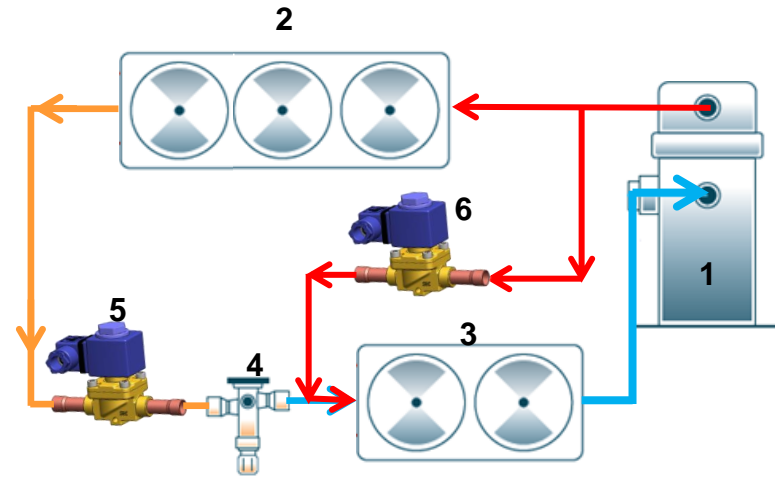
Application: hot gas defrost

Hot gas defrost



When the hot gas defrost is activated the solenoid in the main circuit (5) is closed, while the Hot Gas solenoid (6) is opened. The hot gas from the discharge line of the compressor can be used to defrost the evaporator. During hot gas defrost refrigerant flow (only gas, no phase change liquid-gas-liquid) is circulating through Hot Gas solenoid and evaporator bypassing Condenser and TXV.

Hot gas bypass



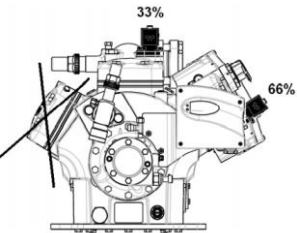
The compressor capacity can be reduced by bypassing the hot discharge gas through a solenoid valve in the evaporator inlet. As the evaporator warms up, the TXV will respond by allowing more flow, thereby acting as a desuperheating valve. This solution guarantees a good velocity through the evaporator, and it prevents oil logging.

1. Compressor 2. Condenser 3. Evaporator 4. TXV 5. Solenoid Valve 6. Thermostat

Solenoid Valve – special applications



Solenoid valve (PWM) for compressor capacity regulation (stepless). Approved for 30M cycles



Solenoid valve for screw and semi-hermetic compressor capacity regulation (step capacity regulation).



Solenoid valve for water/glycol flow



Solenoid valve for residential applications (refrigerators)



Solenoid valve for automotive industry

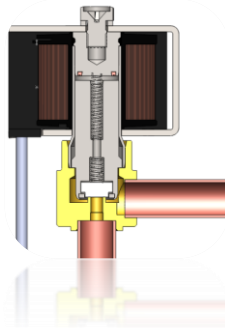
Sanhua is EXPERT in solenoid valves with millions of valves in the field for different industries

Special Compressor Applications



Sanhua valves have already been successfully used for

- 1) Compressor capacity regulation (step)
- 2) Compressor capacity regulation (stepless)
- 3) Compressor oil distribution management



100% individual OEM product
Development only ON REQUEST

Annually ~150 000 pcs supplied. Customers – global compressor manufactures (e.g., Copeland, RefComp...)

Portfolio overview



MDF-A03 (NC)



MDF-B03 (NC)



MDF-A02 (NO)



MDF-A03-RH (NC): R32



MDF Compact (NC): NEW



LDF (NC): compact, soft sealing



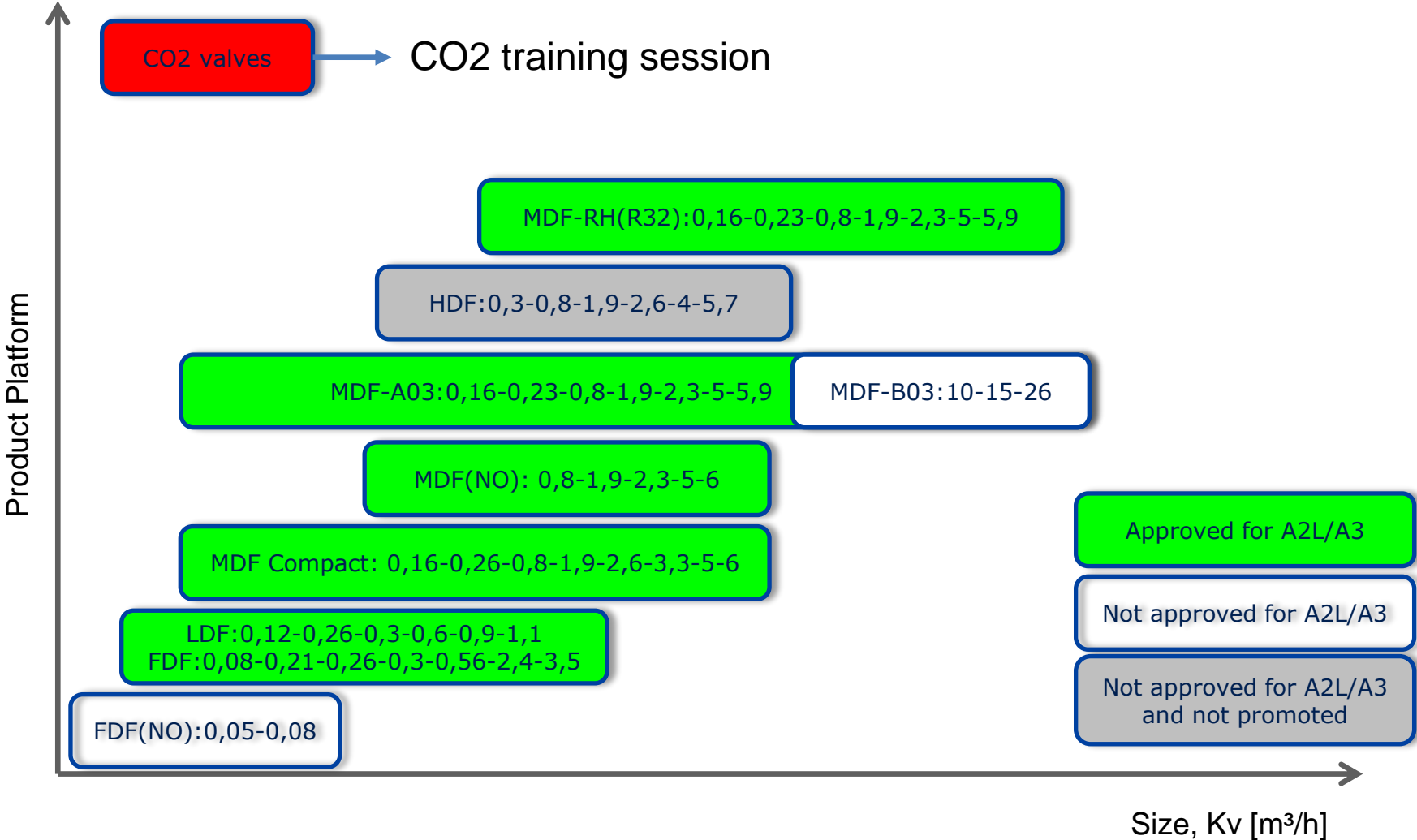
FDF-A (NC): compact, cost effective



FDF-AK (NO): compact, cost effective



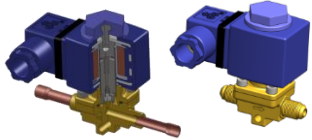
Product matrix



MDF-A03/B03 solenoid valves

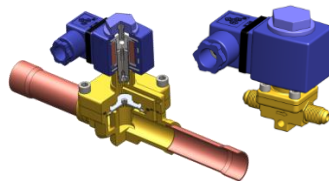


DIRECT OPERATED



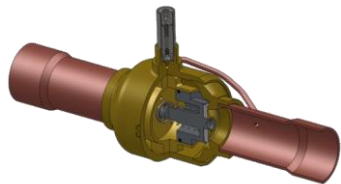
MDF 2
MDF 3

DIAPHRAGM PILOT OPERATED








MDF 6
MDF 10
MDF 15
MDF 20
MDF 22

PISTON PILOT OPERATED







MDF 25
MDF 32
MDF 40

General Specification

-  Applicable for all common HCFC, HFC, HFO, HC
-  Capacity / Size: $K_v = 0,16 \div 25 \text{ m}^3/\text{h}$; $6 \text{ mm} \div 54 \text{ mm}$ (1/4 \div 2 1/8)
-  Temperature range medium min./max.:
MDF2 \div MDF22: $-30^\circ\text{C}/105^\circ\text{C}$; MDF25 \div MDF40: $-40^\circ\text{C}/140^\circ\text{C}$
-  Maximum Operating Pressure: 45 bar; Max OPD : 31 bar
-  Certification: LVD, Compliance with the EN 60335-2-24 / 2-40 / 2-89 (VDE), PED self declaration acc. Art 4.3 and Cat I

Features and benefits

-  High MOP: 45 bar, high MOPD: 31 bar
-  Wide range of different models, high capacity models
-  Variety of coils: fast wiring, VDE certified for flammable refrigerants, ATEX coils,
-  Excellent performance: extremely high internal tightness

MDF-A03/B03 solenoid valves



Valve Body		Usable Coils	Normal position	Actuation	Kv [m ³ /h]	MOP [MPa]	Max. OPD [MPa]		Min. OPD [MPa]		
Solder	Flare						AC ⁴⁾ Coil	DC ⁵⁾⁶⁾ Coil			
MDF-A03-2H	MDF-A03-2L	AC + DC	NC ¹⁾	Direct	0,16	4,5	3,1	3,1	0,00		
MDF-A03-3H	MDF-A03-3L				0,23			NR			
MDF-A03-6H	MDF-A03-6L	AC		Pilot ²⁾	0,8		NP	2,8	0,005		
MDF-D03-6H	MDF-D03-6L	DC					3,1	NR			
MDF-A03-10H	MDF-A03-10L	AC					NP	1,9		3,1	NR
MDF-D03-10H	MDF-D03-10L	DC								2,8	
MDF-A03-15H	MDF-A03-15L	AC					NP	2,3		3,1	NR
MDF-D03-15H	MDF-D03-15L	DC								2,8	
MDF-A03-20H	-	AC + DC		Pilot ²⁾	5,0		4,5	3,1	3,1	0,02	
MDF-A03-22H					5,9						
MDF-B03-25H			10,0								
MDF-B03-32H			Pilot (P) ³⁾		15,0						
MDF-B03-40H					25,0						

1) NC means: Normally closed valve

2) Membrane operated

3) Piston operated

4) NP means: not permitted to use, select MDF-A03 model

5) NR means: not recommended to use. Only possible with R134a and min. evaporation temp. / max. condensing temp. -15 ° C/+58 ° C, select MDF-D03 model

6) Pressure values valid for 24V DC coil. Values for 12V DC coils on request

MDF-A03/B03 - coils



MQ-A03/D03



MQ-A11

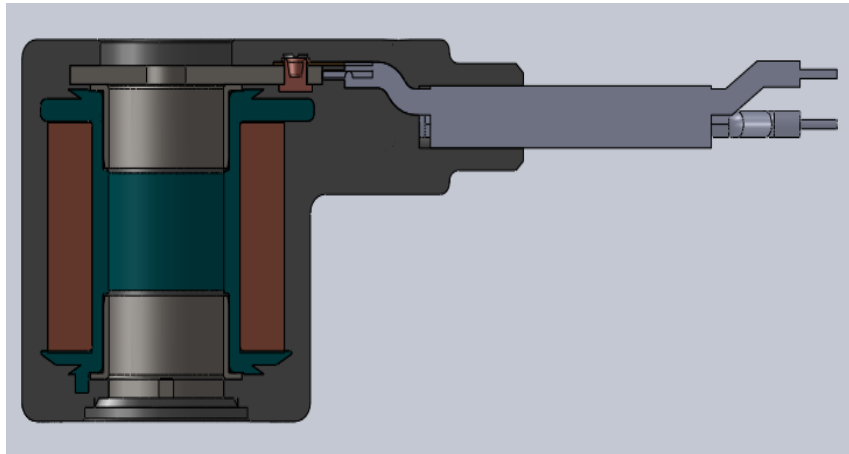


Model Coil	Part Number	Plug type	Supply	Rated Voltage [V]	Power [W]	Voltage Tolerance	Insulation Class	Protection Class (w/plug)	UL Approval		
MQ-A03024-000001	10820009902	DIN Plug	AC	24	10,5 (50Hz) 8,5 (60Hz)	-15% +10%	F	IP67	NO		
MQ-A03024-000018	10820013702							IP65	YES		
MQ-A0311A-000001	10820010102			110 to 120	12 (50Hz) 10 (60Hz)			IP67	NO		
MQ-A0311A-000005	10820010165							IP65	YES		
MQ-A0322G-000001 ¹⁾	10820010002			220 to 240	12 (50Hz) 10 (60Hz)			IP67	NO		
MQ-A0322G-000024	10820015002							IP65	YES		
MQ-A11024-000001	10820009402	Quick Install Plug	AC	24	9,5 (50Hz) 8,5 (60Hz)	±10%		IP67	OR ²⁾		
MQ-A1111A-000001	10820009202			110 to 120	11,5 (50Hz) 10,0 (60Hz)				OR		
MQ-A1122G-000001	10820009002			220 to 240	11 (50Hz) 9,5 (60Hz)				OR		
MQ-D03012-000002	10820001302	DIN Plug	DC	12	15					IP67	NO
MQ-D03024-000002	10820001002			24							NO

1) Coil MQ-A0322G-000001 is third party certified for usage with flammable refrigerants (A2L, A3). Usage of the other coils (only without UL approval) with flammable refrigerants – please contact Sanhua.

2) OR: On Request

Extent of delivery: coil body, fastening screw for the coil body, plug for electrical connection incl. Gaskets and fastening screws



ATEX COIL

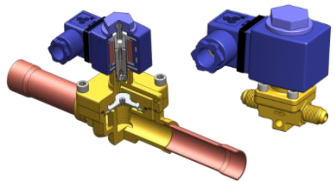
Model	Rated Voltage (V)	Power (W)	Voltage Tolerance	Insulation Class*	Protection Class (w/plug)	Wiring Type
MQ-A0622G-000001	220 to 240 AC	9,5W (50 Hz) 8,0W (60 Hz)	-15% +10%	H	IP 65	Lead Wire
MQ-A06024-000001	24 AC	9,5W (50 Hz) 8,0W (60 Hz)	-15% +10%	H	IP 65	Lead Wire

*** Maximum temperature rise: 130 ° C**

MDF-A02: NO (normally open) solenoid valves








DIAPHRAGM PILOT OPERATED







MDF 6
MDF 10
MDF 15
MDF 20
MDF 22

General Specification

-  Applicable for all common HCFC, HFC, HFO, HC
-  Capacity / Size: $K_v = 0,8 \div 6 \text{ m}^3/\text{h}$; $10 \text{ mm} \div 28 \text{ mm}$ ($3/8 \div 1 1/8$)
-  Temperature range medium min./max.: $-30^\circ\text{C}/105^\circ\text{C}$;
-  Maximum Operating Pressure: 45 bar; Max OPD : 28 bar
-  Certification: LVD, Compliance with the EN 60335-2-24 / 2-40 / 2-89 (VDE), PED self declaration acc. Art 4.3

Features and benefits

-  High MOP: 45 bar
-  Available range of different models, different connections
-  Coils are IP67, certified for flammable refrigerants
-  Excellent performance: extremely high internal tightness

MDF-A02: NO (normally open) solenoid valves

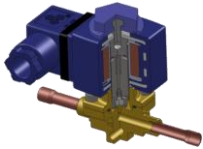


Valve Body		Usable Coils	Normal position	Actuation	Kv [m ³ /h]	MOP [MPa]	Max. OPD [MPa]	Min. OPD [MPa]
Solder	Flare							
MDF-A02-6H	MDF-A02-6L	AC/DC	NO ¹⁾	Pilot	0,8	4,5	2,8	0,02
MDF-A02-10H	MDF-A02-10L				1,9			
MDF-A02-15H	MDF-A02-15L				2,3			
MDF-A02-20H					5			
MDF-A02-22H					6			

1) NO means: Normally open valve

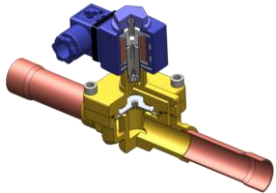
Model Coil	Part Number	Plug type	Supply	Rated Voltage [V]	Power [W]	Voltage Tolerance	Insulation Class	Protection Class (w/plug)	UL Approval
MQ-A02024-000001	10820004502	DIN Plug	AC	24	12,5 (50Hz) 10,5 (60Hz)	-15% +10%	F	IP67	NO
MQ-A0211A-000001	10820003702			110 to 120					NO
MQ-A0222G-000001	10820004102			220 to 240					NO
MQ-D02012-000001	10820006702		DC	12	10	±10%			NO
MQ-D02024-000001	10820006902			24					NO

DIRECT OPERATED








MDF 2RH
MDF 3RH

DIAPHRAGM PILOT OPERATED







MDF 6RH
MDF 10RH
MDF 15RH
MDF 20RH
MDF 22RH

General Specification

-  Applicable for **R32**
-  Capacity / Size: $K_v = 0,16 \div 5,9 \text{ m}^3/\text{h}$; $6 \text{ mm} \div 35 \text{ mm}$ (1/4 ÷ 1 3/8)
-  Temperature range medium min./max.: $-30^\circ\text{C}/105^\circ\text{C}$
-  Maximum Operating Pressure: **49 bar**; Max OPD : 31 bar
-  Certification: LVD, Compliance with the EN 60335-2-24 / 2-40 / 2-89 (VDE), PED self declaration acc. Art 4.3 and **PED Cat II certification (TUV, only with coil MQ-A0322G-xxxxxx)**

Features and benefits

-  High MOP: 49 bar (approved for R32)
-  Wide range of models
-  Necessary VDE/TUV certification
-  High reliability, extensive factory tests

MDF-A03-RH solenoid valves



Valve Body	Normal position	Actuation	Kv [m ³ /h]	MOP [MPa]	Max. OPD [MPa]	Min. OPD [MPa]
Solder						
MDF-A03-2RH	NC	Direct	0,16	4,9	3,1	0,00
MDF-A03-3RH			0,23			
MDF-A03-6RH		Pilot	0,8			0,005
MDF-A03-10RH			1,9			
MDF-A03-15RH			2,3			
MDF-A03-20RH			5,0			
MDF-A03-22RH			5,9			

Model Coil	Part Number	Plug type	Supply	Rated Voltage [V]	Power [W]	Voltage Tolerance	Insulation Class	Protection Class (w/plug)	UL Approval
MQ-A0322G-000001	10820010002	DIN	AC	220 to 240	12 (50Hz) 10 (60Hz)	-15% +10%	F	IP67	NO

Coil MQ-A0322G-000001 is third party certified for usage with flammable refrigerants (A2L, A3). Usage of the other coils with flammable refrigerants – please contact Sanhua.

FDF/LDF compact solenoid valves








FDF series







LDF series



General Specification

-  Applicable for all common HCFC, HFC, HFO, HC
-  Capacity / Size: LDF: Kv = 0,12 to 1,1 m³/h; 1/4 inch ÷ 5/8 inch
FDF: Kv = 0,08 to 3,5 m³/h; 1/4 inch ÷ 5/8 inch
-  Medium temperature TS min./max.: **-30°C/+120°C**
-  Max. operating pressure PS: 4.5Mpa
-  Certification: **LVD, Compliance with the EN 60335-2-24 / 2-40 / 2-89 (VDE)**, PED self declaration acc. Art 4.3

Features and benefits

-  Flexible with customization
-  Compact design, Angle or Straight shape
-  Cost-efficient solution
-  LDF soft sealing design - very low internal leakage

FDF compact solenoid valves



Model Valve Body	Product Number	Normal Position	Actuation	Ø Seat	Kv	MOP	Max. OPD	Min. OPD	
				[mm]	[m ³ /h]	[MPa]	[MPa]	[MPa]	
FDF 2A 94	10120019802	NC	Direct	1,9	0,08	4,5	3,4	0	
FDF 2.5A 08	10120021102		Pilot		2,5		0,21	2,1	0,01
FDF 3A 08	10120019302				2,7		0,26	3,4	
FDF 4A 10	10120006502				4,0		0,30	3,4	0
FDF 6A 58	10120018702				5,8		0,56	3,4	0,01
FDF 11A 16	10120020302				11		2,40	2,8	0,02
FDF 13A 12	10120020502				13		3,5		

Model Coil	Product Number	Rated Voltage [V]	Supply	Power [W]	Freq. [Hz]	Voltage Tolerance	Insulation Class	Wiring type: flying leads [mm]
FQ-A05 22G-001022	10800057302	220 to 240	AC	5 (50Hz) 4,5 (60Hz)	50/60	-15% +10%	B	600±20

For non-flamable refrigerant also coils for other power supply available

LDF compact solenoid valves



Model Valve body	Part Number	Normal position	Actuation	Ø Seat [mm]	Kv [mm]	MOP, [MPa]	OPD [MPa]	
							Max	Min
LDF2A01	10127000102	NC	Direct	2	0.12	4.5	3.1	0
LDF2A02	10127000402			2	0.12	4.5	3.1	0
LDF3A08	10127001802		Pilot	3	0.26	4.5	3.1	0.005
LDF4A08	10127001102			4	0.3	4.5	3.1	0.005
LDF6A08	10127001202			5.8	0.6	4.5	3.1	0.005
LDF8A01	10127000502			8	0.9	4.5	3.1	0.005
LDF8A02	10127000602			8	1.1	4.5	3.1	0.005

Model Coil	Part Number	Rated voltage [V]	Power [W]	Voltage Tolerance	Insulation Class	Wiring type	Cable length, [mm]
FQ-A05 024-000709	10800072302	AC 24	5 (50Hz) 4,5 (60Hz)	+10% -15%	B	Lead Wires	1800
FQ-A05 120-001098	10800062002	AC 120	5 (50Hz) 4,5 (60Hz)				800
FQ-A05 22G-001022	10800057302	AC 220-240	5 (50Hz) 4,5 (60Hz)				600

Coils suitable for flammable and non-flammable refrigerants

MDF Compact - new product range



DIRECT OPERATED



MDF 2

PISTON PILOT OPERATED








**MDF 3
MDF 6**

DIAPHRAGM PILOT OPERATED







**MDF 10
MDF 15
MDF 16
MDF 20
MDF 22**

General Specification

-  Applicable for all common HCFC, HFC, HFO, HC
-  Capacity / Size: $K_v = 0,16 \div 6 \text{ m}^3/\text{h}$; $6 \text{ mm} \div 35 \text{ mm}$ (1/4 \div 1 3/8)
-  Temperature range medium min./max.:
MDF2 \div MDF6: $-40^\circ\text{C}/140^\circ\text{C}$; MDF10 \div MDF22: $-30^\circ\text{C}/105^\circ\text{C}$
-  Maximum Operating Pressure: 45 bar; Max OPD : 31 bar
-  Certification: LVD, Compliance with the EN 60335-2-24 / 2-40 / 2-89 (VDE), PED self declaration acc. Art 4.3

Features and benefits

-  High MOP: 45 bar, high MOPD: 31 bar
-  Optimized range of different models
-  Variety of coils VDE certified for flammable refrigerants
-  Compact and cost effective

MDF Compact



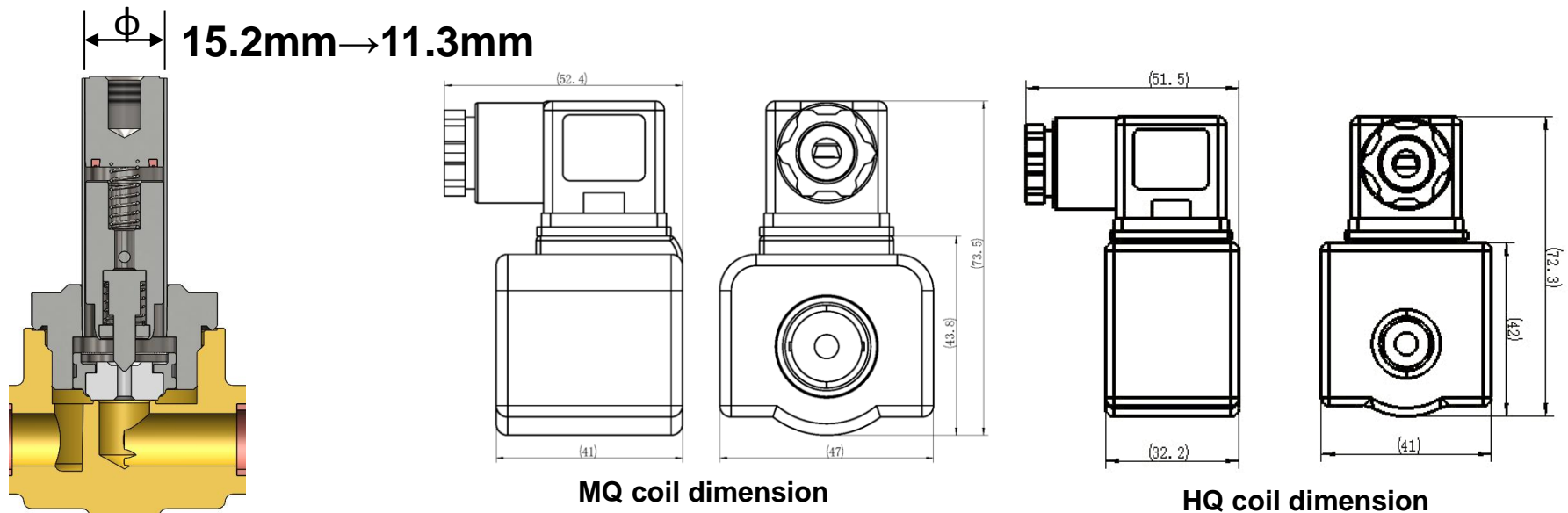
Valve Body	Normal position	Actuation	Kv [m ³ /h]	MOP [bar]	Max. OPD [bar]		Min. OPD [bar]	
					Air	Liquid		
Solder								
MDF2	NC ¹⁾	Direct	0,16	45	31	21	0	
MDF3		Pilot		0,26	45	31	21	0,07
MDF6				0,8	45	31	21	0,07
MDF10				1,9	45	31	21	0,05
MDF15				2,6	45	31	21	0,05
MDF16				3,3	45	31	21	0,05
MDF20				5	45	31	28	0,2
MDF22				6	45	31	28	0,2

Model	Part Number ¹⁾	Type	Power Supply	Rated Voltage [V]	Power [W] [50Hz/60Hz]	Voltage Tolerance	Ins. Class	IP Class (w/plug)	UL Approval
HQ1G11	10780000402	DIN ²⁾ Plug	AC	220~240	7/5.5	-15% +10%	F	IP67	Yes, ins. class B
HQ1D11	10780000602			120	6/5				
HQ1K11	10780000702			24	6/5				

All coils are certified for flammable refrigerants!

MDF vs MDF Compact

- The sleeve OD reduced from $\text{Ø}15$ to $\text{Ø}11$, to match with HQ coil, which is smaller and lower cost
- HQ coil bobbin use pt-310 material, and encapsulating material is BMC, have TUV certification (insulation class F) and UL certification (insulation class B) meantime.



Certification for flammable refrigerants



Self-Declaration or Certification according to PED Directive for products in cat.II

All solenoid valves declared for usage with flammable refrigerants and Nominal Diameter (DN) > 25mm are categorized in cat.II according to PED Directive (2014/68/EN).

All of them have been certified by a recognize international notify body as strictly requested by the PED directive. Safety of models with Nominal Diameter (DN) < 25mm confirmed by self-declaration



Certification according to LVD Directive & IEC EN 60335-2-xx

All solenoid valves declared for usage with flammable refrigerants have been certified by a recognize international notify body according to LVD Directive (2014/35/EU), where applicable, and to IEC EN 60335-2-24/40/89 with specified coils. It has been tested that all the components cannot be considered as ignition source and that surface temperature will not exceed allowed temperature limit so they can be used safely with flammable refrigerants (A2L and A3).



Product range	FG I - flammable	FG I - R32 flammable (MOP 49 bar)	FG II - non flammable
MDF-A03	230 VAC		24/115/230 VAC; 12/24 VDC
MDF-B03			24/115/230 VAC; 12/24 VDC
MDF-A02	24/115/230 VAC; 12/24 VDC		24/115/230 VAC; 12/24 VDC
MDF-A03-RH		230 VAC	
HDF			24/115/230 VAC
LDF	24/115/230 VAC		
FDF-A	230 VAC		24/115/230 VAC
FDF-AK			24/115/230 VAC
MDF Compact	24/120/230 VAC		24/120/230 VAC

Coils for power supply specified in the table available as standard models. if coils for other power supply needed for currently available models, they can be developed ON REQUEST

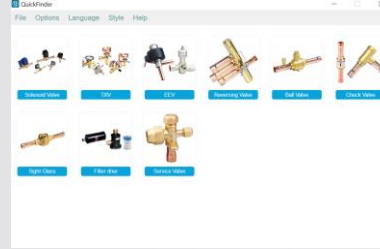
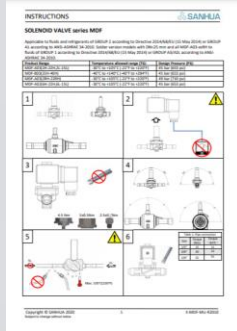
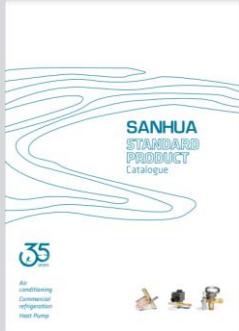
Sizing and selection – cross-reference tables



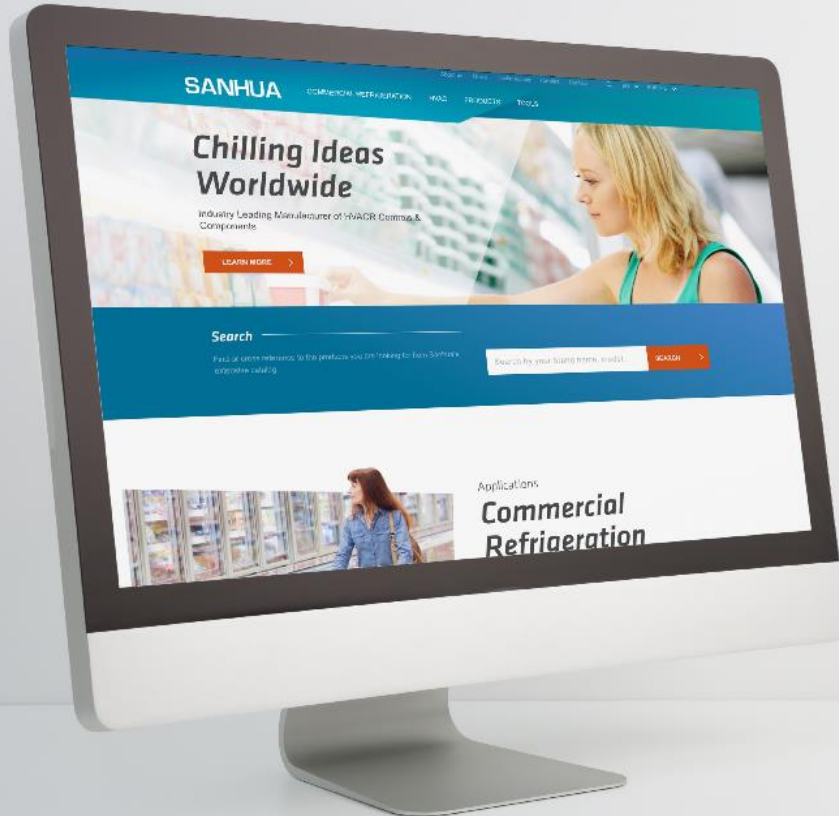
DANFOSS		CASTEL		ALCO - EMERSON		SANHUA	
Name	Kv	Name	Kv	Name	Kv	Name	Kv
EVR 2	0,15	1028N/2S	0,15			MDF-A03-2H	0,16
EVR 3	0,26	1028N/3S	0,23	110 RB 2	0,2	MDF-A03-3H	0,23
				200 RB 3	0,4	MDF-A03-3H	0,23
EVR 4	0,7	1068N	0,8			MDF-A03-6H	0,8
EVR 6	0,87	1068N	0,8			MDF-A03-6H	0,8
EVR 6	1	1068N	0,8	200 RB 4	0,9	MDF-A03-6H	0,8
EVR 8	1,09					MDF-A03-6H	0,8
EVR 8	1,09					MDF-A03-10H	1,9
EVR 8	1,15					MDF-A03-6H	0,8
EVR 8	1,15					MDF-A03-10H	1,9
		1038N	1			HDF6	0,8
EVR 10	1,56					MDF-A03-6H	0,8
EVR 10	1,56					MDF-A03-10H	1,9
				200 RB 6	1,6	MDF-A03-10H	1,9
EVR 10	2,2	1078N/4S	2,2			MDF-A03-10H	1,9
		1048N/4S	2,4			HDF10H01	1,9
		1078N/5S	2,61	240 RA 8	2,3	MDF-A03-10H	1,9
				240 RA 8	2,3	MDF-A03-15H	2,3
EVR 15	3,3	1078N/5S	2,61			MDF-A03-15H	2,3
		1048N/5S	3			HDF15H01	2,6
EVR 15	3,3	1079N/7S	2,61			MDF-A03-15H	2,3

DANFOSS		CASTEL		ALCO - EMERSON		SANHUA	
Name	Kv	Name	Kv	Name	Kv	Name	Kv
		1049N/7S	3			HDF15H02	2,6
EVR 18	3,9	1098N/5S	3,8			MDF-A03-20H	5
		1058N/5S	3,8			HDF20H	4
		1098N/6S	4,8			MDF-A03-20H	5
		1058N/6S	4,8			HDF20H	4
				240 RA 9	4,8	MDF-A03-20H	5
EVR 20	6	1098N/7S	5,7	240 RA 12	5,4	MDF-A03-20H	5
		1058N/7S	5,7			HDF22H01	5,7
EVR 20	6	1099N/9S	5,7	240 RA 12	5,4	MDF-A03-20H	5
		1059N/9S	5,7			HDF22H03	5,7
EVR 22	6					MDF-A03-22H	5,9
EVR 25	9,8	1098N/9S	10	240 RA 16	8,8	MDF-B03-25H	10
		1078N/9S	10			MDF-B03-25H	10
EVR 25	9,8	1099N/11S	10	240 RA 16	8,8	MDF-B03-25H	10
		1079N/11S	10			MDF-B03-25H	10
EVR 32	16,7	1078/11S	16			MDF-B03-32H	15
EVR 32	16,7			240 RA 20	12,8	MDF-B03-32H	15
EVR 32	16,7	1079/13S	16			MDF-B03-32H	15
EVR 40	24,2	1078/13S	25			MDF-B03-40H	25
		1078/M42					
EVR 40	24,2	S	25			MDF-B03-40H	25
EVR 40	24,2	1079/17S	25			MDF-B03-40H	25

SANHUA supporting tools



DANFOSS		CASTEL		ALCO-EMERSON		SANHUA	
Name	Kv	Name	Kv	Name	Kv	Name	Kv
EVR 2	0,15	1028N/25	0,15			MDF-A03-2H	0,16
EVR 3	0,26	1028N/35	0,23	110 RB 2	0,2	MDF-A03-3H	0,23
				200 RB 3	0,4	MDF-A03-3H	0,23
EVR 4	0,7	1068N	0,8			MDF-A03-6H	0,8
EVR 6	0,87	1068N	0,8			MDF-A03-6H	0,8
EVR 6	1	1068N	0,8	200 RB 4	0,9	MDF-A03-6H	0,8
EVR 8	1,09					MDF-A03-6H	0,8
EVR 8	1,09					MDF-A03-10H	1,9
EVR 8	1,15					MDF-A03-6H	0,8
EVR 8	1,15					MDF-A03-10H	1,9
		1038N	1			HDF6	0,8
EVR 10	1,56					MDF-A03-6H	0,8
EVR 10	1,56					MDF-A03-10H	1,9



- Product Catalogue/Datasheet
- Installation Instruction
- Selection software
- Product presentation
- Competitor cross – reference selection