EMERSON Climate Technologies

Operating Instructions

Electrical Control Valves EX4 / EX5 / EX6 / EX7 / EX8

GB

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ALCO CONTROLS

General information and technical data:

EX4/5/6/7/8 are stepper motor driven valves for precise control of refrigerant mass flow in refrigeration, air conditioning, heat pumps, industrial cooling process and close control systems as:

- Expansion valves
- Liquid injection for subcooling and desuperheating
- Capacity control: hot gas bypass regulator
- Capacity control: suction pressure regulator
- Head pressure regulator
- Liquid level regulator
- Crankcase pressure regulator

Safety instructions:

- **Read installation instructions thoroughly. Failure to comply can result in device failure, system damage or personal injury.**
- **It is intended for use by persons having the appropriate knowledge and skill. Before attempting to install the valve make sure pressure in system is brought to and remains at atmospheric pressure.**
- **Do not release any refrigerant into the atmosphere!**
- **Do not use any other fluid media without prior approval of ALCO Controls. Use of fluid not listed could result in:**
  Change of hazard category of product and consequently change of conformity assessment requirement for product in accordance with European pressure equipment directive 97/23/EC.
- **Do not operate valve connected directly to supply voltage. Use applicable stepper motor driver.**
- **Switch off all voltages / currents before cabling.**
- **Do not operate system before all cable connections are completed.**
- **Do not operate the valve when the compressor is not running.**
- **Do not operate the valve when system is under vaccum except for closure of valve before refrigerant charging.**
- **Comply with local electrical regulations when wiring.**

Mounting location:

- Expansion valve and liquid injection application:
  - The valve must be installed in horizontal position to vertical position (Fig. 1)
  - For best result, locate the valve as close as possible to the distributor or inlet of evaporator
- Hot gas bypass applications:
  - Electrical connection must be downward (as per Fig 1).
  - Install the valves as far as possible from compressor discharge.
  - It is also recommended to install a check valve (2) on main hot gas pipe going to condenser after branch line into the valve (1) (see Fig. 2).
- Suction line application: - Electrical connection must be downward

Installation:

- For uni-flow valves the arrow must point in the direction of refrigerant flow.
- **EX4/EX5/EX6/EX7/EX8**: apply brazing for copper to stainless steel with minimum **30% silver brazing rod and required flux** (see Fig. 7).
  - When brazing, direct flame away from valve. Use wet rags or other suitable heat protection.
- **EX8 (old)** is supplied with Rotalock flanges. The fittings are copper plated steel. Apply proper brazing procedure.
  - Make sure the gasket is located properly in groove between valve and flange.
  - Valve and flange must be aligned so that screw-cap can be easily tightened by hand.
  - Tighten the rotalock with 48 Nm.
  - It is recommended to use transportation support for EX8.

Leakage test:

- After completion of installation, a test pressure must be carried out as follows:
  - According to EN378 for systems which must comply with European pressure equipment directive 97/23/EC
  - To maximum working pressure of system for other applications

Warnings:

1) Failure to do so could result in loss of refrigerant and person injury.
2) The pressure test must be conducted by skilled persons with due respect regarding the danger related to pressure.

- Protect the valve against vibration. If the total valve weight results in excessive stress to the piping joints, the valve must be supported by suitable mounting bracket(s).
- The valve must be protected against contaminants. Install an ALCO filter drier before the valve.
- Check for sufficient refrigerant charge/subcooling and make sure no flash gas is present at the inlet of valve before attempting to check valve operation. Install an ALCO sight glass AMI or MIA before the valve.

Wiring and mounting of plug:

- **(Fig. 3** A = White, B = Black, C = Blue, D: Brown**): Prewired plug and cable assembly (EX5-N/L/C...)** is ready for connection to the valve. There is no specific requirement for positioning of plug on pins (see Fig. 8). Push the plug on pins on top of the valve. Rotate the nut one turn in clockwise direction and push the plug. Repeat this procedure until the plug is tighten.
- **EX8 old version (Fig. 4):**

1 Terminal block	5 Insulation ring
2 Terminal	6 Washer
3 Fasten-screw	7 Cable gland
4 Housing	8 Gasket

- The plug is equipped with cable gland PG9 (cable diameter max. 8mm, min. 3.5mm). Use proper cable diameter. Wire size min. 0.5 mm^2 is suitable for motor current.
- Pull cable through cable gland (7), washer (6), insulation ring (5) and housing (4)
- Connect wires to terminals (2). Plug has four terminals (# 1, 2, 3 and 4)
- Pull cable back and insert the terminal-block (1) into housing (4)
- Insert fasten-screw (3) into hole on top of housing (4)
- Tighten cable gland (7) - max. torque 1Nm
- Put gasket (8) on valve, insert plug on pins of EX8 and fasten the screw

- Note 1: The insertion of plug on pins of EX8 is possible only on a certain position when the flat slot of plug is corresponding to wider pin of EX8 (pin 4 is wider than pins 1, 2 and 3).
- Note 2: To maintain IP65, proper installation is mandatory. Loose cable gland or fasten-screw, missing gasket or washer will result in loss of protection against moisture.

Wiring to driver/controller:

See wiring diagram of assosiated driver or controller.
Warning: Improper wiring will result wrong direction of rotation or no rotation of stepper motor. See installation instruction of electronic board.

Operation:

See operation manual of associated electronic driver/controller.
Warning:
All valves are delivered at half open. Do not charge system before closure of valve. See operating instruction of associated driver/controller.

Service hints:

- Do not apply motor voltage/current out of specified range.
- For motor check, use an ohmmeter with suitable range as shown in Fig. 3 (Fig. 5 for EX8 old).
- EX4/EX5/EX6/EX7/EX8 has capability of positive shut-off when it is driven to fully close position.

Technical Data

Type	EX4	EX5	EX6	EX7	EX8	EX8 (old)
Maximum working pressure	PS: 45 bar				PS: 45 bar	PS: 35 bar
Operating temperature at motor	Uni-flow versions: –50°C … +100°C, Bi-flow versions: -40°C … +80°C					
Connection, DN	see Fig. 6					
Fluid group	II					
Refrigerant: CFC, HCFC, HFC	√	√	√	√	√	√
Hazard category: PED 97/23/EC	-	-	-	I	I	I
Nominal Supply Voltage U:	24 VDC	24 VDC	24 VDC	24 VDC	24 VDC	24 VDC
Maximum Current Imax.:	0.5 A	0.5 A	0.5 A	0.75 A	0.8 A	0.8 A
CE Marking	not applicable	not applicable	not applicable	√	√	√

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EX4/EX5/EX6 **EX7** **EX8**

Fig. 1

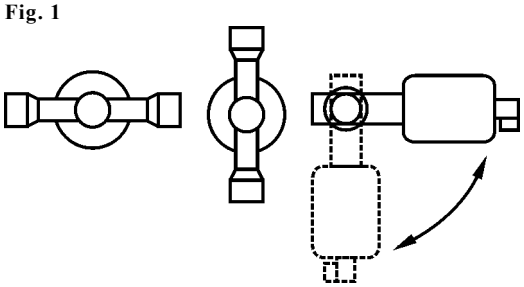


Fig. 2

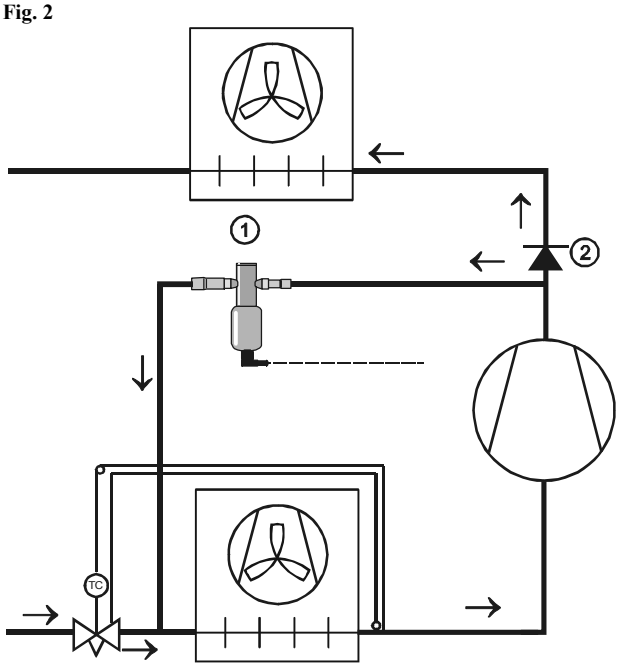
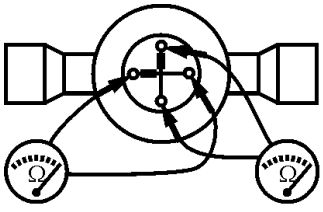


Fig. 3

EX4/EX5/EX6/EX7/EX8
EXV



EX5-N/L/C…
Plug and cable assembly

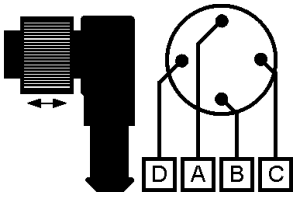


Fig. 4 EX8 (old)

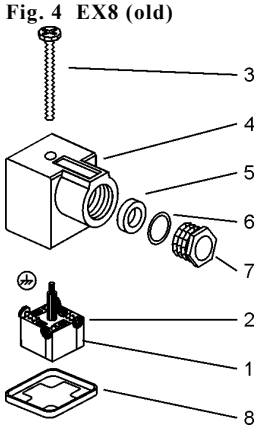


Fig. 5 EX8 (old)

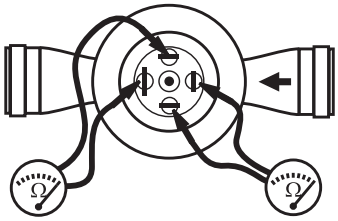


Fig. 7

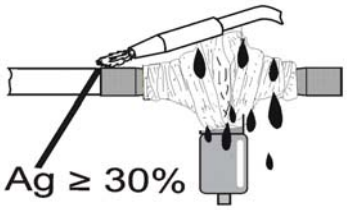


Fig. 8 EX4/5/6/7/8

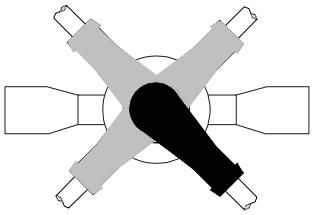
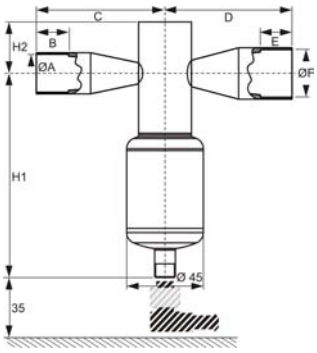
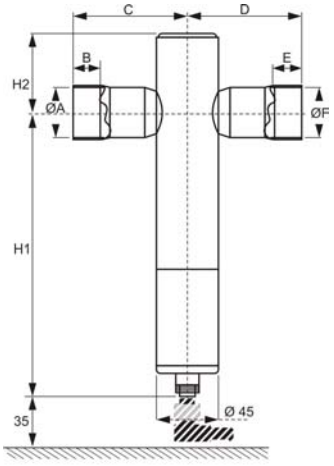


Fig. 6

EX4/EX5/EX6/EX7



EX8



EXV	Ø A x Ø F (ODF)	B	C	D	E	H1	H2
EX4-I21	3/8" x 5/8"	8	45	55	11	113	25
EX4-M21	10 x 16 mm	8	45	55	11	113	25
EX4-U31	16 x 16 mm (5/8" x 5/8")	11	55	55	11	113	25
EX5-U21	5/8" x 7/8" (16 x 22mm)	11	55	65	16	113	25
EX5-U31	7/8" x 7/8" (22 x 22mm)	16	65	65	16	113	25
EX6-I21	7/8" x 1-1/8"	16	65	75	19	113	25
EX6-M21	22 x 28 mm	16	65	75	19	113	25
EX6-I31	1-1/8" x 1-1/8"	19	75	75	19	113	25
EX6-M31	28 x 28 mm	19	75	75	19	113	25
EX7-I21	1-1/8" x 1-3/8"	20	77.5	82.5	23	157	42
EX7-M21	28 x 35 mm	20	77.5	82.5	23	157	42
EX7-U31	1-3/8 x 1-3/8 (35 x 35mm)	23	82.5	82.5	23	157	42
EX8-M21	42 x 42 mm	20	80	80	20	200	56
EX8-U21	1-3/8 x 1-3/8 (35 x 35mm)	20	80	80	20	200	56
EX8-I21	1-5/8 x 1-5/8	20	80	80	20	200	56

EX8-M21 old	42 x 42 mm	25	119	117	25	202	78
EX8-U21 old	1-3/8 x 1-3/8 (35 x 35mm)	25	119	117	25	202	78