

EMERSON CLIMATE TECHNOLOGIES-EX Valves & Controls EX4-EX8 Electrical Control Valve

The EX4-EX8 are stepper motor driven valves that are optimized for the control of liquid or gaseous mass flow in refrigeration systems. Multifunction capability as expansion valve, hot gas bypass, suction gas throttling, head pressure, liquid line actuator and other applications systems.



Features

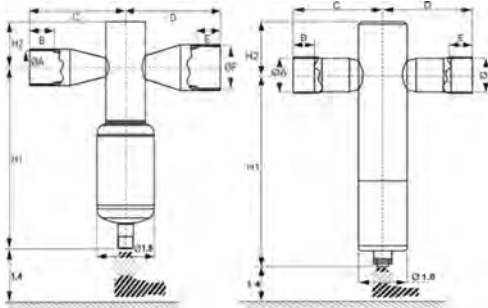
- Fully hermetic design
- Fast full stroke time
- Applicable to all common refrigerants (HCFC, HFC), for subcritical CO₂ applications
- High resolution and excellent repeatability
- Bi-flow versions for heat pump applications
- Positive shut-off function to eliminate the use of an additional solenoid valve
- Linear flow capacity
- Wide capacity range (10 - 100%)
- Continuous modulation of mass flow, no stress (liquid hammering) in the refrigeration circuit
- Direct coupling of motor and valve for high reliability (no gear mechanism)
- Ceramic slide and port for accurate flow and minimal wear
- Balanced force design
- Corrosion resistant stainless steel body, and connections

Specifications

- CE marking:
 - EX4/EX5: not required
 - EX6-EX8: required, Cat I, Module A
- MOPD:
 - EX4-EX7: 505 psid, EX8: 435 psid
- MWP:
 - 650 psig
- Ambient temperature:
 - 40°F to +130°F
- Humidity:
 - 5 to 95% R.H.
- External leakage:
 - ≤ 0.1 oz/yr (R-22)
- Stepper motor type:
 - Bi-polar, phase current by chopper control (constant current)
- Electrical connection:
 - 4 pin terminal via plug
- Driver supply voltage:
 - Recommended: 24 VDC
 - Range: 18-36 VDC
- Phase current (operating):
 - EX4-EX6: 500 mA max
 - EX7: 750 mA
 - EX8: 800 mA
- Holding current:
 - EX4-EX6: 100 mA
 - EX7: 250 mA
 - EX8: 500 mA
- Nominal input power per phase:
 - EX4-EX6: 3.5W
 - EX7-EX8: 5W
- Phase inductance:
 - EX4-EX6: 30 mH ±25%
 - EX7: 20 mH ±25%
 - EX8: 22 mH ±25%
- Step mode:
 - 2 phase full step
- Step angle:
 - 1.8° per step ±8%
- Total number of steps:
 - EX4-EX6: 750 full steps
 - EX7: 1600 full steps
 - EX8: 2600 full steps
- Stepping rate:
 - 500 Hz
- Winding resistance per phase:
 - EX4-EX6: 13 ohm ±10%
 - EX7: 8 ohm ±10%
 - EX8: 6 ohm ±10%
- Full travel time:
 - EX4-EX6: 1.5 seconds
 - EX7: 3.2 seconds
 - EX8: 5.2 seconds

EMERSON CLIMATE TECHNOLOGIES-EX Valves & Controls EX4-EX8 Electrical Control Valve Dimensional Data (in)

Valve Type	Inlet x Outlet (ODF)	B	C	D	E	H1	H2
EX4-I21	3/8" x 5/8"	0.3	1.8	2.2	0.4	4.4	1.0
EX5-U21	5/8" x 7/8"	0.4	2.2	2.6	0.6	4.4	1.0
EX6-I21	7/8" x 1-1/8"	0.6	2.6	3.0	0.7	4.4	1.0
EX7-I21	1-1/8" x 1-3/8"	0.8	3.1	3.2	0.9	6.2	1.7
EX8-I21	1-5/8" x 1-5/8"	0.8	3.1	3.1	0.8	7.9	2.2



EX4/EX5/EX6/EX7/EX8

Nominal Capacities in Tons (10% - 100%)

Nominal capacities as expansion valves and liquid injection valves

Valve Type	R-407C	R-22	R-134a	R-404A	R-410A	R-23	R-124	R-744
EX4	.6 – 5	.6 – 4.7	.3 – 3.6	.3 – 3.3	.6 – 5.5	.6 – 5.1	.3 – 2.6	.9 – 9.5
EX5	1.4 – 15.1	1.4 – 14.2	1.1 – 11.1	1.1 – 10	1.7 – 16.5	1.4 – 15.4	.9 – 8	2.8 – 29
EX6	4.3 – 35.8	4.3 – 34.1	2.8 – 26.4	2.8 – 23.9	4.3 – 39.8	3.7 – 37	2 – 19.1	6.8 – 69.4
EX7	10 – 98.7	10 – 93.8	7.1 – 72.5	7.1 – 65.4	11.4 – 109.5	–	–	19.9 – 190.5
EX8	28.4 – 263	25.6 – 250.2	19.9 – 193.4	17.1 – 174.3	28.4 – 292	–	–	51.2 – 508.7

Note 1: EX Bi-flow versions are not released for use with R-124 and R-23 refrigerants.

Note 2: EX Bi-flow versions have identical capacity in both flow direction

Refrigerant	Evaporating Temperature	Condensing Temperature	Subcooling
R-22, R-134a, R-404A, R-410A	+40 °F	+100°F	2°F
R-407C	+40°F dew point	+100°F bubble	2°F
R-124	+68°F	+176°F	2°F
R-23	-76°F	-13°F	2°F
R-744	-40°F	14°F	2°F

The nominal capacity is based on the following conditions:

Ordering Information

Type	Inlet Connection (in)	Outlet Connection (in)	Reference #	PCN	Description
EX4-I21	3/8	5/8	800615	097719	EX4 Electrical Control Valve
EX5-U21	5/8	7/8	800618	097720	EX5 Electrical Control Valve
EX6-I21	7/8	1 1/8	800620	097721	EX6 Electrical Control Valve
EX7-I21	1 1/8	1 3/8	800624	097722	EX7 Electrical Control Valve
EX8-I21	1 5/8	1 5/8	804631	097723	EX8 Electrical Control Valve
EX5-N60	N/A	N/A	804652	097718	Valve Connector Cable

EMERSON CLIMATE TECHNOLOGIES-EX Valves & Controls EXD-U00 Universal Driver Module

The EXD-U00 is a universal driver that enables the operation of Emerson stepper motor driven valves used in applications such as solenoid valves, electronic expansion valves, hot gas bypass or evaporator pressure regulator as capacity control, crankcase pressure regulator, heat reclaim regulator, and liquid level control.

Features

- Valve opening is proportional to 4-20mA or 0-10V analog input signal
- Plug and play, no parameter settings required
- Digital input can be used to force valve closing
- Dip-switches for selection of EX control valve type, analog input and start mode

Specifications

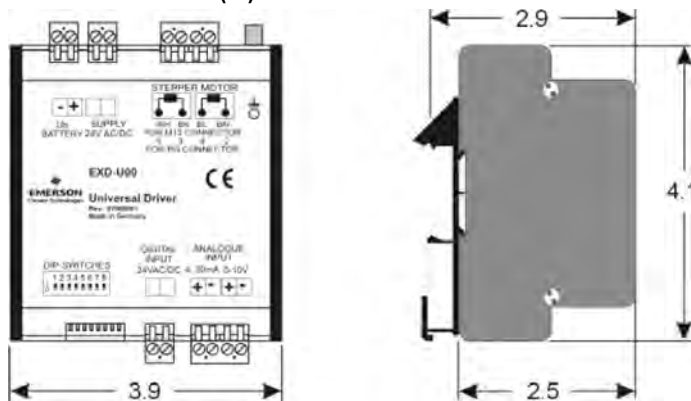
- Supply voltage: 24V AC $\pm 10\%$, 50-60HZ, 24V DC $\pm 10\%$
- Supply current: To be protected by a 0.8A external fuse
- Power consumption: 10VA in conjunction with EX valve
- Temperature:
 - Storage: -5°F to $+150^{\circ}\text{F}$
 - Operating: 32°F to $+140^{\circ}\text{F}$
- Humidity: $< 90\%$ R.H. non condensing
- Approvals: EMC EN 61326-1, EN50081, EN50082
- Marking: CE
- Input analogue signal:
 - 4-20 mA
 - Burden 364Ω
 - 0-10V
 - Impedence $27\text{K} \Omega$
- Digital input: 24V AC $\pm 10\%$, 50-60Hz, 24V DC $\pm 10\%$
- Connection to EX4-8: Via 4 wires cable, maximum 6m length AWG 20/22
- Connector: Screw terminals for wire size 12/20 AWG
- Mounting: DIN rail mounted
- Housing: Aluminum



Ordering Information

Type	Reference #	PCN	Description
EXD-U00	804557	097710	Universal Driver Module
K09-U00	804559	097711	Electrical Terminal Kit

Dimensional Data (in)



EMERSON CLIMATE TECHNOLOGIES-EX Valves & Controls EC3-X32 Superheat Controller

The EC3 is a stand-alone universal superheat controller for stable superheat control with stepper motor driven electronic control valves and is used for air conditioning, refrigeration and industrial applications such as chillers, industrial process cooling rooftops, heat pumps, package units, close controls, cold room, food process and air driers. With the EC3-X32, parameters can be downloaded through ECD-002 or through TCP/IP compatible interface.



Features

- Superheat control in conjunction with Emerson stepper motor driven electrical control valves EX4-EX8
- Limitation of evaporating pressure (MOP)
- Low and high superheat alarm
- Low pressure switch function/alarm
- Freeze protection function/alarm
- Pump down function
- Monitoring of sensors and sensor wiring and detection of sensor and wiring failures
- Intelligent alarm management to protect the compressor, i.e fail safe operation
- Integral rechargeable battery to close EX control valves in case of power loss.
- Support of TCP/IP Ethernet technology with WebServer functionality allows monitoring and configuration of controllers through a standard WebBrowser
- Electrical connection via plug-in type screw terminal
- Aluminum housing for DIN rail mounting

Specifications

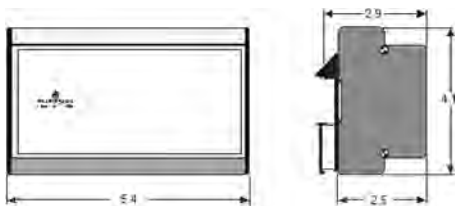
- Supply voltage: 24VAC \pm 10%, 50/60 Hz
- Digital input: 24VAC \pm 10%, 50-60 Hz, 24VDC \pm 10%
- Power consumption: 25 VA max. including connected EX valve and display/keyboard
- Internal battery charging time: Approx. 2 hours if battery is fully empty
- Plug-in connector size: Removable screw version, wire size 12-20 AWG
- Ground connection: 1/4 in. spade earth connector
- Applied directive: EMC, LVD, RoHS (EN 61326, EN 50081, EN 61000-6-2, EN 61000-4-2, EN 61000-4-3, EN 610004-4, EN61000-4-5, EN 61000-4-6, EN 61000-4-11)
- Marking: CE
- Temperatures: Storage, -5°F, to +150°F
Operating, 32°F, to +140°F
- Humidity: 0 – 80% R.H. non condensing

Ordering Information

Type	Reference #	PCN	Description
EC3-X32	807782	097708	Superheat Controller
K03-X32	807644	097709	Terminal Kit
ECN-N60	804497	097714	Temperature Sensor
EX4-EX8**	**	**	Electrical Control Valve
PT4-07M	802332	097715	Pressure Sensors (R-22/F-124/ R-134a/R-404A/R-407C/R507C)
PT4-18M	802333	097716	Pressure Sensor (R-410A)
PT4-30M	802334	097728	Pressure Sensor (R-744)
PT4-M60	804805	097717	Plug and Cable Assembly for Pressure Sensor
ECD-002	807657	097712	Optional Display/Keypad
ECC-N30 or any standard Cat 5 patch cord with RJ45 connectors	807861	097713	Cable Connection between EC3-X32 and ECD-002

**For further details refer to the EX4-EX8 product page.

Dimensional Data



EMERSON CLIMATE TECHNOLOGIES-EX Valves & Controls EC3-X33 Superheat Controller

The EC3 is a stand-alone universal superheat controller for stable superheat control with stepper motor driven electronic control valves and is used for air conditioning, refrigeration and industrial applications such as chillers, industrial process cooling rooftops, heat pumps, package units, close controls, cold room, food process and air driers. The EC3-X33 requires the use of the ECD-002 display key pad unit for setting up the controller.



Features

- Superheat control in conjunction with Emerson stepper motor driven electrical control valves EX4-EX8
- Limitation of evaporating pressure (MOP)
- Low and high superheat alarm
- Monitoring of sensors and sensor wiring and detection of sensor and wiring failures
- Intelligent alarm management to protect the compressor, i.e fail safe operation
- Integral rechargeable battery to close EX control valves in case of power loss.
- Electrical connection via plug-in type screw terminal
- Aluminum housing for DIN rail mounting

Specifications

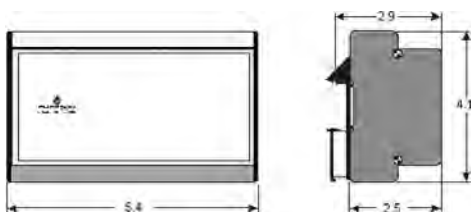
- Supply Voltage: 24VAC \pm 10%, 50/60 Hz
- Digital Input: 24VAC \pm 10%, 50-60 Hz, 24VDC \pm 10%
- Power Consumption: 25 VA max. including connected EX valve and display/keyboard
- Internal battery charging time: Approx. 2 hours if battery is fully empty
- Plug-in connector size: Removable screw version wire size 12-20 AWG
- Ground connection: 1.4 in. spade earth connector
- Applied Directive: EMC, LVD, RoHS
EN 61326, EN 50081, EN 61000-6-2, EN 61000-4-2, EN 61000-4-3, EN 61000-4-4, EN61000-4-5, EN 61000-4-6, EN 61000-4-11)
- Marking: CE
- Temperatures: Storage: -5°F to +150°F
Operating: 32°F to +140°F
- Humidity: 0 – 80% R.H. non condensing

Ordering Information

Type	Reference #	PCN	Description
EC3-X33	807783	097707	Superheat Controller
K03-X32	807644	097709	Terminal Kit
ECN-N60	804497	097714	Temperature Sensor
EX4-EX8**	**	**	Electrical Control Valve
PT4-07M	802332	097715	Pressure Sensors (R-22/F-124/ R-134a/R-404A/R-407C/R507C)
PT4-18M	802333	097716	Pressure Sensor (R-410A)
PT4-30M	802334	097728	Pressure Sensor (R-744)
PT4-M60	804805	097717	Plug and Cable Assembly for Pressure Sensor
ECD-002	807657	097712	Optional Display/Keypad
ECC-N30 or any standard Cat 5 patch cord with RJ45 connectors	807861	097713	Cable Connection between EC3-X33 and ECD-002

**For further details refer to the EX4-EX8 product page.

Dimensional Data



EMERSON CLIMATE TECHNOLOGIES-EX Valves & Controls EDC-002 Display Unit

The EDC-002 is a display/keypad unit necessary for setting up controllers.

Features

- Front panel mounted interface for parameter and status read-out and for controller setup via keypad
- Indicator LEDs for valve opening/closing, demand and alarm



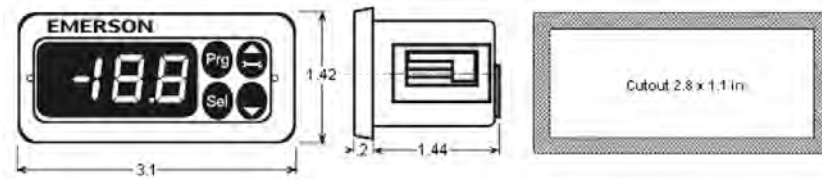
Specifications

- Supply: From EC3 Series controller via connecting cable
- LED indicators: Valve opening, valve closing, alarm, demand
- Display LED: Segmented display, 2-1/2 digits with automatic decimal point between ± 19.9 , switchable between $^{\circ}\text{C}$ and $^{\circ}\text{F}$
- Connecting cable: with RJ45 connectors ECC-N30 or standard CAT5 patch cord
- Temperatures: Storage, -5°F to $+150^{\circ}\text{F}$
Operating, 32°F to $+140^{\circ}\text{F}$
- Humidity: 0 - 80% R.H. non condensing
- Mounting: Panel mount (2.8 x 1.1 inch cutout)

Ordering Information

Device	Reference #	PCN	Description
ECD-002	807657	097712	Optional Display/Keypad
ECC-N30 or any standard Cat 5 patch cord with RJ45 connectors	807861	097713	Cable Connection between EC3-X33 and ECD-002

Dimensional Data



EMERSON CLIMATE TECHNOLOGIES-EX Valves & Controls PT4 Pressure Transmitters

The PT4 Pressure Transmitters convert a pressure into a linear electric output signal. At the heart of the transmitter there is a piezo resistive chip enclosed in an oil capsule.



Features

- Pressure sensitive piezo-based cell with strong primary output signal for precise operation
- Compact dimensions
- Vibration, shock and pulsation resistant
- Reduced full scale error over complete temperature range
- Sealed gauge absolute pressure reference for increased accuracy independent of atmospheric pressure variation
- Output signal is 4 to 20 mA
- Calibrated for specific temperature and pressure ranges to fulfill application demands in air conditioning and refrigeration systems
- Easy-to-install M12 electrical connection with pre-assembled cable assembly
- Pressure connector 7/16-20 UNF with Schrader valve

Specifications

- Supply voltage: Nominal 24 VDC
Range (polarity protected) 8 – 30 VDC
- Permissible noise & ripple: < 1 Vp-p
- Influence of supply voltage: < 0.02 % FS/V
- Operating current: 4 to 20 mA output, Max. ≤ 24 mA
- Load resistance: $RL \leq U_b - 8.0V \cdot 0.02A$
- Mounting position: Non-position sensitive
- Response time: 1 ms
- Temperatures: Ambient: -40°F to +176°F
Medium: -58°F to +275°F
Storage: -40°F to +185°F
- Sensor Life: PT4-07/-18/-30/-50 : ≥5,000,000 cycles full stroke at 77°F
- Burst Pressure: ≥2176 psi
- Electrical connection: PT4-M60
- Approvals: CE marking according to PED, not allowed (SEP)
CE marking according to EMC, CE marked
- Medium compatibility: HFC, HCFC, CFC (not suitable for ammonia and flammable refrigerants!)
- Vibration at 10 – 2000 Hz: Max. 4 g
- Materials: Stainless steel housing, pressure connector and diaphragm in contact with sensed medium

Ordering Information

Type	Reference #	PCN	Description
PT4-07M	802332	097715	Pressure Transmitter
PT4-18M	802333	097716	Pressure Transmitter
PT4-30M	802334	097728	Pressure Transmitter
PT4-M60	804805	097717	Plug/Cable Assemblies

Dimensional Data (in)

