

Product Guide

For Propane Applications



EMERSON™

Preface

This catalogue contains two sections. The first section is related to products which are intended to be applied in systems located in an environment according to ATEX definition (Zone 2). These products are manufactured under consideration of appropriate standards and directives.

The second section is only related to products intended to be used in systems with R290 refrigerant but having appropriate solution in order to prevent explosion risk at any time (non-risk zone).

The definition of “non-risk zone” is related to the environment of the installed device and no special product requirement is needed except material compatibility of part in contact with refrigerant.

These products are not ATEX certified may under no circumstance be used within areas with explosive or flammable atmosphere and that the owner, designer and installer are responsible to ensure strict compliance with related regulation and avoid any such risk.

Products in section 1:

Products are intended for use in systems located in an environment according definition of ATEX (Zone 2)

Page 04 – 45

Products in section 2:

Products are intended for use in non explosive environment (Products do not comply with ATEX requirements)

Page 46 – 58

General Information

Technical data provided herein is collected with scrutiny. However, errors and misprinting remain reserved. The technical data is presented for informational purposes only and they are not to be construed as warranties or guarantees, express or implied, regarding the products or services described or their use or applicability.

Technical data may be updated; should you require confirmation with respect to a specific value, please contact Emerson Climate Technologies GmbH and clearly state the information you require.

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Emerson does not assume responsibility for the selection, use or maintenance of any product. Responsibility for proper selection, use and maintenance of any product remains solely with the purchaser and end-user.

The information given herein is based on data and tests which Emerson Climate Technologies GmbH believes to be reliable. Such information is intended for use by individuals having the appropriate technical knowledge and skills, at their own discretion and risk. Our products are designed and adapted for stationary application. When using our products in mobile applications, our products might fail. The suitability for such mobile applications has to be assured by the plant manufacturer; for this purpose appropriate tests might be necessary.

Contents

Important considerations	4
ATEX Zone 2 Definition	4
Device classification	4
European directives and standard	5
Compliance and Marking	5
Section 1: Products for use in Zone 2 according ATEX definition	6
Introduction	7
ZH Copeland Scroll™ for R290 (Propane)	
Technical Bulletin	8
Capacity Data	9
ZB Copeland Scroll™ for R290 (Propane)	
Technical Bulletin	10
Capacity Data	11
Electronic Expansion Valves EX4-7-...FLR Versions and M12 Connector EVC05A	
Technical Bulletin	13
Operating Instruction	15
Thermo™-Expansion Valves TX3-...FLR	
Technical Bulletin	19
Operating Instruction	22
Solenoid Valves Series 200RB...-FLR	
Technical Bulletin	25
Operating Instruction	27
Operating Instruction ASC... + PG9-ATEX (H.T.P.S.r.l.)	29
PT5-...-FLR Pressure Transmitter	
Technical Bulletin	31
Operating Instruction	32
PS4-...ATEX Pressure Switch with fixed setting	
Technical Bulletin	34
Operating Instruction	35
Hermetic Liquid Line Filter Driers ADK-...FLR	
Technical Bulletin	37
Operating Instruction	39
Moisture Indicator MIA...-FLR	
Technical Bulletin	41
Operating Instruction	43
Section 2: Product material compatible with R290 only for non-explosive environment	46
EC3-P32/-P33 Superheat Controller & Standard ECD-002	
Technical Bulletin	48
Electronic Expansion Valves EXM/L Series	
Technical Bulletin	50
EXD-HP1/2 Stand-alone Superheat Controller	
Technical Bulletin	53
CSS-25U / CSS-32U / CSS-32W Compressor Soft Starter	
Technical Bulletin	55

a. Important Considerations

- The products are intended to be sold in EU and EFTA countries where European directives and standards are in place and considered. Other countries may require additional approval of local authorities/ regulations.
- Documentation is in English language. System manufacturers shall consider this fact. If the transmission of information in local language as per requirement of ATEX directive is needed, system manufacturer is to take care of proper translation.
- The operating instructions results from risk assessment and it must be taken into account during design and manufacturing of system.
- Using inaccurate design operating conditions for selection of products might lead to wrong selection/ results. In this case, the selected products might be oversized or undersized and consequently lead to improper operation of the device in the system.
- Only specified products in this document have been intended for use with R290.
- It is advisable to share the related information with own consultant or notify body in order to make sure the applicability of products for any specific system under consideration of hazardous zone where system supposed to be operated.

b. ATEX Zone 2 Definition

Location of equipment	Category	Explosive atmospheres	Explosive gas	Zone
Group II: Intended for use in other places	3	Unlikely	Gas	2

c. Device Classification

- Non-electrical operating device without potential of electrostatic charge:
 - Thermo expansion valves, sight glasses, solenoid valves body (without coil), filter driers
 - Compressor, pressure transmitters, coils of solenoid valves and electronic expansion valves
- Electrical operating device with maximum permitted electrical operating supply voltage/current:
 - Pressure switches and electronic expansion valves
- Electrical operating device contains a housing with sufficient protection design/construction:

























d. European Directives and Standard

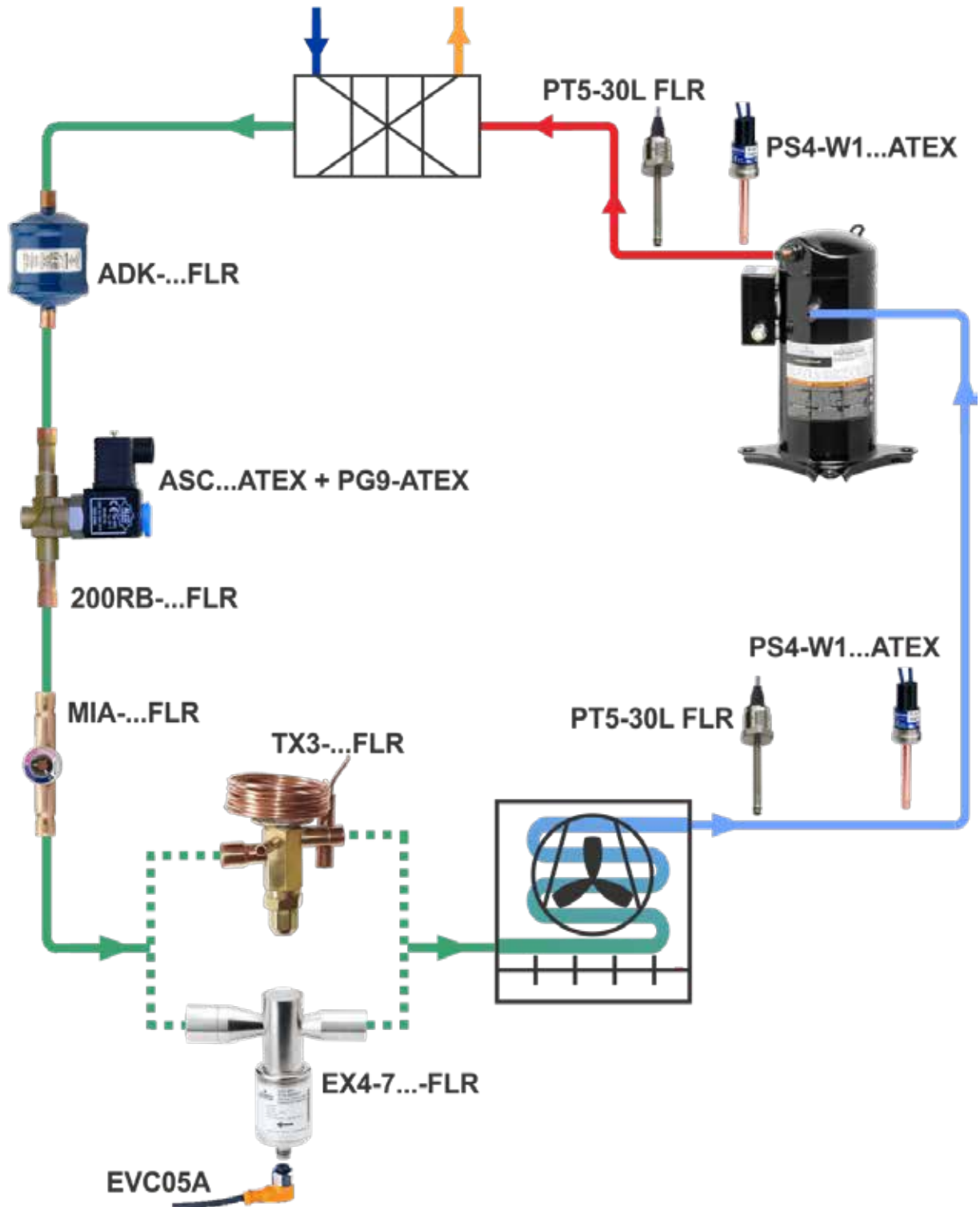
The following directives and standards have been considered for compliance of products in this document:

- PED (Pressure Equipment Directive)
- ATEX 94/9/EC (Equipment and protective systems intended for use in potentially explosive atmospheres Directive)
- LVD cannot be used when ATEX is used
- EMC (Electromagnetic Compatibility Directive)
- Guidelines on the application of Directive ATEX 94/9/EC
- EN60335 (Safety of Household and similar electrical appliance, Part 1 & 40)
- EN60079 (Explosive atmospheres, Part 1, 10-1, 11, 14, 15 and 18)
- EN378 (Refrigerating systems and heat pumps - Safety and environmental requirements)
- EN12284 (Refrigeration systems and heat pumps. Valves: Requirements, testing and marking)
- EN12178 (Refrigeration systems and heat pumps. Liquid level indicating devices: Requirements, testing and marking)
- EN14276-1 (Refrigeration systems and heat pumps. Vessels: Requirements, testing and marking)
- EN12263 (Refrigeration systems and heat pumps. Safety switching devices for limiting pressure: Requirements, testing and marking)
- EN16084 (Refrigeration systems and heat pumps. Qualification of tightness of components and joints)

e. Compliance and Marking

Product type	Directive			Marking
	PED	EMC	ATEX	
Thermo™ Expansion Valve : TX3-...-FLR	Not applicable	Not applicable	Not applicable	
Filter Drier : ADK-...-FLR				
Sight Glass : MIA-...-FLR				
Solenoid Valve : 200RB-...-FLR				
Solenoid Valve Coil + Plug : ASC24V + PG9 ATEX		Not applicable	Not applicable	  
Solenoid Valve Coil + Plug : ASC230V + PG9 ATEX				  
Pressure Transmitter : PT5-...-FLR		Applicable	Applicable	  
Electronic Expansion valve : EX4-7...FLR		Not applicable		  
Electrical plug and cable assembly : EVC05A		Not applicable		  
Pressure Switch : PS4-...ATEX	Applicable	Not applicable	Applicable	  

Section 1: Products for use in Zone 2 according ATEX definition





Introduction

Many end-users, equipment and compressor manufacturers are investigating ways to minimize their impact on the environment. Improving system architectures, using a refrigerant with lower global warming potential (GWP) can significantly improve the carbon footprint of an installation. R290 is one of the most-discussed refrigerants which has long been known for its good performance as refrigerant but is flammable and consequently brings about strict considerations for system manufacturers in terms of system design and operation. The specified listed products in this section have been released for use in systems using R290 as a refrigerant by considering information related to each product as follows:

Product family	Product type	Pages
Scroll Compressor	ZH*KCU	8 - 9
	ZB*KCU	10 - 11
Electronic Expansion Valves	EX4-7...-FLR	12 - 14 & 15 - 17
	EVC05A	12 - 14 & 18
Thermo™ Expansion Valves	TX3-P...-FLR	19 - 24
Solenoid Valves	200-RB3/RB4/RB6...-FLR	25 - 28
Coil + Plug	ASC24V + PG9 ATEX	29
	ASC230V + PG9 ATEX	
Pressure Transmitters	PT5-30L-FLR	30 - 32
Pressure Switches	PS4-W1 808301 0.6/1.8 bar	33 - 35
	PS4-W1 808300 20/26 bar	
Filter Driers	ADK-03.../-05.../-08.../-16.../-30.../-41.../-75...-FLR	36 - 39
Moisture Indicator / Sight Glass	MIA...-FLR	40 - 43

Propane (R290) is a flammable natural refrigerant which has long been known for its good performances. It has zero ozone depletion potential, negligible global warming potential, as well as excellent thermodynamic properties. R290 systems require in average half the charge of hydrofluorocarbons (HFCs). Emerson is launching a full line-up of propane Copeland Scroll compressors designed for chillers and heat pump applications. This line-up meets Emerson reliability standards and is classified ATEX Group II.

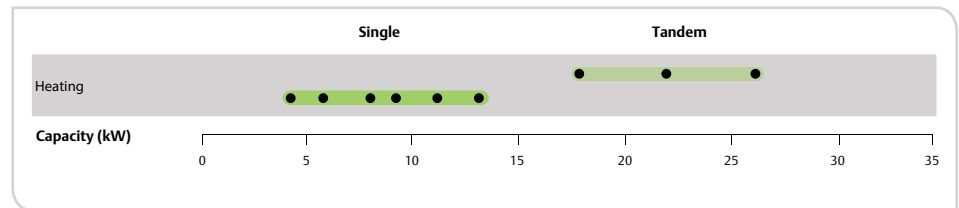


ZH* KCU Copeland Scroll™ for R290

Features and Benefits

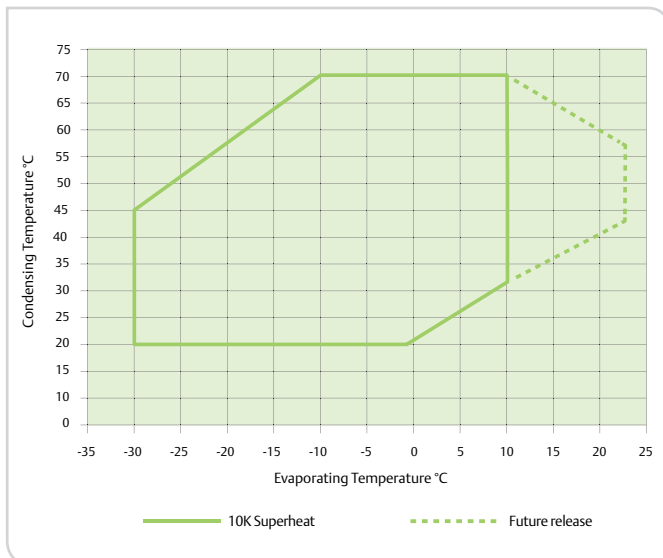
- Axial and radial compliance
- Dedicated oil for propane
- ATEX compliance
- IP65 (IEC 60529)
- No sight-glass, no Schrader valve
- Hermetic compressor
- Wide operating envelope

R290 Scroll Compressor Line-Up*



* Propane Variable Speed compressors in development
 Conditions Heating : Evaporating -7°C, Condensing 50°C, Superheat 10K, Subcooling 4K

Operating Envelope R290



ATEX Compressor Classification

Ex	ATEX Protection against explosion
II	Group II gas atmosphere other than mines susceptible to fire damp
3	Category 3 - Equipment that is intended for use in areas where explosive atmospheres are unlikely to occur in normal operation and if they do occur, are likely to do so infrequently and for a short period only. It must ensure a normal/suitable level of protection for normal operation
G	G - Gas: Explosive atmospheres caused by mixtures of air and gases, vapors, mists
Ex nA	Ex nA - Non Sparking. Protection for Category 3G devices according to EN 60079-15. Suitable for use in Zone 2
IIA	Electrical equipment of Group II is subdivided according to the nature of explosive gas atmosphere for which it is intended. A typical Group IIA gas is propane
T2	T2 - Temperature Classification by maximum permissible surface temperature: 300°C

Technical Overview

Model		Displacement (m³/h)	Heating capacity (kW)*	COP	Sound pressure @1 m (dBA)**	Length / Width/ Height (mm)	Net weight (kg)
1 Ph	3 Ph						
ZH04KCU-PFZN	ZH04KCU-TFMN	5.8	4.4	3.2	60	243 / 242 / 364	23
ZH06KCU-PFZN	ZH06KCU-TFMN	8.0	6.2	3.2	61	243 / 242 / 406	27
ZH08KCU-PFZN	ZH08KCU-TFMN	10.0	7.7	3.3	64	243 / 242 / 419	28
ZH09KCU-PFZN	ZH09KCU-TFMN	11.7	9.0	3.2	62	247 / 241 / 438	38
ZH11KCU-PFZN	ZH11KCU-TFMN	14.4	10.9	3.3	63	247 / 241 / 438	38
-	ZH13KCU-TFMN	17.1	13.0	3.3	64	250 / 246 / 450	40

* Conditions Evaporating -7°C, Condensing 50°C, Superheat 10K, Subcooling 4K

** @ 1m: sound pressure level at 1m distance from the compressor, free field condition

Capacity Data

Condensing temperature °C	R290 Heating Capacity in kW Evaporating temperature °C									Compressor model
	10	5	0	-5	-10	-15	-20	-25	-30	
70	6.1	5.4	4.7	4.2	3.7	0.0	0.0	0.0	0.0	ZH04KCU-TFMN
	8.4	7.4	6.5	5.7	5.1	0.0	0.0	0.0	0.0	ZH06KCU-TFMN
	10.5	9.2	8.1	7.2	6.4	0.0	0.0	0.0	0.0	ZH08KCU-TFMN
	12.2	10.7	9.4	8.3	7.3	0.0	0.0	0.0	0.0	ZH09KCU-TFMN
	15.1	13.3	11.7	10.3	9.1	0.0	0.0	0.0	0.0	ZH11KCU-TFMN
65	6.4	5.6	4.9	4.3	3.8	0.0	0.0	0.0	0.0	ZH04KCU-TFMN
	8.7	7.6	6.7	5.9	5.2	0.0	0.0	0.0	0.0	ZH06KCU-TFMN
	10.9	9.5	8.3	7.3	6.4	0.0	0.0	0.0	0.0	ZH08KCU-TFMN
	12.7	11.1	9.7	8.5	7.5	0.0	0.0	0.0	0.0	ZH09KCU-TFMN
	15.7	13.7	12.0	10.6	9.3	0.0	0.0	0.0	0.0	ZH11KCU-TFMN
60	6.6	5.8	5.1	4.4	3.8	3.3	0.0	0.0	0.0	ZH04KCU-TFMN
	9.0	7.9	6.9	6.0	5.2	4.6	0.0	0.0	0.0	ZH06KCU-TFMN
	11.3	9.8	8.6	7.5	6.6	5.8	0.0	0.0	0.0	ZH08KCU-TFMN
	13.2	11.5	10.0	8.7	7.6	6.7	0.0	0.0	0.0	ZH09KCU-TFMN
	16.2	14.2	12.4	10.8	9.5	8.3	0.0	0.0	0.0	ZH11KCU-TFMN
55	6.9	6.0	5.2	4.5	3.9	3.4	2.9	0.0	0.0	ZH04KCU-TFMN
	9.4	8.2	7.1	6.2	5.4	4.7	4.0	0.0	0.0	ZH06KCU-TFMN
	11.7	10.2	8.9	7.7	6.7	5.8	5.1	0.0	0.0	ZH08KCU-TFMN
	13.7	11.9	10.3	9.0	7.8	6.8	5.9	0.0	0.0	ZH09KCU-TFMN
	16.8	14.7	12.8	11.1	9.7	8.4	7.3	0.0	0.0	ZH11KCU-TFMN
50	7.1	6.2	5.4	4.6	4.0	3.5	3.0	2.5	0.0	ZH04KCU-TFMN
	9.7	8.5	7.3	6.3	5.5	4.7	4.1	3.5	0.0	ZH06KCU-TFMN
	12.1	10.5	9.1	7.9	6.9	5.9	5.1	4.4	0.0	ZH08KCU-TFMN
	14.2	12.3	10.7	9.2	8.0	6.9	5.9	5.1	0.0	ZH09KCU-TFMN
	17.4	15.2	13.2	11.4	9.9	8.6	7.4	6.4	0.0	ZH11KCU-TFMN
45	7.4	6.4	5.5	4.8	4.1	3.5	3.0	2.6	2.1	ZH04KCU-TFMN
	10.1	8.7	7.6	6.5	5.6	4.8	4.1	3.5	3.0	ZH06KCU-TFMN
	12.5	10.9	9.4	8.1	7.0	6.0	5.2	4.5	3.8	ZH08KCU-TFMN
	14.7	12.7	11.0	9.5	8.2	7.0	6.0	5.2	4.4	ZH09KCU-TFMN
	18.0	15.7	13.6	11.7	10.1	8.7	7.5	6.4	5.5	ZH11KCU-TFMN
40	7.6	6.6	5.7	4.9	4.2	3.6	3.0	2.6	2.2	ZH04KCU-TFMN
	10.4	9.0	7.8	6.7	5.7	4.9	4.2	3.6	3.0	ZH06KCU-TFMN
	12.9	11.2	9.7	8.3	7.2	6.2	5.3	4.5	3.9	ZH08KCU-TFMN
	15.2	13.1	11.3	9.7	8.4	7.2	6.1	5.2	4.5	ZH09KCU-TFMN
	18.6	16.1	13.9	12.0	10.3	8.9	7.6	6.5	5.5	ZH11KCU-TFMN
35	7.9	6.8	5.8	5.0	4.3	3.6	3.1	2.6	2.2	ZH04KCU-TFMN
	10.8	9.3	8.0	6.9	5.9	5.0	4.3	3.6	3.1	ZH06KCU-TFMN
	13.3	11.5	9.9	8.6	7.3	6.3	5.4	4.6	3.9	ZH08KCU-TFMN
	15.7	13.6	11.7	10.0	8.6	7.3	6.2	5.3	4.5	ZH09KCU-TFMN
	19.2	16.6	14.3	12.3	10.6	9.0	7.7	6.6	5.6	ZH11KCU-TFMN
30	22.1	19.2	16.6	14.3	12.3	10.6	9.0	7.7	6.6	ZH13KCU-TFMN
	0.0	7.0	6.0	5.1	4.4	3.7	3.1	2.7	2.2	ZH04KCU-TFMN
	0.0	9.6	8.2	7.1	6.0	5.1	4.3	3.7	3.1	ZH06KCU-TFMN
	0.0	11.8	10.2	8.8	7.5	6.4	5.5	4.6	3.9	ZH08KCU-TFMN
	0.0	14.0	12.0	10.3	8.8	7.5	6.3	5.4	4.5	ZH09KCU-TFMN
25	0.0	17.1	14.7	12.6	10.8	9.2	7.8	6.7	5.6	ZH11KCU-TFMN
	0.0	19.6	17.0	14.6	12.5	10.7	9.2	7.8	6.6	ZH13KCU-TFMN
	0.0	0.0	6.2	5.3	4.5	3.8	3.2	2.7	2.3	ZH04KCU-TFMN
	0.0	0.0	8.5	7.2	6.2	5.2	4.4	3.7	3.2	ZH06KCU-TFMN
	0.0	0.0	10.4	9.0	7.7	6.5	5.5	4.7	4.0	ZH08KCU-TFMN
20	0.0	0.0	12.3	10.5	9.0	7.6	6.4	5.4	4.6	ZH09KCU-TFMN
	0.0	0.0	15.1	12.9	11.0	9.4	8.0	6.8	5.7	ZH11KCU-TFMN
	0.0	0.0	17.3	14.9	12.8	10.9	9.3	7.9	6.7	ZH13KCU-TFMN
	0.0	0.0	0.0	5.4	4.6	3.9	3.3	2.8	2.3	ZH04KCU-TFMN
	0.0	0.0	0.0	7.4	6.3	5.3	4.5	3.8	3.2	ZH06KCU-TFMN
20	0.0	0.0	0.0	9.1	7.8	6.6	5.6	4.8	4.0	ZH08KCU-TFMN
	0.0	0.0	0.0	10.8	9.2	7.8	6.5	5.5	4.7	ZH09KCU-TFMN
	0.0	0.0	0.0	13.2	11.3	9.6	8.1	6.9	5.8	ZH11KCU-TFMN
	0.0	0.0	0.0	15.2	13.0	11.1	9.4	8.0	6.8	ZH13KCU-TFMN


Emerson Climate Technologies is offering a full range of propane Copeland Scroll compressors. The new ZB* KCU Copeland Scroll compressor range with R290 is the ideal choice for self-contained medium-temperature applications. These compressors are also suitable for refrigeration chiller and small cascade systems. The complete compressor range of propane scrolls meets Emerson’s reliability standards and is **ATEX Group II** classified.



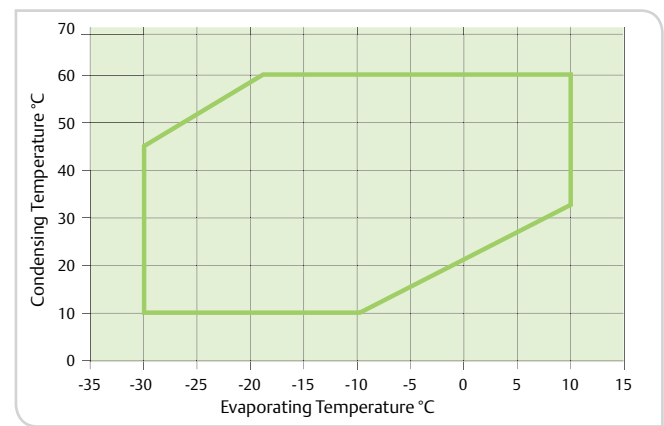
ZB* KCU Copeland Scroll™ for R290

Propane (R290) is a flammable natural refrigerant which has long been known for its good performance. It has zero ozone depletion potential, negligible global warming potential (GWP), as well as excellent thermodynamic properties. R290 systems require in average half the charge of hydro-fluorocarbons (HFCs). These features make R290 suitable for the upcoming F-gas regulations.

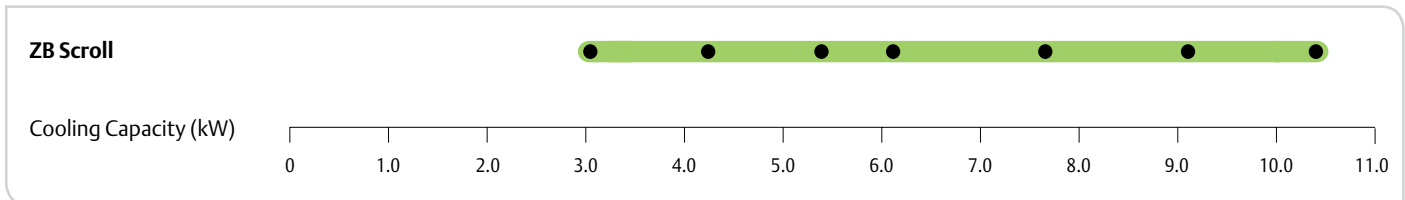
Features and Benefits

- ATEX compliance
- IP65 (IEC 60529) Terminal Box
- Fully hermetic design, no sight-glass, no Schrader valve
- Wide operating envelope
- Dedicated oil for propane
- Ideal for self-contained medium-temperature display cases
- Suitable for refrigeration chiller and small cascade systems
- Light weight, compactness and high efficiency
- Axial and radial compliance
-  II 3G Ex nA IIA T2

Operating Envelope R290



ZB* KCU Compressor Range



EN12900 Evaporating -10C, Condensing 45C, Superheat 10K, Subcooling 0K

Technical Overview

MODEL	Nominal (hp)	Displacement (m ³ /h)	Cooling Capacity (kW)	Stub suction (inch)	Stub discharge (inch)	Oil quantity (l)	Length / Width / Height (mm)	Net weight (kg)	Motor version / code	Maximum operating current (A)	Locked rotor current (A)	Sound pressure @1m (dBA) ***
									3 Ph **	3 Ph **	3 Ph **	
ZB12KCU	2.0	5.8	2.8	3/4	1/2	1.3	243/243/364	25.9	TFM	4.1	26	60
ZB17KCU	2.5	8.0	3.9	3/4	1/2	1.5	243/242/387	27.2	TFM	5.2	32	61
ZB20KCU	3.5	10.0	5.0	3/4	1/2	1.5	243/242/400	28.1	TFM	6.8	46	62
ZB25KCU	4.0	11.7	5.7	3/4	1/2	1.9	247/241/451	39.5	TFM	8.2	64	65
ZB31KCU	5.0	14.4	7.0	3/4	1/2	1.9	247/241/451	37.3	TFM	10.1	64	65
ZB37KCU	6.0	17.1	8.3	3/4	1/2	1.9	250/246/438	39.5	TFM	11.8	74	65
ZB49KCU	8.0	21.4	10.4	1 1/4	1 1/4	1.9	246/256/442	39.5	TFM	15.9	102	68


Capacity Data

Condensing temperature °C	R290 Cooling capacity in kW									Compressor model
	Evaporating temperature °C									
	10	5	0	-5	-10	-15	-20	-25	-30	
60	4.8	4.0	3.3	2.8	2.3	1.8	1.5	0.0	0.0	ZB12KCU-TFMN
	6.5	5.5	4.5	3.7	3.1	2.5	2.0	0.0	0.0	ZB17KCU-TFMN
	8.2	6.8	5.7	4.7	3.8	3.0	2.4	0.0	0.0	ZB20KCU-TFMN
	9.6	8.1	6.7	5.5	4.5	3.7	0.0	0.0	0.0	ZB25KCU-TFMN
	11.8	9.9	8.2	6.8	5.6	4.5	0.0	0.0	0.0	ZB31KCU-TFMN
	13.8	11.6	9.7	8.0	6.6	5.3	0.0	0.0	0.0	ZB37KCU-TFMN
55	17.2	14.5	12.1	10.0	8.2	6.7	0.0	0.0	0.0	ZB49KCU-TFMN
	5.1	4.3	3.6	3.0	2.5	2.0	1.6	1.2	0.0	ZB12KCU-TFMN
	7.0	5.9	4.9	4.1	3.3	2.7	2.2	1.7	0.0	ZB17KCU-TFMN
	8.8	7.4	6.2	5.1	4.1	3.3	2.6	2.0	0.0	ZB20KCU-TFMN
	10.4	8.7	7.3	6.0	4.9	4.0	3.2	0.0	0.0	ZB25KCU-TFMN
	12.7	10.7	8.9	7.4	6.0	4.9	3.9	0.0	0.0	ZB31KCU-TFMN
50	14.8	12.5	10.5	8.7	7.1	5.8	4.7	0.0	0.0	ZB37KCU-TFMN
	18.5	15.7	13.1	10.9	9.0	7.3	5.8	0.0	0.0	ZB49KCU-TFMN
	5.5	4.6	3.9	3.2	2.6	2.1	1.7	1.3	1.0	ZB12KCU-TFMN
	7.5	6.3	5.3	4.4	3.6	2.9	2.4	1.9	1.5	ZB17KCU-TFMN
	9.4	8.0	6.6	5.5	4.5	3.6	2.9	2.2	1.7	ZB20KCU-TFMN
	11.1	9.3	7.8	6.4	5.3	4.3	3.4	2.7	0.0	ZB25KCU-TFMN
45	13.6	11.4	9.6	7.9	6.5	5.3	4.2	3.3	0.0	ZB31KCU-TFMN
	15.8	13.4	11.2	9.3	7.7	6.3	5.1	4.0	0.0	ZB37KCU-TFMN
	19.8	16.8	14.1	11.7	9.7	7.9	6.4	5.0	0.0	ZB49KCU-TFMN
	5.8	4.9	4.1	3.4	2.8	2.3	1.8	1.5	1.1	ZB12KCU-TFMN
	8.0	6.7	5.6	4.7	3.9	3.1	2.5	2.0	1.6	ZB17KCU-TFMN
	10.1	8.5	7.1	5.9	4.8	3.9	3.1	2.5	1.9	ZB20KCU-TFMN
40	11.8	9.9	8.3	6.9	5.7	4.6	3.7	2.9	2.3	ZB25KCU-TFMN
	14.4	12.2	10.2	8.5	7.0	5.7	4.6	3.6	2.8	ZB31KCU-TFMN
	16.7	14.2	12.0	10.0	8.3	6.8	5.5	4.3	3.4	ZB37KCU-TFMN
	21	17.8	15.0	12.5	10.4	8.5	6.9	5.5	4.2	ZB49KCU-TFMN
	6.2	5.2	4.4	3.6	3.0	2.4	2.0	1.6	1.2	ZB12KCU-TFMN
	8.5	7.2	6.0	5.0	4.1	3.4	2.7	2.2	1.7	ZB17KCU-TFMN
35	10.6	9.0	7.5	6.3	5.2	4.2	3.4	2.7	2.0	ZB20KCU-TFMN
	12.5	10.5	8.8	7.3	6.0	4.9	3.9	3.1	2.4	ZB25KCU-TFMN
	15.2	12.9	10.8	9.0	7.4	6.1	4.9	3.9	3.0	ZB31KCU-TFMN
	17.7	15.0	12.7	10.6	8.8	7.2	5.9	4.7	3.7	ZB37KCU-TFMN
	22.2	18.8	15.9	13.3	11.0	9.1	7.3	5.9	4.6	ZB49KCU-TFMN
	6.5	5.5	4.6	3.9	3.2	2.6	2.1	1.7	1.3	ZB12KCU-TFMN
30	8.9	7.6	6.3	5.3	4.4	3.6	2.9	2.3	1.8	ZB17KCU-TFMN
	11.2	9.5	8.0	6.6	5.5	4.5	3.6	2.9	2.2	ZB20KCU-TFMN
	13.2	11.1	9.3	7.8	6.4	5.2	4.2	3.3	2.6	ZB25KCU-TFMN
	16.0	13.6	11.4	9.5	7.9	6.4	5.2	4.2	3.2	ZB31KCU-TFMN
	18.5	15.8	13.3	11.2	9.3	7.6	6.2	5.0	3.9	ZB37KCU-TFMN
	23.3	19.8	16.7	14.0	11.7	9.6	7.8	6.3	4.9	ZB49KCU-TFMN
25	6.9	5.8	4.9	4.1	3.4	2.8	2.2	1.8	1.4	ZB12KCU-TFMN
	9.4	7.9	6.7	5.6	4.6	3.8	3.0	2.4	1.9	ZB17KCU-TFMN
	11.7	9.9	8.4	7.0	5.8	4.7	3.8	3.1	2.4	ZB20KCU-TFMN
	0.0	11.7	9.8	8.2	6.7	5.5	4.4	3.5	2.8	ZB25KCU-TFMN
	0.0	14.3	12.0	10.0	8.3	6.8	5.5	4.4	3.5	ZB31KCU-TFMN
	0.0	16.5	14.0	11.7	9.8	8.1	6.6	5.3	4.2	ZB37KCU-TFMN
20	0.0	20.7	17.5	14.7	12.2	10.1	8.3	6.7	5.3	ZB49KCU-TFMN
	0.0	6.1	5.1	4.3	3.6	2.9	2.4	1.9	1.5	ZB12KCU-TFMN
	0.0	8.3	7.0	5.8	4.8	3.9	3.2	2.6	2.0	ZB17KCU-TFMN
	0.0	10.4	8.7	7.3	6.1	5.0	4.0	3.2	2.6	ZB20KCU-TFMN
	0.0	0.0	10.3	8.6	7.1	5.8	4.7	3.7	2.9	ZB25KCU-TFMN
	0.0	0.0	12.6	10.5	8.7	7.2	5.8	4.7	3.7	ZB31KCU-TFMN
15	0.0	0.0	14.6	12.2	10.2	8.4	6.9	5.6	4.5	ZB37KCU-TFMN
	0.0	0.0	18.3	15.3	12.8	10.6	8.7	7.0	5.6	ZB49KCU-TFMN
	0.0	0.0	5.4	4.5	3.7	3.1	2.5	2.0	1.6	ZB12KCU-TFMN
	0.0	0.0	7.3	6.1	5.0	4.1	3.4	2.7	2.2	ZB17KCU-TFMN
	0.0	0.0	9.1	7.6	6.3	5.2	4.2	3.4	2.7	ZB20KCU-TFMN
	0.0	0.0	0.0	9.0	7.4	6.1	4.9	3.9	3.1	ZB25KCU-TFMN
10	0.0	0.0	0.0	11.0	9.1	7.5	6.1	4.9	3.9	ZB31KCU-TFMN
	0.0	0.0	0.0	12.7	10.6	8.8	7.2	5.9	4.7	ZB37KCU-TFMN
	0.0	0.0	0.0	16.0	13.3	11.0	9.1	7.4	5.9	ZB49KCU-TFMN

Electronic Expansion Valves EX4-7-...FLR Versions and M12 Connector EVC05A

Emerson Climate Technologies' EX4-7-...FLR are stepper motor driven valves for precise control of refrigerant mass flow in air conditioning, refrigeration, heat pumps, close control, and industrial process cooling applications.

Features

- Fully hermetic design
- Stepper motor driven
- Very fast full stroke time
- High resolution and excellent repeatability
- Bi-flow versions with positive shut-off in both flow directions
- Positive shut-off function to eliminate the use of an additional solenoid valve
- Linear flow capacity
- Extremely wide capacity range (10 ... 100%)
- Continuous modulation of mass flow
- Direct coupling of motor and valve for high reliability (no gear mechanism)
- Ceramic slide and port for accurate flow and minimal wear
- Corrosion resistant stainless steel body and connections
-  II 3G Ex nA IIA T3 Gc X
- The qualification /certification of EX4-7-...FLR is valid only in conjunction with EVC05A (M12 Connector)





EX4-...FLR

EX7-...FLR



EVC05A

Features EVC05A (ifm electronic GmbH)

- Vibration and shock resistance
- Protection: BVS 08 ATEX E 109 U
IECEX BVS 08.0041 U
- Marking:  II 3G Ex nA IIC Gc
 II 2D Ex tD IIIC Db IP65/ IP67

Cable and Connector Assembly

Type	Part no.	Length	Connector type to valve	Connector type to driver board or controller
EVC05A	800439	5 m	M12	Loose wires

Selection Table

Type	Part no.	Flow pattern	Nominal capacity range [kW]	Inlet connection	Outlet connection	Electrical connector
EX4-I21FLR	800430	Uni-flow	2...17	3/8" ODF	5/8" ODF	Special M12 plug
EX4-M21FLR	800431			10 mm ODF	16 mm ODF	
EX5-U21FLR	800432		5...51.6	5/8" (16 mm) ODF	7/8" (22 mm) ODF	
EX6-I21FLR	800433		12...124	7/8" ODF	1-1/8" ODF	
EX6-M21FLR	800434			22 mm ODF	28 mm ODF	
EX7-I21FLR	800440		30...340	1-1/8" ODF	1-1/8" ODF	
EX7-M21FLR	800441	28 mm ODF		28 mm ODF		
EX4-U31FLR	800435	Bi-flow (Heat pump)	2...17	5/8" (16 mm) ODF	5/8" (16 mm) ODF	
EX5-U31FLR	800436			7/8" (22 mm) ODF	7/8" (22 mm) ODF	
EX6-I31FLR	800437		1 ... 124	1-1/8" ODF	1-1/8" ODF	
EX6-M31FLR	800438			28 mm ODF	28 mm ODF	
EX7-I31FLR	800442		30...340	1-1/8" ODF	1-1/8" ODF	
EX7-M31FLR	800443			28 mm ODF	28 mm ODF	



Note: The valves are delivered without cable/connector assembly (order separately). Nominal capacity at +38°C liquid temperature, +4°C evaporating temperature and 1K subcooling. For other operating condition, see the next page.

Quick Selection (included 1.5 bar pressure drop for liquid line components and distributor)

Condensing temperature °C	R290 Capacity in kW											Valve type
	Evaporating temperature °C											
	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	
75	17	17	16,9	16,6	16,4	16	15,6	15,2	14,8	14,3	13,8	EX4...FLR
	52	52	51	51	50	49	47	46	45	43	42	EX5...FLR
	124	124	123	121	119	117	114	111	108	104	100	EX6...FLR
	342	341	338	333	328	321	313	305	296	286	276	EX7...FLR
70	17,6	17,7	17,6	17,5	17,2	17	16,7	16,3	15,9	15,4	15	EX4...FLR
	54	54	53	53	52	52	51	49	48	47	45	EX5...FLR
	128	129	128	127	126	124	121	119	116	112	109	EX6...FLR
	353	354	352	350	345	340	334	326	318	309	300	EX7...FLR
65	17,9	18	18,1	18	17,9	17,7	17,4	17,1	16,7	16,4	15,9	EX4...FLR
	54	55	55	55	54	54	53	52	51	50	48	EX5...FLR
	130	131	132	131	130	129	127	125	122	119	116	EX6...FLR
	358	361	362	361	358	354	349	342	335	327	319	EX7...FLR
60	17,8	18,1	18,3	18,3	18,2	18,1	17,9	17,7	17,4	17	16,7	EX4...FLR
	54	55	55	56	55	55	54	54	53	52	51	EX5...FLR
	130	132	133	133	133	132	131	129	127	124	121	EX6...FLR
	357	363	366	366	365	363	359	354	348	341	334	EX7...FLR
55	17,5	17,9	18,2	18,3	18,4	18,3	18,2	18	17,8	17,5	17,2	EX4...FLR
	53	54	55	56	56	56	55	55	54	53	52	EX5...FLR
	127	130	132	134	134	134	133	131	130	128	125	EX6...FLR
	350	359	364	367	368	367	365	361	357	351	344	EX7...FLR
50	16,9	17,5	17,9	18,1	18,3	18,4	18,3	18,2	18	17,8	17,5	EX4...FLR
	51	53	54	55	56	56	56	55	55	54	53	EX5...FLR
	123	127	130	132	133	134	133	133	131	130	128	EX6...FLR
	338	350	358	363	367	368	367	365	361	356	351	EX7...FLR
45	15,9	16,7	17,3	17,7	18	18,2	18,2	18,2	18,1	17,9	17,7	EX4...FLR
	48	51	53	54	55	55	55	55	55	54	54	EX5...FLR
	116	122	126	129	131	132	133	132	132	130	129	EX6...FLR
	318	335	346	355	360	364	365	364	362	358	354	EX7...FLR
40	14,6	15,6	16,4	17	17,5	17,7	17,9	17,9	17,9	17,8	17,7	EX4...FLR
	44	47	50	52	53	54	54	54	54	54	54	EX5...FLR
	106	114	120	124	127	129	130	131	130	130	129	EX6...FLR
	292	313	329	341	350	355	358	359	359	357	353	EX7...FLR
35	12,8	14,2	15,3	16,1	16,7	17,1	17,4	17,5	17,6	17,6	17,5	EX4...FLR
	39	43	46	49	51	52	53	53	53	53	53	EX5...FLR
	93	104	111	117	122	125	127	128	128	128	127	EX6...FLR
	256	285	306	322	334	343	348	351	352	352	350	EX7...FLR
30	10,3	12,3	13,8	14,9	15,7	16,2	16,7	16,9	17,1	17,1	17,1	EX4...FLR
	31	37	42	45	48	49	51	51	52	52	52	EX5...FLR
	75	90	100	108	114	118	121	123	124	125	125	EX6...FLR
	206	247	276	298	314	325	333	339	342	343	343	EX7...FLR
20		5,3	8,7	10,7	12,1	13,1	13,8	14,3	14,7	14,9	15,1	EX4...FLR
		16	26	32	37	40	42	44	45	45	46	EX5...FLR
		39	63	78	88	95	101	104	107	109	110	EX6...FLR
		107	174	214	242	262	277	287	295	299	302	EX7...FLR

Select the valve type from tables for capacity value corresponding to system (evaporator) cooling capacity.

Technical Data EX4-7-...FLR Valves

MOPD (maximum operating pressure differential)	30 bar
Max. working pressure, PS	35 bar
Max. system test pressure	38.5 bar
Ambient temperature	-20...+60°C
Storage temperature	-40...+70°C
Medium inlet temperature	
Bi-flow version:	TS: -40...+80°C
Uni-flow version:	TS: -50...+100°C
Vibration for non-connected and fastened valve	4 g (0 to 1000 Hz, 1 octave /min.)
Material	stainless steel body and fittings
Marking	 acc. to directive 94/9/EC  II 3G Ex nA IIA T3 Gc X

Protection accordance to IEC 529, DIN 40050	IP67 with M12 Connector EVC05A
Humidity	5 to 95% r.H.
Connections	ODF stainless steel fittings
Shock	20 g at 11 ms 80 g at 1 ms
Net weight (kg)	0.5 kg (EX4), 0.52 kg (EX5), 0.60 kg (EX6), 1.1 kg (EX7)
Package and delivery (individual)	without electrical connector
Accessories	M12 Connector EVC05A



Electrical Data EX4-7-...-FLR Valves

Stepper motor type	Bi-polar, phase current by chopper control (constant current)
Electrical connection	4 pin terminal via plug
Nominal supply voltage to the valve U	24 VDC
Driver supply voltage range	18 ... 36 VDC
Phase current, operating	EX4-6-...FLR: 500 mA EX7-...FLR: 750 mA
Holding current	EX4-6-...FLR: 100 mA EX7-...FLR: 250 mA

Step mode	2 phase full step, half step or microstep
Step angle	1.8° per step ±8%
Stepping rate	500 Hz
Total number of steps	EX4-6-...FLR: 750 full steps EX7-...FLR: 1600 full steps
Winding resistance per phase	EX4-6-...FLR: 13 Ohm ±10% EX7-...FLR: 8 Ohm ±10%
Full travel time	EX4-6-...FLR: 1.5 seconds EX7-...FLR: 3.2 seconds
Reference position	Mechanical stop at fully closed position

Technical Data EVC05A (ifm electronic GmbH)

Operating voltage	36 VDC in conjunction with EX4-7-...FLR
Current rating	800 mA in conjunction with EX4-7-...FLR
Design	angled
Ambient temperature	-20...+60°C
Protection	IP 67
Approval	BVS 08 ATEX E 109 U IECEX BVS 08.0041 U

Material body	housing: TPU orange; sealing: Viton
Material nut	Stainless steel 316L / 1.4404
Tightening torque for knurled nut	1.2...1.5 Nm
Weight	0.18 Kg
Connection	PUR cable / 5 m; 4 x 0.34 mm ² (42 x Ø 0.1 mm); Ø 4.9 mm; halogen-free
Marking	 II 3G Ex nA IIC Gc  II 2D Ex tD IIIC Db IP65/IP67


General Information

EX4-7-...-FLR are stepper motor driven valves for precise control of refrigerant mass flow, released for R290 in refrigeration, air conditioning, heat pumps, industrial cooling process and close control systems.

Warning

The qualification /certification of EX4-7-...-FLR is valid only in conjunction with EVC05A (Plug & Cable assembly).

The listed products are electrical devices and are in compliance with EN60079-0/-15 and directive 94/9/EC therefore rated / marked as:

 II 3G Ex nA IIA T3 Gc X

Safety Instructions

- Read operating instructions thoroughly. Failure to comply can result in device failure, system damage or personal injury.
- According to EN 13313 it is intended for use by persons having the appropriate knowledge and skill.
- R290 requires special handling and care due to its flammability. Good ventilation is required during service of the system. Contact with rapidly expanding gases can cause frostbite and eye damage. Proper protective equipment (gloves, eye protection, etc.) has to be used.
- In a severely contaminated system, avoid breathing acid vapors and avoid contact with skin from contaminated refrigerant / lubricants. Failure to do so could result in injury.
- Ensure that the system is correctly labeled with applied refrigerant type and a warning for explosion risk.
- Before opening any system make sure pressure in system is brought to and remains at atmospheric pressure.
- Do not release any refrigerant into the atmosphere!
- Ensure that the system piping is grounded.
- Do not exceed the specified maximum ratings for pressure, temperature, voltage and current.
- Do not operate valve connected directly to supply voltage. Use suitable stepper motor driver.
- 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 vacuum except for closure of valve before refrigerant charging.
- Before installation or service disconnect all voltages from system and device.
- Do not use any other fluid media without prior approval of Emerson.
- Ensure that design, installation and operation are according to European and national standards/regulations.

Mounting Location

- The motor needs to be pointed downward or sideways (Fig. 1).
- For best result, locate the valve as close as possible to the distributor or inlet of evaporator.

Installation

- Direction of refrigerant flow must match with arrow on the label (except bi-flow valves).
- 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 Emerson sight glass MIA...-FLR and an ADK....-FLR filter before the valve.

Warning

- All valves are delivered at half open. Do not charge system before closure of valve. See operating instructions of used driver/controller.
- The interior parts of valve must be protected against moisture and water at any time. It is not permitted to use water, steam or any other solvent to the inside of valve for cleaning purpose.

Recommended external pipe connection:

Nominal pipe connection	Outside diameter	
	Min. (mm)	Max. (mm)
3/8"	9.47	9.55
5/8" / 16 mm	15.80	16.05
7/8" / 22 mm	21.95	22.25
1-1/8"	28.50	28.63
10 mm	9.95	10.05
28 mm	27.95	28.05

Brazing (Fig. 2)

- Perform and consider the brazing joint as per EN 14324.
- Before and after brazing clean tubing and brazing joints.
- Minimize vibrations in the piping lines by appropriate solutions.
- **Do not exceed the max. body temperature of 120 °C!**
- Use flux and silver rod having a minimum of 30% silver.

Pressure Test

- After completion of installation, a pressure test must be carried out according to EN 378 for systems which must comply with European pressure equipment directive 97/23/EC.
- Max. system test pressure: 38.5 bar

Warning

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

Tightness Test

- Conduct a tightness test according to EN 378-2 with appropriate equipment and method to identify leakages of external joints. The allowable leakage rate must be according system manufacturer's specification.

Electrical Connection:

Warning

- Entire electrical connections have to comply with local regulations.
- Improper wiring will result wrong direction of rotation, no rotation of stepper motor or controller malfunction.

Wiring / Mounting of Plug: (Fig. 4-6)

- 2 = White, 4 = Black, 3 = Blue, 1 = Brown
- Use only ATEX approved prewired M12 Connector assembly EVC05A for connection to the valve.
- **See also EVC05A operating instructions for plug mounting and required protection.**
- There is no specific requirement for positioning of plug on pins (see Fig. 5).
- **Ensure that the cables are mounted without tension; always leave the cable a bit loose.**
- **Ensure that cables are not mounted near sharp edges.**
- **Do not bend or mechanically stress the cable outlet, maintain a clearance of 20 mm to neighboring parts.**
- **During operation the connector EVC05A must be protected by an appropriate housing against external mechanical damage or shock (min. required protection up to a mechanical action of 7 J - in accordance with EN60079-0).**
- **Cable end of EVC05A must be connected to a driver/controller which is ATEX approved or located out of hazard zone.**
 - If driver/controller is located out of hazard zone, appropriate ATEX approved cable gland shall be used in boundary of hazard zone and out of hazard zone.
 - If the cable needs to be extended in hazard zone, it is mandatory to use ATEX approved type coupling or junction box.
- **Supply voltage to the valve shall never exceed 36 VDC at any time.**

Wiring / Mounting to Driver / Controller

- See the wiring diagram of used driver or controller.

Operation

- See operating instructions of used electronic driver/controller.
- **Perform a functional test of electrical circuit before charging the system with refrigerant.**

Service / Maintenance

- Defective EX4-7-...FLR valves must be replaced, they cannot be repaired.
- **Disconnect electrical power to driver/controller before service.**
- **Before any debrazing ensure that the flammable refrigerant is pumped out of the system and the room around the system is well vented so no refrigerant left.**
- For motor check:
 - Remove cable plug from valve under no voltage.
 - Use an Ohm meter with suitable range.
 - Measure windings resistance per phase at opposite placed pins acc. Fig. 6 and data as in the table below.
- **The lowest pressure inside system must be at least 0.4 bar higher than ambient pressure at any time. Failure to do so could accumulate air inside the system and create an explosive mixture over time.**

Technical Data

Type	EX4-6-...FLR	EX7-...FLR
Max. allowable working pressure PS	35 bar	
Operating temp. at motor	Uni-flow versions: -50°C...+100°C Bi-flow versions: -40°C...+80°C	
Connection	see Fig. 3	
Refrigerant: R290	✓	✓
Nominal Supply Voltage to the valve U	24 VDC	24 VDC
Max. Current I _{max}	0.5 A	0.75 A
Winding resistance per phase	13 Ω ± 10%	8 Ω ± 10%
CE Marking acc. to directive 94/9/E	Yes	Yes

Fig. 1

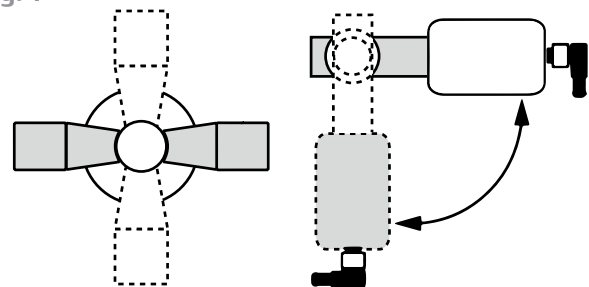
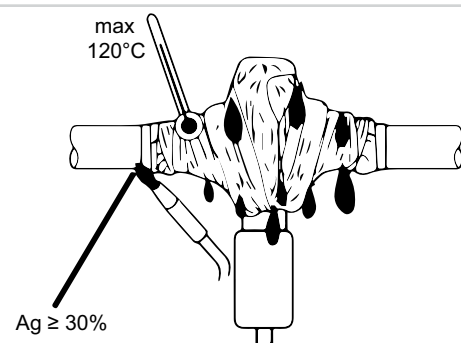
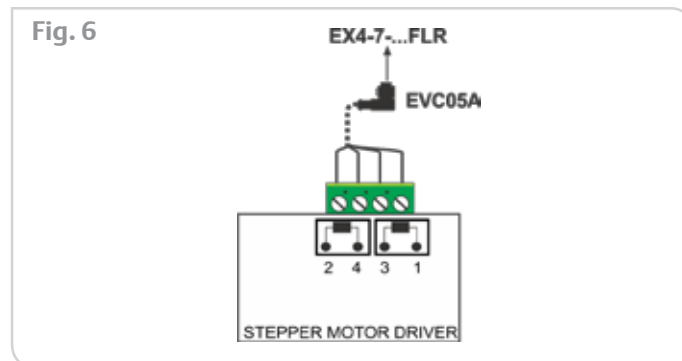
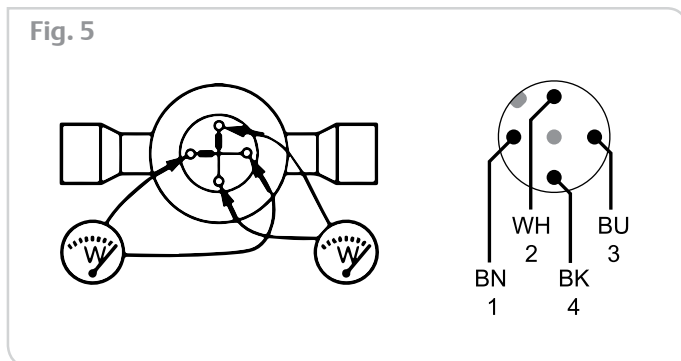
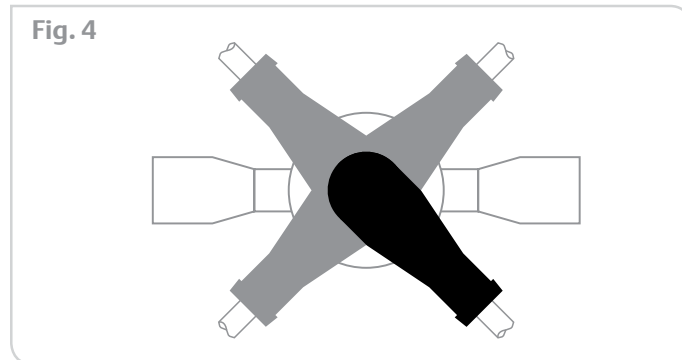
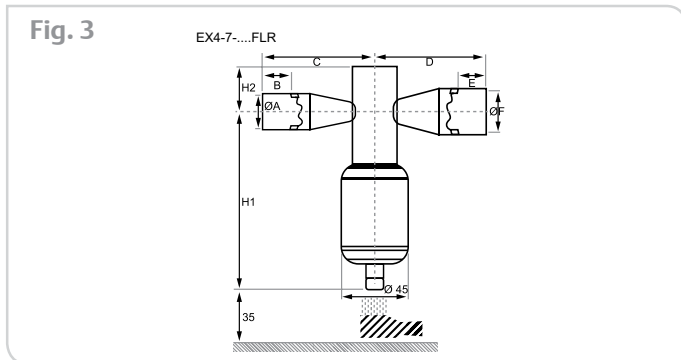


Fig. 2





EXV	Flow pattern	Part. no.	Ø A x Ø F(ODF)	B	C	D	E	H1	H2
EX4-I21FLR	Uni-flow	800430	3/8" x 5/8"	8	45	55	11	113	25
EX4-M21FLR		800431	10 x 16 mm	8	45	55	11	113	25
EX5-U21FLR		800432	5/8" x 7/8" (16 x 22 mm)	11	55	65	16	113	25
EX6-I21FLR		800433	7/8" x 1-1/8"	16	65	75	19	113	25
EX6-M21FLR		800434	22 x 28 mm	16	65	75	19	113	25
EX7-I21FLR		800440	1-1/8" x 1-1/8"	20	78	83	20	158	42
EX7-M21FLR		800441	28 x 28 mm	20	78	83	20	158	42
EX4-U31FLR	Bi-flow	800435	16 x 16 mm (5/8" x 5/8")	11	55	55	11	113	25
EX5-U31FLR		800436	7/8" x 7/8" (22 x 22 mm)	16	65	65	16	113	25
EX6-I31FLR		800437	1-1/8" x 1-1/8"	19	75	75	19	113	25
EX6-M31FLR		800438	28 x 28 mm	19	75	75	19	113	25
EX7-I31FLR		800442	1-1/8" x 1-1/8"	20	83	83	20	158	42
EX7-M31FLR		800443	28 x 28 mm	20	83	83	20	158	42

Sequence for driving of stepper motor and valve

Direction	Reverse direction	Number of steps	Identification code of pins for electrical connections to third party drivers/controllers				
			2	4	3	1	
Current direction							
↓ ↓	↑ ↑	Step 1	+	-	+	-	
		Step 2	-	+	+	-	
		Step 3	-	+	-	+	
		Step 4	+	-	-	+	
		Remark	The sequence is repeated from step 5 to 8 similar to step 1 to 4				
		Step 5	+	-	+	-	
		Step 6	-	+	+	-	
		Step 7	-	+	-	+	
		Step 8	+	-	-	+	
		Remark	The sequence is repeated from step 9 to 12 similar to step 1 to 4				
↓	↓	↓	↓				

Functions and Features

- Use in hazardous areas according to the classification

II3G (Group II, category 3G, apparatus for gas atmosphere).
Complies with the requirements of the standard EN 60079-15.

- Use in hazardous areas according to the classification

II3G (Group II, category 20, apparatus for dust atmosphere). Complies with the requirements of the standards IEC 60079-0 and IEC 60079-31.

- EC component certificate: BVS 08ATEX E 109 U
- IEC Ex component certificate: IECEx BVS 08.0041 U
- Marking:

Ex II3G Ex nA IIC Gc (see table Operating temperature range)

Ex II20 Ex tb IIIC Db IP65/IP67

Operating temperature range

-20...+60°C

for connection cables and jumpers with angled M12 plug and angled M12 sockets

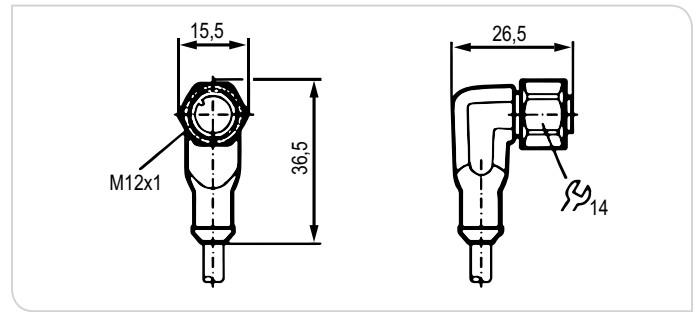
Installation / Set-up

The M12 connectors must only be installed connected and set up by qualified staff. The qualified staff must have knowledge of protection classes, regulations- and provisions for apparatus in hazardous areas.

Check whether the classification (see “Marking” above and marking on the M12 connector) is suitable for the application.

Installation Remarks / Installation

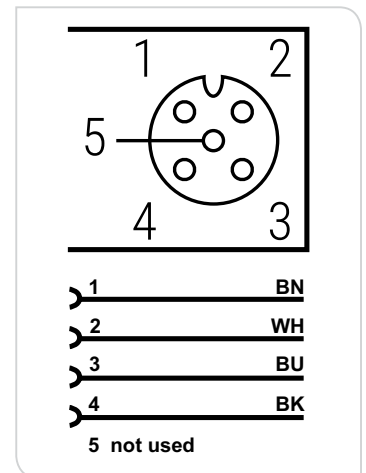
- Adhere to the relevant national regulations and provisions.
- Avoid electrostatic charging on plastic units and cables.
- Protect the M12 connectors efficiently against damage.
- The cables must be firmly laid and effectively protected against damage.
- The relevant installation regulations must be adhered to.
- For the technical data please refer to the data sheet. (see Technical Bulletin EX4-7-...-FLR).
- Avoid direct radiation with high UV components (sunlight); mount the unit in a protected place.
- M12 plugs may only be opened or closed in a sufficiently clean environment.
- Connectors must always be closed with a counterpart. They may be left open in the field only briefly for servicing purposes.



Wiring

Core colors

- BK black
- BN brown
- BU blue
- WH white



Caution: Not for interrupting current!

Special Conditions for Safe Operation

- The M12 connectors were tested in accordance with table 8 of EN 60079-0/table 5 of EN 61241-0 for group II and for a low mechanical risk with impact energy of 4 joules.
- Do not separate the connectors when energized.
- Secure the connector by tightening the nut sufficiently. Tightening torque approx. 1.2 Nm to 1.5 Nm. This tightening torque is ensured as follows:
 - Hand-fasten the coupling nut (0.4 to 0.5 Nm).
 - Then turn by 3 notches using a screwdriver across the flats 14.
- The connector conforms to the requirements for an M12 connector in EN 61076-2-101. The counterpart must also conform to this standard.
- Always refer to the operating-instructions as space restrictions may not allow markings to be applied to the unit.

Maintenance / Repair

The unit must not be modified nor can it be repaired. In case of a fault please contact the manufacturer.

The data sheets, the EC component certificates or IEC Ex component certificates are available from the manufacturer on request.

Emerson Climate Technologies' **TX3-...FLR** series of Thermo™-Expansion Valves are designed for commercial refrigeration and heat pump applications operated with R290.

The **TX3-...FLR** is ideal for those applications requiring compact size combined with stable and accurate control over wide load and evaporating temperature ranges.

Features

- Brazing connections with straight through configuration
- Stainless steel power element resists corrosion
- Large diaphragm provides smoother and consistent valve control
- External equalizer
- External superheat adjustment
- Packaging units with 24 pieces, no single packs



TX3-...FLR

Selection Table

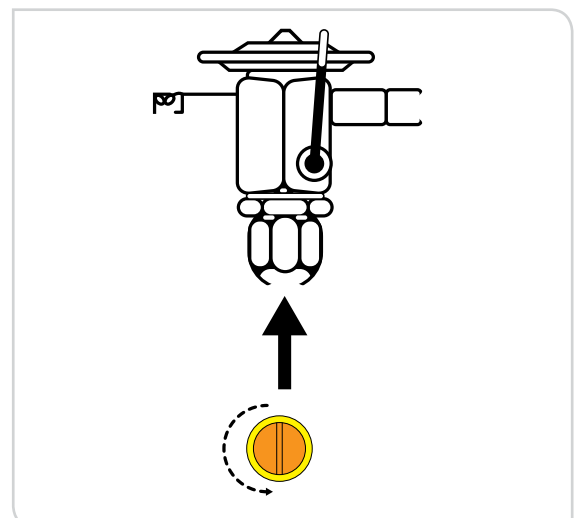
Nominal capacity [kW]	Without MOP		With MOP		Connection size	Inlet x Outlet
	Type	Part no.	Type	Part no.	Equalizer	
3.7	TX3-P23 FLR	801981M	TX3-P33 FLR	801988M	Ext. 1/4"	1/4" x 3/8"
5.4	TX3-P24 FLR	801982M	TX3-P34 FLR	802013M	Ext. 1/4"	3/8" x 1/2"
8.0	TX3-P25 FLR	801983M	TX3-P35 FLR	802014M	Ext. 1/4"	3/8" x 1/2"
11.0	TX3-P26 FLR	801984M	TX3-P36 FLR	802015M	Ext. 1/4"	3/8" x 1/2"
13.5	TX3-P27 FLR	801985M	TX3-P37 FLR	802016M	Ext. 1/4"	1/2" x 5/8"
16.1	TX3-P28 FLR	801986M	TX3-P38 FLR	802017M	Ext. 1/4"	1/2" x 5/8"
22.0	TX3-P29 FLR	801987M	TX3-P39 FLR	802018M	Ext. 1/4"	1/2" x 5/8"

Nominal capacity at +38°C liquid temperature, +4°C evaporating temperature and 1K subcooling. For other operating condition, see the next page.

Guideline

TX3-...FLR will be delivered with sufficient higher superheat setting to make sure match of valve with poor performance of evaporator. The setting can be lowered for high efficient evaporators capable to operate at lower superheat. The following table can be used as guideline:

Evaporating temperature	Readjustment, turn
-40	-1
-35	-1
-30	-1-1/8
-25	-1-1/8
-20	-1-1/8
-15	-1-1/8
-10	-1
-5	-3/4
0	-1/2
5	-1/8
10	-1/3



Quick Selection (included 1.5 bar pressure drop for liquid line components and distributor)

Condensing temperature °C	R290 Capacity in kW												Valve type
	Evaporating temperature °C												
	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	
75	3.3	3.3	3.2	3.2	3.1	3.1	2.6	2.2	1.9	1.6	1.3	1.0	TX3-P23/33FLR
	4.8	4.7	4.7	4.6	4.5	4.4	3.8	3.2	2.7	2.2	1.8	1.5	TX3-P24/34FLR
	7.2	7.1	7.0	6.9	6.8	6.6	5.7	4.8	4.0	3.4	2.8	2.2	TX3-P25/35FLR
	9.8	9.8	9.7	9.5	9.3	9.1	7.8	6.6	5.5	4.6	3.8	3.1	TX3-P26/36FLR
	12.1	12.0	11.8	11.6	11.4	11.1	9.5	8.1	6.8	5.6	4.6	3.8	TX3-P27/37FLR
	14.4	14.2	14.1	13.8	13.6	13.2	11.3	9.6	8.1	6.7	5.5	4.5	TX3-P28/38FLR
	19.6	19.5	19.2	18.9	18.5	18.1	15.5	13.1	11.0	9.2	7.5	6.1	TX3-P29/39FLR
65	3.2	3.2	3.2	3.2	3.2	3.1	2.7	2.3	1.9	1.6	1.3	1.1	TX3-P23/33FLR
	4.6	4.7	4.7	4.6	4.6	4.5	3.9	3.3	2.8	2.3	1.9	1.6	TX3-P24/34FLR
	7.0	7.0	7.0	6.9	6.8	6.7	5.8	5.0	4.2	3.5	2.9	2.4	TX3-P25/35FLR
	9.6	9.6	9.6	9.5	9.4	9.2	8.0	6.8	5.8	4.8	4.0	3.3	TX3-P26/36FLR
	11.7	11.7	11.7	11.6	11.5	11.3	9.7	8.3	7.1	5.9	4.9	4.0	TX3-P27/37FLR
	13.9	14.0	14.0	13.8	13.7	13.4	11.6	9.9	8.4	7.0	5.8	4.8	TX3-P28/38FLR
	19.0	19.1	19.1	18.9	18.7	18.4	15.9	13.6	11.5	9.6	8.0	6.5	TX3-P29/39FLR
55	3.3	3.3	3.4	3.4	3.4	3.4	2.9	2.5	2.2	1.8	1.5	1.3	TX3-P23/33FLR
	4.7	4.8	4.9	4.9	4.9	4.9	4.3	3.7	3.1	2.7	2.2	1.8	TX3-P24/34FLR
	7.1	7.2	7.3	7.4	7.4	7.3	6.4	5.5	4.7	4.0	3.3	2.8	TX3-P25/35FLR
	9.7	9.9	10.0	10.1	10.1	10.0	8.8	7.6	6.5	5.5	4.6	3.8	TX3-P26/36FLR
	11.9	12.2	12.3	12.4	12.4	12.3	10.7	9.3	7.9	6.7	5.6	4.7	TX3-P27/37FLR
	14.2	14.5	14.7	14.7	14.7	14.6	12.8	11.0	9.4	8.0	6.7	5.5	TX3-P28/38FLR
	19.4	19.8	20.0	20.1	20.1	20.0	17.4	15.1	12.9	10.9	9.1	7.6	TX3-P29/39FLR
50	3.4	3.6	3.6	3.7	3.7	3.7	3.3	2.8	2.5	2.1	1.8	1.5	TX3-P23/33FLR
	5.0	5.1	5.3	5.3	5.4	5.4	4.7	4.1	3.5	3.0	2.5	2.1	TX3-P24/34FLR
	7.5	7.7	7.9	8.0	8.1	8.1	7.1	6.2	5.3	4.5	3.8	3.2	TX3-P25/35FLR
	10.2	10.6	10.8	11.0	11.1	11.1	9.7	8.5	7.3	6.2	5.2	4.4	TX3-P26/36FLR
	12.5	13.0	13.2	13.4	13.5	13.5	11.9	10.4	8.9	7.6	6.4	5.3	TX3-P27/37FLR
	14.9	15.4	15.8	16.0	16.1	16.1	14.2	12.3	10.6	9.1	7.6	6.4	TX3-P28/38FLR
	20.4	21.1	21.5	21.8	22.0	22.0	19.4	16.8	14.5	12.4	10.4	8.7	TX3-P29/39FLR
40	3.0	3.2	3.4	3.5	3.6	3.6	3.2	2.8	2.5	2.1	1.8	1.5	TX3-P23/33FLR
	4.3	4.7	4.9	5.1	5.2	5.3	4.7	4.1	3.6	3.1	2.6	2.2	TX3-P24/34FLR
	6.5	7.0	7.3	7.6	7.8	7.9	7.0	6.2	5.3	4.6	3.9	3.3	TX3-P25/35FLR
	8.9	9.6	10.1	10.4	10.7	10.8	9.6	8.4	7.3	6.3	5.3	4.5	TX3-P26/36FLR
	10.9	11.7	12.3	12.7	13.0	13.2	11.8	10.3	9.0	7.7	6.5	5.5	TX3-P27/37FLR
	13.0	14.0	14.7	15.2	15.5	15.8	14.0	12.3	10.7	9.2	7.8	6.5	TX3-P28/38FLR
	17.8	19.1	20.0	20.7	21.2	21.5	19.1	16.8	14.6	12.5	10.6	8.9	TX3-P29/39FLR
30	2.1	2.6	2.9	3.1	3.2	3.4	3.0	2.7	2.4	2.1	1.8	1.5	TX3-P23/33FLR
	3.1	3.7	4.1	4.4	4.7	4.9	4.4	3.9	3.4	3.0	2.5	2.1	TX3-P24/34FLR
	4.6	5.5	6.2	6.7	7.0	7.3	6.6	5.9	5.1	4.5	3.8	3.2	TX3-P25/35FLR
	6.4	7.6	8.5	9.1	9.6	10.0	9.0	8.0	7.0	6.1	5.2	4.4	TX3-P26/36FLR
	7.8	9.3	10.4	11.2	11.8	12.2	11.0	9.8	8.6	7.5	6.4	5.4	TX3-P27/37FLR
	9.3	11.1	12.4	13.3	14.0	14.6	13.1	11.7	10.3	8.9	7.6	6.4	TX3-P28/38FLR
	12.7	15.1	16.9	18.2	19.2	19.9	18.0	16.0	14.0	12.2	10.4	8.8	TX3-P29/39FLR
20		1.2	1.9	2.3	2.6	2.9	2.7	2.4	2.2	1.9	1.6	1.4	TX3-P23/33FLR
		1.7	2.7	3.4	3.8	4.1	3.8	3.5	3.1	2.7	2.4	2.0	TX3-P24/34FLR
		2.5	4.1	5.1	5.7	6.2	5.8	5.3	4.7	4.1	3.6	3.0	TX3-P25/35FLR
		3.5	5.6	6.9	7.8	8.5	7.9	7.2	6.4	5.7	4.9	4.2	TX3-P26/36FLR
		4.3	6.9	8.5	9.6	10.4	9.7	8.8	7.9	6.9	6.0	5.1	TX3-P27/37FLR
		5.1	8.2	10.1	11.4	12.4	11.5	10.5	9.4	8.2	7.1	6.1	TX3-P28/38FLR
		6.9	11.2	13.8	15.6	16.9	15.8	14.3	12.8	11.3	9.7	8.3	TX3-P29/39FLR

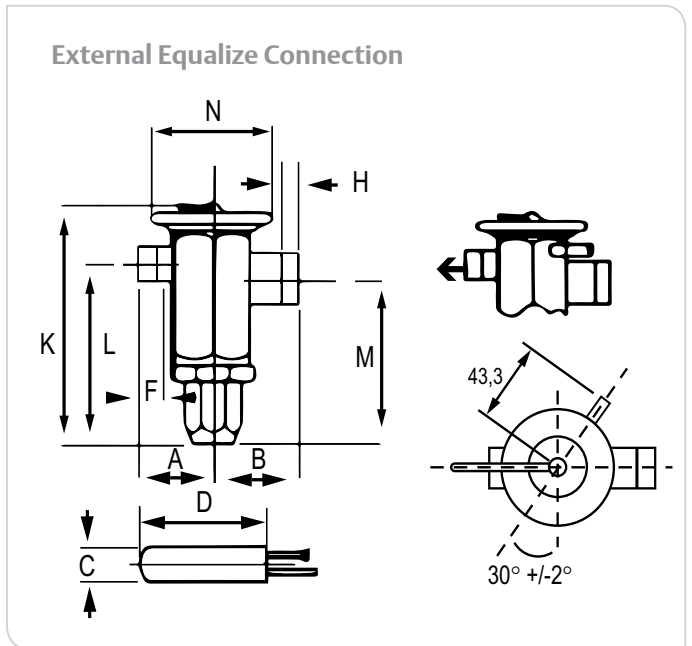
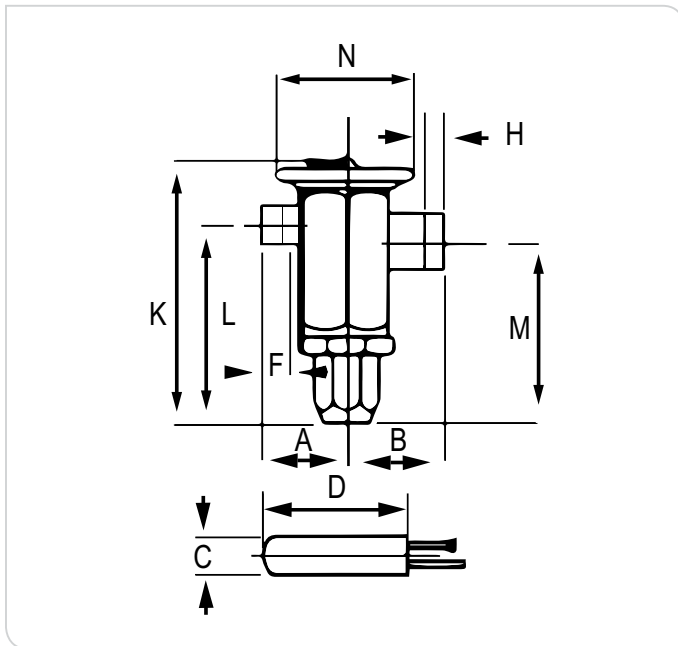
Select the valve type from tables for capacity value corresponding to system (evaporator) cooling capacity.

Technical Data

Compatibility	R290
Maximum working pressure PS:	35 bar
Factory test pressure PT:	38.5 bar
Burst pressure	175 bar
Medium temperature range	-45°C...+75°C
Maximum bulb temperature	+71°C

Seat leakage	≤ 1% nominal capacity
Connection	ODF, copper
Charges	CFC free
Protection	salt spray test
Weight	~ 0.5 kg (individual)
Pack quantity	24 (no single pack)

Dimensions [mm]



Body

Type	Connection size [inch]		Roughing in dimensions [mm]							
	Inlet	Outlet	A	B	F	H	N	K	L	M
TX3-...3-FLR	1/4"	3/8"	43.3	44.1	7.9	7.9	44.5	86.5	64.7	54.4
TX3-...4-FLR	3/8"	1/2"	44.1	44.1	7.9	9.5				
TX3-...5-FLR	3/8"	1/2"	44.1	44.1	7.9	9.5				
TX3-...6-FLR	3/8"	1/2"	44.1	44.1	7.9	9.5				
TX3-...7-FLR	1/2"	5/8"	44.1	44.5	9.5	12.7				
TX3-...8-FLR	1/2"	5/8"	44.1	44.5	9.5	12.7				
TX3-...9-FLR	1/2"	5/8"	44.1	44.5	9.5	12.7				

Bulb

Dimensions of bulb [mm]		Capillary tube length
D (length)	Ø C	
53.2	12.8	1.5 m

General Information

TX3-...FLR are Thermo-Expansion Valves for superheat control.

The listed products are not in scope of ATEX product directive 94/9/EC as they do not incorporate an own source of ignition.

TX3-...FLR must be installed in an appropriate housing to protect them from mechanical damage or shock.

⚠ Safety Instructions

- **Read operating instructions thoroughly. Failure to comply can result in device failure, system damage or personal injury.**
- **According to EN 13313 it is intended for use by persons having the appropriate knowledge and skill.**
- **R290 requires special handling and care due to its flammability. Sufficient ventilation is required during service of the system. Contact with rapidly expanding gases can cause frostbite and eye damage. Proper protective equipment (gloves, eye protection, etc.) has to be used.**
- **In a severely contaminated system, avoid breathing acid vapors and avoid contact with skin from contaminated refrigerant / lubricants. Failure to do so could result in injury.**
- **Ensure that the system is correctly labeled with applied refrigerant type and a warning for explosion risk.**
- **Do not release any refrigerant into the atmosphere!**
- **Do not exceed the specified maximum ratings for pressure and temperature.**
- **Before opening any system make sure pressure in system is brought to and remains at atmospheric pressure.**
- **Observe and avoid mechanical damage of component housing.**
- **Ensure that design, installation and operation are according to European and national standards/regulations.**

Installation (Fig. 1, 2)

- Valves may be installed in any position, but should be located as close as possible to the distributor or evaporator inlet.
- Attach the remote bulb to the suction line (Fig. 2) as close to the evaporator outlet as possible. Securely fasten the bulb with straps provided. Insulate bulb with a suitable material. Ensure that the capillary is mounted without tension, always leave the capillary a bit loose and it should not be strangulated. Maintain also a clearance from the capillary to other objects. The capillary should not be in contact with other objects.

Fig. 1

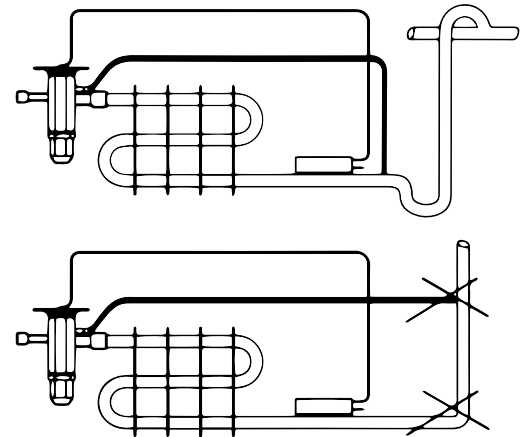
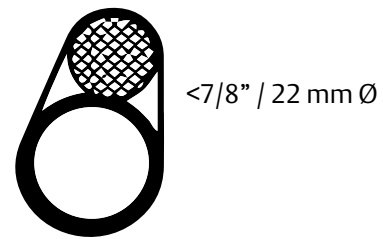


Fig. 2



- Connect equalizer line (1/4" or 6 mm tube) to valve and suction line. Be sure that it cannot siphon oil from the suction line (Fig. 1).
- The expansion valve must be free of all contaminants. Install an Emerson filter drier before the valve.

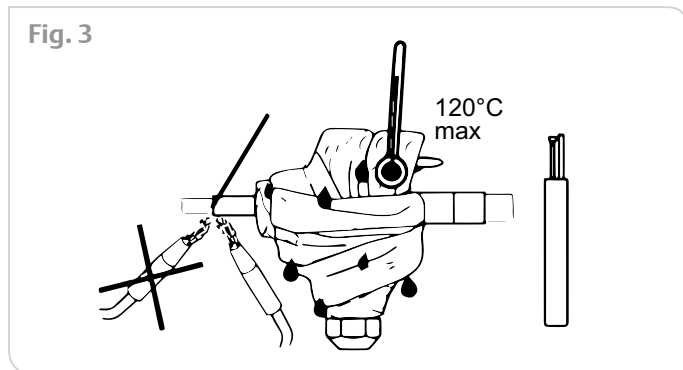
Recommended external pipe connections:

Nominal pipe connection	Outside diameter	
	Min. (mm)	Max.(mm)
1/4"	6.30	6.38
3/8"	9.47	9.55
1/2"	12.62	12.73
5/8"	18.80	15.90
7/8"	22.15	22.25
1-1/8"	28.50	28.63
6 mm	5.95	6.05
10 mm	9.95	10.05
12 mm	11.96	12.05
16 mm	15.95	16.05
22 mm	21.95	22.06
28 mm	27.95	28.05

Brazing (Fig. 3)

- Perform and consider the brazing joint as per EN 14324.
- Before and after brazing clean tubing and brazing joints.
- To avoid oxidization, it is advised to purge the system with an inert gas such as nitrogen while brazing.

Do not exceed max. body temperature of 120°C!



- Be sure liquid line is connected to inlet of TX3-...FLR (marked “IN” on valve body).
- Minimize vibrations in the piping lines by appropriate solutions.

Pressure Test

- After completion of installation, a pressure test must be carried out according to EN 378 for systems which must comply with European pressure equipment directive 97/23/EC.
- Max. system test pressure: 38.5 bar.

⚠ Warning

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

Tightness Test

Conduct tightness test according to EN 378-2 with appropriate equipment and method to identify tightness of external joint. The allowable leakage rate must be according system manufacturer’s specification.

Operation

- Check for sufficient refrigerant charge and be sure no flash gas is present before attempting to check the expansion valve operation.
- Check/measure superheat.

Superheat Adjustment (Fig. 4)

TX3-...FLR are factory set to a standard setting (s. Technical Bulletin). If the superheat must be adjusted proceed as follows:

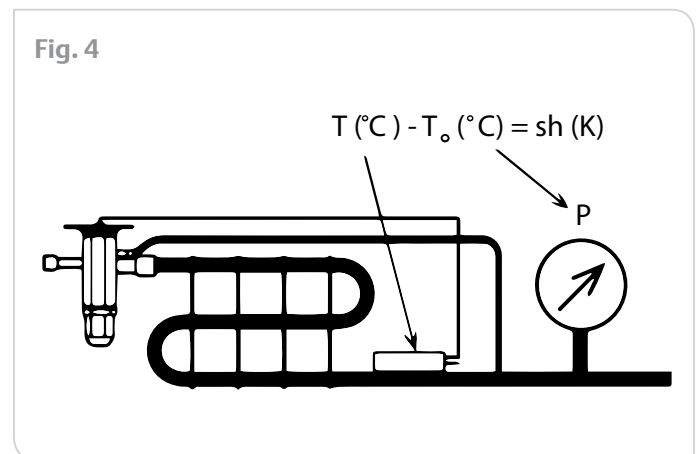
1. Remove seal cap from bottom of valve.
2. Turn adjustment screw clockwise to increase and counterclockwise to decrease superheat.

Warning: There are approx. 13 turns on the adjustment stem (from left to right stop). When stop is reached any further turning will damage valve. Changes in superheat (K) per stem turn depending on evaporating temperature and refrigerant; see below. 30 minutes are required for the system to stabilize after the adjustment is made.

Superheat change (K) per stem turn

	Evaporating temperature						
	-40°C	-30°C	-20°C	-10°C	0°C	10°C	20°C
R 290	4.8	3.6	2.7	2.1	1.7	1.4	1.1

3. Determine superheat according to Fig. 4.
4. Replace and tighten seal cap (hand-tighten with more than 2 Nm).
5. Check for external leakage.



⚠ Service / Maintenance

- Defective TX3-...FLR must be replaced; they cannot be repaired.
- Before any debrazing ensure that the flammable refrigerant is pumped out of the system and the room around the system is well vented so no refrigerant left.

Technical Data of TX3 -...FLR

Charge	Recommended evaporating temperature
Liquid	-40°C...+20°C

- Max. allowable working pressure PS : 35 bar
- Test pressure PT : 38.5 bar
- Released / compatible for : R290, mineral-, alkyl benzene and ester lubricants

TX3 types, not listed in the following table, are not released for use with flammable refrigerants!

Type	Part no.
TX3-P23FLR	801981M
TX3-P24FLR	801982M
TX3-P25FLR	801983M
TX3-P26FLR	801984M
TX3-P27FLR	801985M
TX3-P28FLR	801986M
TX3-P29FLR	801987M
TX3-P33FLR	801988M
TX3-P34FLR	802013M
TX3-P35FLR	802014M
TX3-P36FLR	802015M
TX3-P37FLR	802016M
TX3-P38FLR	802017M
TX3-P39FLR	802018M



200RB...-FLR are normally closed solenoid valves for various application duties.

Features

- Normally closed
- Pilot operated requires minimum operating pressure differential
- Compact size
- Extended fittings: No disassembly necessary for brazing
- ATEX compliance coil and plug in 24VAC/50Hz and 230VAC/50Hz
- as a kit available



200RB...-FLR + ASC... + PG9 ATEX

Coil and Plug

II 3G Ex nA IIA T3 Gc U

II 2G IIC T6 Gb

Selection Table Valves

Type	Part no.	Kv-Value [m3/h]	Capacity [kW] Liquid line duty	Connections Solder / ODF	
				[mm]	[inch]
200RB 3T3-FLR (mm)	801323	0.4	7.3	10	
200RB 3T3-FLR	801445				3/8"
200RB 4T10-FLR	801446	0.9	17.3	10	
200RB 4T4-FLR	801447				1/2"
200RB 4T3-FLR	801448				3/8"
200RB 4T12-FLR	801449	1.6	30.4	12	
200RB 6T4-FLR	801450				1/2"
200RB 6T12-FLR	801451				
200RB 6T5-FLR	801452				5/8"

Note: Nominal capacity at +38°C condensing temperature +4°C evaporating temperature, 1 K subcooling and 0.15 bar pressure drop.

Selection Table Coil + Plug

Type	Part no.	Description
ASC24V + PG9 ATEX	801123	Kit consisting of coil, plug and clip (blue)
ASC230V + PG9 ATEX	801124	Kit consisting of coil, plug and clip (blue)

Technical Data Valve

Max. allowable working pressure PS	31 bar
Test pressure PT	34.1 bar
Operating temperature range TS	-40°C...+120°C
Max. ambient temperature	-40°C...+50°C

Technical Data Coil + Plug

Supply voltage	ASC3-EX24VAC 24VAC ±10% ASC3-EX230VAC 230VAC ±10%
Frequency	50 Hz
Ambient temperature range	-10°C...+50°C
Protection class	IP65
Plug	PG9-ATEX (H.T.P. S.r.l.)
Cable length	3 m
Marking (Coil & Plug)	II 3G Ex nA IIA T3 Gc U, II 2G IIC T6 Gb, CE

Quick Selection (0.15 bar pressure drop)

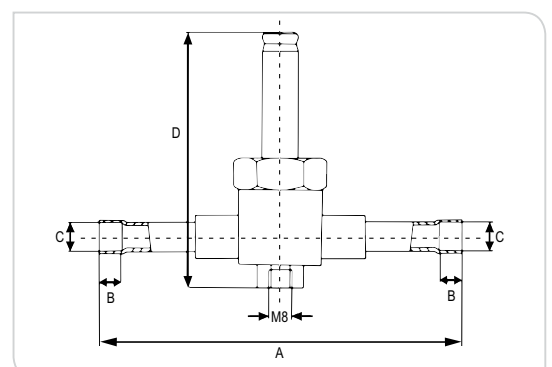
Condensing Temperature °C	Capacity in kW Evaporating temperature °C													Valve type
	R290		R290											
	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45	
70	4.6	4.5	4.4	4.2	4.1	4.0	3.8	3.7	3.5	3.4	3.3	3.1	3.0	200RB3...FLR
	10.9	10.6	10.3	10.0	9.7	9.4	9.0	8.7	8.4	8.0	7.7	7.4	7.0	200RB4...FLR
	19.2	18.6	18.1	17.5	17.0	16.4	15.9	15.3	14.7	14.1	13.5	12.9	12.4	200RB6...FLR
65	5.1	5.0	4.9	4.7	4.6	4.4	4.3	4.2	4.0	3.9	3.7	3.6	3.4	200RB3...FLR
	12.1	11.8	11.5	11.2	10.8	10.5	10.2	9.9	9.5	9.2	8.8	8.5	8.2	200RB4...FLR
	21.2	20.7	20.2	19.6	19.0	18.5	17.9	17.3	16.7	16.1	15.5	14.9	14.3	200RB6...FLR
60	5.6	5.5	5.3	5.2	5.1	4.9	4.8	4.6	4.5	4.3	4.2	4.1	3.9	200RB3...FLR
	13.3	12.9	12.6	12.3	12.0	11.6	11.3	11.0	10.6	10.3	9.9	9.6	9.3	200RB4...FLR
	23.3	22.7	22.2	21.6	21.0	20.5	19.9	19.3	18.7	18.1	17.5	16.9	16.2	200RB6...FLR
55	6.1	5.9	5.8	5.7	5.5	5.4	5.2	5.1	5.0	4.8	4.7	4.5	4.4	200RB3...FLR
	14.4	14.1	13.7	13.4	13.1	12.8	12.4	12.1	11.7	11.4	11.0	10.7	10.3	200RB4...FLR
	25.2	24.7	24.1	23.6	23.0	22.4	21.8	21.2	20.6	20.0	19.4	18.8	18.1	200RB6...FLR
50	6.5	6.4	6.3	6.1	6.0	5.8	5.7	5.6	5.4	5.3	5.1	5.0	4.8	200RB3...FLR
	15.5	15.2	14.8	14.5	14.2	13.8	13.5	13.1	12.8	12.4	12.1	11.7	11.4	200RB4...FLR
	27.2	26.6	26.1	25.5	24.9	24.3	23.7	23.1	22.5	21.9	21.2	20.6	20.0	200RB6...FLR
45	7.0	6.9	6.7	6.6	6.4	6.3	6.2	6.0	5.9	5.7	5.6	5.4	5.2	200RB3...FLR
	16.6	16.2	15.9	15.6	15.2	14.9	14.6	14.2	13.9	13.5	13.1	12.8	12.4	200RB4...FLR
	29.1	28.5	27.9	27.4	26.8	26.2	25.6	24.9	24.3	23.7	23.1	22.4	21.8	200RB6...FLR
40	7.5	7.3	7.2	7.0	6.9	6.7	6.6	6.4	6.3	6.1	6.0	5.8	5.7	200RB3...FLR
	17.6	17.3	17.0	16.6	16.3	16.0	15.6	15.3	14.9	14.5	14.2	13.8	13.5	200RB4...FLR
	31.0	30.4	29.8	29.2	28.6	28.0	27.4	26.8	26.2	25.5	24.9	24.3	23.6	200RB6...FLR
30	8.3	8.2	8.1	7.9	7.8	7.6	7.5	7.3	7.2	7.0	6.9	6.7	6.5	200RB3...FLR
	19.7	19.4	19.1	18.7	18.4	18.0	17.7	17.3	16.9	16.6	16.2	15.8	15.5	200RB4...FLR
	34.7	34.1	33.5	32.9	32.3	31.6	31.0	30.4	29.8	29.1	28.5	27.8	27.2	200RB6...FLR
25	8.8	8.6	8.5	8.3	8.2	8.0	7.9	7.7	7.6	7.4	7.3	7.1	7.0	200RB3...FLR
	20.8	20.4	20.1	19.7	19.4	19.0	18.7	18.3	18.0	17.6	17.2	16.8	16.5	200RB4...FLR
	36.5	35.9	35.3	34.7	34.1	33.4	32.8	32.2	31.5	30.9	30.2	29.6	28.9	200RB6...FLR
20		9.1	8.9	8.8	8.6	8.5	8.3	8.2	8.0	7.9	7.7	7.5	7.4	200RB3...FLR
		21.5	21.1	20.8	20.4	20.1	19.7	19.3	19.0	18.6	18.2	17.8	17.5	200RB4...FLR
		37.7	37.1	36.5	35.8	35.2	34.6	33.9	33.3	32.6	32.0	31.3	30.7	200RB6...FLR

Select the valve type from tables for capacity value corresponding to system (evaporator) cooling capacity. For other pressure drop than 0.15, please use the below correction factors.

Correction factors $K_{\Delta P}$														
ΔP , bar	0.05	0.1	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70
$K_{\Delta P}$	1.73	1.22	1.0	0.87	0.77	0.71	0.65	0.61	0.58	0.55	0.52	0.50	0.48	0.46

Dimensions [mm]

Type	A	B	Connection / ODF	D
200RB 3T3-FLR (mm)	126	8	10 mm	88.3
200RB 3T3-FLR	126	8	3/8"	88.3
200RB 4T10-FLR	126	8	10 mm	88.3
200RB 4T4-FLR	126	10	1/2"	88.3
200RB 4T3-FLR	126	8	3/8"	88.3
200RB 4T12-FLR	126	10	12 mm	88.3
200RB 6T4-FLR	126	10	1/2"	88.3
200RB 6T12-FLR	126	10	12 mm	88.3
200RB 6T5-FLR	126	13	16 mm & 5/8"	88.3



General Information

200RB...-FLR are solenoid valves for open or close of refrigerant flow.

The listed products are not in scope of ATEX product directive 94/9/EC as they do not incorporate an own source of ignition.

200RB...-FLR must be installed in an appropriate housing to protect them from mechanical damage or shock.

⚠ Safety Instructions

- Read operating instructions thoroughly. Failure to comply can result in device failure, system damage or personal injury.
- According to EN 13313 it is intended for use by persons having the appropriate knowledge and skill.
- R290 requires special handling and care due to its flammability. Sufficient ventilation is required during service of the system. Contact with rapidly expanding gases can cause frostbite and eye damage. Proper protective equipment (gloves, eye protection, etc.) has to be used.
- In a severely contaminated system, avoid breathing acid vapors and avoid contact with skin from contaminated refrigerant/lubricants. Failure to do so could result in injury.
- Ensure that the system is correctly labeled with applied refrigerant type and a warning for explosion risk.

WARNING: Do not use a solenoid valve as a safety shut-off valve or for service purpose.

- Do not release any refrigerant into the atmosphere!
- Do not exceed the specified maximum ratings for pressure, temperature.
- Before opening any system make sure pressure in system is brought to and remains at atmospheric pressure.
- Ensure that the system piping is grounded.
- Before installation or service disconnect voltage from system and device.
- Observe and avoid mechanical damage of component housing.
- Ensure that design, installation and operation are according to European and national standards/regulations

Installation

- Do not dent, bend, or use the enclosing tube as a lever. A damaged enclosing tube may result in coil burnout, inoperative valve or leakage.
- Direction of flow must match with arrow on valve body.

Recommended external pipe connection

Nominal pipe connection	Outside diameter	
	Min. (mm)	Max. (mm)
3/8"	9.47	9.55
1/2"	12.62	12.73
5/8"	15.80	15.90
10 mm	9.95	10.05
12 mm	11.96	12.05
16 mm	15.95	16.05

Mounting Location (Fig. 1, 2)

- Allow sufficient clearance above the valve for removal of Coil.
Valves may be mounted in horizontal or vertical lines (Fig. 1). Up-side down position is not allowed and can cause mal-function (Fig. 2).

Fig. 1

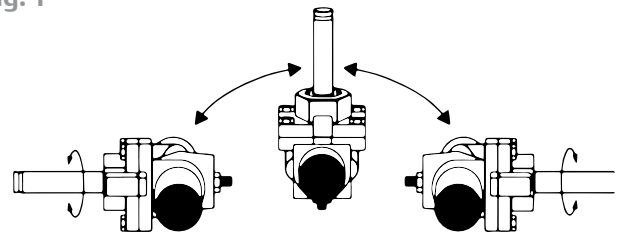
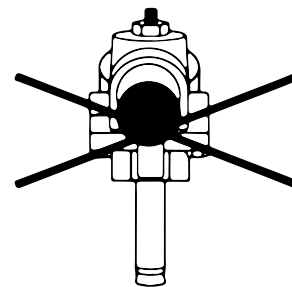
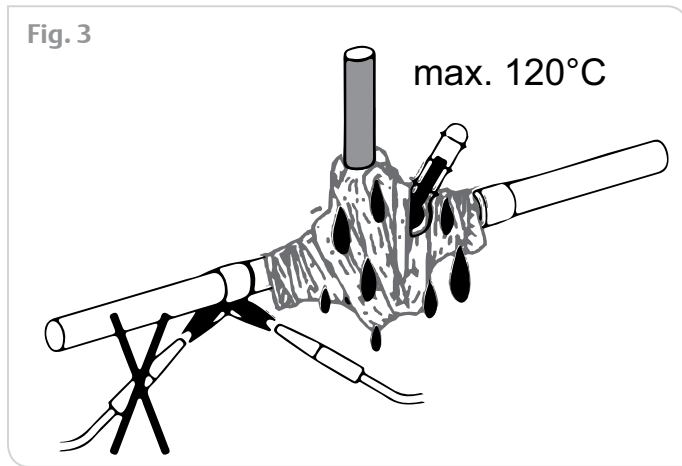


Fig. 2



Brazing (Fig. 3)

- Perform and consider the brazing joint as per EN 14324.
- Before and after brazing clean tubing and brazing joints.
- **Do not disassemble valve for brazing.**
- To avoid oxidization, it is advised to purge the system with an inert gas such as nitrogen while brazing.
- **Do not exceed max. body temperature of 120°C.**



- Internal parts must be protected from foreign material and moisture. An Emerson filter drier is recommended to be installed.
- Minimize vibrations in the piping lines by appropriate solutions.

Pressure Test

- After completion of installation, a pressure test must be carried out according to EN 378 for systems which must comply with European pressure equipment directive 97/23/EC.
- Max. system test pressure: 34.1 bar.

⚠ Warning

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

Tightness Test

Conduct tightness test according to EN 378-2 with appropriate equipment and method to identify tightness of external joint. The allowable leakage rate must be according system manufacturer’s specification.

Operation

- Before operation let the parts cool down to a temperature < 40°C.
- Cycle valve several times. A distinct “click” should be heard each time the solenoid coil is energized.

Note: Emerson solenoid valves are equipped with a continuous-duty coil, which when energized for an extended period of time becomes hot. This is normal.

⚠ Service / Maintenance

- Defective 200RB...-FLR must be replaced; they cannot be repaired.
- Before any service disconnect electrical power of the coil and use permanent magnet to keep the valve open while emptying the system.
- Before any debrazing ensure that the flammable refrigerant is pumped out of the system and the room around the system is well vented so no refrigerant left.
- **Warning:** Never remove energized coil from valve. This applies also for testing purposes.

Technical Data of 200RB... -FLR

- Max. allowable working pressure PS: 31 bar
- Test pressure PT: 34.1 bar
- Operating Temperature Range TS: -40°C...+120°C
- Max. ambient temperature: -40°C...+50°C
- Released / compatible for: R290, mineral-, alkyl benzene and ester lubricants
- Standards: EN 12284

200RB types, not listed in the following table, are not released for use with flammable refrigerants!



Type	Part no.
200RB 3T3-FLR (mm)	801323
200RB 3T3-FLR	801445
200RB 4T10-FLR	801446
200RB 4T4-FLR	801447
200RB 4T3-FLR	801448
200RB 4T12-FLR	801449
200RB 6T4-FLR	801450
200RB 6T12-FLR	801451
200RB 6T5-FLR	801452

General Information

ASC-230VAC /ASC-24VAC + PG9 ATEX is a coil and plug for use with propane.

Types and Markings

We generate two kits contain coil (old coil from Bobinage France), electrical plug and blue clip.

Kit 1	
Coil: ASC-230VAC ATEX Electrical Plug: PG9-ATEX	 II 3G Ex nA IIA T3 Gc U
	 II 2G IIC T6 Gb

Kit 1	
Coil: ASC-230VAC ATEX Electrical Plug: PG9-ATEX	 II 3G Ex nA IIA T3 Gc U
	 II 2G IIC T6 Gb

These components must be installed in an appropriate housing to protect them from mechanical damage or shock.

Safety instructions

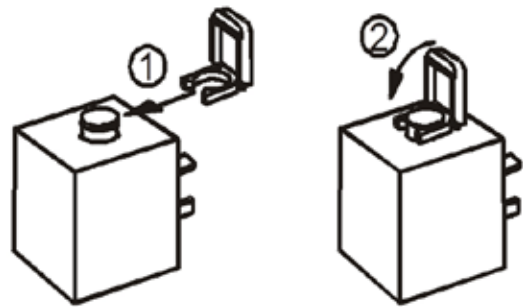
Warning: It is not permitted to disconnect the plug from coil while the power is ON during operation or standby.

- Read operating instructions thoroughly. Failure to comply can result in device failure, system damage or personal injury.
- According to EN 13313 it is intended for use by persons having the appropriate knowledge and skill.
- R290 requires special handling and care due to its flammability, sufficient ventilation is required during service of the system. Contact with rapidly expanding gases can cause frostbite and
- Eye damage. Proper protective equipment (gloves, eye protection, etc.) has to be used.
- Ensure that the system is correctly labeled with applied refrigerant type and a warning for explosion risk.
- Do not exceed the specified maximum ratings for voltage.
- Before installation or service disconnect voltage from system and device.
- Do not energize coil unless it is attached to the valve.
- Observe and avoid mechanical damage of component housing.
- Installation of Coil: (Fig. 1)
- Place coil over the enclosing tube. Coil may be rotated 360° for ease of wiring.
- Press coil housing down firmly, secure (1) and close (2) the coil retainer

Electrical Connection

- Entire electrical connections have to comply with local regulations.
- Ensure that the cables are mounted without tension; always leave the cable a bit loose.
- Ensure that cables are not mounted near sharp edges.
- Do not bend or mechanically stress the cable outlet, maintain a clearance of 20 mm to neighboring parts.
- Make sure a fuse installed ahead of coil at appropriate location (non ATEX environment or explosive protective switch box).

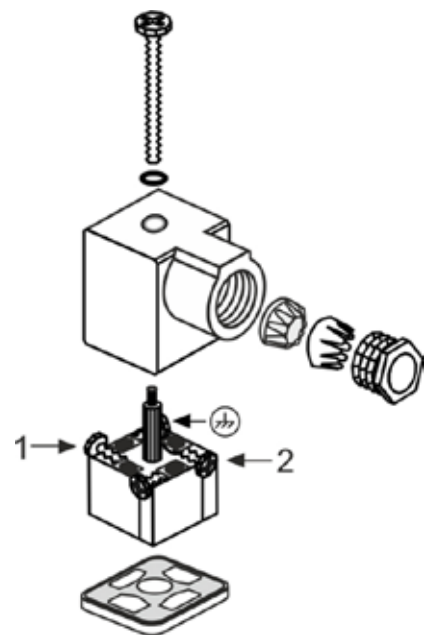
Figure 1



Wiring

1. Cable with three wires has to be connected to terminal 1 and 2 and (ground) on the plug terminal box.
2. Place the delivered gasket on the coil and insert the already wired PG9-ATEX Plug on the coil. Tighten screw (little gasket!) with 0.1 Nm. Pay attention to small gasket under the screw. (Fig. 2)

Figure 2



⚠ Operation

- **Note:** ASC coils are intended for continuous-duty, which when energized for an extended period of time, it becomes hot. This is normal.
- Before energizing the valve be sure that the source voltage and frequency matches that on the coil label.

Technical Data

- Supply voltage variation: 230 VAC ±10%
24 VAC ±10%
- Frequency: 50 Hz
- Ambient temperature range: -10... +50°C
- Protection class: IP65




Operating instructions

Solenoid Field Attachable connector

H.T.P. High Tech Products Srl

Via Lesina, 45
24030 Brembate di Sopra (BG) – Italy
Tel. +39.035.692509 / fax +39.035.203291
VAT: IT02622450167
www.webhpt.eu - info@webhpt.eu
Sede Legale:
Via G. Quarenghi, 11 – 24122
BERGAMO (BG) - ITALY

Connectors DIN EN175301-803 G1-G2 series
Connectors DIN EN175301-803 M1-M2 series
Connectors DIN EN175301-803 P1-P2 series

 II 2 GD IIC T6 Gb
 II 2D Ex tb IIIC T85°C Db IP65/IP67

SECURITY WARNING

Before doing any of the above described operation , please make sure that cable is not under power supply and there are not current sources nearby. The connectors must be protected to reduce the risk of impact.


- Before to proceed with the following steps, please be assured that the installation-operating zone is free from dust.
- Dust presence may affect “IP” protection performances.
- Double check the following product ratings: V max , I max , Temp max
- If needed, peel the cable jacket and the wires using suitable tools.
- Unscrew the cable gland, the grommet and the washer from the connector and put them on the cable you want to connect
- Using a screwdriver, open the connector inserting the tool into the opposite lid.
- Connect the wires according to the electrical plan to the wire clamps on the connector terminal block. MAKE SURE THE WIRES ARE CONNECTED CORRECTLY BY CHECKING THAT THE POLES INDICATION (1,2,.. GND) WHICH IS PRINTED ABOVE THE CONNECTOR FITS WITH WIRE COLOR AND/OR CONNECTION ACCORDING TO THE INSTALLATION DRAWING.
- Close the connector, be assured the gland is suitably tight.
- Connect the connector to the solenoid, putting between the solenoid and the coil the gasket, which is included in the package.
- Fit the fixing screw (included in the package) and screw it tightly to the solenoid using the suitable screwdriver.
- Now it's possible to give power and check the solenoid operation.\

IF, FOR ANY REASON, YOU NEED TO UNCOUPLE THE CONNECTOR FROM THE SOLENOID MAKE PREVIOUSLY SURE THE POWER IS OFF

This connector complies with the applicable norms (for its protection class only) contained in European directive 94/9/CE

Pressure Transmitters convert a pressure into a linear electrical output signal.



Features

- Thin-film stainless steel sensor with output signal 4 to 20 mA and 2-wire connection
- Specially calibrated pressure ranges with $\pm 1\%$ accuracy performance
- Fully hermetic
- Protection class IP65
- Minimum lot size 20 pieces
-  II 3G Ex nC IIB T4 Gc X



PT5-...FLR

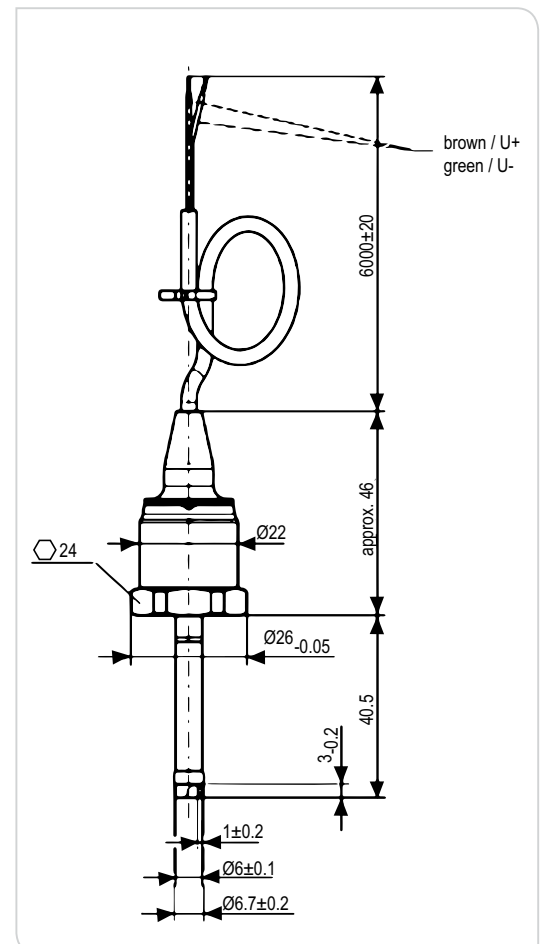
Selection Table

Type	Part no. multi-pack	Pressure connection	Cable length	Marking
PT5-30L-FLR	802389M	6 mm tube x 40 mm long	6.0 m	 Mark acc. 2004/108/EC, EN61326 Emission (Group 1, Class B) & immunity (industrial locations)  II 3G Ex nC IIB T4 Gc X

Technical Data

Supply voltage (polarity protected)	Nominal : 24VDC Range : 7...30VDC
Permissible noise & ripple Influence of supply voltage	$< 1 V_{p-p}$ $< 0,02 \% FS/V$
Output signal	Maximum ≤ 24 mA 4...20 mA
Load resistance	$R_L \leq \frac{U_b - 7.0V}{0.02A}$
Response time	≤ 5 ms
Pressure sensing range	0...30 bar corresponding to 4...20 mA
Max. working pressure PS	35 bar
Test Pressure PT	38.5 bar
Temperatures: Transport and storage Operating ambient housing Medium	-20...+80°C -20...+80°C -40...+100°C
Sensor lifetime	30 million load cycles with 1.3 times of nominal pressure
Protection class (EN 60529)	IP65
Vibration at 10...2000Hz	20 g according to IEC 60068-2-6
Materials Housing, pressure connector and diaphragm with medium contact	Stainless steel 316L, 1.4534

Dimensions [mm]



General Information

Pressure Transmitters convert a pressure into a linear electrical output signal.

PT5-...-FLR meets explosion protection requirements for electrical equipment, equipment group II, equipment categories 3G, in ignition protection class “nC” as hermetically sealed device in explosion group IIB and temperature class T4. They are marked with:

Ex II 3G Ex nC IIB T4 Gc X

PT5-...-FLR must be installed in an appropriate housing to protect them from mechanical damage, shock and light.

⚠ Safety Instructions

- Read operating instructions thoroughly. Failure to comply can result in device failure, system damage or personal injury.
- According to EN 13313 it is intended for use by persons having the appropriate knowledge and skill.
- R290 requires special handling and care due to its flammability. Sufficient ventilation is required during service of the system. Contact with rapidly expanding gases can cause frostbite and eye damage. Proper protective equipment (gloves, eye protection, etc.) has to be used.
- In a severely contaminated system, avoid breathing acid vapors and avoid contact with skin from contaminated refrigerant / lubricants. Failure to do so could result in injury.
- Ensure that the system is correctly labeled with applied refrigerant type and a warning for explosion risk.
- Do not release any refrigerant into the atmosphere!
- Do not exceed the specified maximum ratings for pressure, temperature, voltage and current.
- Before opening any system make sure pressure in system is brought to and remains at atmospheric pressure.
- Ensure that the system piping is grounded.
- Before installation or service disconnect all voltages from system and device.
- Observe and avoid mechanical damage of housing in order to maintain protection class.
- Ensure that design, installation and operation are according to European and national standards/regulations.

Installation (Fig. 1)

- Mounting directions per Fig. 1 in order to prevent the collection of contaminant in pressure sensing element.

Brazing (Fig. 2)

- Perform and consider the brazing joint as per EN14324.
- Before and after brazing clean tubing and brazing joints.
- Minimize vibrations in the piping lines by appropriate solutions.
- Use of flux and silver rod having a minimum of 30% silver.

Fig. 1

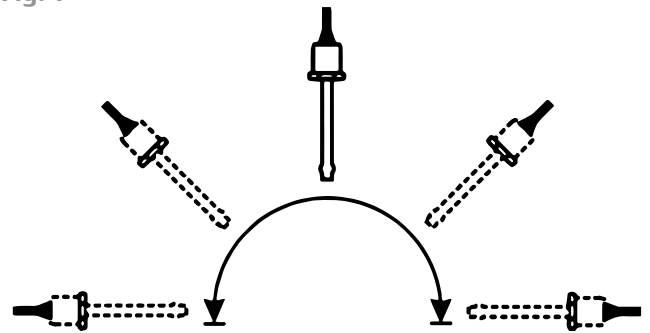
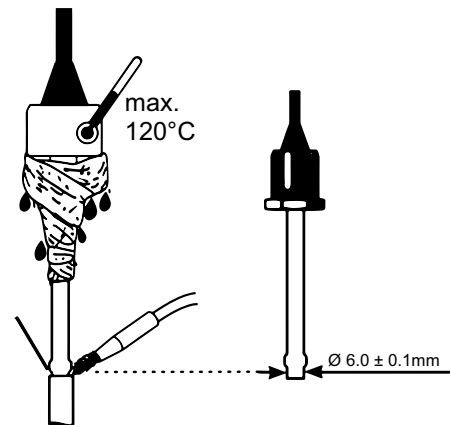


Fig. 2



Pressure Test

- After completion of installation, a pressure test must be carried out according to EN 378 for systems which must comply with European pressure equipment directive 97/23/EC.
- Max. system test pressure: 38.5 bar.

Warning

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

Tightness Test

Conduct tightness test according EN378-2 with appropriate equipment and method to identify tightness of external joints. The allowable leakage rate must be according system manufacturer’s specification.

Electrical Connection

- Entire electrical connections have to comply with local regulations.
- Ensure that the cables are mounted without tension; always leave the cable a bit loose.
- Ensure that cables are not mounted near sharp edges.
- Do not bend or mechanically stress the cable outlet, maintain a clearance of 20 mm to neighboring parts.

Wiring

- PT5-...-FLR are in compliance with European EMC directive and bear CE-marking.
- Connection cables should not be extended beyond standard 6 m length, otherwise entire system needs to be verified from the system manufacturer for free system signal emissions and immunity for conformity to EMC directive and standards.
- Signal line should not be installed parallel with power lines to avoid electrical interference.
- Ensure polarity for connection of 2-wire cable to controller:
- +24V DC to be connected to brown wire
- Output Signal / 0V to be connected to green wire

Operation

- Perform a functional test of electrical circuit before charging the system with refrigerant.

Service / Maintenance

- Defective PT5-...-FLR must be replaced; they cannot be repaired.
- Disconnect electrical power before service.
- Before any debrazing ensure that the flammable refrigerant is pumped out of the system and the room around the system is well vented so no refrigerant left.

Technical Data of PT5 -...-FLR:

- Max. allowable working pressure PS: 35 bar
- Test pressure PT: 38.5 bar
- Supply voltage: 7V...30V DC, class 2
- Output signal: 4 mA...20 mA
- Protection class (EN 60529): IP65
- Medium temperature: -40°C...+100°C
- Ambient temperature: -20°C...+80°C
- Released / compatible for: R290; mineral-, alkyl benzene and ester lubricants
- Cable length (2 wire): 6.0 m

Marking

- **CE** Mark according 2004/108/EC, EN61326 Emission (Group 1, Class B) and immunity (industrial locations)
- **Ex** II 3G Ex nC IIB T4 Gc X

PT5 types not listed in the following table are not released for use with flammable refrigerants!

Type	Range	Part no.
PT5-30L-FLR	0...30 bar	802389M

Features

- High and low pressure switches
- With molded cable
- Protection IP67
- TÜV approved
- Minimum lot size 100 pieces
- Other settings are not available



PS4-...ATEX

Marking

- ENEC05 and CE0035 according to PED 97/23/EC
- II 3G ExnA IIA T2Gc U

Selection Table

Type	Part no.	Setting [bar]		EN 12263	Contact function	Application	Pressure connection
		Cut-out	Cut-in				

Low pressure switches with automatic reset; Open on falling pressure

PS4-W1	808301 808303*	0.6/1.8 bar ATEX	0.6	1.8	PSL	open on falling pressure	low pressure	6 mm
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High pressure switches with automatic reset; Open on rising pressure

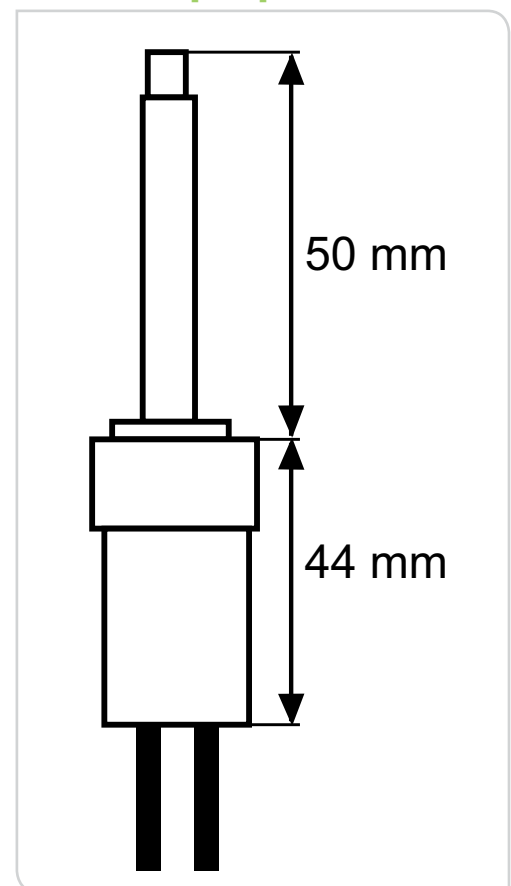
PS4-W1	808300 808302*	20/26 bar ATEX	20	26	PSH	open on rising pressure	high pressure	6 mm
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Note: *) Singlepack

Technical Data

Max. allowable working pressure PS: PS4-W1 808301 0.6/1.8 bar ATEX PS4-W1 808300 20/26 bar ATEX	17 bar 37.2 bar
Test pressure PT: PS4-W1 808301 0.6/1.8 bar ATEX PS4-W1 808300 20/26 bar ATEX	30 bar 41 bar
Electrical rating:	50 mA max. at 24 VDC
Vibration resistance (10 ... 250 Hz)	4 g
Electrical connection Cable version Cable color	18 AWG 0.8 mm ² , 600 V (max. 125°C) LP: (blue) HP: (black)
Type of electrical contact:	Single pole single throw (SPST)
Protection class (EN60259)	IP67
Temperature range:	Medium: -35°C...+135°C Ambient: -30°C...+65°C Storage: -30°C...+80°C
Cable length	3 m
Marking	ENEC05 and CE0035 acc. to PED 97/23/EC II 3G ExnA IIA T2Gc U

Dimensions [mm]



It is mandatory to protect pressure switch against supply voltage higher than 30 VDC and operating current over 50 mA at any time.

General Information

The Pressure Controls PS4-...ATEX are intended to monitor the pressure and to act as a safety device.

The listed products are electrical operated switches with ignition source and are in compliance with EN 60079 / directive 94/9/EC therefore rated / marked as:

Ex II 3G ExnA IIA T2Gc U

PS4-...ATEX must be installed in an appropriate housing to protect them from mechanical damage or shock.

⚠ Safety Instructions

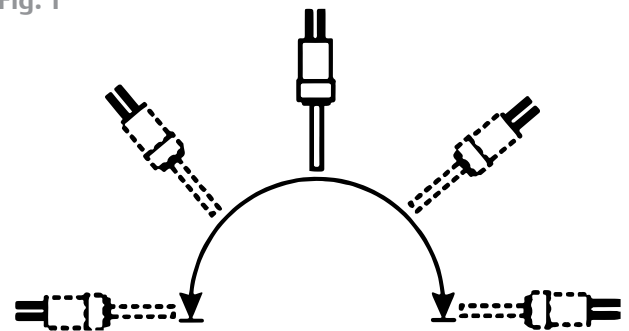
- Read operating instructions thoroughly. Failure to comply can result in device failure, system damage or personal injury.
- According to EN 13313 it is intended for use by persons having the appropriate knowledge and skill.
- R290 requires special handling and care due to its flammability. Sufficient ventilation is required during service of the system. Contact with rapidly expanding gases can cause frostbite and eye damage. Proper protective equipment (gloves, eye protection, etc.) has to be used.
- In a severely contaminated system, avoid breathing acid vapors and avoid contact with skin from contaminated refrigerant / lubricants. Failure to do so could result in injury.
- Ensure that the system is correctly labeled with applied refrigerant type and a warning for explosion risk.
- Make sure that the high pressure switch is installed on high pressure side and low pressure switch on low pressure side of system. Failure to do will result in system without protection against high and low pressure and consequently risk of explosion and human injury.
- Do not release any refrigerant into the atmosphere!
- Do not exceed the specified maximum ratings for pressure, temperature, voltage and current.
- Before opening any system make sure pressure in system is brought to and remains at atmospheric pressure.
- Ensure that the system piping is grounded.
- Before installation or service disconnect voltage from system and device.
- Observe and avoid mechanical damage of housing in order to maintain protection class.

- Ensure that design, installation and operation are according European ATEX Directive, as well as the according national standards / regulations are respected.

Installation (Fig. 1)

- PS4-...ATEX pressure controls should not be exposed to gas pulsations. When pulsations can be expected, use a pulsation damper or a capillary tube connection (min. 1m).
- Mounting directions per Fig. 1 in order to prevent the collection of contaminant in pressure sensing element.

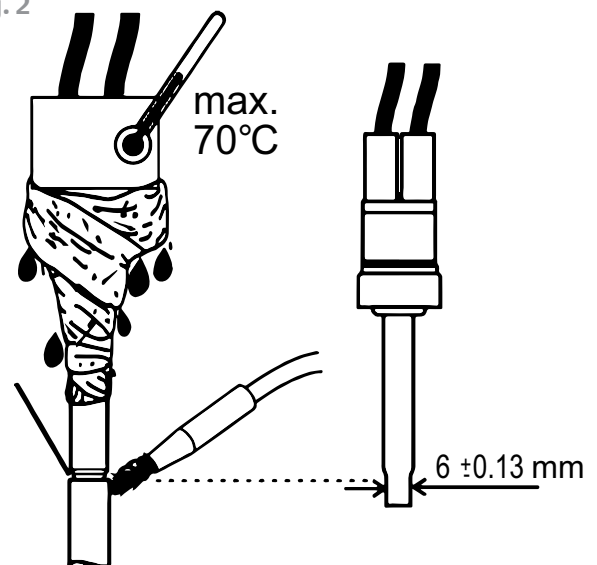
Fig. 1



Brazing (Fig. 2)

- Perform and consider the brazing joint as per EN 14324.
- Before and after brazing clean tubing and brazing joints.
- Minimize vibrations in the piping lines by appropriate solutions.

Fig. 2



Pressure Test

- After completion of installation, a pressure test must be carried out according to EN 378 for systems which must comply with European pressure equipment directive 97/23/EC.
- The max. system test pressure shall be 30 bar for low pressure side and 41 bar for high pressure side.

⚠ Warning

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

Tightness Test

Conduct tightness test according to EN 378-2 with appropriate equipment and method to identify tightness of external joints. The allowable leakage rate must be according system manufacturer’s specification.

Electrical Connection

- **Entire electrical connections have to comply with local regulations.**
- **Ensure that the cables are mounted without tension; always leave the cable a bit loose.**
- **Ensure that cables are not mounted near sharp edges.**
- **Do not bend or mechanically stress the cable outlet, maintain a clearance of 20 mm to neighboring parts.**

Operation

- **Perform a functional test of electrical circuit before charging the system with refrigerant.**


Service / Maintenance

- **Defective PS4-...ATEX must be replaced; they cannot be repaired.**
- **Disconnect electrical power before service.**
- **The lowest pressure inside system must be at least 0.4 bar higher than ambient pressure at any time. Failure to do so could accumulate air inside the system and create an explosive mixture over time.**
- **Before any debrazing ensure that the flammable refrigerant is pumped out of the system and the room around the system is well vented so no refrigerant left.**

Technical Data of PS4 -...ATEX:

- Max. allowable working pressure PS: (see table below)
- Test pressure PT: (see table below)
- Protection class (EN 60529): IP67
- Ambient temperature (housing): -30°C...+65°C
- Storage / transportation temperature: -30°C...+80°C
- Medium temperature: -35°C...+135°C
- Released / compatible for: R290, mineral- and alkyl benzene, ester lubricants
- Electrical rating: 50 mA max. at 24 VDC max
- Function: Pressure limiter, type approval EN 12263, PSL/PSH
- Pressure controls PS4...ATEX are factory preset to specific switch points (see label). The set points cannot be modified.
- Type of electrical contact: Single pole single throw (SPST)

Marking

- ENEC05 and CE0035 according to PED 97/23/EC
-  II 3G ExnA IIA T2Gc U

PS4 types, not listed in the following table, are not released for use with flammable refrigerants!

Type	Part no.	Settings	PS	PT
PS4-W1	808301	0.6/1.8 bar ATEX	17 bar	30 bar
PS4-W1	808303*	0.6/1.8 bar ATEX	17 bar	30 bar
PS4-W1	808300	20/26 bar ATEX	37.2 bar	41 bar
PS4-W1	808302*	20/26 bar ATEX	37.2 bar	41 bar

Note: *) Singlepack

ADK-...FLR filter driers are used for protection of systems against contaminant.

Features

- Solid block
- Hermetic design
- Rugged steel shells
- Corrosion resistant epoxy paint
- Cushioned flow for non-turbulent performance
- High water adsorption capacity
- High acid adsorption capacity
- High filtration capacity / efficiency
- No CE marking according art. 3.3 PED 97/23 EC
- Max. working pressure PS: 35 bar



ADK-...FLR

Selection Table

Type	Part. no	Connection ODF	Flow capacity [kW] Pressure drop	
			0.07 bar	0.14 bar
ADK-032S FLR	803650	1/4"	9.6	14.1
ADK-036MMS FLR	803651	6 mm	8.8	13.1
ADK-052S FLR	803652	1/4"	11.8	18.7
ADK-056MMS FLR	803653	6 mm	10.9	16.4
ADK-053S FLR	803654	3/8"	17.9	26.4
ADK-0510MMS FLR	804066	10 mm	17.9	26.4
ADK-082S FLR	804067	1/4"	13.1	19.0
ADK-086MMS FLR	804068	6 mm	11.7	17.5
ADK-083S FLR	804069	3/8"	18.0	26.4
ADK-0810MMS FLR	804070	10 mm	18.0	26.4
ADK-084S FLR	804071	1/2"	29.3	44.2
ADK-0812MMS FLR	804072	12 mm	28.8	43.2
ADK-163S FLR	804073	3/8"	20.5	29.3
ADK-1610MMS	804074	10 mm	20.5	29.3
ADK-164S FLR	804075	1/2"	39.4	54.7
ADK-1612MMS FLR	804076	12 mm	35.4	53.1
ADK-165S FLR	804077	5/8" / 16 mm	54.4	79.3
ADK-304S FLR	804078	1/2"	39.5	56.5
ADK-305S FLR	804079	5/8" / 16 mm	57.8	79.9
ADK-307S FLR	804080	7/8" / 22 mm	72.6	114.5
ADK-417S FLR	804081	5/8" / 16 mm	85.3	128.0
ADK-757S FLR	804082	7/8" / 22 mm	115.5	173.3

Correction Factors ADK

Use following simplified formula for operating conditions other than -15°C / +30°C

$$Q_n = Q_o \times K_t$$

Q_n : Nominal flow capacity

Q_o : Required cooling capacity

K_t : Correction factor for evaporating and liquid temperature

Liquid temperature °C	Correction factor K_t Evaporating temperature [°C]											
	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35
70	1.58	1.62	1.66	1.71	1.77	1.83	1.89	1.96	2.03	2.11	2.20	2.29
65	1.43	1.46	1.50	1.54	1.58	1.63	1.68	1.73	1.79	1.86	1.92	2.00
60	1.30	1.33	1.37	1.40	1.44	1.48	1.52	1.56	1.61	1.66	1.72	1.78
55	1.20	1.23	1.26	1.29	1.32	1.35	1.39	1.42	1.46	1.51	1.55	1.60
50	1.12	1.14	1.17	1.19	1.22	1.25	1.28	1.31	1.34	1.38	1.42	1.46
45	1.05	1.07	1.09	1.11	1.13	1.16	1.19	1.21	1.24	1.28	1.31	1.34
40	0.98	1.00	1.02	1.04	1.06	1.08	1.11	1.13	1.16	1.19	1.22	1.25
35	0.93	0.95	0.96	0.98	1.00	1.02	1.04	1.06	1.08	1.11	1.14	1.16
30	0.88	0.90	0.91	0.93	0.94	0.96	0.98	1.00	1.02	1.04	1.07	1.09
25	0.84	0.85	0.86	0.88	0.89	0.91	0.93	0.95	0.96	0.98	1.00	1.03
20	-	0.81	0.82	0.84	0.85	0.87	0.88	0.90	0.91	0.93	0.95	0.97

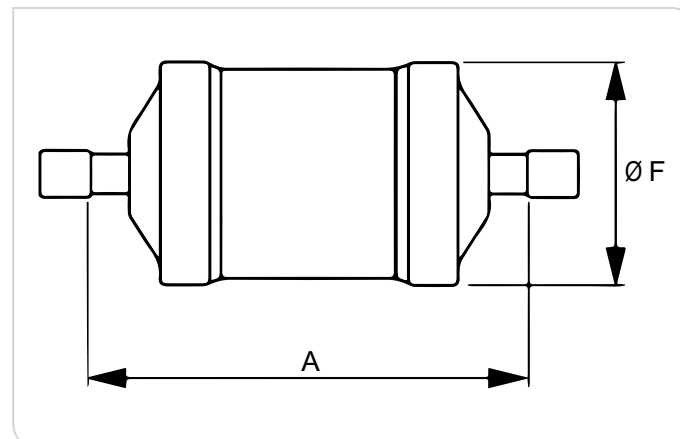
Technical Data

Max. working pressure PS	35 bar
Test pressure PT	38.5 bar
Medium temperature TS	-45...+65°C
Ambient temperature	-45...+65°C
Fluid group	II
Solder connections	Copper, ODF

Shell	Steel
Paint	Epoxy powder paint
Protection	500+ Hours salt spray test
Package	Individual packaged
Standards	EN 14276-1
Marking	HP

Dimensions [mm]

Type	Connection ODF	[mm]	
		A	Ø F
ADK-032S-FLR	1/4"	70.1	44.0
ADK-036MMS-FLR	6 mm	70.1	44.0
ADK-052S-FLR	1/4"	85.3	63.5
ADK-056MMS-FLR	6 mm	85.3	63.5
ADK-053S-FLR	3/8"	84.8	63.5
ADK-0510MMS-FLR	10 mm	84.8	63.5
ADK-082S-FLR	1/4"	102.7	63.5
ADK-086MMS-FLR	6 mm	102.6	63.5
ADK-083S-FLR	3/8"	102.1	63.5
ADK-0810MMS-FLR	10 mm	102.1	63.5
ADK-084S-FLR	1/2"	102.5	63.5
ADK-0812MMS-FLR	12 mm	102.6	63.5
ADK-163S-FLR	3/8"	126.6	63.5
ADK-1610MMS-FLR	10 mm	126.6	63.5
ADK-164S-FLR	1/2"	127.0	63.5
ADK-1612MMS-FLR	12 mm	127.0	63.5
ADK-165S-FLR	5/8" / 16 mm	127.6	63.5
ADK-304S-FLR	1/2"	193.6	76.2
ADK-305S-FLR	5/8" / 16 mm	194.2	76.2
ADK-307S-FLR	7/8" / 22 mm	193.6	76.2
ADK-417S-FLR	5/8" / 16 mm	199.9	88.9
ADK-757S-FLR	7/8" / 22 mm	337.4	88.9



General Information

ADK...FLR filter driers are used for protection of systems against contaminant.

The listed products are not in scope of ATEX product directive 94/9/EC as they do not incorporate an own source of ignition.

ADK...FLR must be installed in an appropriate housing to protect them from mechanical damage or shock.

Safety Instructions

- Read operating instructions thoroughly. Non-observance can result in device failure, system damage or personal injury.
- According to EN 13313 it is intended for use by persons having the appropriate knowledge and skill.
- R290 requires special handling and care due to its flammability. Sufficient ventilation is required during service of the system. Contact with rapidly expanding gases can cause frostbite and eye damage. Proper protective equipment (gloves, eye protection, etc.) has to be used.
- In a severely contaminated system, avoid breathing acid vapors and avoid contact with the skin from contaminated refrigerant/lubricants. Failure to do so could result in injury.
- Ensure that the system is correctly labeled with applied refrigerant type and a warning for explosion risk.
- Do not release any refrigerant into the atmosphere.
- Do not exceed the specified maximum ratings for pressure and temperature.
- Before opening any system make sure pressure in system is brought to and remains at atmospheric pressure.
- Do not use on any other fluid media without prior approval of Emerson. Use of fluids not listed could result in chemical deterioration of the desiccant in filter drier.
- Ensure that design, installation and operation are according to European and national standards/regulations.

Mounting Location

- Filter driers may be installed in any position within the liquid line. Direction of refrigerant flow must be observed.

- For best results locate the filter drier as close as possible to the inlet of expansion device. If using a liquid line solenoid valve and/or moisture indicator. Locating filter drier upstream will provide protection for the solenoid valve and the moisture indicator will measure the effectiveness of the drier.
- Protect the filter drier against sunrays and vibration.

Installation

- Do not remove seal caps until ready for installation in order to minimize entering of moisture and dirt.

Avoid damaging the connections!

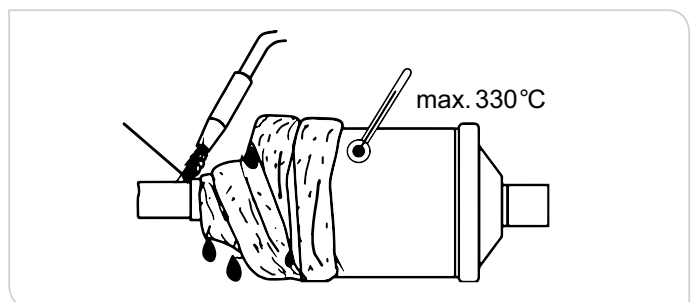
- Direction of refrigerant flow must match with arrow on the label. Reverse flow reduces the filtering ability and increases the pressure drop through the filter drier.

Recommended external pipe connection:

Nominal pipe connection	Outside diameter	
	Min. (mm)	Max. (mm)
1/4"	6.30	6.38
3/8"	9.47	9.55
1/2"	12.62	12.73
5/8"	15.80	15.90
7/8"	22.15	22.25
1-1/8"	28.50	28.63
6 mm	5.95	6.05
10 mm	9.95	10.05
12 mm	11.96	12.05
16 mm	15.95	16.05
22 mm	21.95	22.06
28 mm	27.95	28.05

Brazing (Fig. 1)

- Perform and consider the brazing joint as per EN 14324.
- Before and after brazing clean tubing and brazing joints.
- Minimize vibrations in the piping lines by appropriate solutions.



Pressure Test

- After completion of installation, a pressure test must be carried out according to EN 378 for systems which must comply with European pressure equipment directive 97/23/EC.
- Max. system test pressure: 38.5 bar.

Warning

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

Tightness Test

Conduct a tightness test according to EN 378-2 with appropriate equipment and method to identify tightness of external joints. The allowable leakage rate must be according system manufacturer's specification.

Operation

- After leakage test start system and after sufficient running time check color of moisture indicator for moisture level. We recommend the use of Emerson moisture indicators.
- In systems with excessive moisture it may be necessary to replace the filter drier for several times in order to bring moisture in the system to a safe level.

Service / Maintenance

- **Before any debrazing ensure that the flammable refrigerant is pumped out of the system and the room around the system is well vented so no refrigerant left.**
- **Disconnect electrical power before service.**
- **Always install a new filter drier when existing ones become saturated with moisture and foreign materials.**
- **Do not attempt to dry out a used filter drier.**

Technical Data of ADK -...FLR

- Max. allowable working pressure PS: 35 bar
- Test pressure PT: 38.5 bar
- Temperature Range TS: -45°C...+65°C
- Released / compatible for: R290, mineral- and alkyl benzene, ester lubricants
- Standards: EN 14276-1

ADK types not listed in the following table are not released for use with flammable refrigerants!

Type	Part no.
ADK-032S-FLR	803 650
ADK-036MMS-FLR	803 651
ADK-052S-FLR	803 652
ADK-056MMS-FLR	803 653
ADK-053S-FLR	803 654
ADK-0510MMS-FLR	804 066
ADK-082S-FLR	804 067
ADK-086MMS-FLR	804 068
ADK-083S-FLR	804 069
ADK-0810MMS-FLR	804 070
ADK-084S-FLR	804 071
ADK-0812MMS-FLR	804 072
ADK-0163S-FLR	804 073
ADK-0160MMS-FLR	804 074
ADK-164S-FLR	804 075
ADK-0162MMS-FLR	804 076
ADK-165S-FLR	804 077
ADK-304S-FLR	804 078
ADK-305S-FLR	804 079
ADK-307S-FLR	804 080
ADK-417S-FLR	804 081
ADK-757S-FLR	804 082

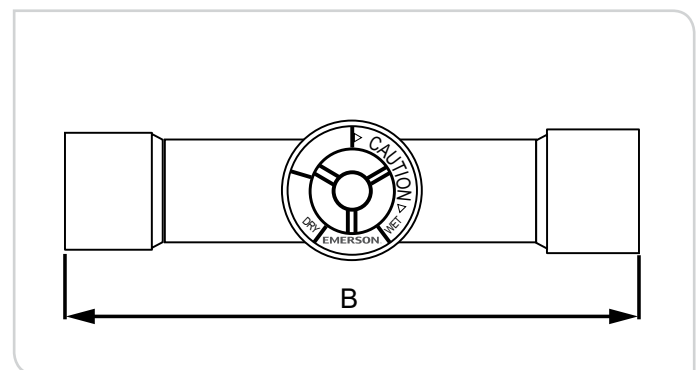
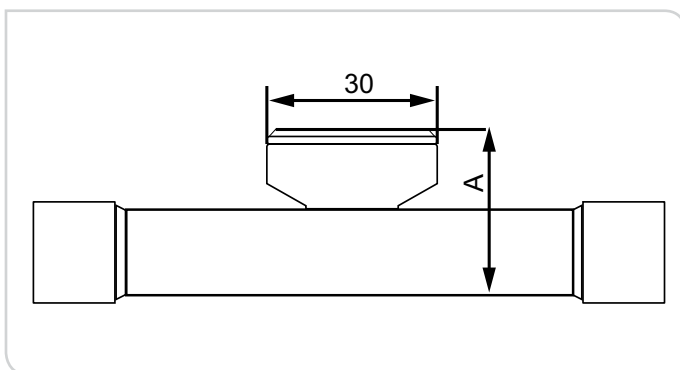
Features

- Fully hermetic
- Lower Pressure drop
- Corrosion free stainless steel body
- Crystal Indicator element for long lifetime and reliability
- Easily determination of moisture content
- Sensitive indicator with calibrated four colors. Conforms to requirement of most compressor manufacturers
- Large clear viewing area
- ODF extended tube configurations suitable for all commercial applications



MIA Moisture Indicator

Selection and Dimensions [mm]



Type	Part no.	For tube outside diameter	Height A [mm]	Length B [mm]	Weight [g]
MIA 014-FLR	805895	1/4"	25.7	98.0	60
MIA 038-FLR	805896	3/8"	28.5	109.0	70
MIA 012-FLR	805897	1/2"	31.8	113.0	75
MIA 058-FLR	805898	5/8"	31.8	108.5	85
MIA 078-FLR	805899	7/8"	37.8	122.5	150
MIA 118-FLR	805900	1 1/8"	43.5	122.5	190

Type	Part no.	For tube outside diameter	Height A [mm]	Length B [mm]	Weight [g]
MIA M06-FLR	805901	6 mm	25.9	98.0	60
MIA M10-FLR	805894	10 mm	28.5	109.0	70
MIA M12-FLR	805902	12 mm	28.5	113.0	75
MIA M28-FLR	805903	28 mm	43.5	122.5	190
MIA M10S-FLR	805904	10 mm	28.7	119	75
MIA M12S-FLR	805905	12 mm	28.5	113	75

Technical Data

Maximum working pressure PS	35 bar
Test pressure PT	49.5 bar
Medium compatibility	R290, mineral-, alkyl benzene and ester lubricants
Connections	ODF extended copper tubes, solder connections only

Pressure drop	negligible
Operating temperature TS	-40...+100°C
External leakage (100% - production tested with Helium - Spectrometer)	5.0 x 10 ⁻⁶ mbar l/sec = 4.9 x 10 ⁻⁶ cc/sec
Standards	EN 12178

Determining the Moisture Content with the Color Code

Refrigerant	Liquid temperature °C	Moisture content in mg water per kg refrigerant (ppm)			
		Blue	Purple	Fuchsia	Rose
		Dry		Caution	Caution wet
R290	25	2	4	9	14
	38	5	8	18	29
	52	10	16	36	59



Note: In area “Caution” and “Caution wet” filter drier should be changed.



General Information

MIA...-FLR are sight glasses with moisture indicator.

The listed products are not in scope of ATEX product directive 94/9/EC as they do not incorporate an own source of ignition.

MIA...-FLR must be installed in an appropriate housing to protect them from mechanical damage or shock.

⚠ Safety Instructions

- **Read operating instructions thoroughly. Non-observance can result in device failure, system damage or personal injury.**
- **According to EN 13313 it is intended for use by persons having the appropriate knowledge and skill.**
- **R290 requires special handling and care due to its flammability. Sufficient ventilation is required during service of the system. Contact with rapidly expanding gases can cause frostbite and eye damage. Proper protective equipment (gloves, eye protection, etc.) has to be used.**
- **In a severely contaminated system, avoid breathing acid vapors and avoid contact with skin from contaminated refrigerant / lubricants. Failure to do so could result in injury.**
- **Ensure that the system is correctly labeled with applied refrigerant type and a warning for explosion risk.**
- **Do not release any refrigerant into the atmosphere!**
- **Do not exceed the specified maximum ratings for pressure and temperature.**
- **Before opening any system make sure pressure in system is brought to and remains at atmospheric pressure.**
- **Ensure that design, installation and operation are according to European and national standards/regulations.**

Mounting Location

- MIA...-FLR has to be installed only in the liquid line, otherwise the humidity reading can show wrong values.
- MIA...-FLR is bi-directional and may be installed in any position which allows visual access to the indicator window itself.
- The moisture indicator is normally located after the filter drier and before the expansion valve.

Installation

- Do not remove seal caps until ready for installation in order to minimize entering of moisture and dirt.

⚠ Avoid damaging the connections!

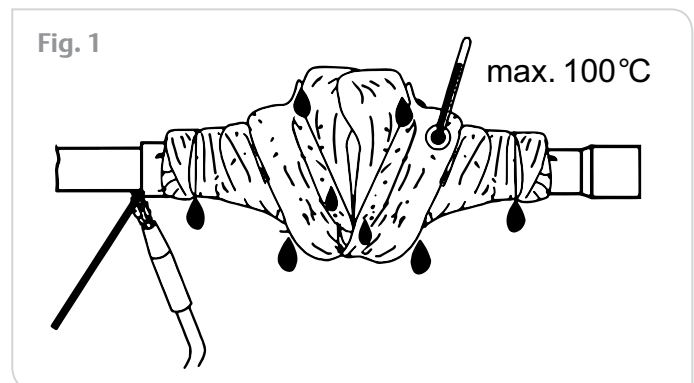
- The MIA...-FLR is fully hermetic and cannot be disassembled.

Recommended external pipe connection:

Nominal pipe connection	Outside diameter	
	Min. (mm)	Max. (mm)
1/4 "	6.30	6.38
3/8"	9.47	9.55
1/2"	12.62	12.73
5/8"	15.80	16.05
7/8"	22.15	22.25
1-1/8"	28.50	28.63
6 mm	5.95	6.05
10 mm	9.95	10.05
12 mm	11.96	12.05
28 mm	27.95	28.05

Brazing (Fig. 1)

- Perform and consider the brazing joint as per EN 14324.
 - Before and after brazing clean tubing and brazing joints.
 - To avoid oxidization, it is advised to purge the system with an inert gas such as nitrogen while brazing.
- Do not exceed the maximum temperature of 100°C.**



- To avoid overheating it is advised to make the join at one end and cool the indicator completely before repeating the procedure on the other end connection.
- Minimize vibrations in the piping lines by appropriate solutions.

Fig. 2

Refrigerant	Liquid temperature °C	ppm			
		Blue / Dry	Purple	Fuchsia / Caution	Rose / Caution wet
R290	25	2	4	9	14
	38	5	8	18	29
	52	10	16	36	59

Pressure Test

- After completion of installation, a pressure test must be carried out according to EN 378 for systems which must comply with European pressure equipment directive 97/23/EC.
- Max. system test pressure: 38.5 bar.

Warning

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

Tightness Test

Conduct tightness test according to EN 378-2 with appropriate equipment and method to identify tightness of external joint. The allowable leakage rate must be according system manufacturer's specification.

Humidity Reading (Fig. 2)

- The humidity content in mg Water per kg refrigerant (ppm) can be identified by the color code in Fig. 2.
- A minimum period of 12 hours is recommended after installation before attempting to determine system moisture content.
- In case of indicator is showing **fuchsia** or **rose** color the change of the filter drier is required.

Service / Maintenance

- Defective MIA...-FLR must be replaced; they cannot be repaired.
- Disconnect electrical power before service.
- Before any debrazing ensure that the flammable refrigerant is pumped out of the system and the room around the system is well vented so no refrigerant left.

Technical Data of MIA... -FLR

- Max. allowable working pressure PS: 35 bar
- Test pressure PT: 49.5 bar
- Medium temperature TS: -40°C...+100 °C
- Released / compatible for: R290, mineral- and alkyl benzene, ester lubricants
- Standards: EN 12178

MIA types not listed in following table are not released for use with flammable refrigerants!

Type	Part no.
MIA 014-FLR	805895
MIA 038-FLR	805896
MIA 112-FLR	805897
MIA 058-FLR	805898
MIA 078-FLR	805899
MIA 118-FLR	805900
MIA M6-FLR	805901
MIA M10-FLR	805894
MIA M12-FLR	805902
MIA M28-FLR	805903
MIA M10S-FLR	805904
MIA M12S-FLR	805905





Product material compatible with R290 only for Non explosive environment

Content	Page
Products	
Superheat Controllers EC3-P32*/EC3-P33* and ECD-002*	
Technical Bulletin	48
Electronic Expansion Valves EXM/L Series	
Technical Bulletin	50
Stand-alone Superheat/Economizer Controller EXD-HP1/2	
Technical Bulletin	53
Oil Management OM3-020P TraxOil	
Technical Bulletin	55
Compressor Soft Starter CSS-25U/CSS-32U/CSS-32W	
Technical Bulletin	57

⚠ *) These devices have potential ignition source and do not comply with ATEX requirements. Installation only in "non explosive location".

EC3-P32 / -P33 Superheat Controller & Standard ECD-002

EC3-P32 / -P33 are stand-alone universal superheat controllers.

EC3-P32 offers remote access with built-in TCP/IP Ethernet communications and WebServer functionality. Any standard WebBrowser (e.g. Internet Explorer® or Mozilla Firefox) can be used for monitoring or parameter setting. EC3-P33 has no network communication.

Features EC3-P33 / EC3-P32

- Superheat control in conjunction with Emerson stepper motor driven Electrical Control Valves EX4-7...-FLR
- Selectable refrigerants: R290, R1234Ze, R1234yf, R32, R1270 (The valves compatibility release for R290 and R32 for time being)
- Low superheat alarm and MOP function
- Feed through of 4...20 mA signal from evaporator pressure sensor to analogue output. This may also be connected to pressure input of any other controller to avoid need for multiple pressure sensors
- Monitoring of sensors and sensor wiring and detection of sensor and wiring failures
- Intelligent alarm management in order to protect the compressor i.e. fail safe operation
- Integral rechargeable battery to close electrical control valve in case of power loss
- Electrical connection via plug-in type screw terminals
- Aluminum housing for DIN rail mounting



EC3-P32



EC3-P33 with ECD-002

Additional Features EC3-P32 only

- High superheat alarm
- Low pressure switch function/alarm
- Freeze protection function/alarm
- Pump down function

Selection Table

Description	Type	Part No.
Superheat Controller	EC3-P33	807858
Terminal kit EC3-P33	K03-X33	807645
Display / keypad unit (opt.)	ECD-002	807657
Superheat Controller	EC3-P32	807857
Terminal kit EC3-P32	K03-X32	807644

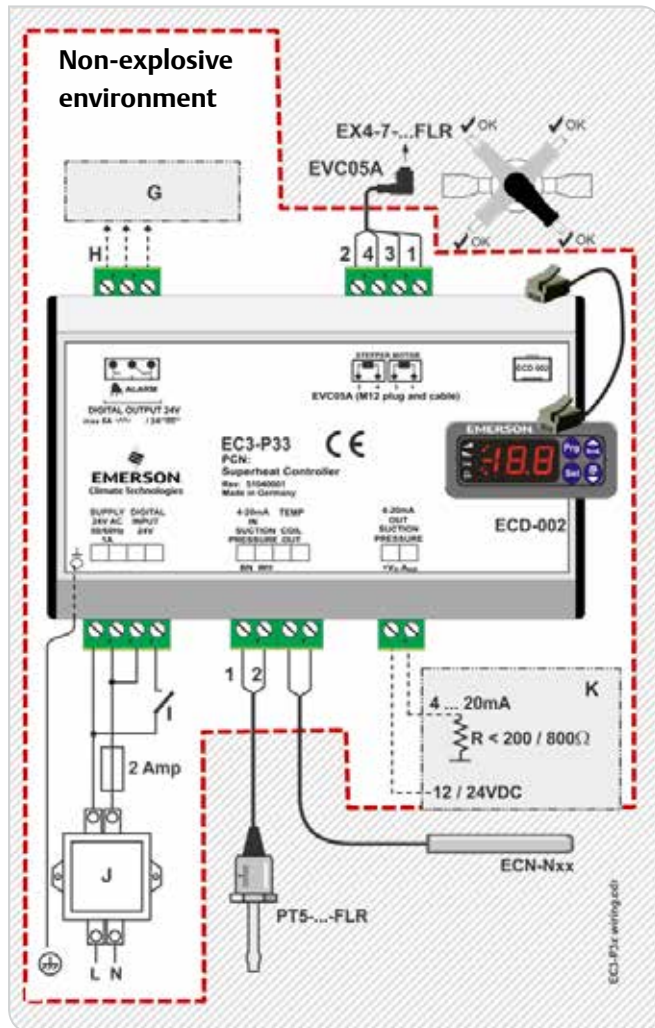
⚠ These devices have potential ignition source and do not comply with ATEX requirements. Installation only in "non explosive location".

Selection Table Accessories

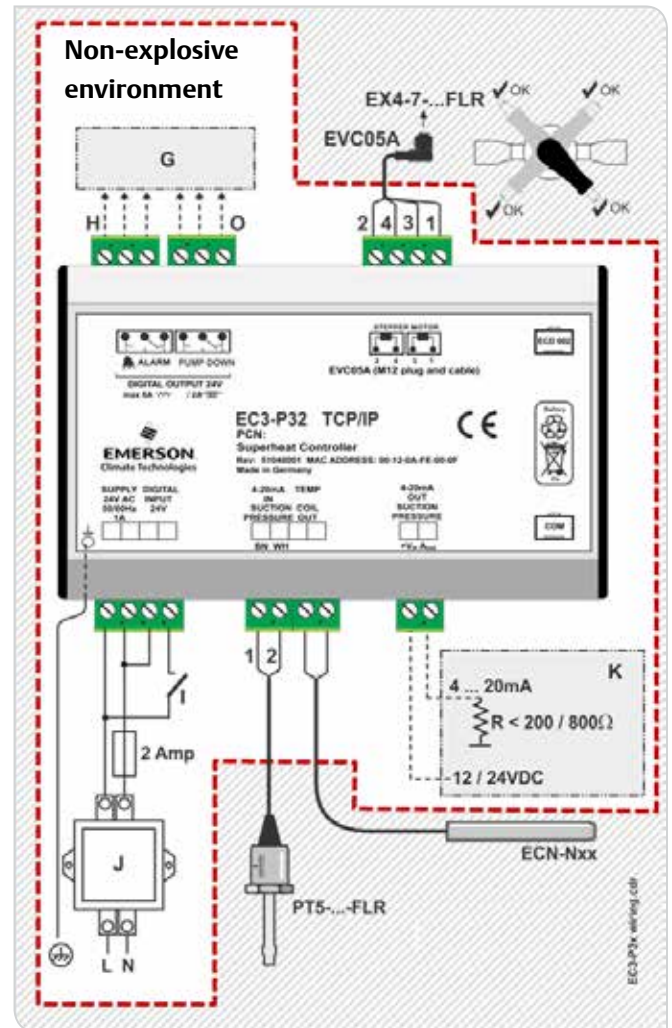
Description	Type	Part no.
Temperature sensor	Cable length 3.0 m	ECN-N30 804496
	Cable length 6.0 m	ECN-N60 804497
	Cable length 12.0 m	ECN-N99 804499
Pressure transmitter	0...30 bar	PT5-30L FLR 802389M

Wiring Diagram

EC3-P33



EC3-P32



- 2: White 4: Black 3: Blue 1: Brown wire
- G: Remote control panel, system controller
- H: Alarm relay, dry contact; Relay coil is not energized at alarm condition or power off
- ⚠ The use of the relay is essential to protect the system in case of power failure if the communications interface or the ECD-002 are not utilized.
- I: Digital input (0V/open = Stop; 24V/closed = Start)
- J: Transformer Class II, 24VAC secondary / 25VA
- K: Third party controller (can use analog output signal of EC3)
- O: Pump down relay, dry contact; Relay is energized during normal operation.

Note: The internal resistor of a third party controller must fulfill the following conditions:

- Supply voltage 12VDC: $R \leq 200\Omega$
- Supply voltage 24VDC: $R \leq 800\Omega$

Network Connection EC3-P32 only



Technical Data

EC3-P32 / -P33

Supply voltage	24VAC ±10%, 50/60Hz
Digital input	24 V AC ±10%, 50-60HZ 24 V DC ±10%
Power consumption	25VA max. including connected ECV and display / keyboard
Internal battery charging time	Approximately 2 hours if battery is fully empty
Plug-in connector size	Removable screw version wire size 0.14...1.5 mm ²
Ground connection	6.3 mm spade earth connector
Marking	CE
Protection class	IP 20 (DIN EN60529)
Vibration	4 g, 10-1000 Hz
Temperature storage	-20...+65°C
Temperature operating	0...+60°C 1...+25°C for optimum battery life
Applied detective	
EMC	EN 61326, EN 50081, EN 61000-6-2,
LVD	EN 61000-4-2, EN 61000-4-3, EN 61000-4-4,
ROHS	EN 61000-4-5, EN 61000-4-6, EN 61000-4-11
Humidity	0...80% r.h. non condensing
Weight	~ 800 g
Mounting	DIN rail mounted



ECD-002

ECD-002 Display Unit

Supply	From EC3 Series Controller via connecting cable
LED indicators	Valve opening, valve closing, alarm, demand
Display LED	Numeric segmental display. 2½-digits, red, with automatic decimal point between ±19.9, switchable between °C and °F
Connecting cable	ECC-Nxx or standard CAT5 patch cord with RJ45 connectors
Temperature storage operating	-20...+65°C 0...+60°C
Humidity	0...80% r.h. non condensing
Protection class (DIN EN 60529)	IP65 (mounting in front panel with gasket)
Weight	~ 52 g
Mounting	Panel mount (71 x 29 mm cutout)

⚠ These devices have potential ignition source and do not comply with ATEX requirements. Installation only in "non explosive location".

EXM/EXL

EXM/EXL Unipolar stepper motor driven Electronic Expansion Valves are for precise control of refrigerant mass flow in heat pumps, heating units, air conditioning and close control applications. The valve is not released for refrigeration applications such as cold room and refrigeration display cabinet.

Features

- Hermetic design
- Continuous, linear modulation of mass flow
- Bi-flow with same capacity in normal and reverse flow direction
- High MOPD: 40 bar in normal flow direction
- Unipolar stepper motor
- Removable coils in two versions: 12VDC/24VDC
- Fine resolution: 500 pulses (half steps) or 250 full steps
- Protection class of molded coil is IP65 (acc. EN 60529) excluding the cable end terminals (JST).
- Reliability: 225 million pulses at 40 bar differential pressure
- Bulk packing, boxes of 10 pieces



EXM/EXL with Coil

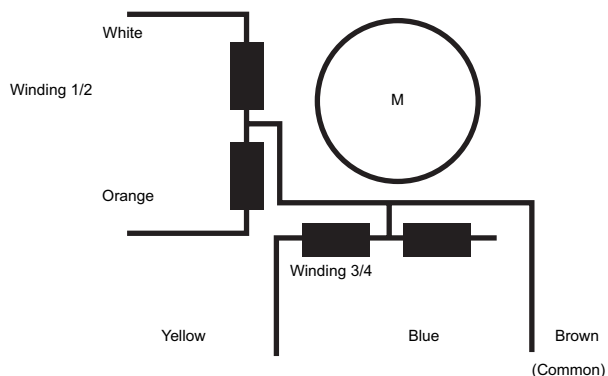
Valve series	Description	Type	Part No.	Nominal Capacity (kW) R290	Connections Size / Style
EXM	Valve less coil	EXM-B0A	800399M	1.6	1/4" ODM
		EXM-B0B	800400M	4.9	
		EXM-B0D	800401M	10.3	
		EXM-B0E	800402M	12.1	
	Coil 12VDC	EXM-125	800403M	-	-
Coil 24VDC	EXM-24U	800415M	-	-	
EXL	Valve less coil	EXL-B1F	800405M	15.0	1/4" ODF
		EXL-B1G	800406M	20.3	8 mm ODM
	Coil 12VDC	EXL-125	800407M	-	-
		EXL-24U	800416M	-	-

Note: Nominal capacities at +38°C condensing temperature, +4 °C evaporating temperature and 1K subcooling.

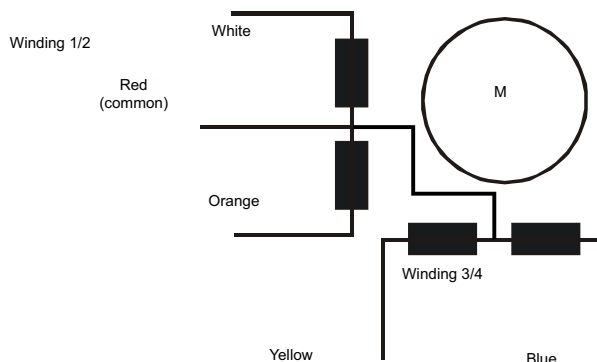
⚠️ These devices have potential ignition source and do not comply with ATEX requirements. Installation only in "non explosive location".

Wiring

EXM-125/EXL-125 (12 VDC, 5 wires coil)



EXM-24U/EXL-24U (24 VDC, 5 wires coil)



Winding Number	Wire Color	Recommended half step pulsing/switching mode								Remark
		1	2	3	4	5	6	7	8	
1/2	White	ON	ON	OFF	OFF	OFF	OFF	OFF	ON	1) The pulse sequence 1 to 8 will be repeated for further pulses in order to open the valve. 2) The pulse sequence 8 to 1 will be repeated for further pulses in order to close the valve.
	Orange	OFF	OFF	OFF	ON	ON	ON	OFF	OFF	
3/4	Yellow	OFF	ON	ON	ON	OFF	OFF	OFF	OFF	
	Blue	OFF	OFF	OFF	OFF	OFF	ON	ON	ON	
Commons	12V: Brown 24V: Red	ON	ON	ON	ON	ON	ON	ON	ON	

Valve movement mode (pulsing/switching sequence)
 Valve open: 1 → 2 → 3 → 4 → 5 → 6 → 7 → 8
 Valve close: 8 → 7 → 6 → 5 → 4 → 3 → 2 → 1

Quick Selection (included 1.5 bar pressure drop for liquid line components and distributor)

Condensing temperature (°C)	Capacity (kW)										Valve Type
	Evaporating Temperature (°C)										
R290	15	10	5	0	-5	-10	-15	-20	-25	-30	R290
70	1.5	1.5	1.5	1.5	1.4	1.4	1.4	1.3	1.3	1.3	EXM-B0A
	4.5	4.5	4.5	4.5	4.4	4.3	4.2	4.1	4	3.9	EXM-B0B
	9.6	9.6	9.5	9.4	9.3	9.1	8.9	8.7	8.4	8.2	EXM-B0D
	11.3	11.3	11.3	11.1	11	10.8	10.5	10.2	10	9.6	EXM-B0E
	14.1	14.1	14	13.8	13.6	13.4	13.1	12.7	12.4	12	EXL-B1F
65	19	19	18.9	18.7	18.4	18.1	17.7	17.2	16.7	16.2	EXL-B1G
	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.4	1.4	1.4	EXM-B0A
	4.7	4.7	4.7	4.7	4.6	4.6	4.5	4.4	4.3	4.2	EXM-B0B
	9.8	9.9	9.9	9.9	9.8	9.6	9.5	9.3	9	8.8	EXM-B0D
	11.6	11.7	11.7	11.6	11.5	11.4	11.2	10.9	10.7	10.4	EXM-B0E
60	14.4	14.5	14.5	14.4	14.3	14.1	13.9	13.6	13.3	12.9	EXL-B1F
	19.5	19.6	19.6	19.5	19.4	19.1	18.8	18.4	17.9	17.4	EXL-B1G
	1.5	1.6	1.6	1.6	1.6	1.5	1.5	1.5	1.5	1.4	EXM-B0A
	4.7	4.8	4.8	4.8	4.8	4.7	4.7	4.6	4.5	4.4	EXM-B0B
	9.9	10	10.1	10.1	10.1	10	9.9	9.7	9.5	9.3	EXM-B0D
55	11.7	11.9	11.9	12	11.9	11.8	11.6	11.5	11.2	11	EXM-B0E
	14.5	14.7	14.8	14.8	14.8	14.6	14.4	14.2	13.9	13.6	EXL-B1F
	19.7	19.9	20.1	20.1	20	19.8	19.5	19.2	18.9	18.4	EXL-B1G
	1.5	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.5	1.5	EXM-B0A
	4.6	4.8	4.8	4.9	4.9	4.8	4.8	4.7	4.7	4.6	EXM-B0B
50	9.8	10	10.2	10.2	10.2	10.2	10.1	10	9.8	9.7	EXM-B0D
	11.6	11.8	12	12.1	12.1	12	11.9	11.8	11.6	11.4	EXM-B0E
	14.4	14.7	14.9	15	15	15	14.8	14.6	14.4	14.2	EXL-B1F
	19.4	19.9	20.1	20.3	20.3	20.2	20.1	19.8	19.5	19.2	EXL-B1G
	1.5	1.5	1.6	1.6	1.6	1.6	1.6	1.6	1.6	1.5	EXM-B0A
45	4.5	4.7	4.8	4.8	4.9	4.9	4.9	4.8	4.8	4.7	EXM-B0B
	9.5	9.8	10.1	10.2	10.3	10.3	10.2	10.2	10	9.9	EXM-B0D
	11.2	11.6	11.9	12	12.1	12.1	12.1	12	11.9	11.7	EXM-B0E
	13.9	14.4	14.7	14.9	15	15.1	15	14.9	14.7	14.5	EXL-B1F
	18.8	19.5	19.9	20.2	20.4	20.4	20.3	20.2	19.9	19.6	EXL-B1G
40	1.4	1.5	1.5	1.6	1.6	1.6	1.6	1.6	1.6	1.6	EXM-B0A
	4.3	4.5	4.6	4.7	4.8	4.8	4.9	4.8	4.8	4.8	EXM-B0B
	9	9.5	9.8	10	10.2	10.2	10.2	10.2	10.1	10	EXM-B0D
	10.6	11.2	11.6	11.8	12	12.1	12.1	12.1	12	11.8	EXM-B0E
	13.2	13.9	14.3	14.7	14.9	15	15	15	14.9	14.7	EXL-B1F
35	17.9	18.7	19.4	19.8	20.1	20.3	20.3	20.2	20.1	19.9	EXL-B1G
	1.3	1.4	1.5	1.5	1.5	1.6	1.6	1.6	1.6	1.6	EXM-B0A
	3.9	4.2	4.4	4.6	4.7	4.8	4.8	4.8	4.8	4.8	EXM-B0B
	8.3	8.9	9.3	9.7	9.9	10	10.1	10.1	10.1	10	EXM-B0D
	9.8	10.5	11	11.4	11.7	11.9	12	12	11.9	11.9	EXM-B0E
30	12.2	13	13.7	14.2	14.5	14.7	14.8	14.9	14.8	14.7	EXL-B1F
	16.4	17.6	18.5	19.2	19.6	19.9	20.1	20.1	20	19.9	EXL-B1G
	1.1	1.3	1.4	1.4	1.5	1.5	1.5	1.5	1.5	1.5	EXM-B0A
	3.5	3.8	4.1	4.3	4.5	4.6	4.7	4.7	4.7	4.7	EXM-B0B
	7.3	8.1	8.7	9.2	9.5	9.7	9.9	10	10	9.9	EXM-B0D
25	8.6	9.6	10.3	10.8	11.2	11.5	11.7	11.8	11.8	11.7	EXM-B0E
	10.7	11.9	12.8	13.4	13.9	14.3	14.5	14.6	14.6	14.6	EXL-B1F
	14.5	16.1	17.3	18.2	18.8	19.3	19.6	19.7	19.8	19.7	EXL-B1G

Technical Data

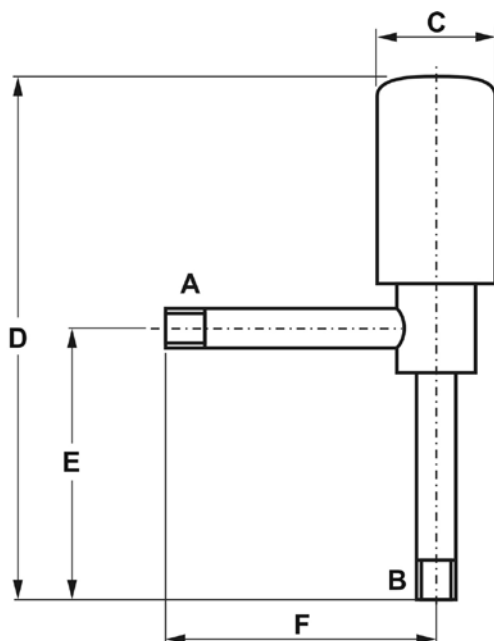
MOPD (maximum operating pressure differential)	40 bar in normal flow 33 bar in reverse flow	Bi-flow direction	Normal: Connection A to B Reverse: Connection B to A
Max. working pressure PS	45 bar	Valve installation	Coil upside or to vertical within $\pm 90^\circ$
External leakage	≤ 3 gram / year	Package and delivery	10 pieces
Temperature range TS		CE marking	Not required
Liquid refrigerant Ambient Relative humidity	-30...+70°C -30...+60°C 95%	Connections, A and B	EXM: 1/4" ODM EXL: 1/4" ODF and 8 mm ODM
Air seat leakage at 10 bar differential pressure	Typically 150 cm ³ /min.	Weight	Valve EXM: 65 g, EXL: 76 g Coil EXM: 124 g, EXL: 156 g

⚠️ These devices have potential ignition source and do not comply with ATEX requirements. Installation only in "non explosive location".

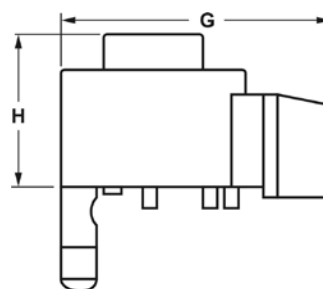
Electrical Data

Stepper motor type	Uni-polar, constant voltage	Step mode	Half step = one pulse
Electrical connection	12 VDC coil: 5 wires 24 VDC coil: 5 wires	Total number of pulses	500 half step (250 full step)
Supply voltage	12 VDC coil: 12V \pm 10% 24 VDC coil: 24V \pm 10%	Pulsing rate	30...90 pulses (half step) per sec
Phase current, operating	12 VDC coil: 260 mA 24 VDC coil: 130 mA	Full travel time	16.6 seconds at 30 pulse/sec 5.5 seconds at 90 pulse/sec
Winding resistance per phase	12 VDC coil: 46 Ohm 24 VDC coil: 185 Ohm	Reference position	Mechanical stop at fully close position at 520 pulses
Insulation resistance	Min. 100 M Ω at 500 VDC	Valve starts to open at:	32 pulses \pm 20 pulses
Cable length	1 meter	Insulation class	E
		Protection class Coil	IP65 excluding cable and terminal (JST)

Dimensions (mm)



Valve series	Description Type		C (mm)	D (mm)	E (mm)	F (mm)
	Diameter	Length (mm)				
EXM-...	1/4 " ODM	8	17.3	78	36	36.3
EXL-...	1/4 " ODF / 8 mm ODM	8	21.8	90	42	42



Coil	E (mm)	F (mm)
EXM-...	52.5	32
EXL-...	59	34

EXD-HP1/2

are stand-alone universal superheat controllers for heat pumps, heating units, air conditioning and precision cooling such as telecom and shelter applications.

Features

- Self-adapting superheat control in conjunction with EMERSON stepper motor driven electronic expansion Valves EXM/EXL
- Discharge hot gas temperature control by wet refrigerant vapor/vapor injection to compressor
- EXD-HP1: Controller with one EXV output
- EXD-HP2: Controller with two independent EXV outputs
- Controllers as slave with Modbus (RTU) communication capability. All data (read/write) accessible by any third party controller having modbus communication (RTU)
- Upload/download key (accessory) for transmission of parameter settings among controllers with the same setting
- Low pressure switch and freeze protection function
- Manual positioning of valve(s)
- Limitation of evaporating pressure (MOP)
- Low/high superheat alarm
- Monitoring of sensors and sensor wiring and detection of sensor and wiring failures
- Integrated display (3-digits LEDs) and key board
- Electrical connection via plug-in type screw terminals (included with controller)
- DIN rail mounting housing
- OEM product: Box order quantities: 20 pieces (Multi-pack)



Selection Table

Type	Description	Part No.	
		Multipack	Single pack
Controllers			
EXD-HP1	with 1 EXV output	807836M	-
EXD-HP2	with 2 EXV outputs	807837M	-
Valves/Coils			
EXM-B0A	Electronic expansion valve	800399M	-
EXM-B0B		800400M	-
EXM-B0D		800401M	-
EXM-B0E		800402M	-
EXM-125	Coil 12 VDC	800403M	-
EXL-B1F	Electronic expansion valve	800405M	-
EXL-B1G		800406M	-
EXL-125	Coil 12 VDC	800407M	-
Temperature Sensor			
ECP-P30	Temperature sensor with 3 m cable	-	804495
Pressure Sensor			
Suction pressure (Refrigerant)			
PT5-07M/PT5-07T	-0.8...7 bar (R22, R134a, R407C)	802350M / 802370M	802350 / 802370
PT5-18M/PT5-18T	0 ...18 bar (R410A, R32 /suction pressure)	802351M / 802371M	802351 / 802371
PT5-30M/PT5-30T	0 ...30 bar (R410A, R32 / Intermediate pressure)	802352M / 802382M	802352 / 802382
Plug and cable assembly for pressure sensors			
PT4-M15	1.5 m cable length	804803M	804803
PT4-M30	3.0 m cable length	804804M	804804

Note: For further detail please see Technical Bulletin of EXM/L and PT5...FLR.

⚠️ These devices have potential ignition source and do not comply with ATEX requirements. Installation only in "non explosive location".

Technical Data

EXD-HP1/2

Supply voltage	24 VAC/DC \pm 10%	Protection class	IP 20
Power consumption	EXD-HP1: Max. 15VA EXD-HP2: Max. 20VA	Housing	Self-extinguishing ABS
Digital inputs	EXD-HP1: Two, each potential free EXD-HP2: Three each potential free	Mounting	DIN rail mounted
Relay output	SPDT contacts, AgSnO Inductive (AC15) 24 V AC : 1 A Resistive: 24 VAC/DC: 4 A	Temperatures storage operating	-20...+65°C -10...+60°C
Plug-in connector size	Removable screw version wire size 0.14 ... 1.5 mm ²	Relative humidity	0...85% RH non condensing
Applied directive	LVD, EMC, RoHS,	Weight	175 g
Compliance with	DIN EN60335-1 DIN EN 55014-1, DIN EN 55014-2	Marking	CE

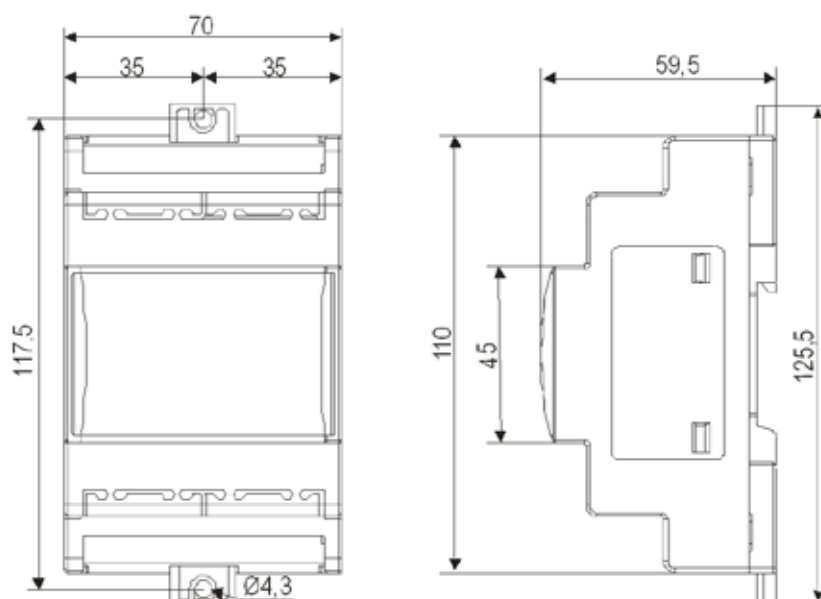
Input Sensors, Output Valves

Description	Specification
Temperature input	ECP-P30 (3 meter cable length) Range: -30°C...+150°C
Pressure sensor input	PT5 Signal: 4...20 mA
Electronic expansion valves (stepper motor) output	EXM and EXL series

MOPD Table

Description	Min.	Max.	Default
	(°C)		
R410A	-40	+45	+15
R32	-40	+30	+15
R407C	-40	+48	+15
R22	-40	+50	+13
R134a	-40	+66	+15
R290	-40	+50	+15

Dimensions (mm)



The first VDE certified **Compressor Soft Starter** for safety of household. It is used for switching, protection and starting current limitation of single phase compressors in residential heat pumps, refrigeration and air-conditioning applications.

Features

- For motors with maximum operating current up to 25A / 32A
- Limitation of starting current to less than 45A; PCN 805209 less than 30A
- Self adjusting for use in 50 Hz or 60 Hz supply
- Self adjusting to motor current - no manual adjustment or calibration necessary
- Alarm relay output
- Start capacitor for improved motor acceleration is switched off after start
- Low voltage shutdown
- Locked rotor recognition and shutdown
- Delay function to limit number of motor starts per hour
- Thyristor protected contactor for long life
- No extra motor contactor needed
- Self diagnostics
- Mounting clip for easy installation allows DIN rail mounting in two directions
- Easy wiring by cage type screw terminals
 CSS-...U: 4mm² cross section terminals
 CSS-...W: 6mm² cross section terminals



CSS-32U Soft Starter



CSS-32W Soft Starter

Selection Table

Type	Part no.	Description	Screw terminals	Nom. compr. current	Max. start current
CSS-32U	805204	Compressor Soft Starter incl. mounting clip	4 mm ²	32A max	45 A
CSS-32U	805204M	Box with 20 pieces . mounting clips	4 mm ²	32A max	45 A
CSS-32W	805211	Compressor Soft Starter incl. mounting clip	6 mm ²	32A max	45 A
CSS-32W	805211M	Box with 20 pieces . mounting clips	6 mm ²	32A max	45 A
CSS-25U	805205	Compressor Soft Starter incl. mounting clip	4 mm ²	25A max	45 A
CSS-25U	805205M	Box with 20 pieces . mounting clips	4 mm ²	25A max	45 A
CSS-25U	805209	Compressor Soft Starter I _{max} 30 A incl. mounting clip	4 mm ²	25A max	30 A
CSS-25U	805209M	Box with 20 pieces . mounting clips	4 mm ²	25A max	30 A

⚠️ These devices have potential ignition source and do not comply with ATEX requirements. Installation only in "non explosive location".

Accessory

Type	Part no.	Description
K00-003	807663	3-pol screw connector to alarm output for wires up to 2.5 mm ² ; bag with 50 pieces

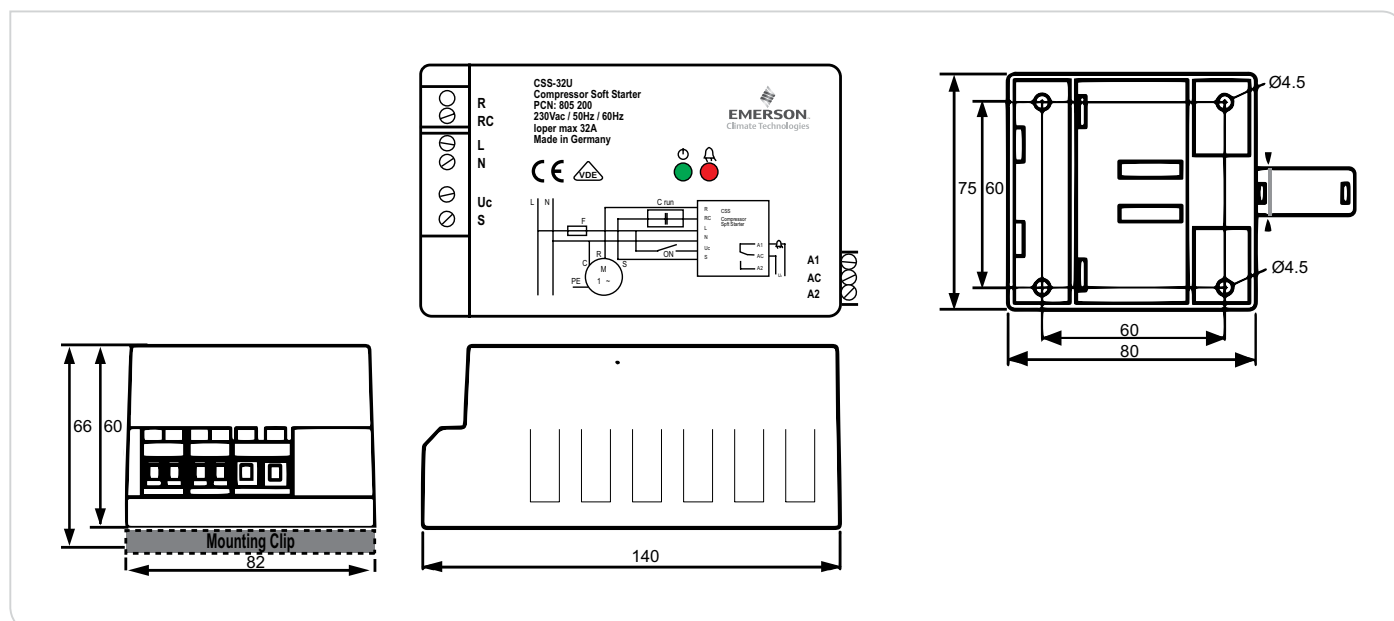
Technical Data

Operating voltage	230V 50 / 60 Hz nominal	Alarm relay. AgNi (SPDT)	250V~ / 3A
Nominal compressor current	CSS-32U / - 32W : 32A max. CSS-25U : 25A max.	Resistive (AC1) max.	30V= / 3A
Maximum start current	CSS-32U / -32W : 45A CSS-25U (805 205) : 45A CSS-25U (805 209) : 30A	Flexible cable cross section	CSS-32U/-25U all terminals : 0.25...4 mm ² CSS-32W (R, RC, L terminals) : 0.25...6 mm ²
Operating temperature	-20...+55°C non condensing	Flexible cable cross section	alarm output connector K00-003 : 0.25...2.5 mm ²
Storage temperature	-20...+65°C non condensing	Max. vibration (at 10 to 1000 Hz)	4 g
Start capacitor	200...240 uF	Weight	430 g
Time delay after stop	0.5...5 Min	Protection acc. IEC 529	IP20

Standards

EN 60947-1	Low voltage switch gear and control gear	EN 60335-1	Safety of household and similar electrical appliances -
EN 60947-4-2	Contactors and motor-starters - AC semiconductor motor controllers and starters	EN 60335-2-40	Part 2-40 Particular requirements for electrical heat pumps, air-conditioners and dehumidifiers
EMC 2004/108/EC	Electromagnetic Compatibility (EMC) Directive	ROHS 2002/95/EC	Restriction of Hazardous Substances Directive
LVD 2006/95/EC	Low Voltage Directive	Marking	CE, VDE Reg.-Nr. D967 / D663

Dimensions [mm]







Emerson Climate Technologies at a Glance

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and brands with our global engineering, design and distribution capabilities to create reliable, energy efficient climate systems that improve human comfort, safeguard food, and protect the environment.

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