1 ANI-2F1-A

Module for process control in CO_2 refrigeration plants with rack and gas cooler control

1.1 Front view

Fig. 1: Front view with ANI-C control panel

1.2 Features

- Standard rack controller with up to 2 compressors controlled by evaporation temperature
  - Compressor 1 constant (FC), compressor 2 directly controlled
  - Frigotakt+
  - Monitoring of suction gas temperature
  - Oscillation protection function
  - Blocking time after compressor fault
  - 3-step load shedding including Fastreturn
  - Operating hours counter and cycle counter for each compressor
- High pressure and medium pressure control
- Gas cooler fan control
- Gas cooler monitoring
- Refrigerant monitoring
- CAN bus connection via patch cable and screw terminals
- Fastening by top-hat rail
- Can be locked to prevent unwanted parameter adjustment (SAC - Security Access Control)
- Connection to the Wurm system via Wurm CAN communication bus (C-BUS) and FRIGODATA XP

Accessories

- Control panel (ANI-C)

Contents

1.3 Safety instructions

Writing conventions

- Avoid the described hazard: Otherwise **minor** or **medium** bodily injury or property damage will result.

VORSICHT

- Avoid the described hazard: Otherwise there is danger from **electric voltage** that can lead to death or **serious** bodily injury.

WARNUNG

For your safety

For safe operation and to avoid personal injury and equipment damage through operator error, 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 ANI-2F1-A is a process control module for CO_2 refrigeration plants with rack and gas cooler control.

DANGER TO LIFE FROM ELECTRIC SHOCK AND/OR FIRE!

WARNUNG

- 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!

ELECTROMAGNETIC INTERFERENCE MAY CAUSE FAULTS!

VORSICHT

- 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	
V2.0.0 and higher	2022-01	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.

1.4 Circuit diagram

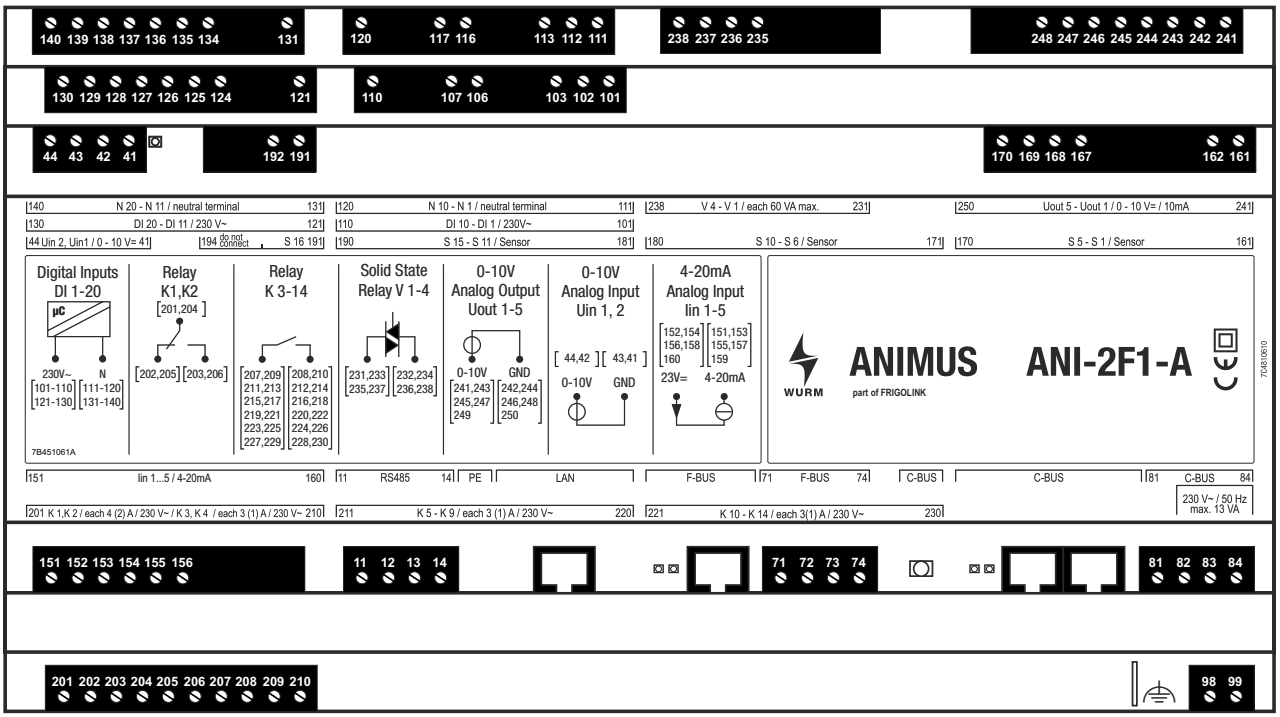

Fig. 2: Circuit diagram

Power supply

Terminal	Power supply	Potential
98	Neutral	N
99	230V~	L

Functional earth (FE)

Terminal	Assignment
⏚	Shield

- To ensure failure-free operation and reliable data communication, connect the functional earth. Connect the functional earth connection via the enclosed earthing terminal and the pre-assembled cable directly to the device with the earthed installation plate.

HINWEIS

1.4.1 Input circuit diagram

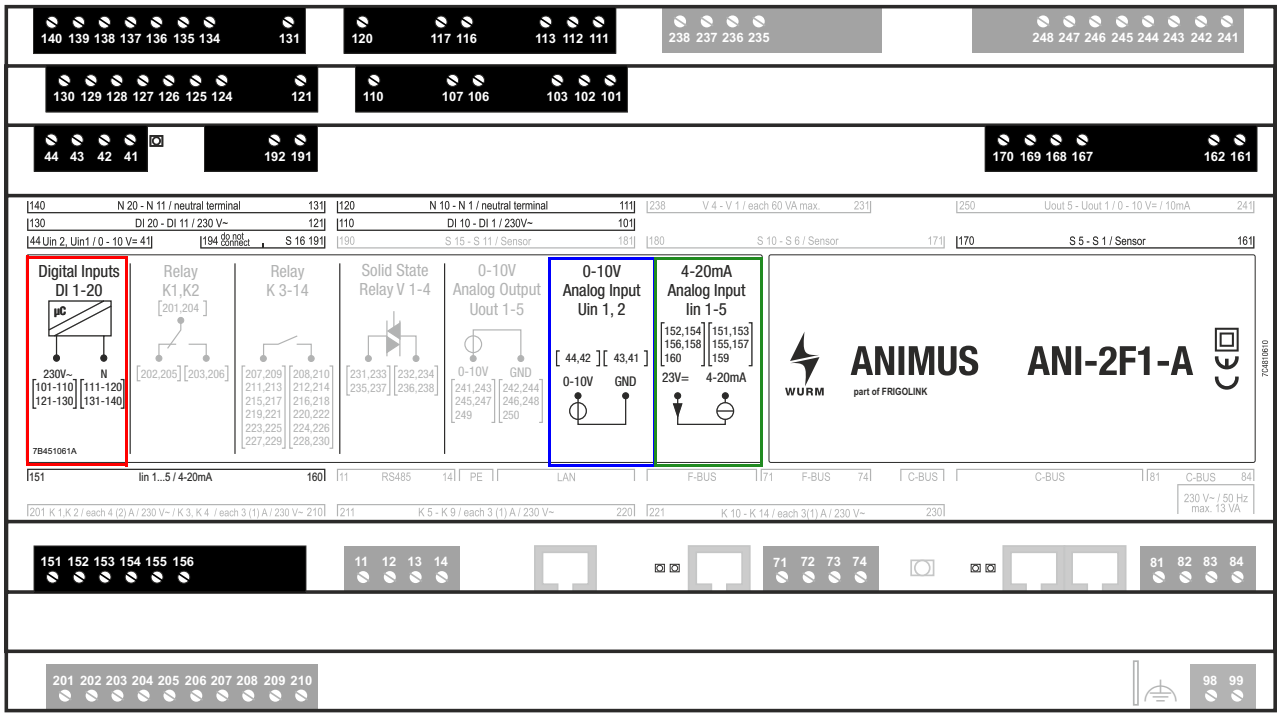

Fig. 3: Input circuit diagram

Digital inputs DI 1 - DI 20

Terminal	Digital input	Potential	Assignment
101	DI 1	230V~	Not available
111		N	
102	DI 2	230V~	Night signal
112		N	
103	DI 3	230V~	Load shedding 1
113		N	
104/114	DI 4 Not used		
105/115	DI 5 Not used		
106	DI 6	230V~	CP 1 operating feed-back
116		N	
107	DI 7	230V~	CP 2 operating feed-back
117		N	
108/118	DI 8 Not used		
109/119	DI 9 Not used		
110	DI 10	230V~	CP 1 fault
120		N	
121	DI 11	230V~	CP 2 fault
131		N	
122/132	DI 12 Not used		
123/133	DI 13 Not used		
124	DI 14	230V~	Min. refrigerant fault
134		N	
125	DI 15	230V~	Max. refrigerant fault
135		N	
126	DI 16	230V~	LP rack fault
136		N	

Terminal	Digital input	Potential	Assignment
127	DI 17	230V~	HP rack fault
137		N	
128	DI 18	230V~	GC fan fault
138		N	
129	DI 19	230V~	UPS / gas warning 1 fault
139		N	
130	DI 20	230V~	RCCB / gas warning 2 fault
140		N	

Analogue inputs: Voltage Uin 1 - Uin 2

Terminal	Analogue input	Potential	Assignment
41	Uin 1	GND	Not available
42		0-10V	
43	Uin 2	GND	Not available
44		0-10V	

Analogue inputs: Current Iin 1 - Iin 5

Terminal	Analogue input	Potential	Assignment
151	Iin 1	4-20mA	MT 1 p0
152		23V=	
153	Iin 2	4-20mA	p.mp
154		23V=	
155	Iin 3	4-20mA	p.gc
156		23V=	
157/158	Iin 4 Not used		
159/160	Iin 5 Not used		

Analogue inputs: Sensors S 1 - S 16

Terminal	Sensor input	Sensor type	Assignment
161/162	S 1	TRK	Ts MT
163/164	S 2 Not used		
165/166	S 3 Not used		
167/168	S 4	TRK	T.out
169/170	S 5	DGF	T.gc 1
171/172; 173/174; 175/176; 177/178; 179/180; 181/182; 183/184; 185/186; 187/188; 189/190;	S 6 - S 15 Not used		
191/192	S 16	TRK	Control cabinet sensor
193/194	Not used		

1.4.2 Output circuit diagram

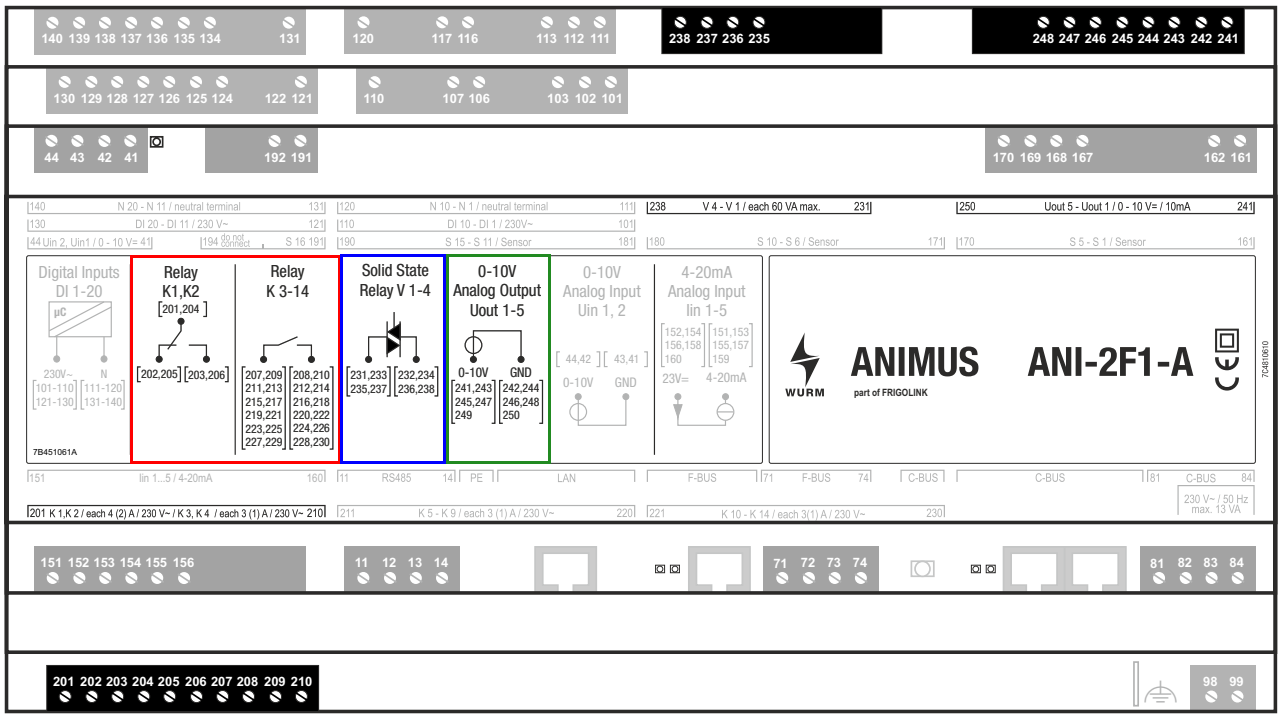

Fig. 4: Output circuit diagram

Digital outputs: Relays K 1 - K 14

Terminal	Digital output	Contact arrangement	Assignment
201	Change-over contacts K 1 / 4(2)A / 230V~	COM	Alarm output prio 1
202		NC	
203		NO	
204	Change-over contact K 2/ 4(2)A / 230V~	COM	Alarm output prio 2
205		NC	
206		NO	
207	NO contact K 3 / 3(1)A / 230V~	COM	MT CP 1 operation
208		NO	
209	NO contact K 4 / 3(1)A / 230V~	COM	MT CP 2 operation
210		NO	
211/212	K 5 Not used		
213/214	K 6 Not used		
215/216	K 7 Not used		
217/218	K 8 Not used		
219/220	K 9 Not used		
221/22	K 10 Not used		
223/224	K 11 Not used		
225/226	K 12 Not used		
227/228	K 13 Not used		
229/230	K 14 Not used		

Digital outputs SSR V 1 - V 4

Terminal	Digital output (SSR)	Contact arrangement	Assignment
231/232	V 1 Not used		
233/234	V 2 Not used		
235	Semiconductor V 3 4...60VA / 230V~	NO	Not available
236			
237	Semiconductor V 4 4...60VA / 230V~	NO	Not available
238		COM	

Analogue outputs Uout 1 - Uout 5

Terminal	Analogue output	Potential	Assignment
241	Uout 1	0-10V	FC CP 1
242		GND	
243	Uout 2	0-10V	GC fan
244		GND	
245	Uout 3	0-10V	MP valve 1
246		GND	
247	Uout 4	0-10V	HP valve
248		GND	
249/250	Uout 5 Not used		

1.4.3 Communication circuit diagram

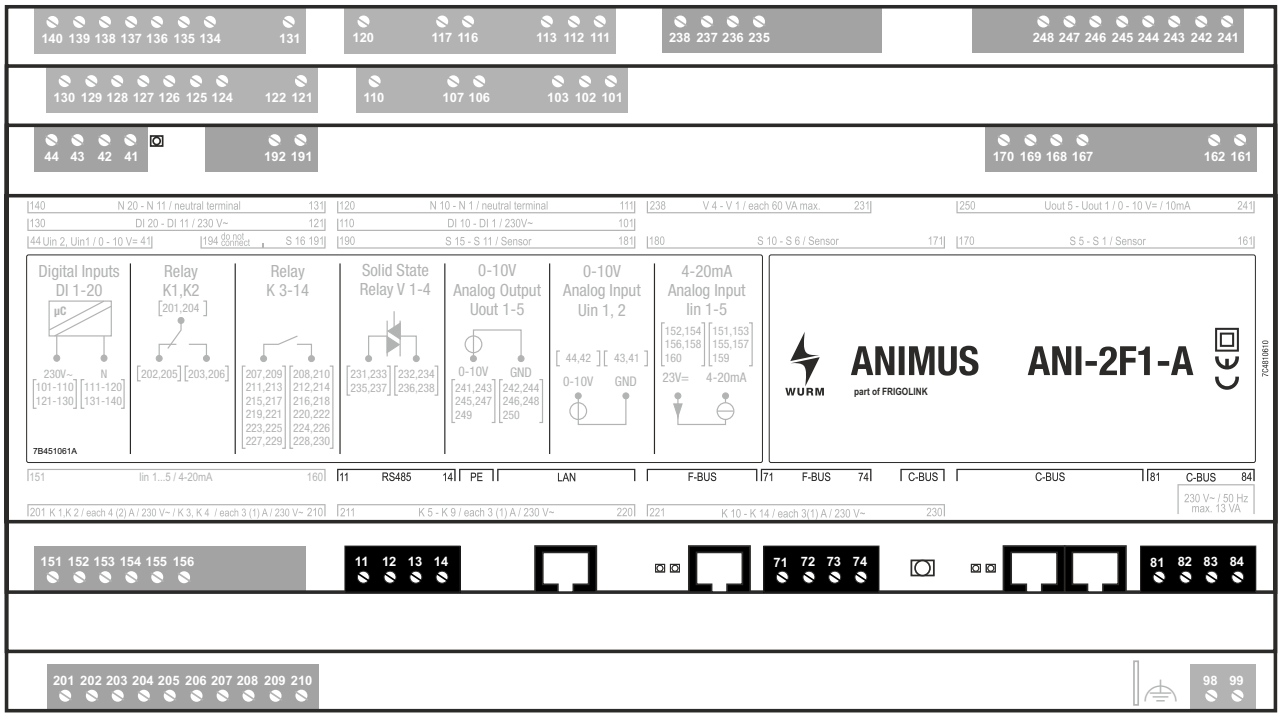

Fig. 5: Communication circuit diagram

Communication

Terminal	Potential	Assignment
81	0V	C-BUS
82	L	
83	S	
84	H	
71	0V	F-BUS
72	L	
73	S	
74	H	
11	0V	RS 485
12	B/+	
13	A/-	
14	5V	

1.5 Installing

The module is designed for top-hat rail installation. The housing is also suitable for installation in fuse boxes or distribution switch cabinets. Modules can be positioned side by side without gaps.

DANGER TO LIFE FROM ELECTRIC SHOCK AND/OR FIRE!

WARNUNG

- 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.

Top-hat rail installation

1. There are 2 fastening safety catches located on the back of the module. **(A)** Press both fastening safety catches **(a)** downward until they engage with a click.
2. There are 4 retaining lugs located on the back of the module. **(B)** Set the module with retaining lugs **(b)** on the top-hat rail **(c)**. Make sure that you position the module **parallel** to the top-hat rail with both hands and that all retaining lugs are located behind the edge of the top-hat rail.
3. Push the module down onto the top-hat rail.
4. **(C)** Swivel the bottom of the module towards the top-hat rail.
5. **(D)** Press the fastening safety catches **(a)** towards the module until they engage in the top-hat rail.

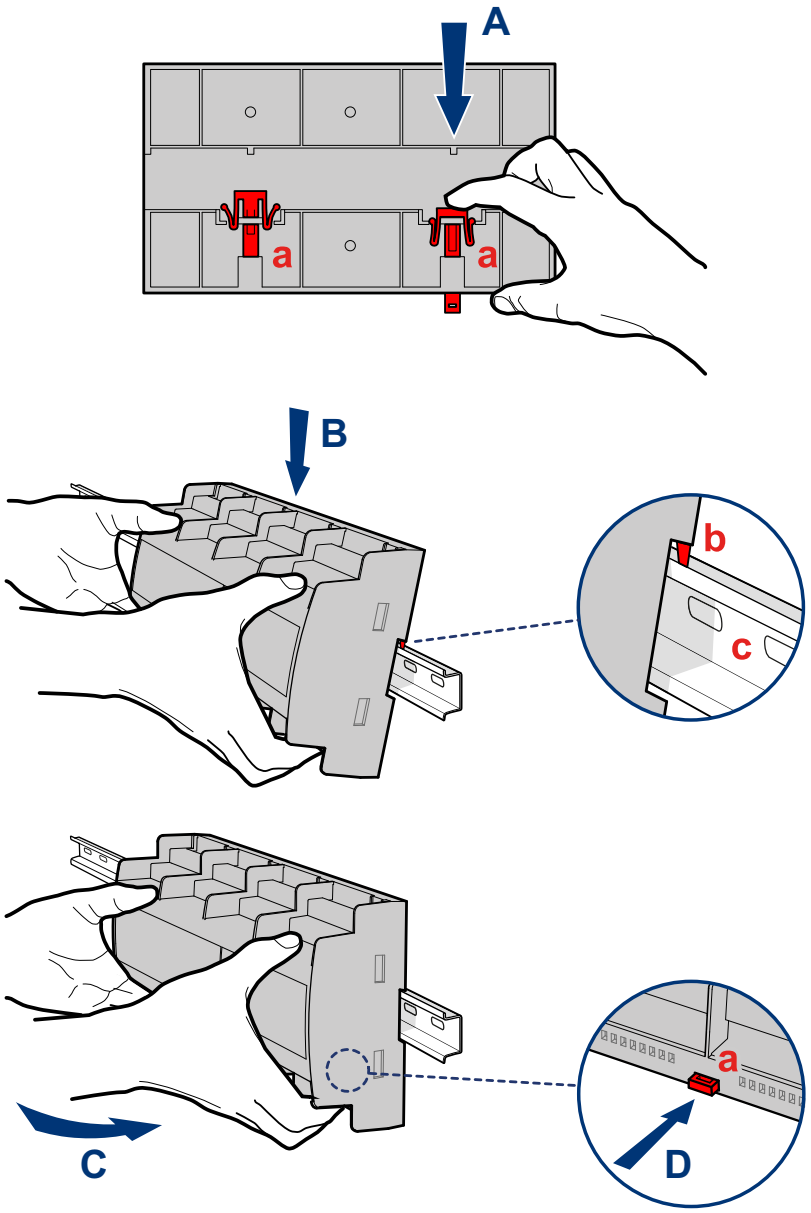

Fig. 6: Top-hat rail installation

Dismantling

1. Insert a flat-tip screwdriver in the openings in the fastening safety catches.
2. Pull the two fastening safety catches away from the housing until they are heard to click.
3. Swivel the bottom of the module gently away from the top-hat rail and towards yourself.
4. Lift the module upwards away from the top-hat rail.

1.6 Technical data

Power supply	230V~, +10% / -15%, 50Hz, max. 13VA
Display	Optional control panel with graphic display 1 x LED (green/red), operating voltage: green, fault: red 4 x LED (green), CAN bus data traffic (CAN Tx, CAN Rx)
Sensors	4 x DGF/TRK
C-BUS communication	3-conductor CAN bus interface, shielded, galvanically isolated, screw terminals 2.5mm^2 and RJ45 socket
F-BUS communication	3-conductor CAN bus interface, shielded, galvanically isolated, screw terminals 2.5mm^2 and RJ45 socket
Analogue inputs	3 x 4...20mA, 23V=power supply 2 x 0...10V=
Digital inputs	14 x floating for 230V~ (neutral conductor N per input)
Analogue outputs	4 x 0...10V=, non-floating, max. load 10mA
Digital outputs	2 x mechanical relays 4(2)A / 230V~ (change-over contact) 2 x mechanical relays 3(1)A / 230V~ (normally open contact) 2 x semiconductor relay 4...60VA / 230V~
Dimensions	(W x H x D) 270 x 80 x 165mm
Housing	Plastic
Fastening	Top-hat rail TH 35-15 or TH 35-7.5 (DIN EN 60715)
Ambient temperature	Operation: -20...+55°C, storage: -25...+70°C
Weight	Approx. 1125g
CE conformity	- 2014/30/EU (EMC Directive) - 2014/35/EU (Low Voltage Directive) CE
	RoHS II
Valid from	Version 2.0.0

For details of input assignments, see: Chapter 1.4.1 “Input circuit diagram” on page 6.
For details of output assignments, see: Chapter 1.4.2 “Output circuit diagram” on page 8.
For details of sensor assignments, see: Chapter “Analogue inputs: Sensors S 1 - S 16“ on page 7.

HINWEIS

- For information about the ANI-2F1-A functions, please see the product manual for the ANI-2F1.