



One Valve For All Applications  
*Electrical Control Valves And Controllers*  
For Refrigeration And Air-Conditioning



## How to Save Energy in Industrial Cooling and Air-Conditioning

The recent energy price increases caused an explosion of the operating cost of systems. To reduce energy consumption saves money and as a beautiful side effect protects the environment. Refrigeration and air-conditioning systems belong to the big energy consumers all over the world. Means to reduce the consumption have a strong effect on the cost.

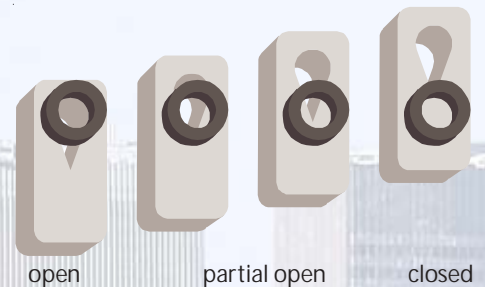
Under full load conditions or fixed condensing pressure, conventional, as well as electronic systems operate efficient. Under partial load condition or floating condensing pressure, which happens at low ambient temperature (e.g. at cloudy whether, in the night, in spring, fall or winter) the condensing pressure decreases. In this case Thermo-Expansion valves tend to oscillate which decreases their lifetime. Systems with electronic components operate in partial load the same exact and stable as under full load. The potential to save energy is best at low condensing pressure.



Control valves EX5 ... EX8 for capacities from 5 to 1000 kW.

### Advantages of Electrical Control Valves EX

The electrical control valves **EX5**, **EX6**, **EX7** and **EX8** from ALCO are optimised for control of liquid or gaseous mass flow in refrigeration systems. The stepper motor drive, which produces exact valve opening, is energised directly from the electrical power and therefore operates independent from differential pressure.



open

partial open

closed

### The Electronic Controllers from ALCO

The controller is responsible for the respective control task. ALCO controllers are optimised for the requirements of refrigeration and air-conditioning and perform all control tasks which have been performed by conventional valves in the past, as superheat control or capacity control.

Valve seat and slider are made out of solid ceramic. Positive shut off function eliminate the need for additional solenoid valve. The special form of the valve slide provides for proper floating through the valve and highly linear capacity characteristic between 10% and 100% of maximal capacity.



Superheat controller EXD-S



Uninterruptible Power Supply ECP-024



Stepper motor controller EXD-U

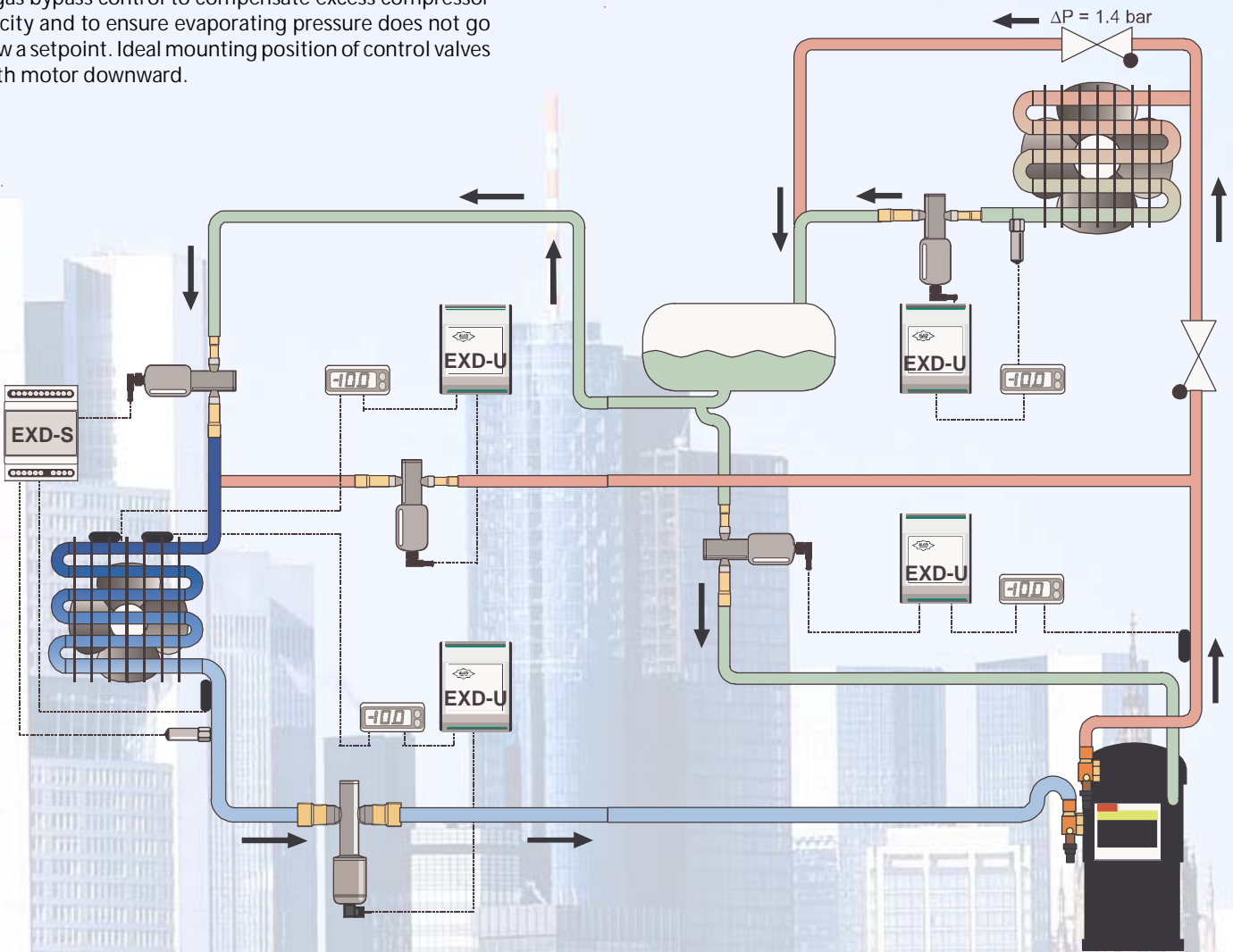
The electronic Superheat Controller **EXD-Sxx** controls the superheat at the evaporator. A complete system consisting of Control Valve, Superheat Controller, Temperature and Pressure Sensor controls the superheat exactly to setpoint, independent from condensing pressure. The MOP function protects the compressor from dangerous overload conditions. The positive shut-off function eliminates the use of an additional solenoid valve, because the Uninterruptible Power Supply **ECP-024** closes the valve after power loss. The controllers are pre-configured for each refrigerant and valve type. Additional commissioning is not required.

The Universal Stepper Motor Control **EXD-U** is used in all other commercial refrigeration and air-conditioning applications. Opening of the Electrical Control Valve follows exactly the analog input signal of 0 ... 10 V or 4 ... 20 mA. The digital input signal is used to close the valve independent from analog input. When the digital signal switches the controller on again, the valve opens to the opening specified by the analogue input. The optional selectable "Start Mode" first opens the valve to 1/3 opening and then to the analogue set point.

# Applications of Electrical Control Valves

The sample refrigeration circuit demonstrates how one Control Valve can be used in different control tasks: Expansion valve for superheat control; suction pressure control for capacity control, liquid injection for desuperheating of compressor, condensing pressure control and hot gas bypass control to compensate excess compressor capacity and to ensure evaporating pressure does not go below a setpoint. Ideal mounting position of control valves is with motor downward.

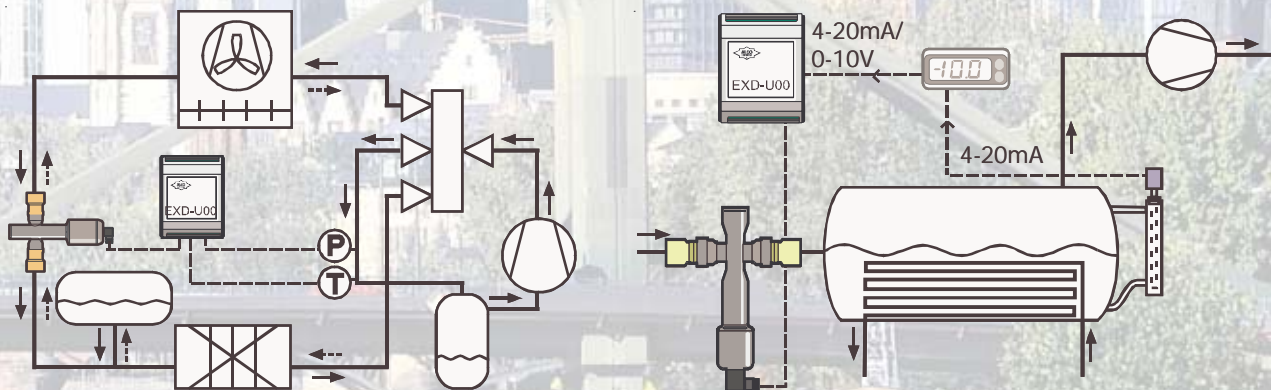
The same valve can be used for all conventional refrigerants (R22, R134a, R407C, R404A, R507, R410A etc\*).



## Other Applications:

For heatpumps with inverse refrigerant flow EX7-B21 is now available in bidirectional version:

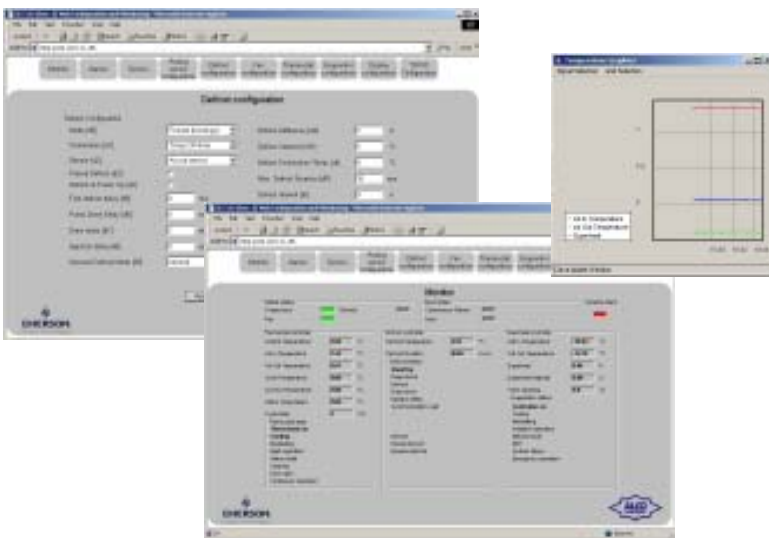
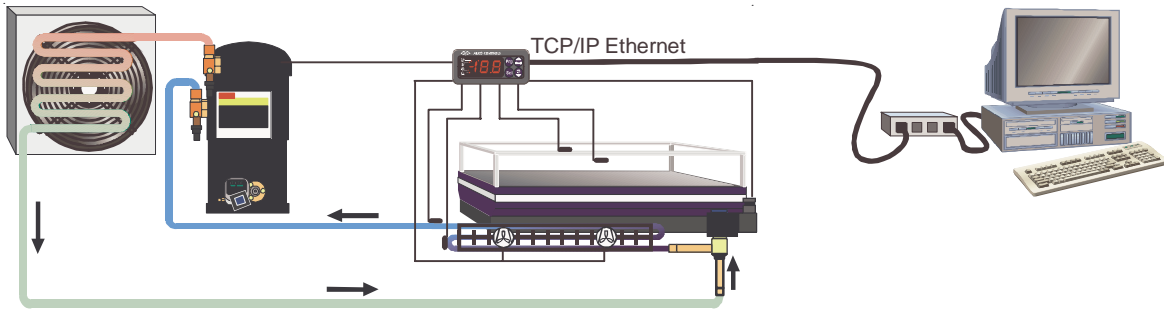
Level control is preferred application in water chillers with flooded evaporators:



\* Not released for use with caustic, poisonous or flammable substances.

## Electronic Controllers for Cold Rooms and Display Cases

The controllers of the popular EC-series are used for control of display cases, cold rooms, compressor packs and condensers. The controllers fulfill several control tasks simultaneously, as superheat and temperature control, defrost, compressor, condenser and condensing unit control.



Two network protocols support remote monitoring, alarm, status parameter control and commissioning:

- **TCP/IP Controller** for small refrigeration systems with Ethernet connection to PC of service technician. The standard protocol TCP/IP and the built-in web server provide a clearly arranged display. The service technician just calls the pages with his local web browser.
- **LON Controller** for large refrigeration systems with third party controllers or building automation. Common feature of this product family is the standard network protocol LON.

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