1 FKD003

Field module for installation in refrigeration units for cold locations

1.1 Front view

Fig. 1: Front view

1.2 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 assignment for sensors, control inputs and relays
- Emergency program in case of CAN bus errors
- External power supply via TR9-9-4
- Secure connection via pre-assembled accessories (ZCB)
- Front panel with sealing frame for increased splash protection
- Connection to master module via Wurm CAN field bus (F-BUS)

1.3 Safety instructions

Writing conventions

CAUTION

- Avoid the described hazard: otherwise, **minor** or **intermediate** 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 operator 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 the case of improper use or use for purposes other than the intended purpose.

Target group	This manual is intended for “service technician” personnel.
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 carrying out installation, wiring or disassembly work! Otherwise, mains voltage and/or external voltage may still be present, even if the control voltage is switched off!
- The wiring of the device must be carried out only by qualified electricians!
- Use the correct tools for any work!
- Check the entire wiring after connection!
- Observe the maximum loads for all connections!
- Never expose the device to moisture, for example due to condensation or cleaning agents!
- Stop operating the device if it is faulty or damaged and its safe operation is compromised!
- Do not open the device.
- Do not repair the device yourself! If the device requires repairs, send it in with an exact description of the fault!

CAUTION

ELECTROMAGNETIC INTERFERENCE MAY CAUSE FAULTS!

- Always use shielded data cables and place them far away from power lines.

Wurm Infocenter

paperless info

Version and validity of the documentation

Version	Date	
V2.2 and higher	2024-03	Documentation status

Any versions not listed are special solutions for individual projects and are not described in detail in this document.
This document will automatically cease to be valid if a new technical description is issued.
Manufacturer: Wurm GmbH & Co. KG Elektronische Systeme, Morsbachtalstraße 30, D-42857 Remscheid
You can find more information on our website at www.wurm.de.

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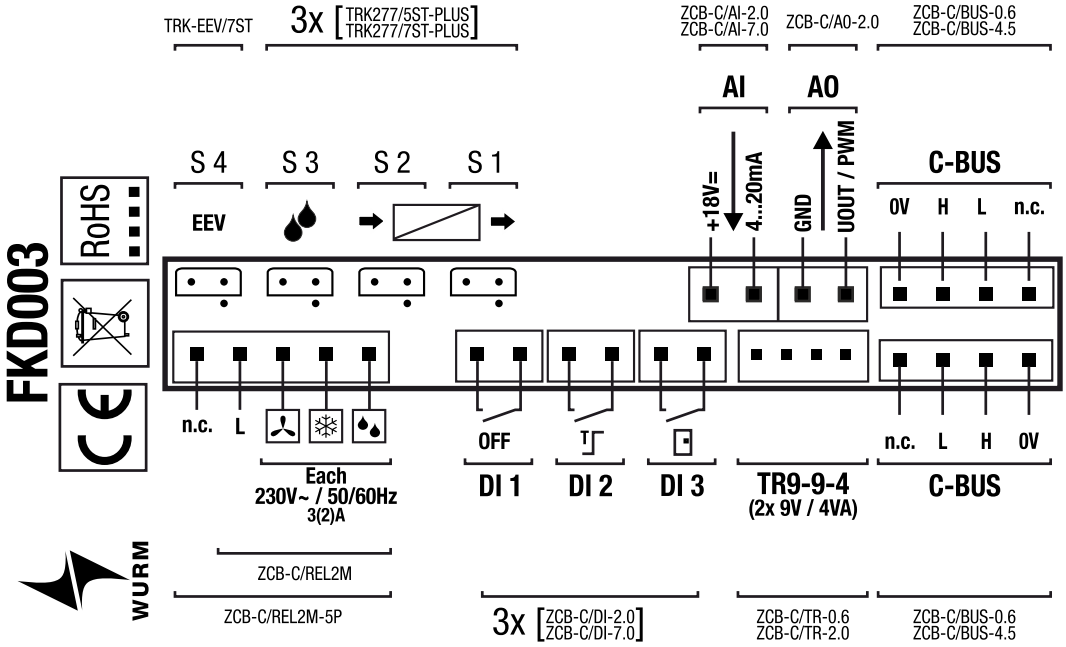

Fig. 2: Connection diagram

1.5 Installation / connections

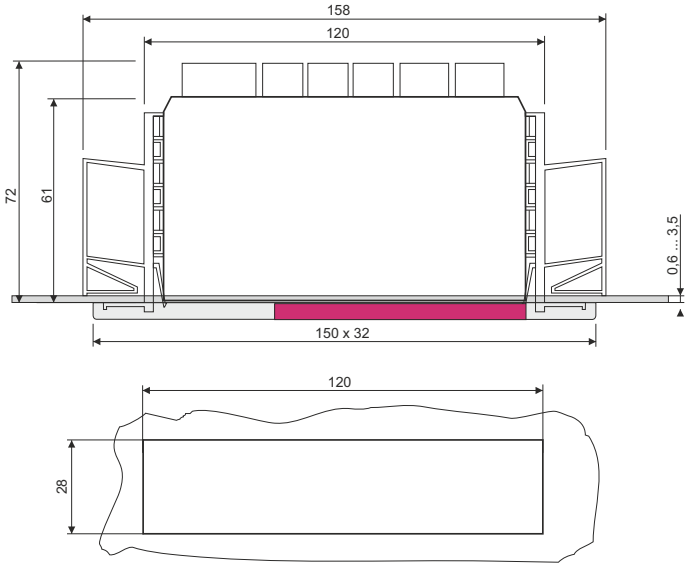

Fig. 3: Installation section

WARNING

DANGER TO LIFE FROM ELECTRIC SHOCK AND/OR FIRE!

- Switch off the power to the entire plant before installing. Otherwise, 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 pre-assembled cable.

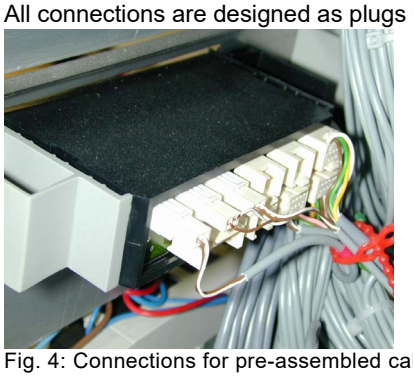

Fig. 4: Connections for pre-assembled cables

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 input, 2.0m
ZCB-C/DI-7.0	Controller – digital input, 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 input (wire end sleeves), 4...20mA, 7.0m
ZCB-C/AO-2.0	Controller (plug) – analogue output (wire end sleeves), 0/10V, Uout / PWM, 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

1.6 Display elements and control elements

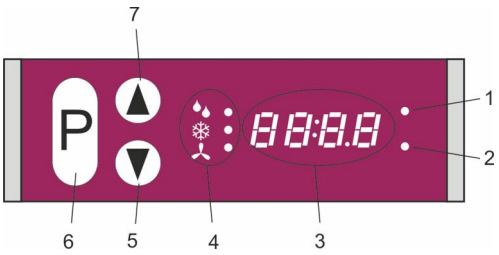

Fig. 5: Display elements and control elements

1	Parameter change approved
2	Advanced level
3	Value/parameter number
4	Defrost; cooling; fan
5	Down key
6	Confirm key
7	Up key

1.7 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).

1.7.1 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.

Fig. 6: Activating the advanced level

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.

1.7.2 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.

Fig. 7: Selecting parameters

1.7.3 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.

Fig. 8: Set parameter

When changing the parameters, it is not necessary to re-enable access to make further value adjustments.

Actual values are simply displayed. They cannot be adjusted even if the LED "Parameter change approved" is flashing.

4. To blocked 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.

1.7.4 Set module number

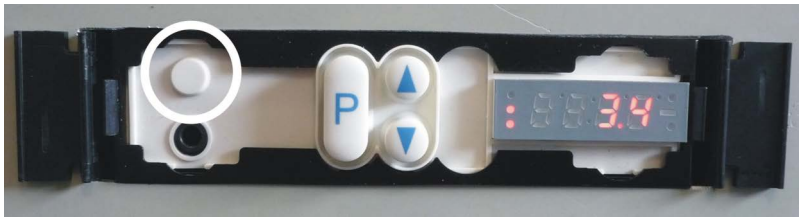

Fig. 9: Service key

1. Press the service key 3 x.
   ▶ Address P11 opens.

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

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

1.7.5 Block keys against unauthorised operation

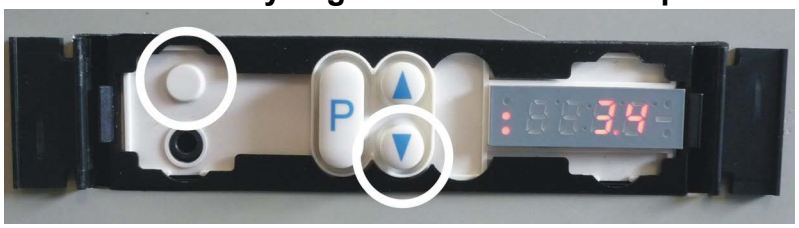

Fig. 10: Block operation

1. Press the service key + ▼ for 5 seconds.
   ▶ Keys are 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.

Fig. 11: Enable operation

1. Press the service key + **P** for 5 seconds.
   ▶ Keys are 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 signaled by the appearance of the text "FrEE" for 1 second.

1.8 Parameter

Standard level: actual value

No.	Parameter	Factory	Min.	Max.	Description
P00	Control actual value		-	-	Current actual value of temperature control

Advanced level: actual value and setpoint

No.	Parameter	Factory	Min.	Max.	Description
P01	Actual value of supply air		-	-	Temperature of supply air sensor S 1
P02	Actual value of return air		-	-	Temperature of return air sensor S 2
P03	Actual value of defrost limit sensor		-	-	Temperature of defrost limit sensor S 3
P04	Actual value of suction gas temperature		-	-	Temperature of suction gas sensor S 4
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	Modulation of the PWM 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		-	-	Device version used
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: CLR OFF	OFF	OFF	ON	Current status of digital input DI 1
P15	Status of input: 2nd setpoint	OFF	OFF	ON	Current status of digital input DI 2
P16	Status of input: Door open	OFF	OFF	ON	Current status of digital input DI 3

*Adjustable parameters

1.9 Error messages and emergency programs

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

Display	Cause	Monitoring function and emergency programs
COLL	Address conflict on the 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	CAN bus communication error	A power surge may destroy the set parameters. Operation is carried out with the factory default settings. Enter all storage locations again! De-energise the control unit!

1.10 Technical data

Power supply	Via transformer TR9-9-4 with plug connection
Communication	3-conductor 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 floating contact (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
Voltage output	1 x 0/10V, Uout / PWM, non-floating, max. load 1mA, For the actuation of electronic relay ATV230 (Valve 230V~/=)
Housing	Plastic
Dimensions	(W x H x D) 158 x 32 x 75mm (DIN 43880)
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
	RoHS II