

EXD-U00 Universal Driver Module Technical Data



EXD-U00 universal driver module enables the operation of Emerson stepper motor driven valves EX4/EX5/EX6/EX7/EX8 as

- Solenoid valve
- Electrical expansion valve
- Capacity control by means of hot gas bypass or evaporating pressure regulator
- Crankcase pressure regulator
- Hot gas bypass regulator
- Heat reclaim regulator
- Liquid level regulator

Features

- 4...20mA or 0...10V analogue input signal
- Plug and run, no parameter setting i.e. automatic operation
- Easy configurable by Dip-switches
- DIN rail mounted with aluminium housing
- Easy wiring
- Fully tested and ready for operation
- CE marked



EXD-U00

Selection table

Sure Description	Emerson PCN	Type	Order No.
Universal driver module	097710	EXD-U00	804 557
Electrical terminal kit for EXD-U00	097711	K09-U00	804 559



K09-U00

Introduction

Although the main structure for refrigeration and air conditioning systems (HVAC) has remained unchanged for many years, there has been a continuous trend of system improvements in order to increase the capability, reliability and reduction of energy consumption in HVAC systems. The improvements can be made by modification of the components, i.e. compressors, heat exchangers, system design and with the application of electronic controls.

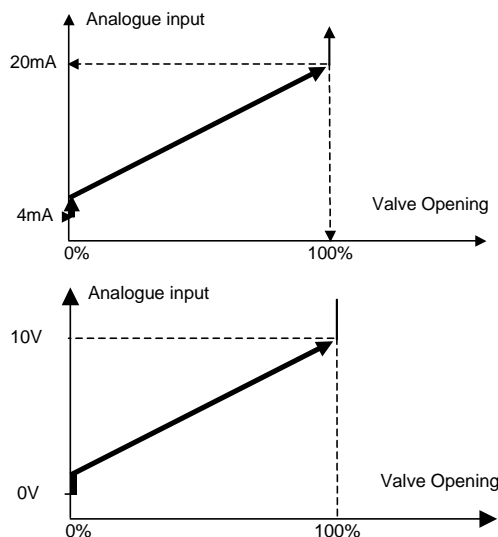
Emerson, manufacturer of flow, temperature and pressure controls, has been working for several years on a new system control solution. This will assist system manufacturers to optimize and improve their systems. The electronic control solution concept stands for reduction of energy consumption while providing better and tighter control of all operating parameters.

Function

The driver module requires an analogue input signal of 4...20mA or 0...10V. The output is the closing/opening of EX4/EX5/EX6/EX7/EX8 and consequently the control of refrigerant liquid or vapor mass flow in accordance with the analogue input. The universal driver module can be connected to any controller which can provide a 4...20mA or 0...10V analogue signal. This gives extreme flexibility to system manufacturers to use any desired controller and achieve different functionalities.

The objective of design was the simplicity of the driver module and real plug and play.

The universal driver module keeps the valve at a fully closed position when the input signal is 4mA or 0V. The valve will be fully open at 20mA or 10V. EXD-U00 module needs a digital input command in order to operate the valve only when it is required.



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Shut-off and Start/Stop command

Emerson stepper motor driven control valves provide positive shut-off when they are driven to a closed position. An external digital input allows the driver module start to regulate the valve. The valve remains at close position as long as the external digital input is off, regardless of analogue input.

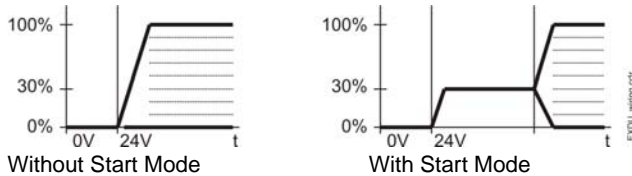
Pump down

Emerson electronic valves can be driven to close position while the compressor is running for pump down function. The initiation and termination of pump down is within the system controller. For more information, please consult Emerson.

Start Mode

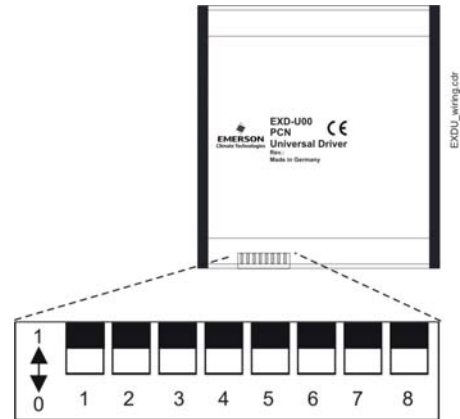
There is the possibility to set the start mode:

- **With start mode:** after start command (24V at digital input), valve opens to 1/3 immediately and after that regulate the mass flow according to external analogue input signal (see figure below, right).
- **Without start mode:** after start command (24V at digital input), valve starts to regulate the mass flow according to analogue input signal (see figure below left).



Setting

The universal driver needs no setting except configuration with dip-switches for the application of a different valve, different analogue input signal, and type of start mode.



Function	Dip Switch Number							
	1	2	3	4	5	6	7	8
EX4/EX5/EX6 operation	0	1	1	0	1	0	-	-
EX7 operation	1	0	0	1	0	1	-	-
EX8 operation	1	1	0	1	1	1	-	-
4-20 mA analogue input signal	-	-	-	-	-	-	-	0
0-10V analogue input signal	-	-	-	-	-	-	-	1
With start mode (Fig.3b)	-	-	-	-	-	-	1	-
Without start mode (Fig.3a)	-	-	-	-	-	-	0	-

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Nominal Capacity Tables for Different Functions

EX4/EX5/EX6/EX7/EX8 Nominal capacities as expansion valves and liquid injection valves

Nominal Capacities (10% ... 100%), Tons

Valve Type	R-407C	R-22	R-134a	R-404A	R-410A	R-23	R-124	R-744
EX4	.6 ... 4.9	.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

The nominal capacity is based on the following conditions:

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

EX4/EX5/EX6/EX7/EX8 Nominal capacities as hot gas bypass regulator, Tons

Valve Type	R-22/R-407C	R-134a	R-404A/R-507
EX4	1.4	1.0	1.3
EX5	4.5	3.1	4.3
EX6	10.5	7.3	10.1
EX7	37.3	26.0	35.7
EX8	113.0	79.0	108.5

+40°F Evap/+100°F Cond for all refrigerants (+109°F dew point for R-407C).

Remarks: EX4, EX5, EX6, EX7 and EX8 must be installed with motor downward in hot gas line applications.

This insures the valve life expectancy.

EX6/EX7/EX8 Nominal capacities as suction pressure regulator (evaporator or crankcase), Tons

Valve Type	R-407C	R-22	R-134a	R-404A
EX6	1.1	1.1	0.9	1.0
EX7	3.8	4.0	3.0	3.5
EX8	11.5	12.2	9.2	10.5

+40°F Evap/+100°F Cond for all refrigerants (+109°F dew point for R-407C) and 2.0 psid pressure drop.

Remarks: EX4, EX5, EX6, EX7 and EX8 must be installed with motor downward in suction line applications.

This insures the valve life expectancy.

Multiply above nominal capacities by following factors to obtain capacities at different pressure drops:

ΔP, psid	1.5	2.0	3.0	4.5
Correction factor	0.82	1.00	1.15	1.41

Example: EX6 provides 1 ton at 2.0 psid pressure drop with R-404A: and 4 psi pressure drop.

EX5/EX6/EX7/EX8 Nominal capacities as condensing pressure regulator and liquid duty, Tons

Valve Type	R-407C	R-22	R-134a	R-404A
EX5	5	6	5	4
EX6	12	13	12	9
EX7	44	46	43	31
EX8	133	140	131	93

+40°F Evap/+100°F Cond for all refrigerants (+109°F dew point for R-407C) and 5 psid pressure drop.

Multiply above nominal capacities by following factors to obtain capacities at different pressure drops.

ΔP, psid	2.0	3.0	5.0
Correction factor	0.65	0.76	1.00

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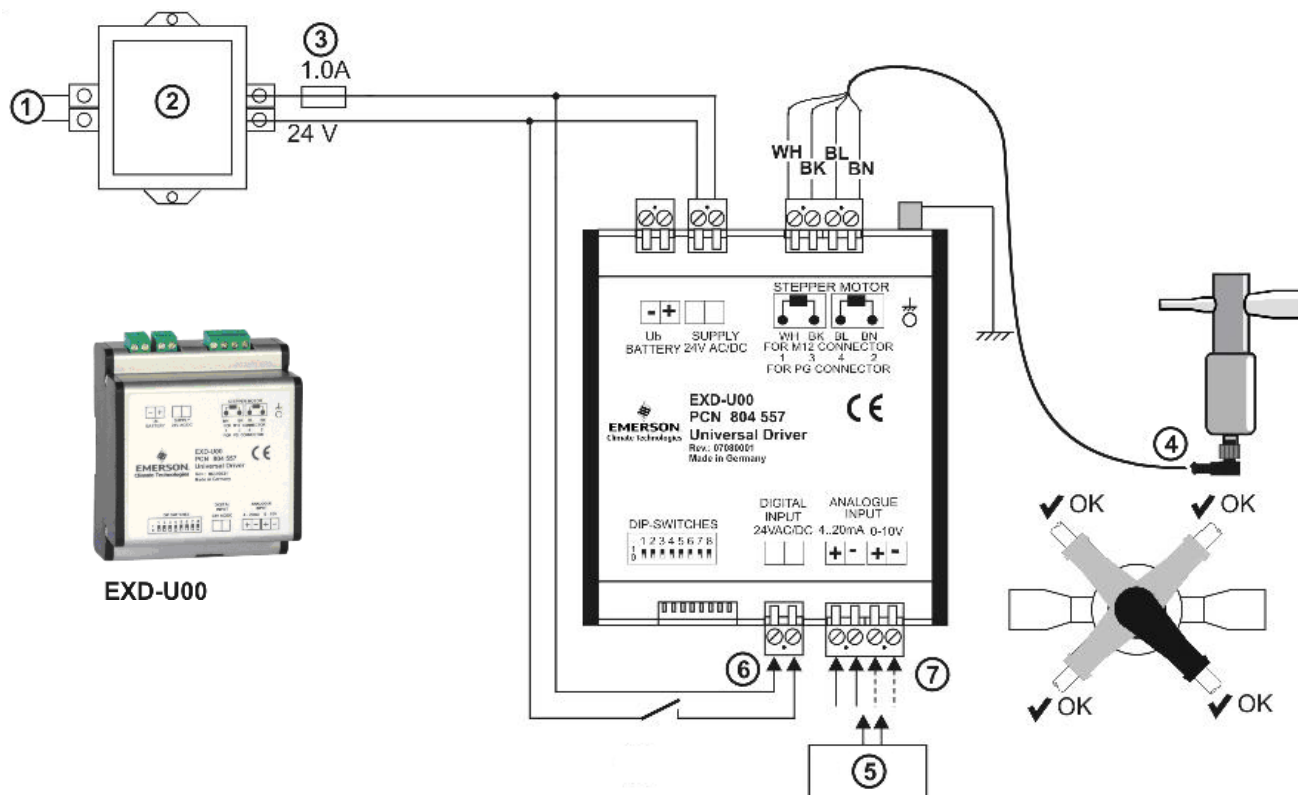
EX6/EX7/EX8 Nominal capacities for hot gas flow such as heat reclaim application, Tons

Valve Type	R-22 / R-407C	R-404A/R-507
EX6	3.1	2.8
EX7	11.1	10.2
EX8	33.8	30.7

Nominal capacities are at 1.0 psid pressure drops, +40°F evaporating temperature, +100°F bubble point for all refrigerants (+109°F dew point for R407C) and 0.8 isentropic efficiency of compressor.

Remarks: EX6/EX7/EX8 must be installed with motor downward in hot gas line applications. This insures the valve life expectancy.

Wiring diagram

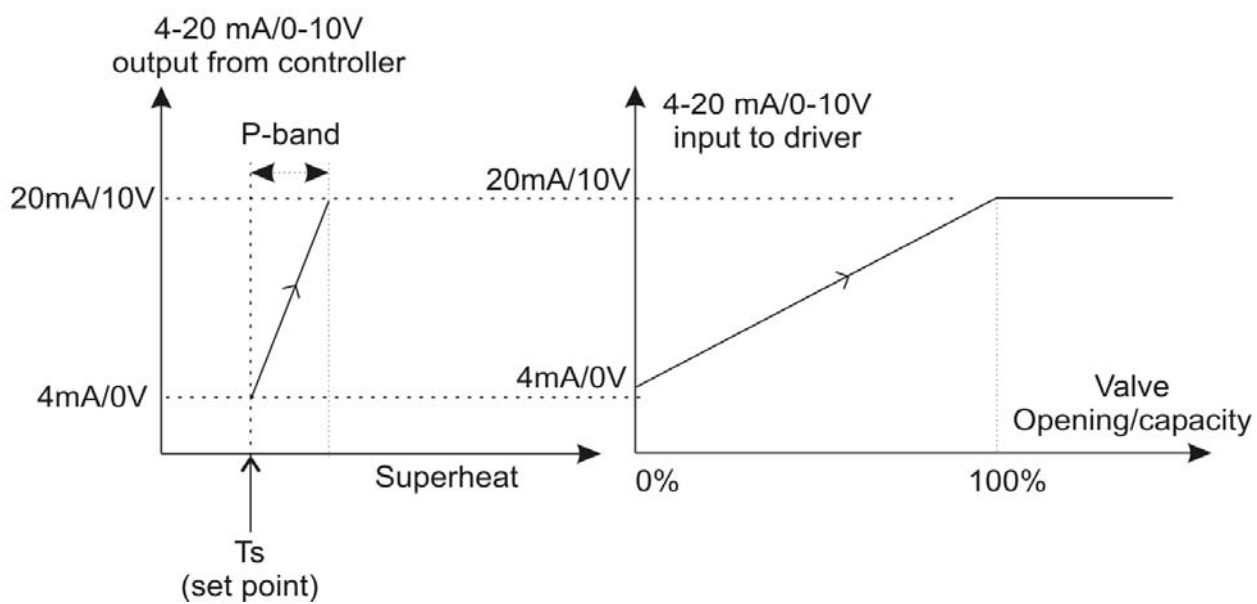
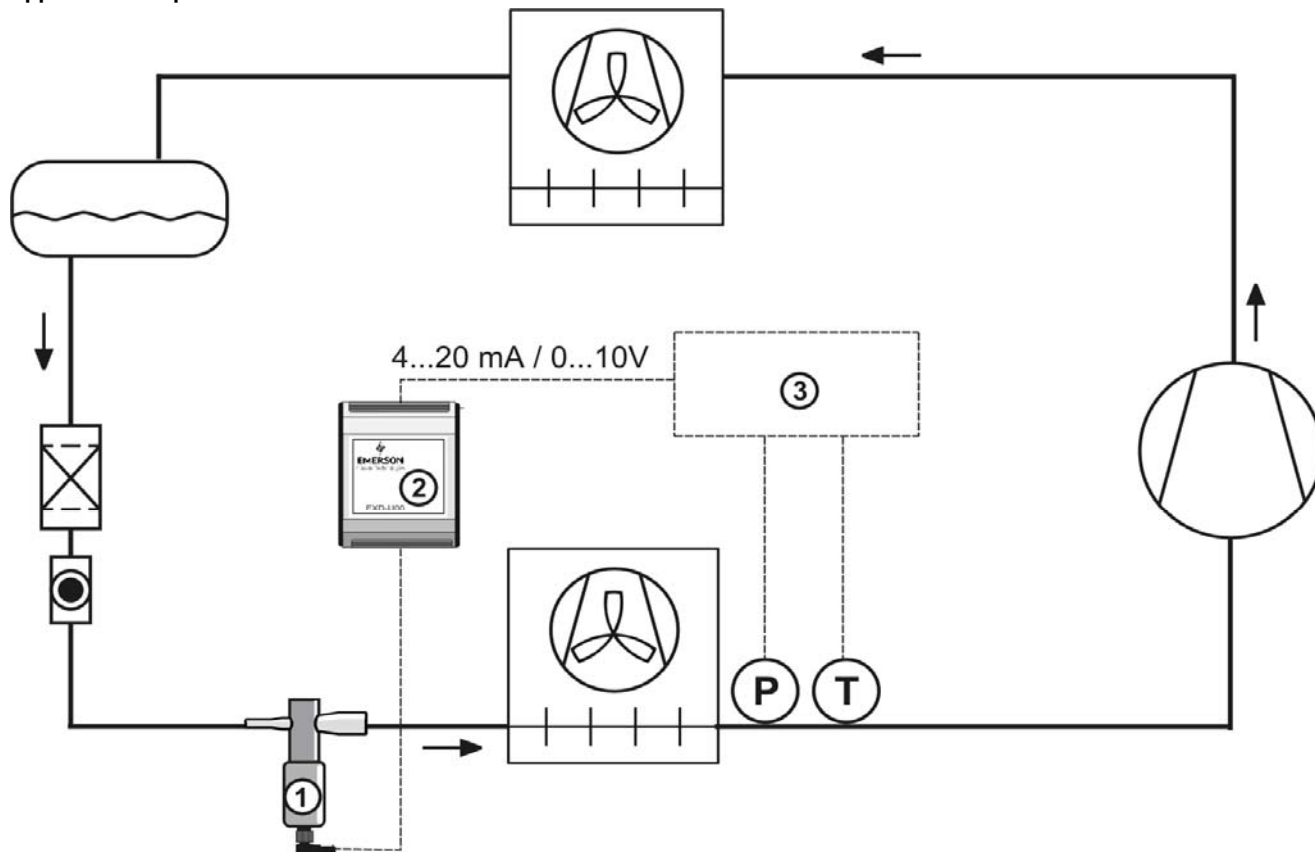


- (1) = Power supply
- (2) = Transformer
- (3) = Fuse
- (4) = Plug cable assembly EX5-Nxx for connection to EX4/EX5/EX6/EX7/EX8
- (5) = Controller supplies 4 ... 20mA or 0 ... 10V
- (6) = Digital input signal (0V = OFF; 24V = ON)
- (7) = Analogue input signal (4 ... 20mA or 0 ... 10V)

Cable color code

- WH = White
- BK = Black
- BL = Blue
- BN = Brown

Application: Expansion valve

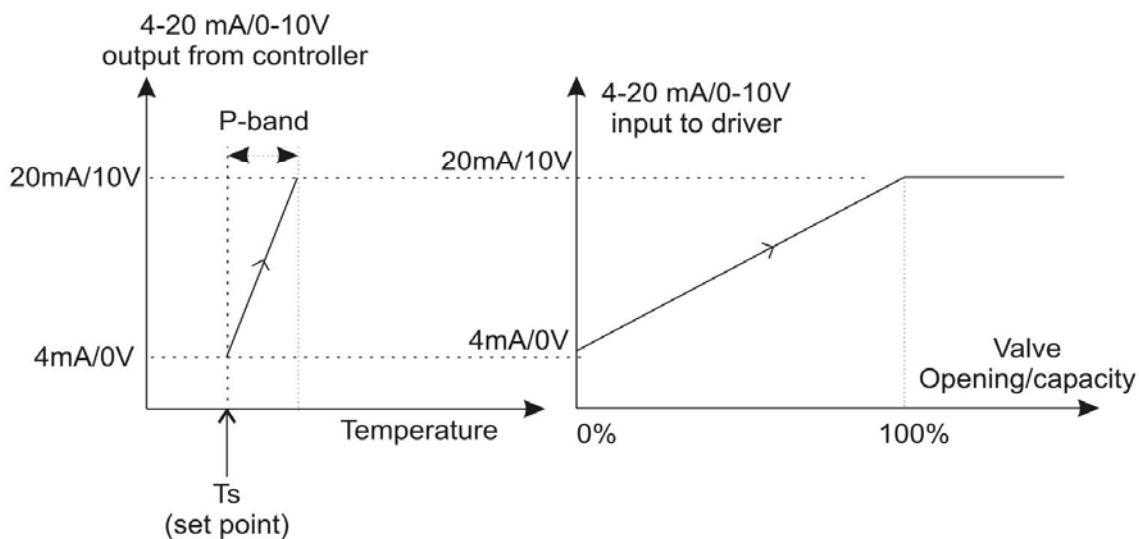
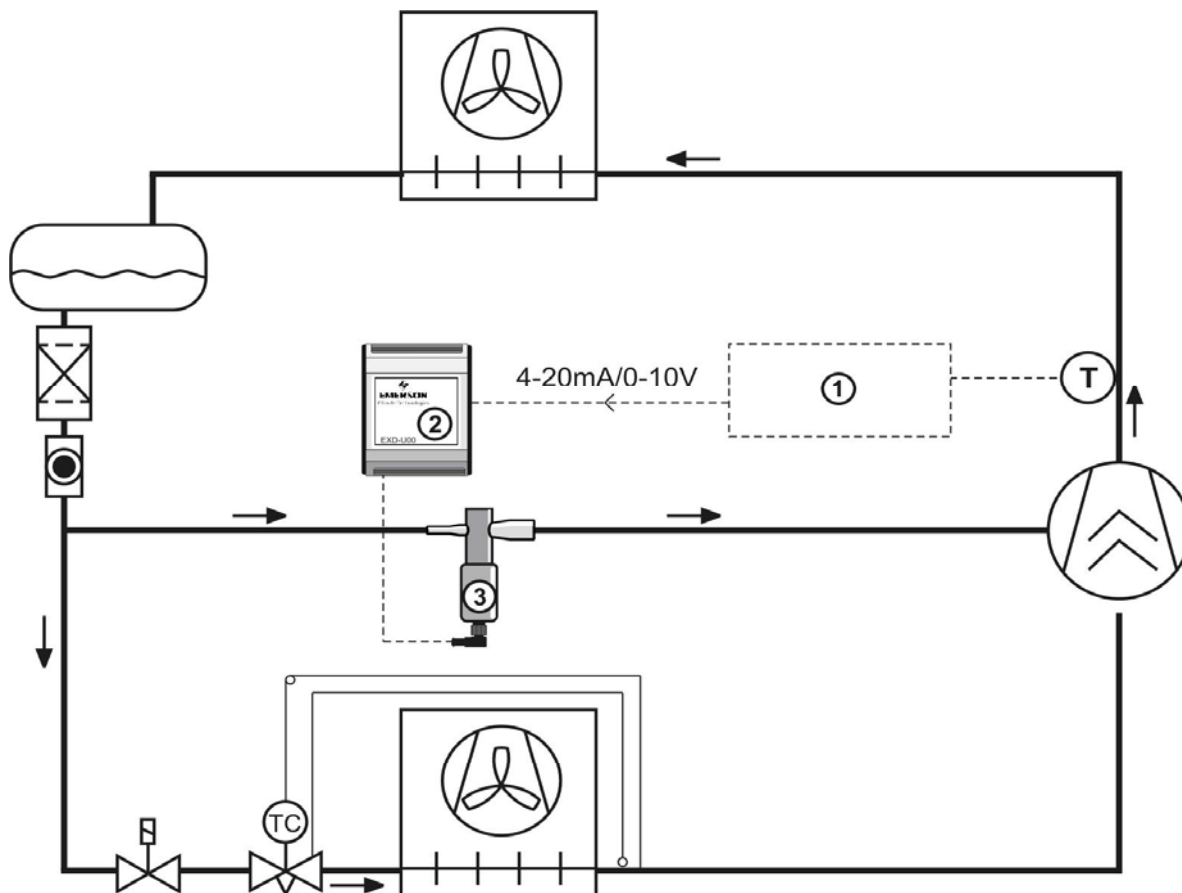


- (1) = Electrical control valve
- (2) = Universal Driver Module EXD-U00
- (3) = Superheat Controller

EXD-U00 Universal Driver Module



Application: Liquid injection

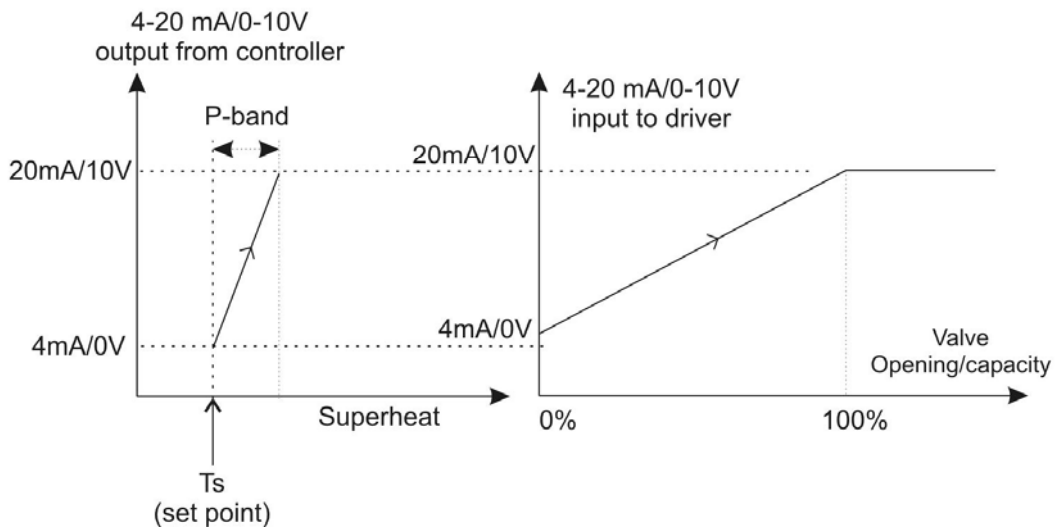
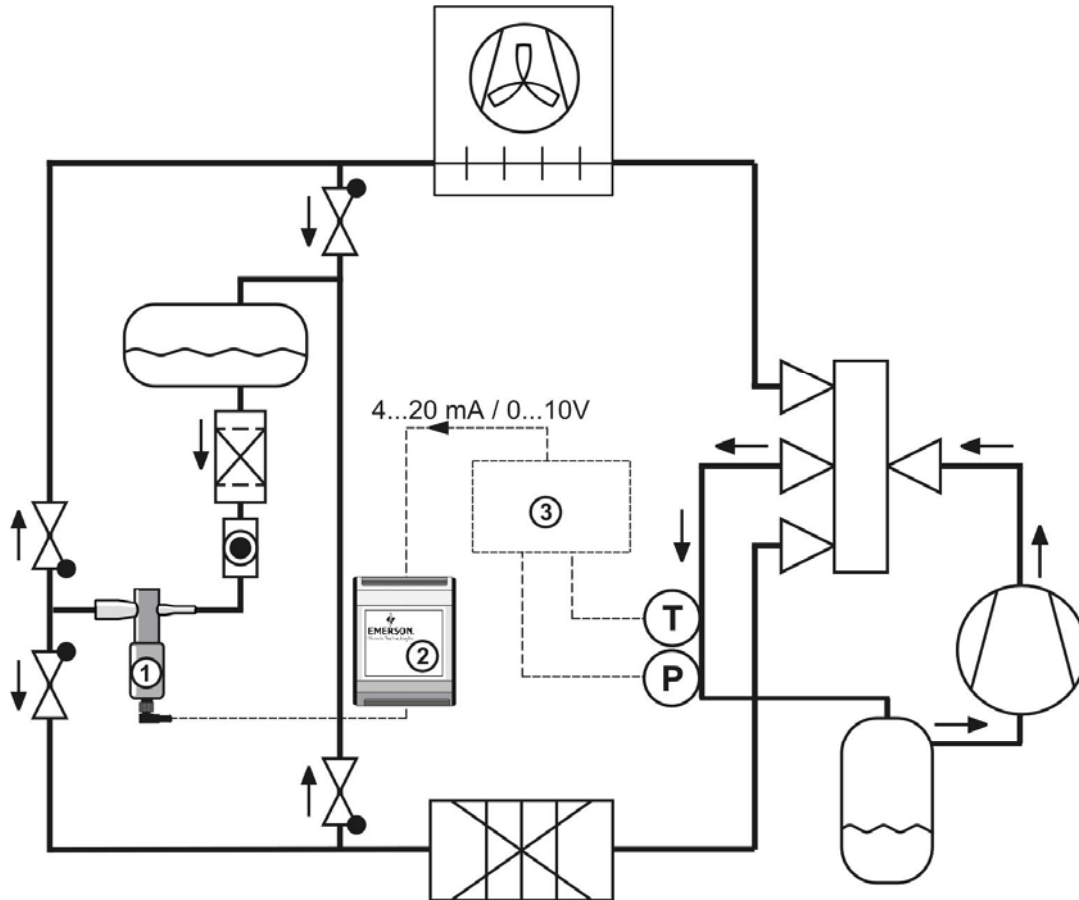


- (1) = Temperature Controller
- (2) = Universal Driver Module EXD-U00
- (3) = Electrical control valve

EXD-U00 Universal Driver Module

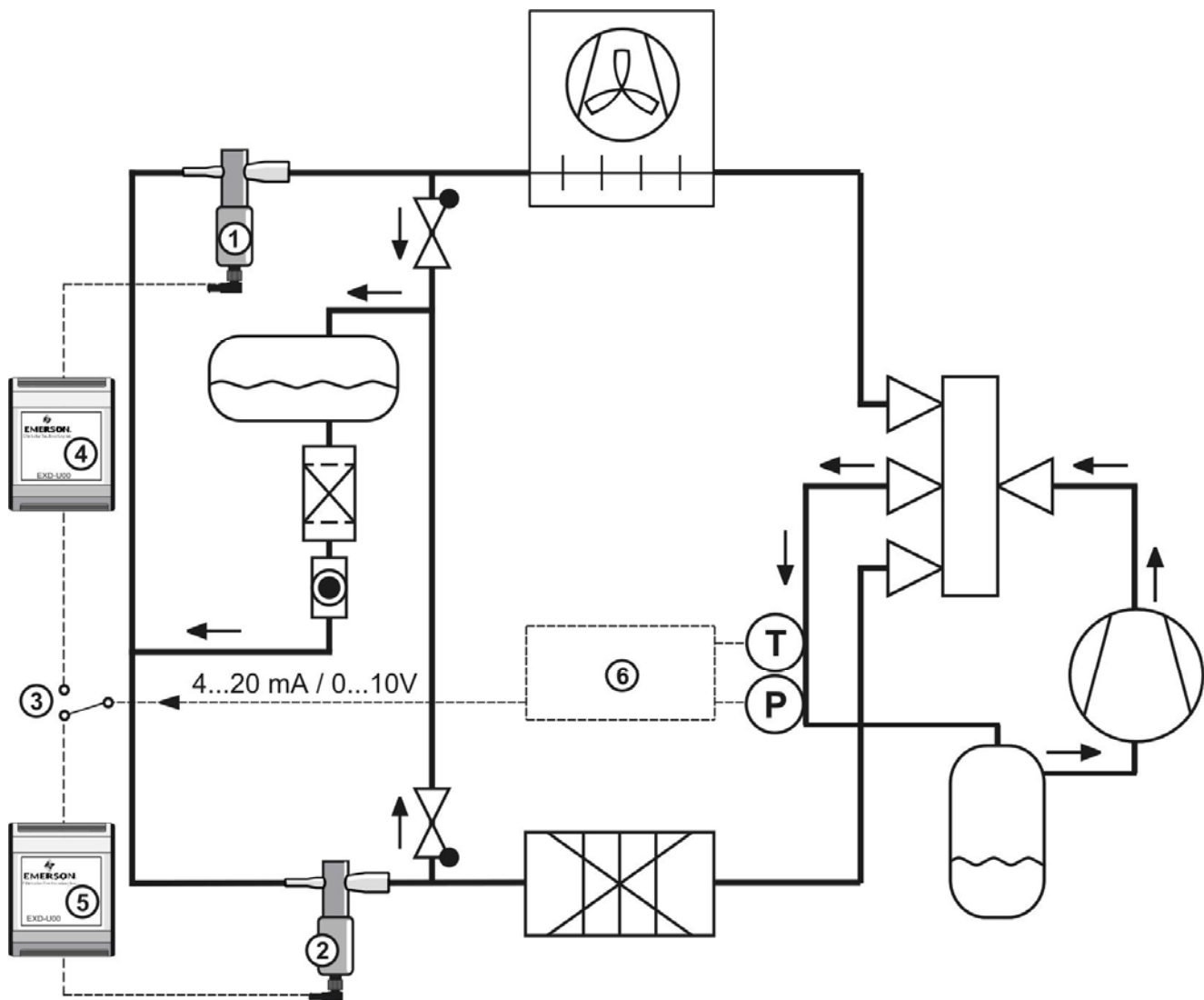


Application: Expansion valve in heat pumps (one EXV)



- (1) = Electrical control valve
- (2) = Universal Driver Module EXD-U00
- (3) = Superheat controller

Application: Expansion valves in heat pumps (two EXVs)

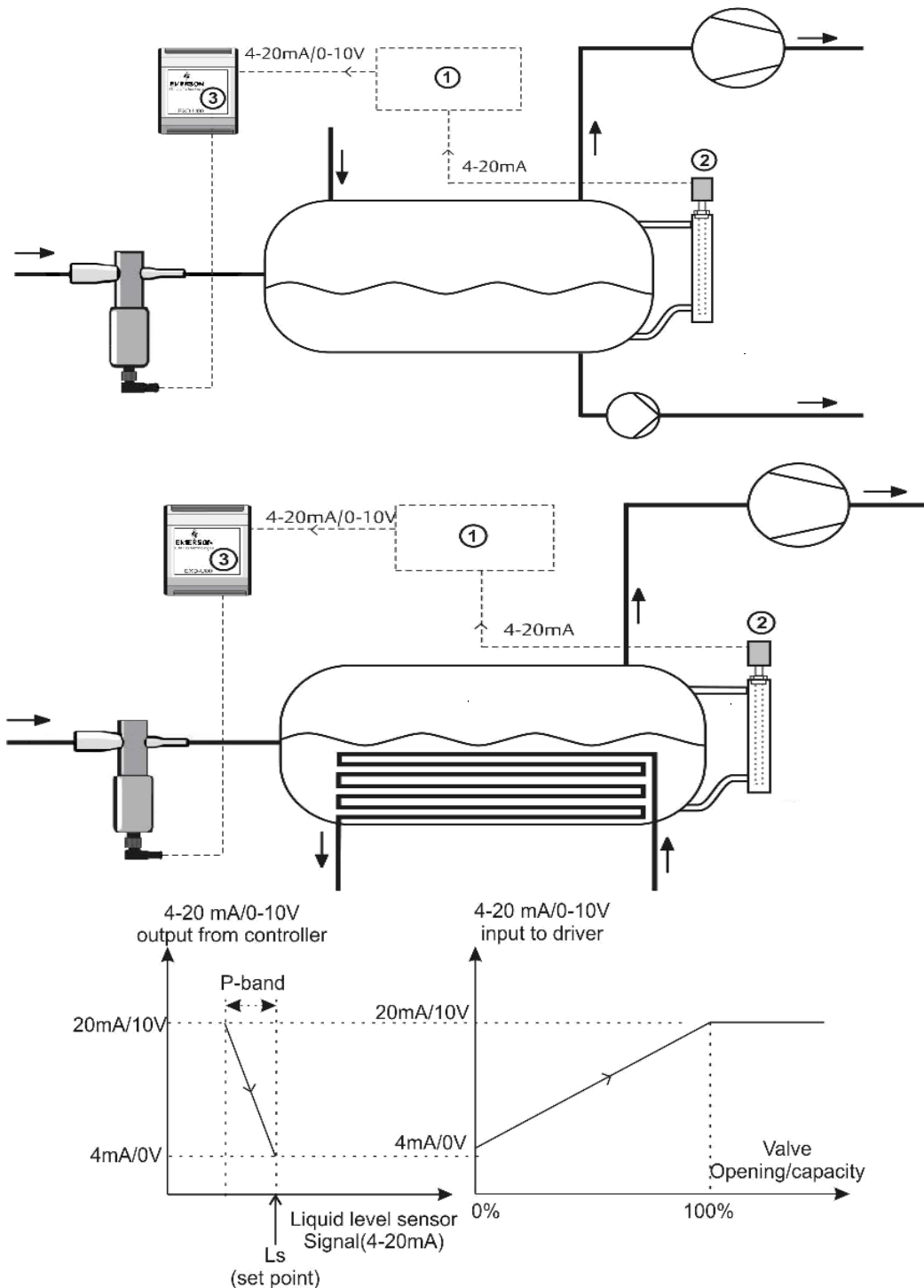


- (1) = Expansion valve heating mode
- (2) = Expansion valve cooling mode
- (3) = Cooling/heating mode change over
- (4) = Universal Driver Module EXD-U00 for heating mode
- (5) = Universal Driver Module EXD-U00 for cooling mode
- (6) = Superheat controller

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Application: Liquid level



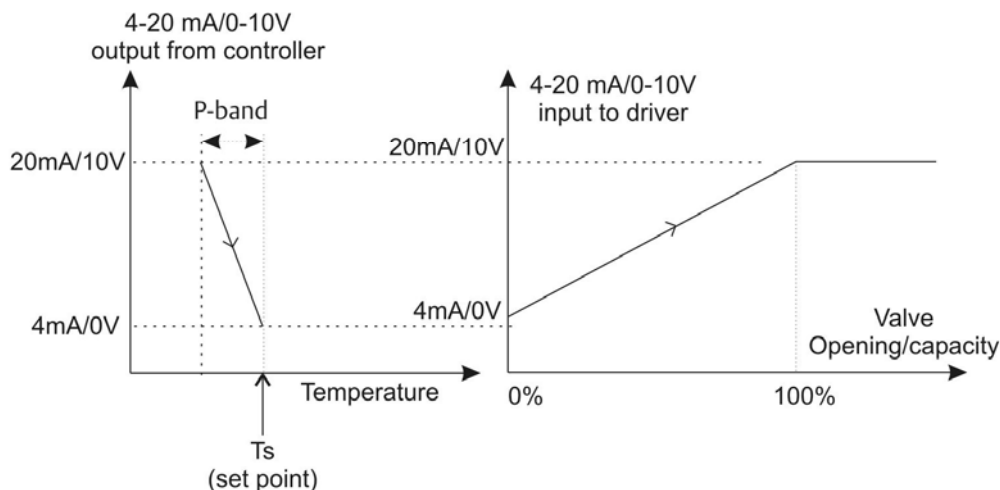
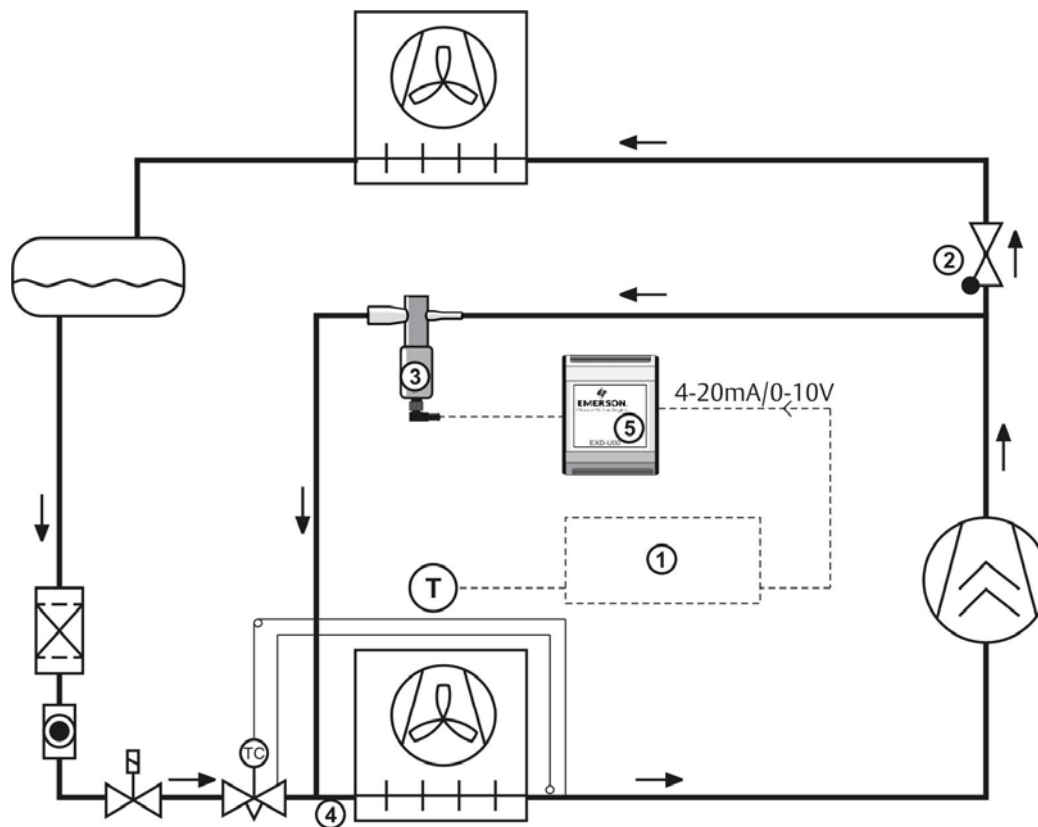
- (1) = Level controller
- (2) = Liquid level sensor
- (3) = Universal Driver Module EXD-U00

Note: EXVs are not released for use with ammonia.

EXD-U00 Universal Driver Module

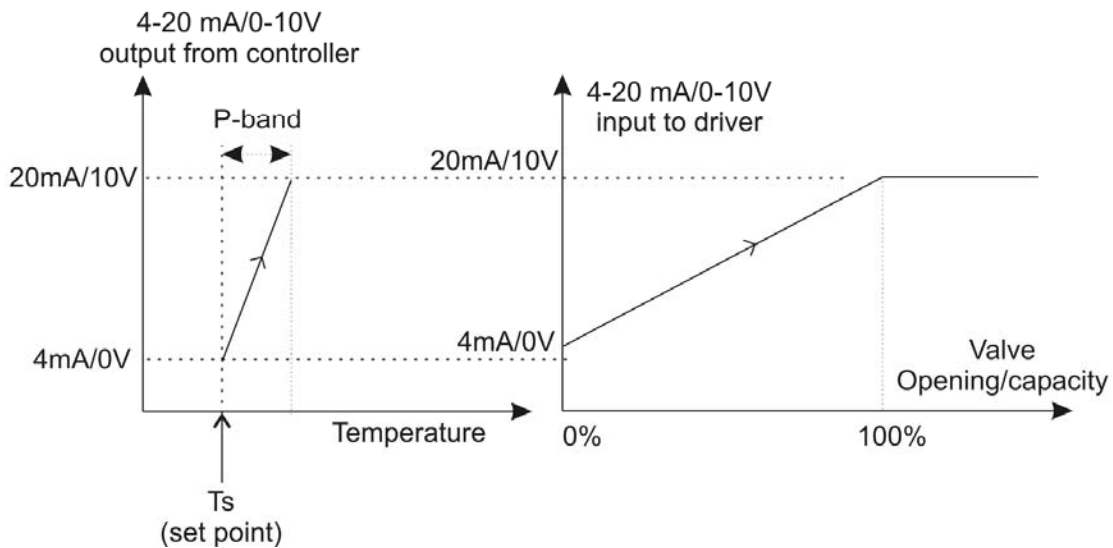
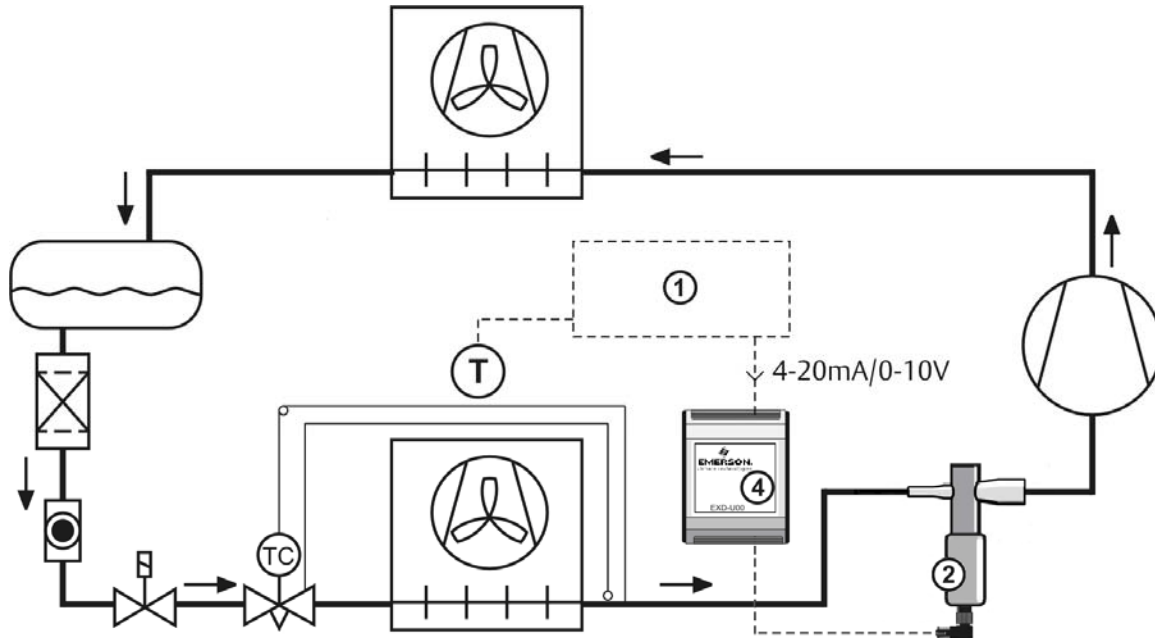


Application: Capacity control / discharge air temperature control by means of hot gas bypass



- (1) = Temperature Controller
- (2) = Check Valve: It is important to install a check valve just after T-connection as shown. Check valve will not allow return of liquid refrigerant from condenser through electrical control valve in to the evaporator during power interruption to system.
- (3) = Hot gas bypass valve must be installed with motor downward. This insures the valve life expectancy.
- (4) = Liquid Distributor must be selected properly for hot gas mass flow.
- (5) = Universal Driver Module EXD-U00

Application: Capacity control / discharge air temperature control by means of evaporating pressure regulation



(1) = Temperature Controller

(2) = Evaporator temperature regulator. EX6, EX7 and EX8 must be installed with motor downward in suction line applications. This insures the valve life expectancy.

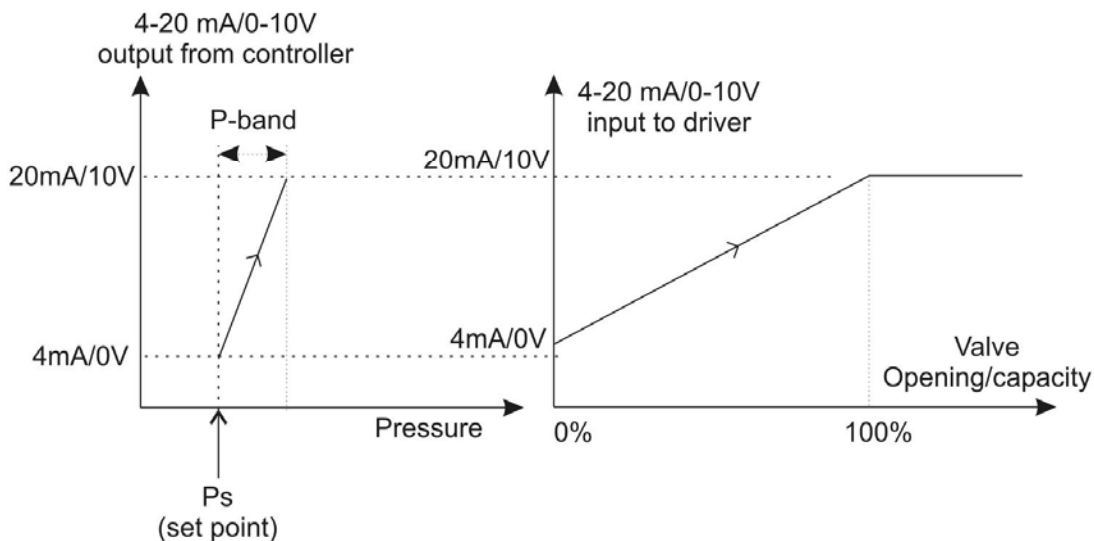
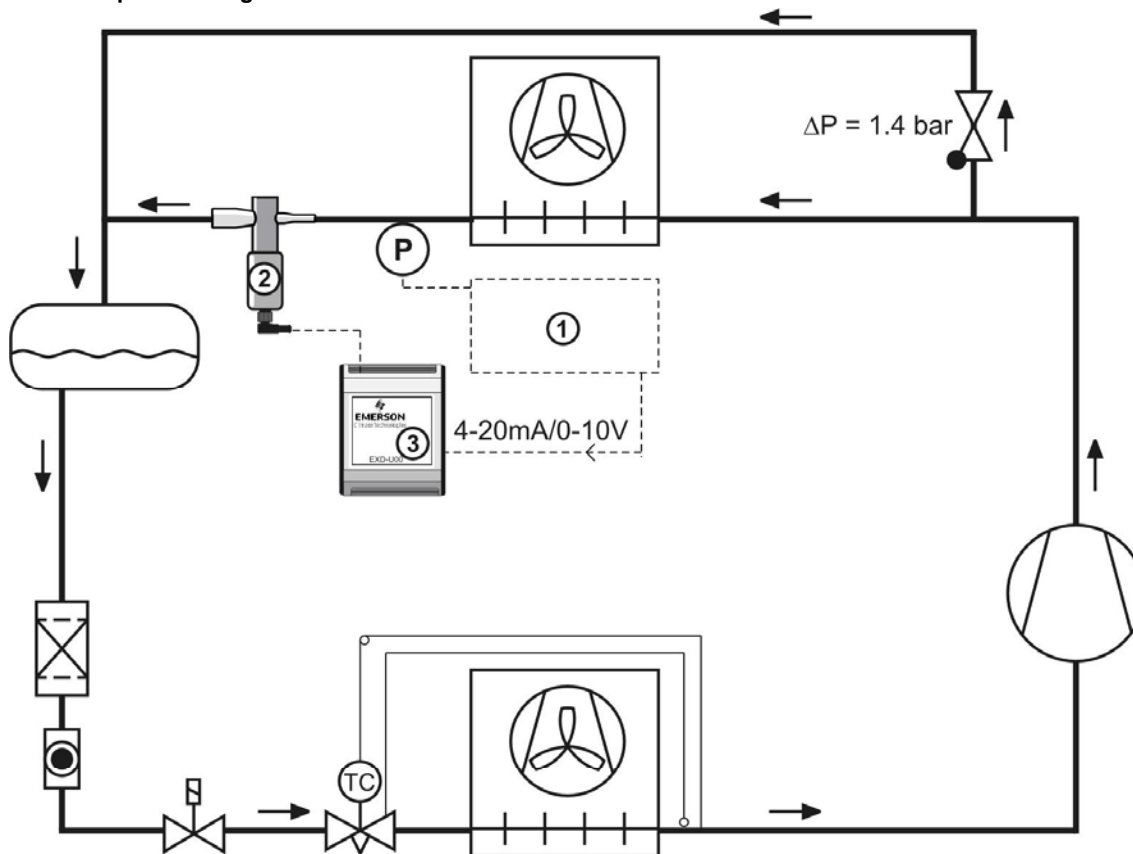
(3) This application may require additional liquid injection to suction line for desuperheating of compressor by means of suction line superheat control or discharge line temperature control. Please consult Emerson for more details.

(4) = Universal Driver Module EXD-U00

EXD-U00 Universal Driver Module



Application: Head pressure regulator



- (1) = Pressure Controller
- (2) = Condensing pressure regulator
- (3) = Universal Driver Module EXD-U00

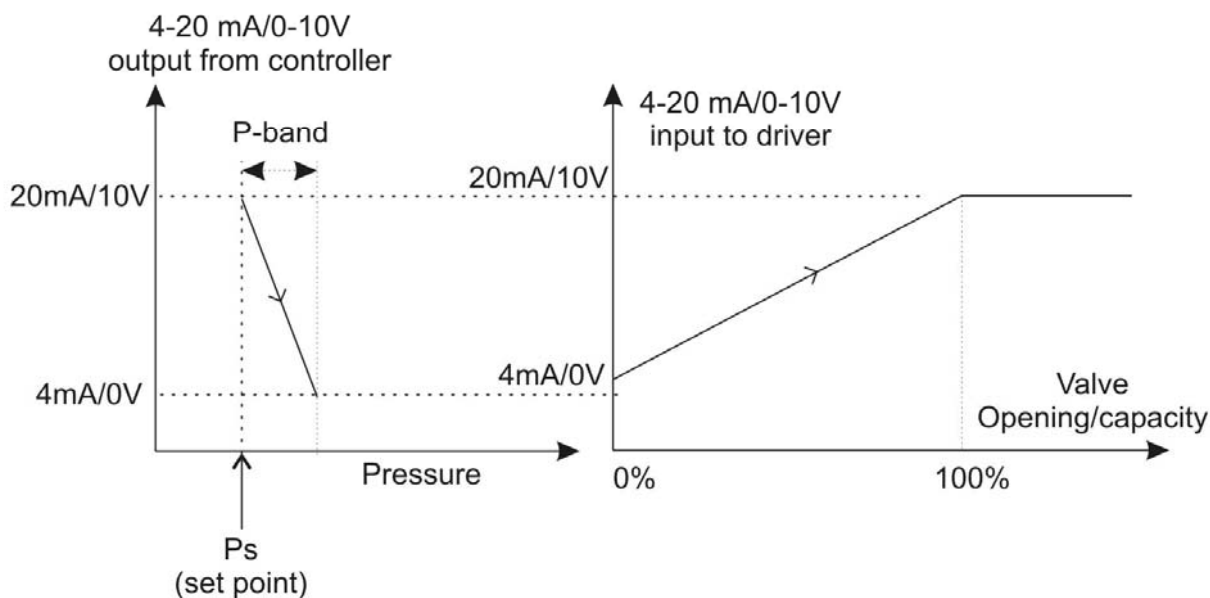
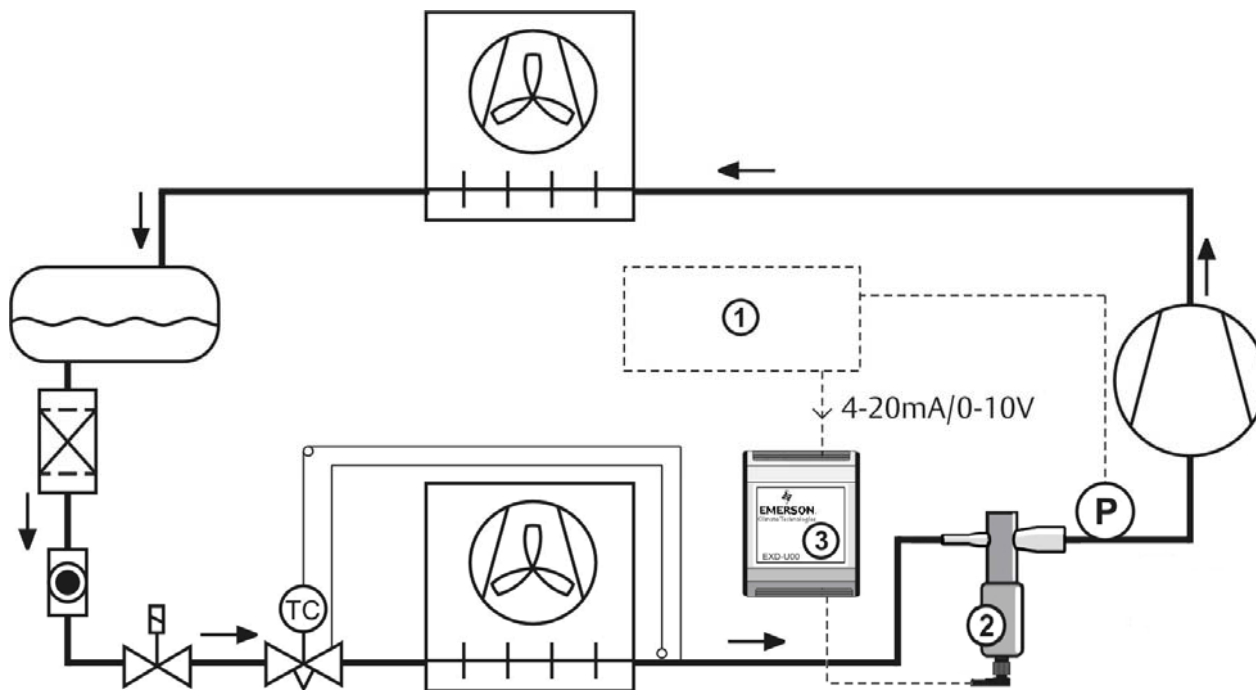
EXD-U00
Universal Driver Module



EXD-U00 Universal Driver Module



Application: Crankcase pressure regulator



Remarks:

(1) = Pressure Controller

(2) = Crankcase pressure regulator. ECVs must be installed with motor downward in suction line applications. This insures the valve life expectancy.

(3) = Universal Driver Module EXD-U00

EXD-U00 Universal Driver Module



Technical Data

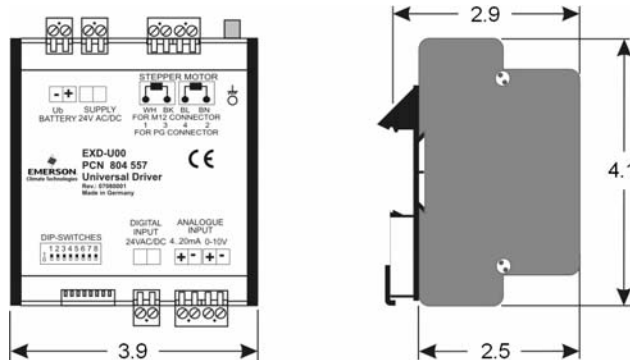
Universal Driver Module EXD-U00

Supply voltage	24V AC $\pm 10\%$, 50-60HZ 24V DC $\pm 10\%$
Supply current	to be protected by a 1.0 A external fuse
Power consumption	10VA in conjunction with EXV
Temperature: storage operating	-4 ... +149°F +32 ... +140°F
Humidity	<90% r.H. non condensing
Protection class	IP20
Approvals	EMC EN 61326-1, EN50081, EN50082
Marking	CE

Input analogue signal Burden	4-20mA 364 Ω
Input analogue signal Impedance	0-10 V 27 k Ω
Digital input	24V AC $\pm 10\%$, 50-60Hz 24V DC $\pm 10\%$
Connection to EX4/EX5/EX6/EX7/EX8	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

Dimensions

Universal Driver Module EXD-U00



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This document replaces all earlier versions.

