

Solid-state Switching Devices

3RF29..-0JA.-1KK0 Heating Current Monitoring Function Module

Main Characteristics:

- Applicable on 3RF21 and 3RF23
- Partial monitoring for up to 6 loads
- Remote TEACH function
- Integrated voltage compensation
- Network and thyristor monitoring
- Selectable fault memory
- Plug-in control terminal – not included
- Degree of protection IP 20
- Adjustable response delay



Standards / Approvals:

- DIN EN 60947-4-3
- UL 508 / CSA
- CE
- C-Tick

Product Description:

Operation and monitoring of up to 6 heating elements with constant resistance at a 3RF21 solid state relay or 3RF23 solid state contactor.

This module permanently measures the current strength. This value is then continuously compared to a reference value (TEACH) which has once been stored during commissioning. If the current drops by 1/6 of the reference value, however, by at least the value of the min. partial load current, the module detects a partial load fault. If the current exceeds the maximum measuring range a fault will be detected too. Voltage fluctuations within the load circuit are compensated and do not result in a fault message.

The response delay in fault cases is adjustable to a value between 100 msec and 3 sec via a potentiometer at the module. The setting whether the module is to store the fault message or not is also made via this potentiometer. If fault messages are to be stored, the fault output remains active until the voltage supply is shortly disconnected from A1-A2 for reset. If fault messages are not to be stored, the output is automatically reset upon fault rectification.

Furthermore, the function module monitors TEACH faults, thyristor faults and network failures.

Ordering Key:

3RF29	16	- 0	J	A	1	3
Function module for 3RF21 and 3RF23	Max. load current 16 = 16 A 32 = 32 A	Connection technology 0 = Not relevant	Switching function J = Heating current monitoring	Controlled phases A = Single-phase	Control voltage 1 = 24 V AC/DC	Operating voltage 3 = 110 ... 230 V 6 = 400 ... 600 V

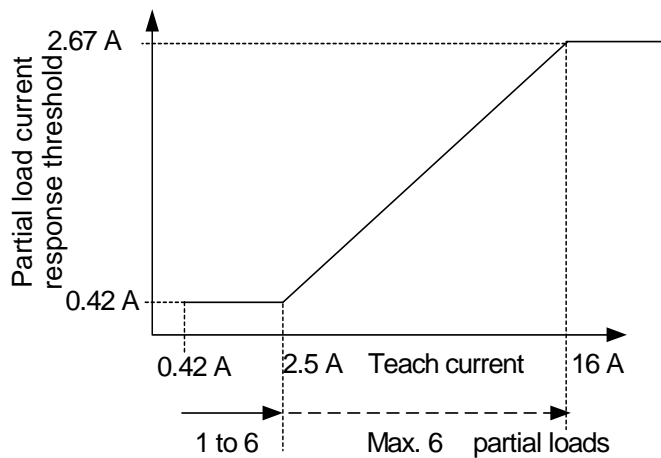
Not all possible versions are available ex stock.

Main Circuit:

Type		3RF2916-0JA.	3RF2932-0JA.
Current detection			
Rated operating current I _e	A	16	32
• TEACH range	A	0.4 ... 16	0.8 ... 32
• Measuring range	A	0 ... 16	0 ... 32
• Min. load current	A	0.42	0.8
Number of partial loads		1 ...6	

Type		3RF29..-0JA.3	3RF29..-0JA.6
Rated operating voltage U_e			
	V	110 ... 230	400 ... 600
• Tolerance	%	-15/+10	
• Rated frequency	Hz	50/60 ± 2	
Rated insulation voltage U_i			
	V	600	
Voltage detection			
• Measuring/TEACH range	V	93.5 ... 253	340 ... 660
Compensation			
Network voltage fluctuation	%	20 (only within the measuring range)	

Partial load monitoring response threshold in dependence of the sum current



E.g. 3RF2916-0JA..

The characteristic curve shows the load change (Y axis) required for a partial load fault in dependence of the teach current (X axis).

Control Circuit A1 – A2:

Type		3RF29...-0JA1.	
Rated control supply voltage U_s	V	AC/DC 24	
• Current input	mA	< 40	
• Max. control supply voltage	V	AC 26.5	DC 30
• Min. control supply voltage	V	AC 20.5	DC 18

Control Input IN1/ON and IN2/REF:

Type		3RF29...-0JA1.	
Rated operating voltage U_c	V	AC/DC 24 AC/DC	
• With operating current	mA	< 15	
• Max. operating voltage	V	AC 26.5	DC 30
Response voltage	V	AC 14	DC 15
• With pickup current	mA	> 2	> 2
Drop-out voltage	V	5	5
Rated frequency of the control supply voltage	Hz	50/60 ± 10 %	--

Auxiliary Circuit NC Contact (11-12):

Type		3RF29...-0JA1.	
Switching voltage	V	AC/DC 24	
• Operating current (utilization category)	A	0.5 (-12 DC)	
• Max. switching voltage	V	30	
• Min. switching voltage	V	15	
Max. thermal current I_{th}	A	1	

General Data:		
Ambient temperature		
During operation	°C	-25 ... 60
During storage	°C	-55 ... 80
Mounting altitude	m	0 ... 1000; at > 1000 m, please contact our Technical Assistance
Impact resistance acc. to DIN IEC 68	g/ms	15/11
Vibration resistance	g	2
Degree of protection		IP20
Electromagnetic compatibility (EMC)		
Interference emission		
○ Conducted interference voltage IEC 60 947-4-3		Class A for industrial applications ¹
○ Radiated, high-frequency interference voltage IEC 60 947-4-3		Class A for industrial applications
Interference resistance		
○ Electrostatic discharge acc. to IEC 61 000-4-2 (corresponds to severity 3)	kV	Contact discharge 4; air discharge 8; performance criterion 2
○ Induced HF fields acc. to IEC 61 000-4-6	MHz	0.15 ... 80; 140 dB μ V; performance criterion 1
○ Burst acc. to IEC 61 000-4-4	kV	2/5.0 kHz; performance criterion 1
○ Surge acc. to IEC 61 000-4-5	kV	Phase-to-ground 2; phase-to-phase 1; performance criterion 2
Isolation resistance	MOhm	1,5 (between Main- and Control circuit)

Type		Screw connection
Connection, auxiliary/control contacts		
Conductor cross-section with or without end sleeve	mm ² mm ² AWG	1 x (0.5 ... 2.5) 2 x (0.5 ... 1.0) 20 ... 12
Stripping length	mm	7
Terminal screw		M 3
○ Tightening torque	Nm	0.5 ... 0.6
D 3.5 / PZ 1	lb.in	4.5 ... 5.3
Current transformer hole diameter	mm	17

Allocation to the Solid State Switching Devices:			
Applicable for the following types	Order No.	Control voltage	Connection technology
Solid state relays	3RF21...-1.A0.	3RF21...-3.A0.	Us = 24 V DC Us = 24 V AC/DC Us = 4...30 V DC
	3RF21...-1.A1.	3RF21...-3.A1.	
	3RF21...-1.A4.	3RF21...-3.A4.	
Solid state contactors	3RF23...-1.A0.	3RF23...-3.A0.	Us = 24 V DC Us = 24 V AC/DC Us = 4...30 V DC
	3RF23...-1.A1.	3RF23...-3.A1.	
	3RF23...-1.A4.	3RF23...-3.A4.	
Accessories	Order No.		
Sealable caps	3RF2900-0RA88		

¹ **Attention!**

This product was constructed as a EMC Class A device. The use of this product in residential applications could lead to radio interferences. In such an application, additional filtering may be required.

Mounting:

The module can be mounted onto all 3RF21 solid state relays and 3RF23 solid state contactors with a control voltage of 24 V AC/DC. After disconnection of the control terminal from the solid state switching device and disconnection of the line to the load from the 2T terminal, the heating current monitoring can be snapped on. All connections to the basic device are realized thereby. Caution: The guide at the transformer must be inserted into the groove of the solid state switching device! The control terminal of the solid state relay or contactor is plugged into the function module's IN1-A2 terminal. The line to the load must be routed through the transformer (D 17.0 mm) and reconnected to the solid state switching device.

For dismounting, the two clips affixed to the top of the load monitoring must be lifted by means of a small screwdriver. The module must then be manually withdrawn from the basic device in vertical direction.

6-phase plug-in control terminal

The plug-in control terminal is not included. The terminal could be order at Phoenix Contact with order number 1982 790 (2,5 HC/6-ST-5,08).

The terminal is labeled, the colour is light grey (RAL7035) and screws are Pozidriv 1 (\pm screw).

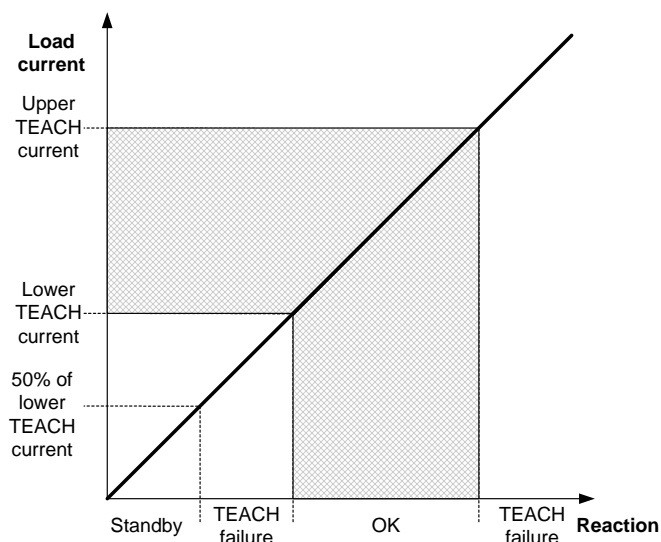
Commissioning:

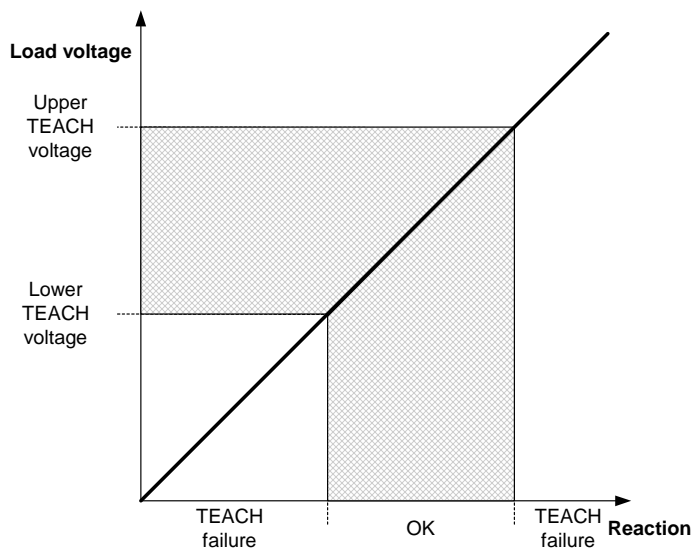
When the supply voltage (terminal A1-A2) is first applied, the two THYRISTOR and SUPPLY LEDs flash alternately as no TEACH process has yet been carried out. The fault signal output is set.

The function module can be taught in the controlled or uncontrolled state.

Apply a control signal to the IN2/REF input for at least 100 msec. After this time, the heating current monitoring detects the current flowing through the solid state relay or contactor for approx. 500 msec and stores it as a setpoint value. The correct completion of the TEACH process is indicated by a simultaneous continuous illumination of the three right LEDs. The fault output is reset. The TEACH process can be repeated at any time.

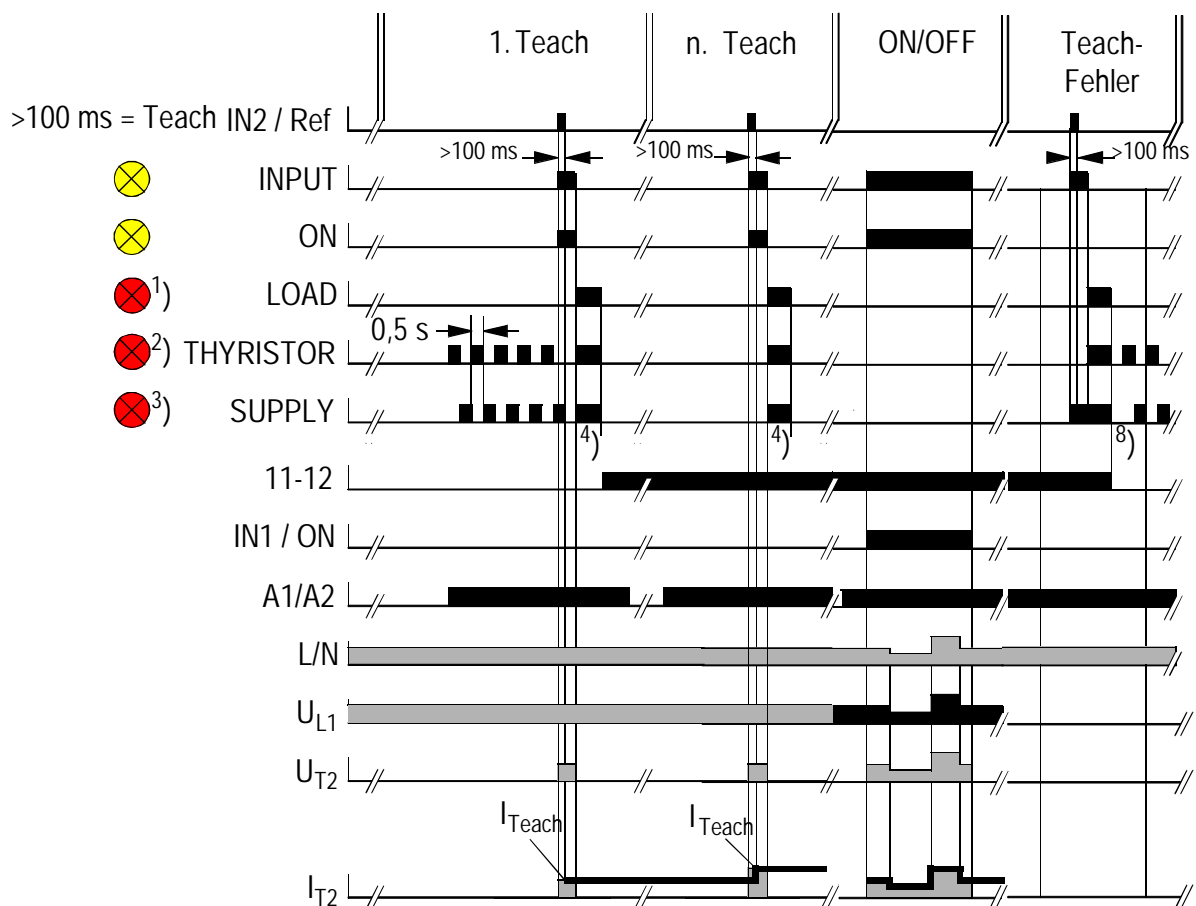
If, during the TEACH process, the current or the voltage lie outside the detection range, this results in a TEACH fault (THYRISTOR and SUPPLY LEDs flash alternately).

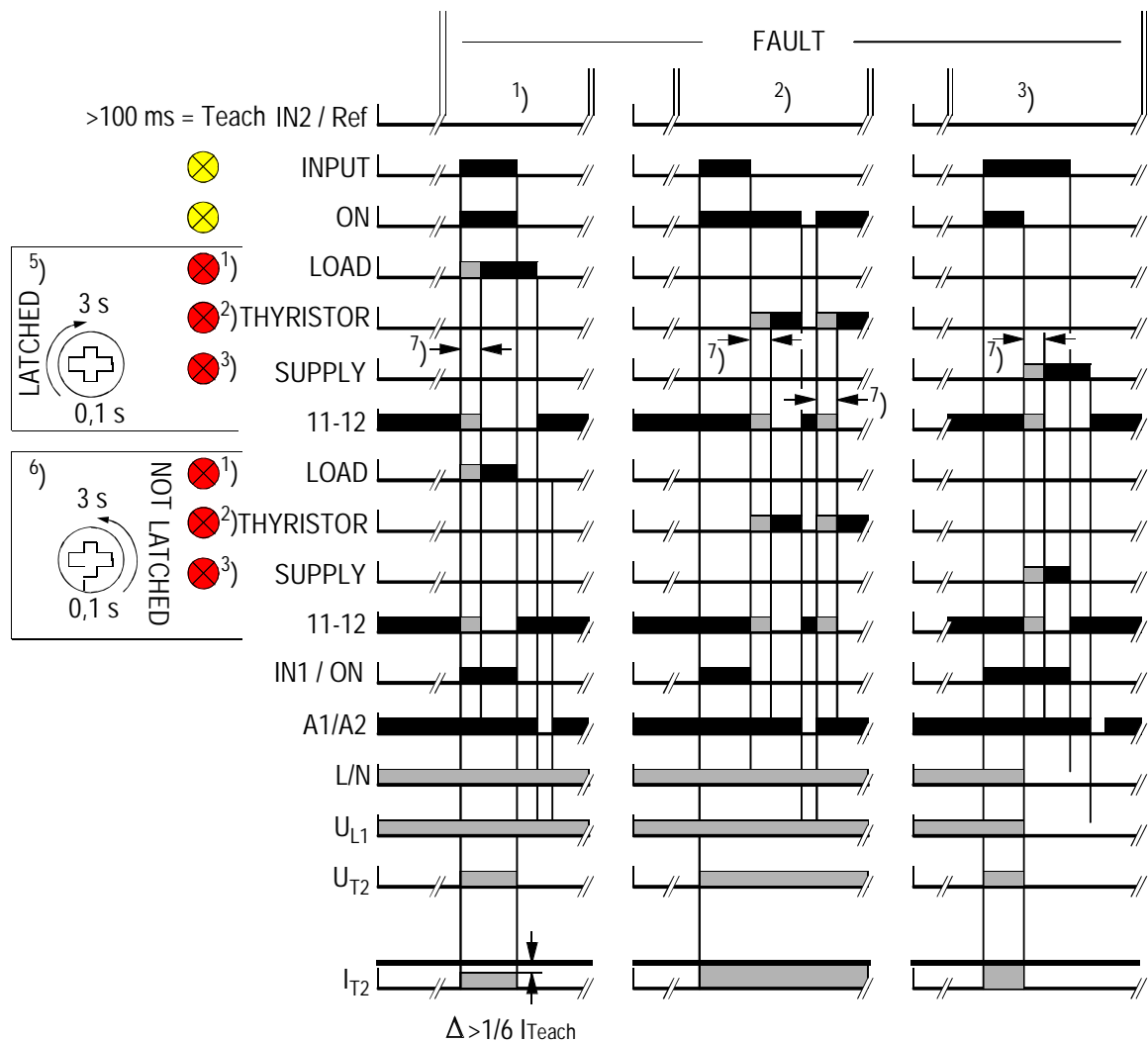




If the current is below than 50 % of the lower TEACH range, the device switch over to „Standby“-Modus and the LED LOAD shimmer. So the device detects not connected loads, for example not used heating channels in molding tools, and sends no failure signal out. Due to a new TEACH process the device could be reset.

Function Diagram

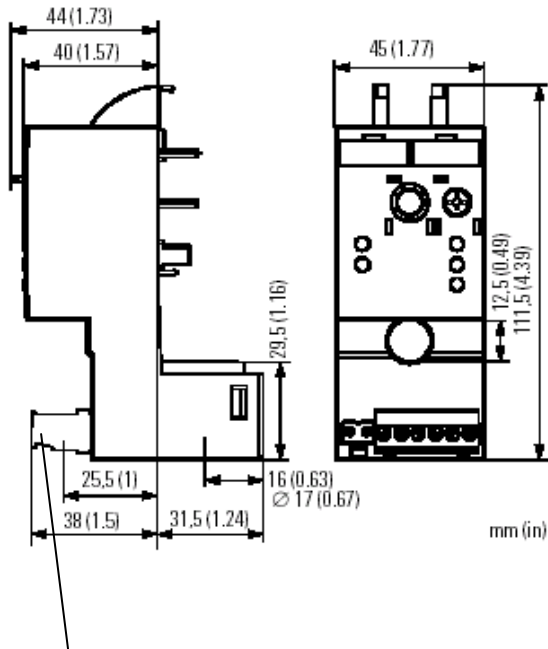




- 1) Partial load fault
- 2) Thyristor fault
- 3) Network failure
- 4) Current value stored

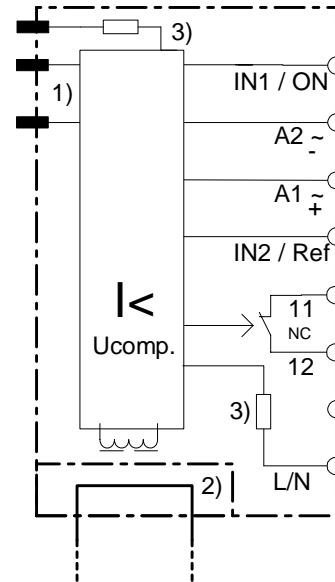
- 5) Storing
- 6) Non-storing
- 7) 0.1 – 3 sec
- 8) Current or supply outside the detection range = teach fault

Dimension Drawing:



The control terminal is not included in the scope of delivery.

Device Circuit Diagram:

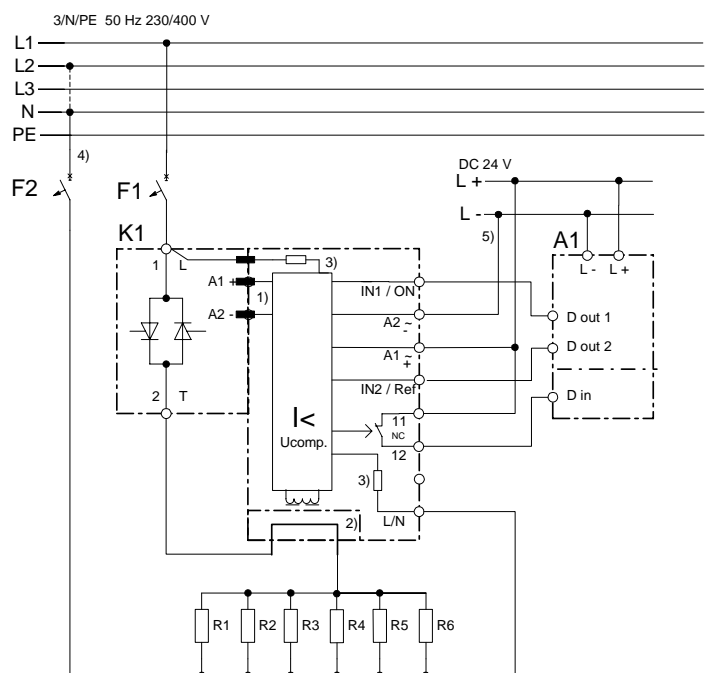


3RF29...-0JA1.
 $U_s = 24 \text{ V AC / DC}$

Example Circuit Diagram:

- A1 Control (PLC)
- F1, 2 Miniature circuit-breaker main circuit
- K1 3RF23 solid state contactor with plugged-on load monitoring module
- R1-6 Load resistances

- 1) Internal connection to the solid state relay/contactors
- 2) Straight-through transformer
- 3) Voltage detection not galvanic separated (3 MOhm each path)
- 4) Connection contact L/N with
 - Load monitoring 3RF29...-0JA.3 at the neutral conductor N (e.g. 230 V)
 - Load monitoring 3RF29...-0JA.6 at a second phase (e.g. 400 V)
 Use of a second m.c.b. recommended
- 5) Earthing of L- recommended





PMA

Prozeß- und Maschinen- Automation GmbH
P.O. Box 31 02 29
D-34058 Kassel
Tel.: +49 - 561- 505 1307
Fax: +49 - 561- 505 1710
E-mail: mailbox@pma-online.de
Internet: <http://www.pma-online.de>

Your local representative: