Front view

Field module for installation in refrigeration units for cold locations

Features

- Operation of electronic expansion valves, pulsed via ATV230 (valve controller 230V~/=)
- Control of one evaporator per module
- Integrated temperature display
- Tool-free front installation
- Fixed input/output allocation for sensors, control inputs and relays
- Emergency program in case of CAN bus errors
- External power supply over TR9-9-4
- Secure connection through prefabricated accessories (ZCB)
- Front panel with seal frame for increased splash protection
- Connection to master module via Wurm CAN field bus (F-BUS)

Writing conventions

Symbol	Meaning
⚠ **CAUTION!**	Avoid the described hazard: otherwise **minor** or **medium** physical injury or damage to property will result.
⚠ **WARNING!**	Avoid the described hazard: otherwise there is danger from **electric voltage** that could lead to death or **serious** physical injury.

For your safety

For safe operation and to avoid personal injury and equipment damage through operating error, always read these instructions, become familiar with the device, and follow all safety instructions on the product and in this document, as well as the safety guidelines of Wurm GmbH & Co. KG Elektronische Systeme. Keep these instructions ready to hand for quick reference and pass them on with the device if the product is sold.

Wurm GmbH & Co. KG Elektronische Systeme accepts no liability in case of improper use or use for other than the intended purpose.

Target group	These instructions are intended for service technicians.
Intended use	The FKD003, which is installed in refrigerators, is a field module for cold locations.

⚠ **WARNING!**
Danger to life from electric shock and/or fire!

- Switch off the power to the entire plant when installing, wiring or removing! Otherwise a mains voltage and/or external voltage may still be present even if the control voltage is switched off!
- The wiring of the device should be carried out only by a qualified electrician!
- Use only the correct tools for all work!
- Check all wiring after connection!
- Take note of the maximum loads on all connections!
- Never expose the device to moisture, for example due to condensation or cleaning agents!
- Take the device out of operation if it is faulty or damaged and is therefore compromising safe operation!
- Do not open the device!
- Do not repair the device yourself! If required, send it in for repair with an exact description of the fault!

⚠ **CAUTION!**
Electromagnetic interference can cause faults!

- Use only shielded data lines and place them far away from power lines!

Software revision and validity of documentation

Software version		
V2.2	2018-01	Documentation status

Any software versions not listed are special solutions for individual projects and are not described in detail in this document. This document automatically ceases to be valid if a new technical description is issued.
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For further information, see our website at www.wurm.de

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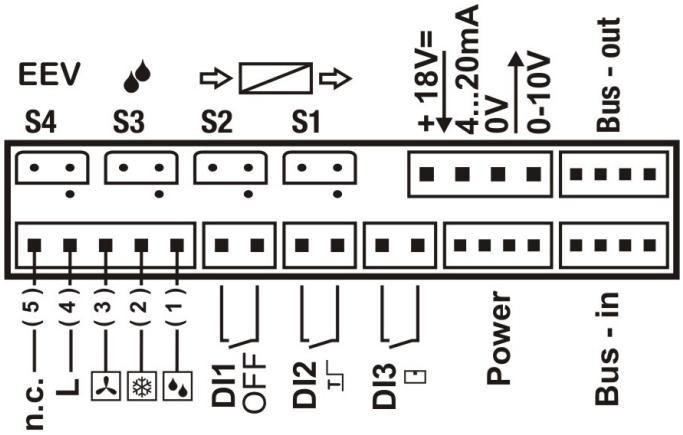
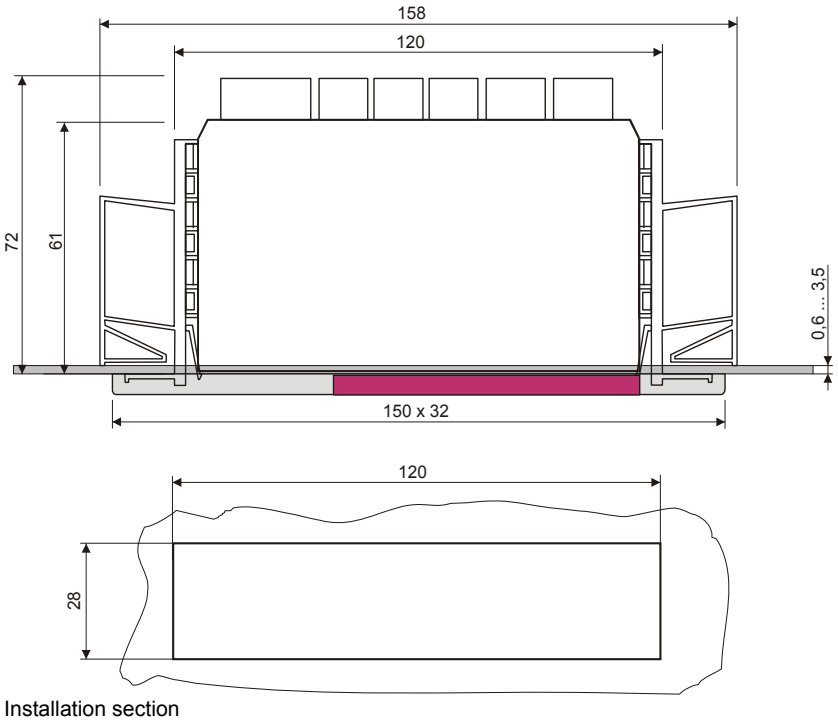
1 Circuit diagram



2 Installation / connections

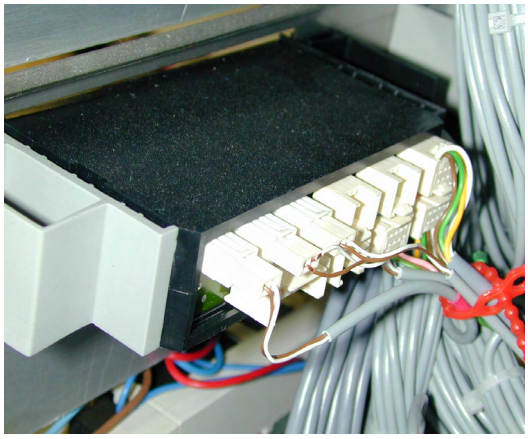


Installation section

WARNING! Danger to life from electric shock and/or fire!

- Switch power off to the entire system when installing and wiring! Otherwise a mains voltage and/or external voltage may still be present even if the control voltage is switched off!

All connections are designed as plugs for prefabricated cable.

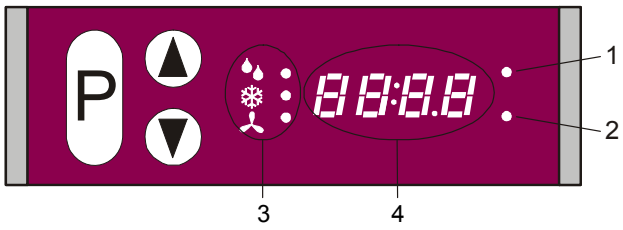


Connections for prefabricated cables

The following cables, CAN bus adapters and terminating resistors are available for the FKD003.

Cables	Application
ZCB-C/TR-0.6	Controller – transformer, 0.6m
ZCB-C/TR-2.0	Controller – transformer, 2.0m
ZCB-C/REL2M-5P	Controller – load, 5-pin
ZCB-C/DI-2.0	Controller - digital inputs, 2.0m
ZCB-C/DI-7.0	Controller - digital inputs, 7.0m
ZCB-C/AI-2.0	Controller (plug) – analogue input (wire end sleeves), 4…20mA, 2.0m
ZCB-C/AI-7.0	Controller (plug) – analogue output (wire end sleeves), 4…20mA, 7.0m
ZCB-C/AO-2.0	Controller (plug) – analogue output (wire end sleeves), 0…10V, 2.0m
ZCB-C/BUS-0.6	Controller – controller/bus adapter (plug), 0.6m
ZCB-C/BUS-4.5	Controller – controller/bus adapter (plug), 4.5m
Bus adapter	**Application**
ZCB-ADP/BUS	CAN bus adapter
Terminating resistor	**Application**
ZCB-ADP/R	Terminating resistor for CAN bus

3 Display and control elements



LEDs and 7-segment display	
1	Parameter change approved
2	Advanced level
3	Status LEDs
4	Value / parameter number
Display symbols	
	Defrosting
	Cooling
	Fan

4 Device operation

The setting menu is divided into 2 distinct function areas, the **standard level and the advanced level**.

The **standard level** encompasses only the display of the control actual value and the status LEDs.
The **advanced level** encompasses all parameters (P01 to P16).

4.1 Activating the advanced level

1. To switch to advanced level, press the <P> key for 5 seconds.
   The LED "Advanced level" will flash for as long as the level is released.

2. To return to the advanced level, press the <P> key again for 5 seconds.

   If no key is pressed within 2 minutes, the display automatically returns to the standard level.

4.2 Selecting parameters

1. Press the <P> key to display the parameter number.
   The parameter number will appear in the display for as long as the key is depressed.
2. To select individual parameters with the <P> key depressed, press the ▲ or▼ key.
   When the keys are released, the value corresponding to the parameter is displayed.

4.3 Set parameter

1. Select the parameter to be set (first enable the advanced level if necessary).
2. Parameter change approved. Press all 3 keys simultaneously for 5 seconds.
   The LED "Parameter change approved" flashes.
3. Change the values using the ▲ or ▼ keys.

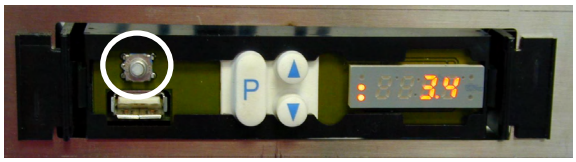
5s 5s

When changing the parameters, it is not necessary to re-enable access to make further value adjustments.
Current values are simply displayed. They cannot be adjusted even if the LED "Parameter change approved" is flashing.

4. To disable parameter change, press all 3 keys simultaneously again for 5 seconds.

If no key is pressed within 2 minutes, the display automatically returns to the standard level and parameter change is disabled. The jump back is always made to the temperature display.

4.4 Set module number

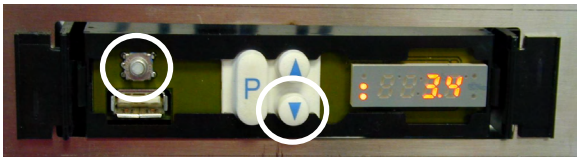


Note!
▪ 3 x Service key => address P11

For easier setting of the module number (P11), the menu item can be opened directly by pressing the Service key (behind the front plate) 3 times in rapid succession.

All that is needed now to set the address is to release parameter adjustment.

4.5 Block keys against unauthorised operation



Note!
▪ 5s Service key + ▼ => keys blocked

If the Service key and the arrow key ▼ are pressed simultaneously for 5 seconds, the keyboard (3 visible keys) is blocked. An effective block is confirmed by displaying the text ""noOP" for 1 second. Blocking the keys simultaneously exits the advanced level and branches to the standard menu.
Access is also blocked if it was released before.

When keys are blocked, each time a key is pressed, the access and advanced level LEDs are lit to indicate that key blocking is active, so that the device will not be considered faulty mistake.

Note!
▪ 5s Service key + **P** => keys enabled

The block can be removed by pressing the service key together with the Menu key "**P**" for 5 seconds. Removal of the block is signalled by the appearance of the text "*FrEE*" for 1 second.

5 Parameter

Standard level: actual value					
No.	**Parameter**	**factory**	**Min.**	**Max.**	**Description**
P00	Control actual value		-	-	Current actual value of temperature control

Advanced level: actual values and setpoints					
No.	**Parameter**	**factory**	**Min.**	**Max.**	**Description**
P01	Actual value of supply air		-	-	Temperature of supply air sensor S1
P02	Actual value of return air		-	-	Temperature of return air sensor S2
P03	Actual value of defrost limit sensor		-	-	Temperature of defrost limit sensor S3
P04	Actual value of suction gas temperature		-	-	Temperature of suction gas sensor S4
P05	Actual value 4...20mA		0	25.5	Current on 4…20mA input (resolution: 0...25.5mA)
P06	Actual value 0...10V output		0	100	Triggering of the 0...10V output (resolution: 0...100%)
P07	Sensor type supply air S1	277	-	-	Type of the temperature sensor – to be set on the master module
P08	Sensor type return air S2	277	-	-	Type of the temperature sensor – to be set on the master module
P09	Sensor type defrost limit S3	277	-	-	Type of the temperature sensor – to be set on the master module
P10	Sensor type suction gas temperature S4	277	-	-	Type of the temperature sensor – to be set on the master module
P11*	Address	0	0	7	Selected module number (F-BUS address)
P12	Version		-	-	Applied device version
P13*	Relay test function		0	3	0 = all relays off 1 = defrost 2 = cooling 3 = fan The relay test is automatically deactivated if the menu is exited or if there is no other key input for 2 minutes.
P14	Status of input: Cold location off	OFF	OFF	ON	Current status of digital input DI1
P15	Status of input: 2nd setpoint	OFF	OFF	ON	Current status of digital input DI2
P16	Status of input: Door open	OFF	OFF	ON	Current status of digital input DI3

***Adjustable parameters**

6 Fault messages and emergency programs

In case of a fault, the display flashes with the fault code.

Display	Cause	Monitoring function and emergency program
COLL	Address conflict on CAN bus	The set module number is already assigned. Set a different module number!
buS	CAN bus error No communication over the CAN bus	Check the CAN bus connection!
ErCo	CAN bus communication error	The device has detected activities on the F-BUS, but is not being controlled by the corresponding master module. Check address setting and parameter settings of the master module!
EE	Data fault in non-volatile memory	A power surge may destroy the set parameters. Operation is carried out with the factory default settings. Newly enter all storage locations! De-energise the control unit!

7 Technical data

Power supply	Through transformer TR9-9-4 with plug connection
Communication	3-wire CAN bus interface, galvanically isolated
Temperature sensor	3 x TRK277/5ST-PLUS or TRK277/7ST-PLUS (Standard connection: supply air, return air, defrost limit) 1 x TRK-EEV/7ST (suction gas)
Analogue input	4…20mA, output voltage 18V=, max. 22mA
Digital inputs	3 x potential-free contacts (1 x cold location off, 1 x 2nd setpoint, 1 x cold room door open)
Outputs	The total current on the output relays must not exceed 6A.
Output relay	1 x cooling, normally closed contact, 230V~, 3(2)A 1 x fan, normally closed contact, 230V~, 3(2)A 1 x defrost, normally open contact, 230V~, 3(2)A
Analogue output	1 x 0…10V=, non-isolated, max. load 1mA, Alternatively for control of electronic relay ATV230 (Valve 230V~/=)
Housing	Plastic
Dimensions	(WxHxD) 158 x 32 x 75mm
Fastening	In the installation cut-out with holding clips and sealing frame (120 x 28mm)
Ambient temperature	Operation: 0...+55°C, storage: -25…+70°C
Degree of protection	IP54 (front)
Weight	About 150g
CE conformity	– 2014/30/EU (EMC Directive) – 2014/35/EU (Low Voltage Directive) CE
EAC conformity	– TR CU 004/2011 – TR CU 020/2011 EAC
	RoHS II
Valid from	Version 2.2

Note!

- Please observe the detailed descriptions in the chapters of the FRIGOLINK system manual.