

# RW Thermal Overload Relays

## General Information



- 1 - Identification place
- 2 - Reset + Multifunction button
- 3 - Current setting dial
- 4 - Auxiliary contact terminals
- 5 - Main contact terminals

## Description

The RW overload relays protect loads against overheating caused by overloads or phase failure. When we have an overload or a phase failure in the circuit, the motor current increases. Such current rise activates the tripping mechanism that will actuate on the auxiliary contacts 95-96 (NC) and 97-98 (NO).

The auxiliary contacts disconnect the load by means of a contactor. The time for disconnection is related to the overload current and the current set on the relay, which is properly represented on the relay tripping curve.

After the trip, it is necessary to wait for the system to reestablish in order to do the reset, which can be done automatic or manually.

## Applications

The RW overload relays were designed to protect three-phase and single-phase AC motors, and DC motors<sup>1)</sup>. If the RW overload relays are used in the protection of single-phase AC loads or DC loads, the wiring diagrams presented in this catalog must be observed.

*Note: 1) RW317 and RW407 models must only be used with AC electric motors.*

## Overload Relays in Star-Delta Starters

When overload relays are used in star-delta starters, it should be noted that a current corresponding to  $0.577 (\sqrt{3} / 3) \times I_n$  motor will pass through the contactor. The overload relay installed on the line contactor must then be set to  $0.577 \times I_n$  motor.

## Short-Circuit Protection

Fuses or circuit breakers must be used for short-circuit protection.

## Weather Conditions

The RW overload relays are temperature compensated according to IEC 60947-4-1 and DIN VDE 0660 Part 102 standards in the temperature range between -20 °C and +60 °C. For temperatures between +60 °C and +80 °C, a correction factor should be used, according to the table below.

Ambient air temperature	Current correction factor
65 °C	0.94 x I <sub>n</sub>
70 °C	0.87 x I <sub>n</sub>
75 °C	0.81 x I <sub>n</sub>
80 °C	0.73 x I <sub>n</sub>

## Altitude

Up to an altitude of 2,000 m, the relays do not undergo any changes in their specified performance. As the altitude increases, the atmospheric properties vary in terms of dielectric withstand, cooling capacity and pressure. The performance of the relay is therefore subject to a correction factor for proper operation at altitudes above 2,000 m.

Altitude (m)	Current correction factor I <sub>u</sub> (A)	Voltage U <sub>g</sub> (V)
2,000	1 x I <sub>n</sub>	690
3,000	0.96 x I <sub>n</sub>	550
4,000	0.93 x I <sub>n</sub>	480
5,000	0.9 x I <sub>n</sub>	420

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## Phase Failure Sensitivity

According to IEC 60947-4-1, when two poles of the relay have overloads of 15%, and one of the poles have zero current, the overload relay must trip/open in less than 2 hours.

For effective protection against phase failure, specific products must be considered for this function, providing actuation in a few seconds.

## Characteristic Tripping Curve

The characteristic tripping curve is the ratio between time and tripping current in the form of multiples of the rated current for symmetrical three-phase loads operating from the cold state.

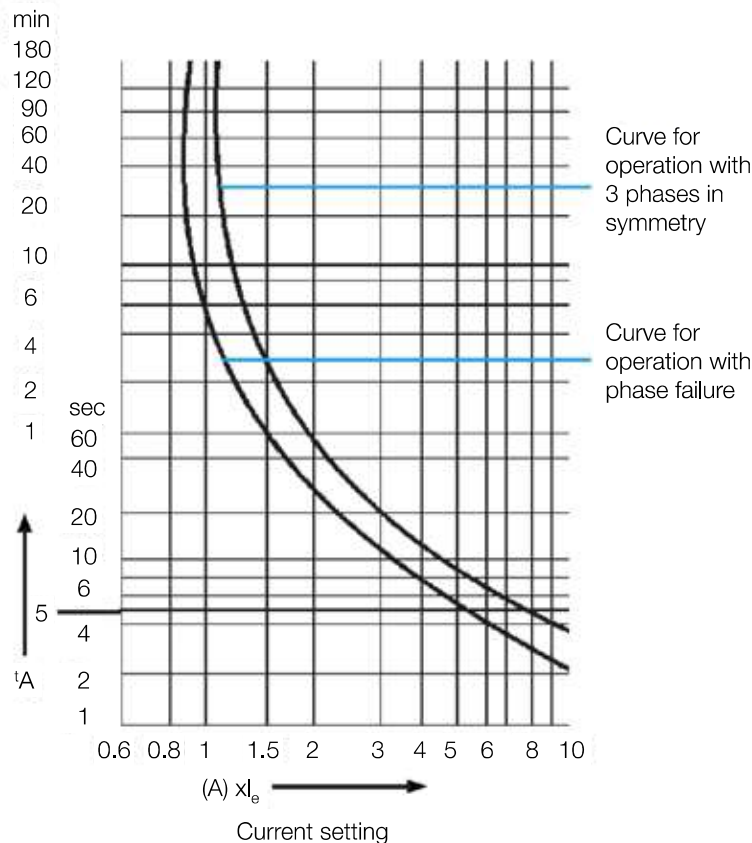
The tripping current limits on the RW bimetallic overload relays for symmetrical three-phase loads are between 105% and 120% of the rated current. The characteristic tripping curve of an RW overload relay is valid when all the three phases are under the same current intensity.

In cases of phase failure, the tripping time tends to be longer or a higher current value will be needed to trip the mechanism. This required higher current value may result in damage to the load if it remains for a long time.

In order to prevent that, the RW overload protection relays have been developed with technology that makes them phase failure sensitive, accelerating the action of the two active phases on the tripping mechanism, thus maintaining the appropriate tripping curve characteristics.

The following graph shows the characteristic tripping curves with the average values of the tolerance range, considering an ambient temperature of 20 °C starting from the cold state. These curves show the tripping time in relation to the rated current in operating conditions with three and two phases.

For a different operating temperature, the thermal relay tripping time is reduced to approximately 25% of that.



# RW Thermal Overload Relays

## Multifunction Reset / Test Button

The relay has a Reset button and on the same button four functions, as follows:

- A** - Automatic reset function only. The stop/test function is not allowed;
- AUTO** - Automatic reset function and stop/test function;
- HAND** - Manual reset function and stop/test function;
- H** - Manual reset function only. The stop/test function is not allowed;



Operation description:

In the **H** (manual - reset only) and **A** (automatic - reset only) positions, the stop/test functions are blocked, while in the **HAND** (manual) and **AUTO** (automatic) positions, test simulation and tripping by directly pressing the Reset button are possible. In the **H** and **HAND** positions, after the relay trips (relay tripped), it has to be manually reset by pressing the Reset button, while in the **A**

and **AUTO** positions, the relay is automatically reset after tripping. The **H**, **HAND**, **AUTO** and **A** functions are set by turning the red button without pressing it, positioning it in the indications of the Reset button. In the change from **HAND** to **AUTO**, the Reset button must be lightly pressed simultaneously with the turning of the red button.

Functions	H	HAND	AUTO	A
Relay reset	Manual <sup>1)</sup>	Manual <sup>1)</sup>	Automatic	Automatic
Auxiliary contact 95-96 (NC) opening test	Function is disabled	Test/stop is allowed	Test/stop is allowed	Function is disabled
Auxiliary contact 97-98 (NO) opening test	Function is disabled	Test/stop is allowed	Test/stop is allowed	Function is disabled

Note: 1) Allow cooling for a short time before resetting the relay.

## Recovery Time

The RW overload relays require a certain time for the bimetallic strips to cool down after the trip. Only after this time can the relay be reset.

This time is a function of the tripping curve and the intensity of the tripping current. After the relay trips due to overload, the load cools down during the relay reset time.

## Operation with Frequency Inverter

The RW17, RW27, RW67 and RW117 overload relays can operate with frequency inverters.

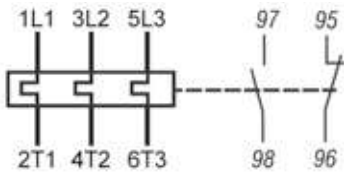
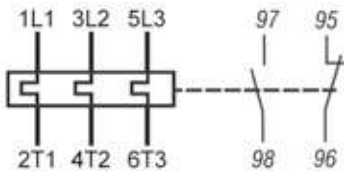
Depending on the inverter frequency of operation, the current must be set above the motor rated current, due to eddy currents and skin effects.



# RW Thermal Overload Relays 0.28...140 A

- Bimetallic overload relay with trip class 10
- Phase failure sensitivity
- Temperature compensation
- Manual or automatic reset
- Direct mounting to mini-contactors and contactors
- Allow individual mounting by means of an accessory<sup>1)</sup>
- Adjustable multifunction button with the functions: HAND, AUTO, H or A
- Auxiliary contacts 1NO + 1NC



Direct mounting Screw terminal	Current range (A)	Diagram	Maximum fuse (gL/gG) <sup>2)</sup>	Blue version		Weight kg
				Code	Part Number	
CW07 CWC07...16	0.28...0.4		2	RW17-1D3-D004	12450892	0.155
	0.4...0.63		2	RW17-1D3-C063	12450895	
	0.56...0.8		2	RW17-1D3-D008	12450896	
	0.8...1.2		4	RW17-1D3-D012	12450897	
	1.2...1.8		6	RW17-1D3-D018	12450898	
	1.8...2.8		6	RW17-1D3-D028	12450899	
	2.8...4		10	RW17-1D3-U004	12450900	
	4...6.3		16	RW17-1D3-D063	12450901	
	5.6...8		20	RW17-1D3-U008	12450903	
	7...10		25	RW17-1D3-U010	12450905	
	8...12.5		25	RW17-1D3-D125	12450906	
	10...15		35	RW17-1D3-U015	12450907	
	11...17		40	RW17-1D3-U017	12450908	
CWC025	7...10	25	RW17-2D3-U010	12450909	0.155	
	8...12.5	25	RW17-2D3-D125	12450910		
	10...15	35	RW17-2D3-U015	12450911		
	11...17	40	RW17-2D3-U017	12450912		
	15...23	50	RW17-2D3-U023	12450913		
	22...32	63	RW17-2D3-U032	12450914		
CWB9...38	0.28...0.4		2	RW27-2D3-D004	12140441	0.165
	0.43...0.63		2	RW27-2D3-C063	12140442	
	0.56...0.8		2	RW27-2D3-D008	12140443	
	0.8...1.2		4	RW27-2D3-D012	12140444	
	1.2...1.8		6	RW27-2D3-D018	12140445	
	1.8...2.8		6	RW27-2D3-D028	12140446	
	2.8...4		10	RW27-2D3-U004	12140447	
	4...6.3		16	RW27-2D3-D063	12140448	
	5.6...8		20	RW27-2D3-U008	12140449	
	7...10		25	RW27-2D3-U010	12140450	
	8...12.5		25	RW27-2D3-D125	12140451	
	10...15		35	RW27-2D3-U015	12140452	
	11...17		40	RW27-2D3-U017	12140453	
	15...23		50	RW27-2D3-U023	12140454	
	22...32		63	RW27-2D3-U032	12140455	
	32...40		90	RW27-2D3-U040	12140456	
	CWB40...80		25...40	80	RW67-5D3-U040	
32...50		80	RW67-5D3-U050	13368961		
40...57		100	RW67-5D3-U057	13368962		
50...63		100	RW67-5D3-U063	13368963		
57...70		125	RW67-5D3-U070	13368964		
63...80		125	RW67-5D3-U080	13368965		
CWB95...125	63...80	200	RW117-3D3-U080	14204758	0.480	
	75...97	225	RW117-3D3-U097	14204759		
	90...112	250	RW117-3D3-U112	14204761		
	110...140	315	RW117-3D3-U140	14204762		

Notes: 1) Except for RW17-1D and RW17-2D.  
2) Maximum fuse for Type 2 coordination (gL/gG).

## RW Thermal Overload Relays 0.28...840 A

- Bimetallic overload relay with trip class 10
- Phase failure sensitivity
- Temperature compensation
- Manual or automatic reset
- Direct mounting to contactors
- Allow individual mounting by means of an accessory
- Adjustable multifunction button with the functions: HAND, AUTO, H or A
- Auxiliary contacts 1NO + 1NC



Direct mounting	Current range (A)	Diagram	Maximum fuse (gL/gG) <sup>1)</sup>	Code	Part Number	Weight kg
CWM9...40	0.28...0.4		2	RW27-1D3-D004	10045630	0.165
	0.43...0.63		2	RW27-1D3-C063	10186032	
	0.56...0.8		2	RW27-1D3-D008	10186033	
	0.8...1.2		4	RW27-1D3-D012	10045631	
	1.2...1.8		6	RW27-1D3-D018	10045632	
	1.8...2.8		6	RW27-1D3-D028	10452548	
	2.8...4		10	RW27-1D3-U004	10452213	
	4...6.3		16	RW27-1D3-D063	10045633	
	5.6...8		20	RW27-1D3-U008	10452197	
	7...10		25	RW27-1D3-U010	10045634	
	8...12.5		25	RW27-1D3-D125	10452967	
	10...15		35	RW27-1D3-U015	10452384	
	11...17		40	RW27-1D3-U017	10452204	
	15...23		50	RW27-1D3-U023	10452205	
22...32	63	RW27-1D3-U032	10452382			
CWM32/40	25...40		80	RW67-1D3-U040	10452216	0.320
	32...50		100	RW67-1D3-U050	10452217	
CWM50...80	25...40		80	RW67-2D3-U040	10844133	0.320
	32...50		100	RW67-2D3-U050	10186035	
	40...57		100	RW67-2D3-U057	10452201	
	50...63		100	RW67-2D3-U063	10452218	
	57...70		125	RW67-2D3-U070	10045635	
	63...80		125	RW67-2D3-U080	10045636	
CWM95/105	63...80		200	RW117-1D3-U080	10186370	0.490
	75...97		225	RW117-1D3-U097	10410002	
	90...112		250	RW117-1D3-U112	10410003	

Note: 1) Maximum fuse for Type 2 coordination (gL/gG).



Separate mounting or with claws	Current range (A)	Diagram	Maximum fuse (gL/gG) <sup>1)</sup>	Code	Part Number	Weight kg
CWM112	63...80		200	RW117-2D3-U080	11033689	0.750
	75...97		225	RW117-2D3-U097	10045646	
	90...112		250	RW117-2D3-U112	10410004	
CWM112...300, CWM400, CWM450, CWM560	100...150		315	RW317-1D3-U150	10045647	1.985
	140...215		355	RW317-1D3-U215	10410005	
	200...310		500	RW317-1D3-U310	10410006	
	275...420		710	RW317-1D3-U420	10410007	
CWM450, CWM560, CWM500...800	400...600		1,000	RW407-1D3-U600	10452250	3.435
	560...840		1,250	RW407-1D3-U840	10045637	