

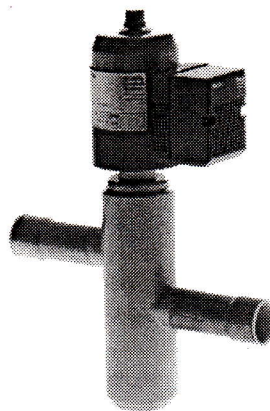
**M2FS..LX..
Modulating control valve
for suction throttle
control**

Straight-through valve with magnetic actuator for modulating suction throttle control of refrigeration units.

Suitable for safety refrigerants such as R22, R134a, R404A, R507, etc.

- Short positioning time
- High resolution
- High rangeability
- Hermetically sealed
- Versatile electrical interface
- Friction-free
- Robust and maintenance-free

1) Only admissible with low voltage (SELV, PELV)



M2FS..LX.. with ZM..

Technical data

Electrical interface:	
Control signals:	ZM101/A : DC 0 ... 10 V or DC 0 ... 20 V phase cut ZM121/A : DC 4 ... 20 mA or DC 0 ... 20 V phase cut ZM111 : DC 0 ... 20 V phase cut AC 24 V +15/-10 % for DC 0 ... 10 V and DC 4 ... 20 mA
Supply voltage 1)	
Nominal power	See table, page 2
Operating pressure, $p_{e,max}$	3.2 MPa (32 bar)
Pressure differential $\Delta p_{v,max}$:	
Liquid	0.2 MPa (2 bar)
Gas	0.8 MPa (8 bar)
Leakage	Max 0.05% k_{vs} (to VDI/VDE2174)
Temperature of medium	- 40 ... 120 °C
Valve characteristic (stroke, k_v)	Linear, optimised in low opening range
Resolution $\Delta H / H_{100}$	> 1 : 200 (H = Stroke)
Type of operation	Modulating
Position when de-energised	Closed
Orientation	Any
Positioning time	Approx. 1 s
Materials (valve body):	
Housing components	Steel and copper
Seat / inner valve	Bronze / CrNi steel
Pipe connections	Extended female solder unions
Connection terminals	Screw terminals for 4 mm ² wire
Protection standard	IP54 to IEC529
Ambient temperature	- 40 ... 50 °C
Weight	See 'Dimensions and weight', page 3
Conforms to	CE requirements

Ordering information

The ZM.. terminal housing must be ordered separately.

Ordering example

M2FS15LX (Control valve)
ZM101/A (Terminal housing)

See sheet 4701 for a summary of refrigerant valve applications

See sheet 4591 for information on the ZM.. and ZM../A terminal housing

Principle of operation / Construction

The control signal is converted in the ZM../A terminal housing into a phase cut signal, which generates a magnetic field in the coil. This causes the only moving part, the armature, to change its position in accordance with the interacting forces (magnetic field, counter-spring, hydraulics etc.). The armature responds rapidly to any change in signal, transferring the corresponding movement directly to the control disc, enabling fast changes in load to be corrected quickly and accurately. The force of the counter-spring closes the valve automatically if the power is switched off or fails.

The armature or magnetic core is designed as a floating component within the pressure system, so that no external shaft gland is required. The leakage losses common with moving parts are thus avoided.

The valve cross-section allows for easy flow whether the valve is fully or only partially open. This reduces pressure losses and ensures quiet operation.

The valves are fitted with extended female solder unions, making pipe connection easy.

Manual adjustment

On delivery, the valve is closed and the handwheel has no effect. For service purposes, or to set it to minimum flow, the valve can be opened by removing the protective cap and using a screwdriver (turn clockwise to OPEN). This does not affect the characteristic of the remaining stroke.

Mounting

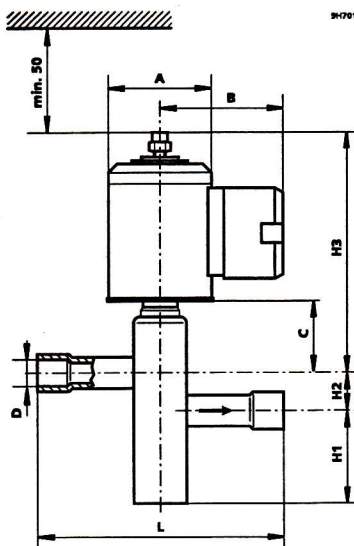
Mounting instructions (Ref. 35549 and 35541) are enclosed with the valve.

The refrigerant valves can be mounted in any orientation, but upright mounting is preferable.

The pipes should be fitted such that the alignment does not distort the valve connections. Before soldering the pipes, ensure that the direction of flow through the valve is correct.

Pipes must be soldered with care. The flame should be large enough to ensure that the junction heats up quickly and the valve does not get too hot. The flame should be directed away from the valve. Cool the valve body with a wet cloth while soldering.

Always switch off the power supply before connecting or disconnecting the ZM../A terminal housing



Dimensions [mm] and weight [kg]

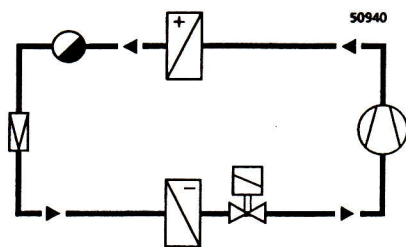
Valve type	DN [mm]	D [Inches]	L	H ₁	H ₂	H ₃	A	B	C	W [kg]
M2FS15LX06	15	5/8	150	57	25	180	60	73	67	2.6
M2FS15LX15	15	5/8	150	57	25	180	60	73	67	2.6
M2FS15LX	15	5/8	150	57	25	180	60	73	67	2.6
M2FS20LX	20	7/8	170	62	30	189	70	78	67	3.5
M2FS25LX	25	1 1/8	200	66	36	193	70	78	71	4.2
M2FS32LX	32	1 3/8	250	91	43	213	80	84	80	6.0

D : Pipe connections

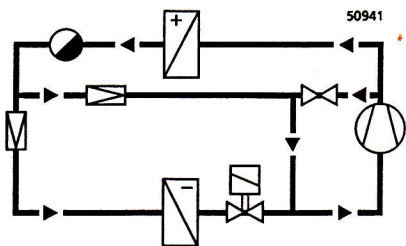
W : Weight (including packaging)

Commissioning

Connect a manometer to the suction side of the compressor, and close the valve manually to the point where the manometer shows the minimum admissible suction pressure. The valve stroke is now limited, so ensuring the minimum flow rate required to cool the condenser. This is essential for configurations without a hot gas control valve / re-injection valve.



Control range approx.. 50 % ...100 %
Compressor energy savings up to 40 %



Control range approx. 10 % ...100 %
Compressor energy savings up to 40 %

Application examples

(Diagrams show principles only, without installation-specific details)

Suction throttle control

As the control valve closes, the evaporation temperature rises. The air cooling effect falls continuously. The electronic control system provides cooling on the basis of demand, without unwanted dehumidification and the associated costs of retreatment of the air.

The pressure on the suction side of the compressor falls and the power consumption of the compressor is reduced. The energy saving to be expected with low loads can be found by reference to the selection chart supplied by the compressor manufacturer (power consumption at minimum admissible suction pressure).

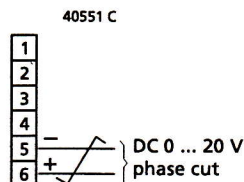
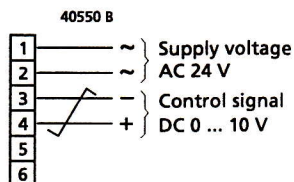
Recommended pressure drop Δp_{V100} across the fully open control valve: between 0.15 and 0.5 bar.

Example:

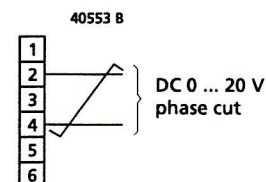
Refrigeration capacity \dot{Q}_0	34 kW
Refrigerant	R404A
Evaporation temperature t_0	5 °C
Condensation temperature t_c	50 °C
Liquid temperature t_{fl}	45 °C
Selected valve:	M2FS32LX
Δp_V (from selection chart)	0.4 bar

Terminal layout

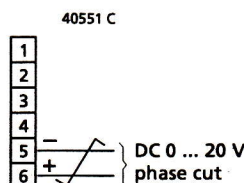
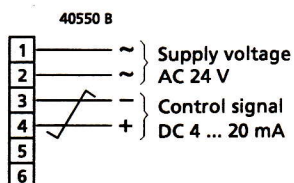
ZM101/A (DC 0...10 V or DC 0 ... 20 V phase cut)



ZM111 (DC 0...20 V phase cut)



ZM121/A (DC 4 ... 20 mA or DC 0 ... 20 V phase cut)



See sheet 4591 for connection diagrams for the ZM.. and ZM../A terminal housings,

Warning

ZM../A terminal housing used with DC 0 ... 20 V signals:

Do not connect AC 24 V to Terminals 1 and 2.

Connect Terminal 5, (marked " - ")

- to the appropriate Y output terminal on UNICO, KLIMO and MULTIREG (type 9 controllers)
- to Terminal 2 on type NKOA terminal modules.