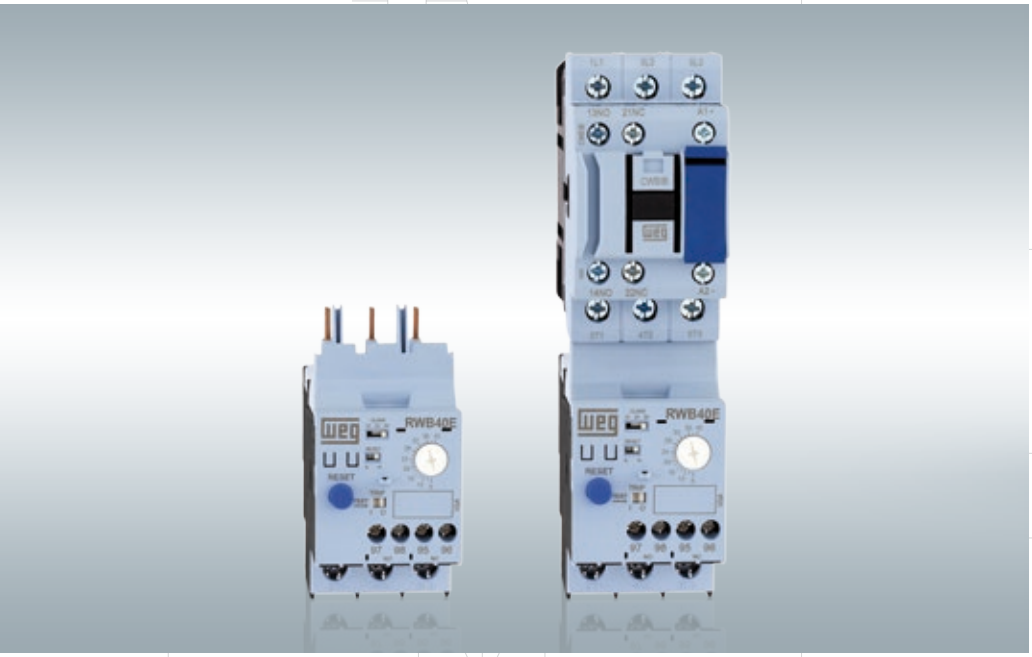
Automation

Solid-State Overload Relays
RW_E

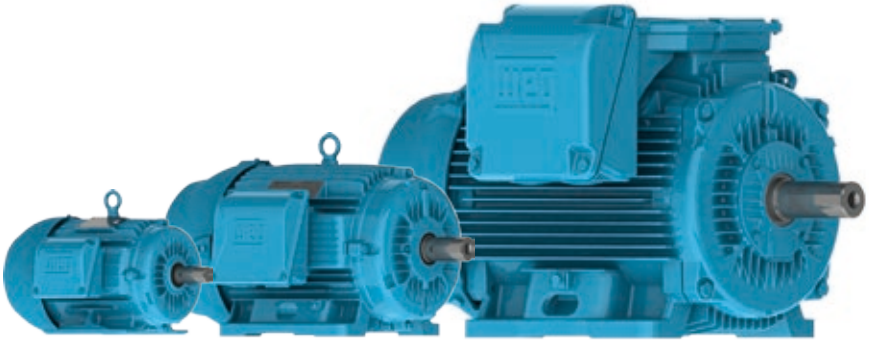


Solid-State Overload Relays - RW_E

Versatility and Accuracy for Electric Motor Protection

The continuous pursuit for improvement and cost reduction in production in industry have taken the electric motor control and protection systems to a level where low losses, precision and versatility are imperative. In order to better meet industry needs, WEG launches the RW_E solid-state overload relays for motor protection.

The RW_E is meant to assure increased reliability for protection of low voltage three-phase electric motors in sinusoidal 50/60 Hz networks where reliability, low power dissipation and ease maintenance management are mandatory.



The new RW_E solid-state overload relays are developed with cutting edge technology, according to the most demanding standards worldwide such as IEC 60947-4-1 and UL 60947-4-1A (UL 508) and produced with environmentally friendly and reusable materials.

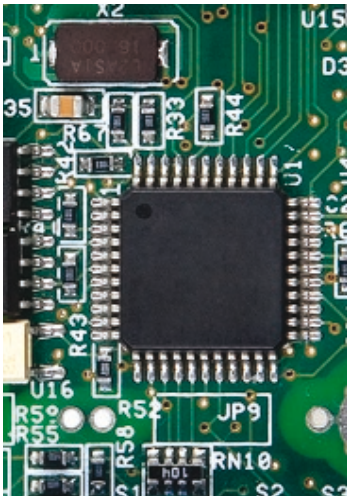
Solid-State Overload Relays - RW_E

Solid-State x Thermal (Bimetallic) Overload Relays

Thermal overload relays are designed to mimic the heat actually generated in the motor. They simulate the motor heating by passing motor current directly or indirectly through bimetal strips. As the motor temperature increases, so does the temperature of the overload relay thermal unit. The heat bends the bimetal strips and, depending on the current setting of the relay, a trip mechanism is activated.

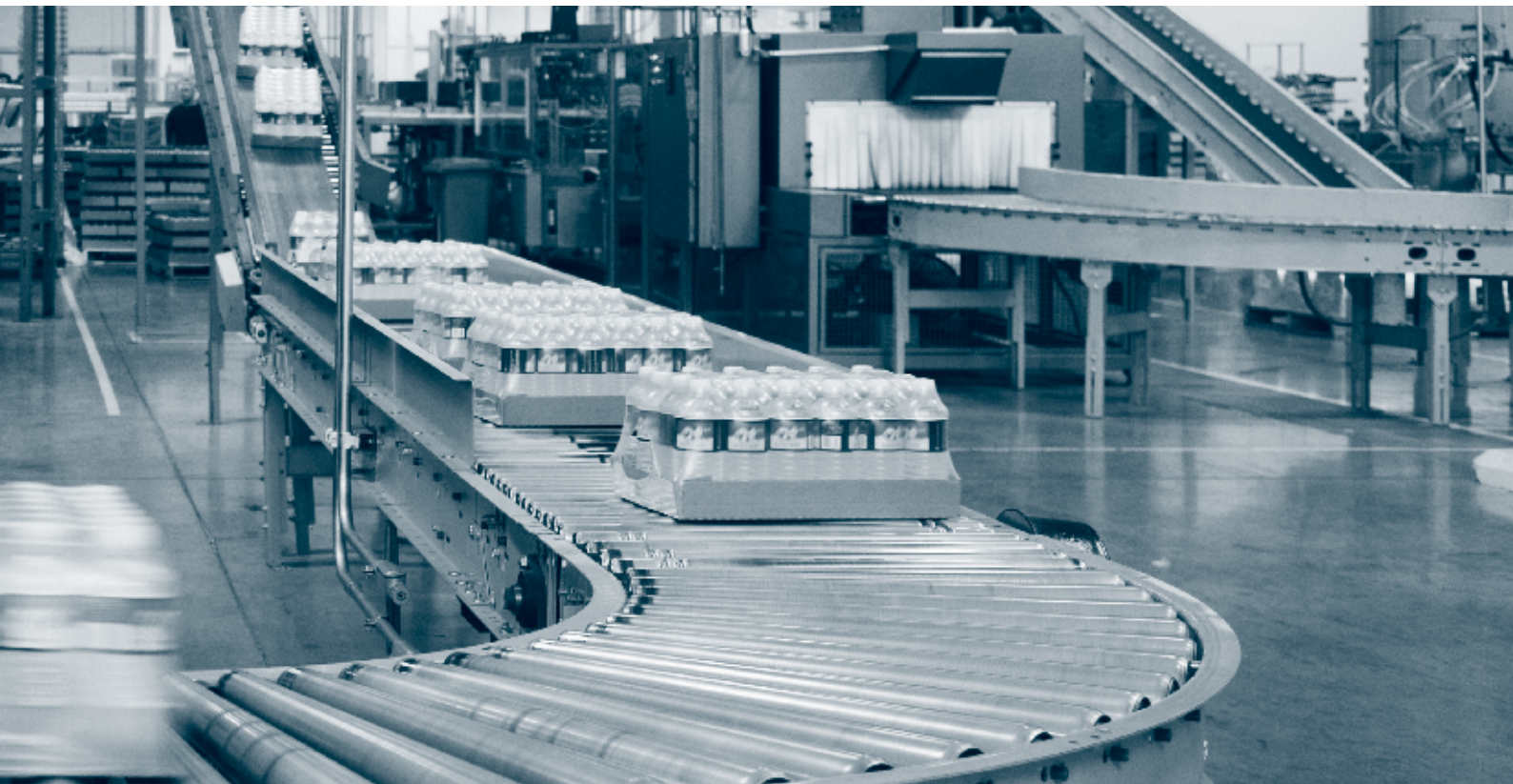
Continuous duty and low number of motor start-ups are common in most usual applications. In such situations, the motor and relay heating curves have a strong relationship. No matter how high the current drawn by the motor, the thermal overload relay provides protection and does not trip unnecessarily.

On the other hand, in applications where frequent motor start-ups (intermittent duty) take place, the increase of heating behaves slightly different in the bimetal strips than in the motor windings and undesired early trippings are common. In such situations, the thermal capacity of the motor is not properly utilized and thermal overload relays are not the most suitable solution.
In solid-state overload relays, the motor current is measured by current transformers and then converted into an electronic signal. Thus, different from thermal overload relays where a significant amount of energy is wasted in the bimetal strips, in solid-state overload relays the low heat losses of the electronic circuits result in less energy consumption and lead to reduced need of ventilation of cabinets.



In addition, due to this technology, the microprocessed signal allows increased precision providing better motor overload protection.
And yet, maybe the most important advantage of solid-state overload relays is the wide current range with the 5:1 ratio between maximum and minimum setting.

When compared to the usual 1.5:1 ratio of the thermal overload relays, this wide range leads to a tremendously reduced number of different items to cover all current ranges up to 840 A. In a few words, it leads to great reduction in inventory and flexibility on planning.

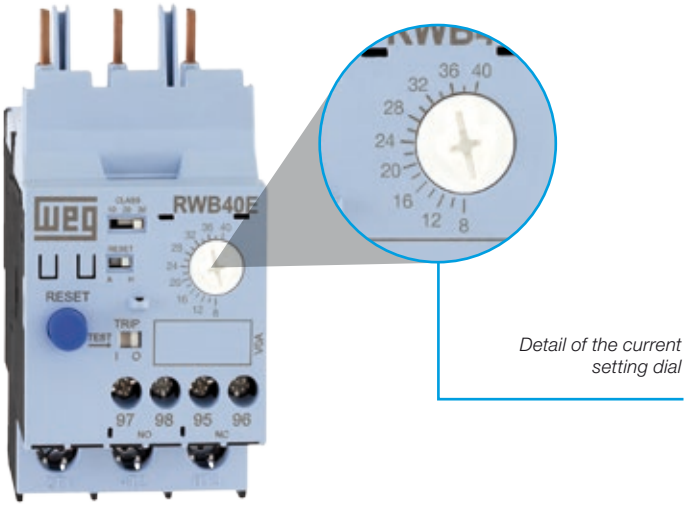


Solid-State Overload Relays - RW_E

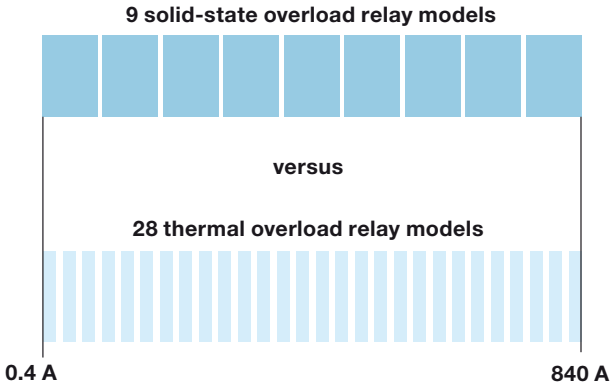
Flexibility and Versatility

In an increasingly globalized and competitive market it is common that machine manufacturers provide their customers with a wide choice of electric motors with a huge number of different models and output powers.

With its wide range current setting (5:1 ratio between maximum and minimum setting), the same RW_E relay can be used for protection of electric motors of different power ratings or for protection of the same motor when applied on networks of different voltages and frequencies. The benefit is versatility and flexibility for machine manufacturers due to the possibility of standardization of control panels.



Detail of the current setting dial



The RW_E can be directly mounted on WEG contactors (CWB and CWM lines) providing very reliable and flexible motor starter units.

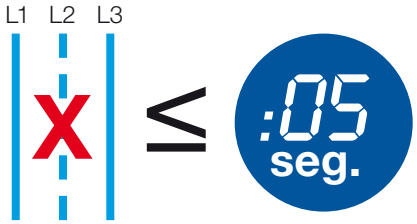
An additional advantage is that the solid-state overload relays RW_E are self-powered, that is, no additional external power is required for operation thus it can be applied directly to the contactor in the same way the thermal overload relays are applied.This feature also allows easy replacement of thermal relays for solid-state ones without the need of rearranging the control circuit wiring or changing the contactor.

Note: overload relays must be protected against short-circuits by fuses or circuit breakers.

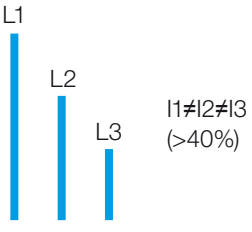
Available Protections

- Overload

- Phase loss

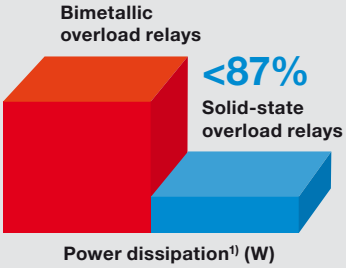


- Phase unbalance



Solid-State Overload Relays - RW_E

Due to their design and technology, the electronic circuits of RW_E relays lead to very low power dissipation (less than 0.38 W up to 25 A) and consequently may contribute to the reduction of need for ventilation of control cabinets.

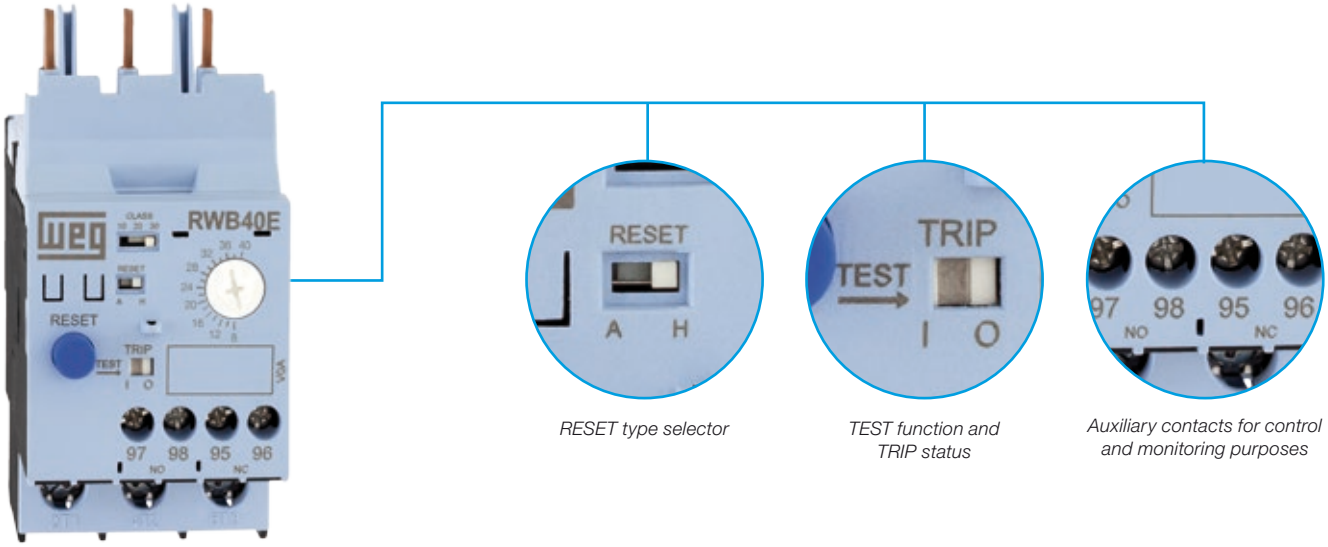


Note: 1) Average values of power dissipation per pole for RW_E of current ranges up to 25 A.

Basic Features

The RW_E counts on two independent and highly reliable built-in auxiliary contacts (12 V, 10 mA) that, when properly wired in series with the coil of the contactor, assure the motor is switched off when a failure occurs and can also be used for monitoring purposes.

On its front side the RW_E has a RESET pushbutton and a TEST switch. Both functions allow checking proper wiring and the status of the auxiliary contacts. The status window (TRIP) that displays the current operation status is also located on the front side.



RESET type selector

TEST function and TRIP status

Auxiliary contacts for control and monitoring purposes

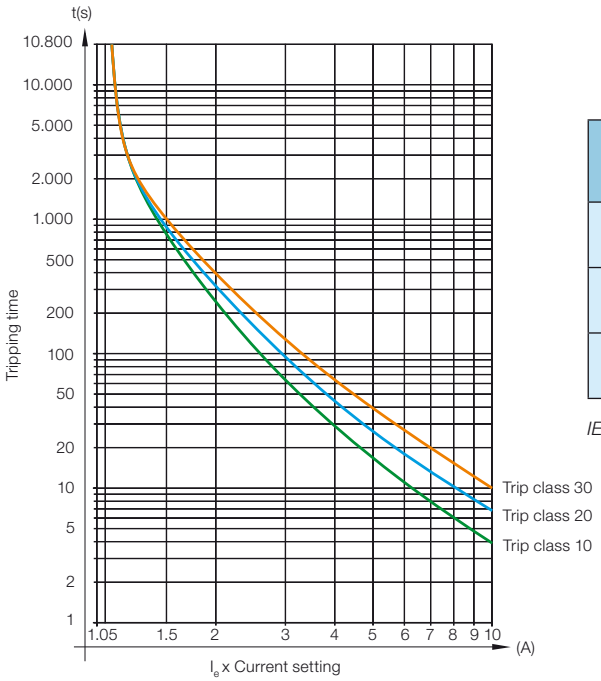
Solid-State Overload Relays - RW_E

Suitable for Great Variety of Applications

The solid-state overload relays RW_E are suitable to protect motors in a wide range of industrial applications including those where long starting time is required. This way, motors on low, medium or heavy duty applications can be properly protected just by selecting the proper trip class (10, 20 or 30 according to IEC 60947-4-1) in the DIP-switches.

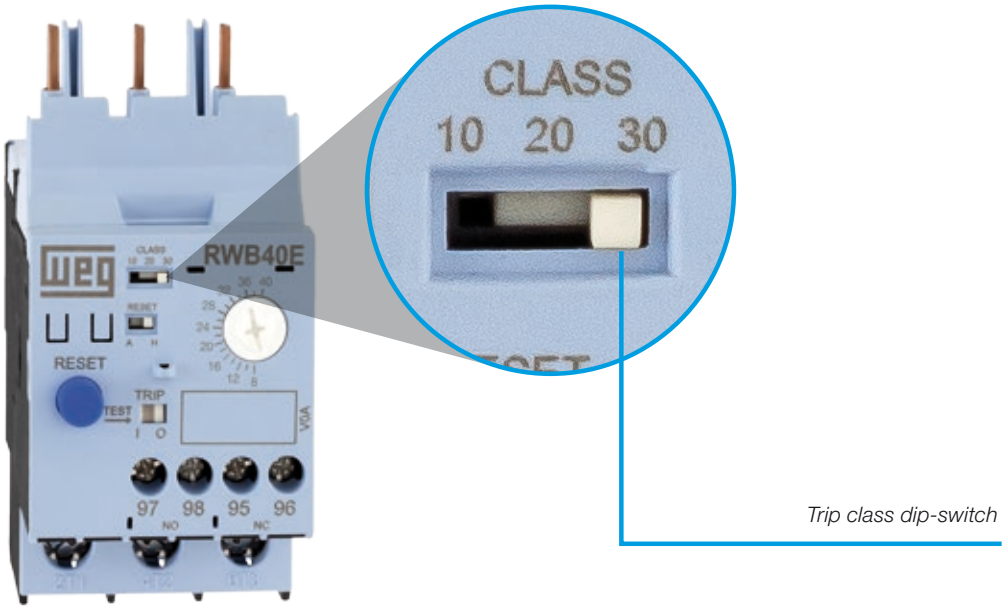
Additionally, the microprocessed electronic circuits of RW_E are temperature compensated according to IEC 60947-4-1, which means that throughout the temperature range of -20 °C up to +60 °C, the tripping point is not affected and it performs consistently without undesirable tripping.

The RW_E also features thermal memory which assures that the heating and cooling effects of motors are modeled and proper protection is guaranteed even after downtime periods.

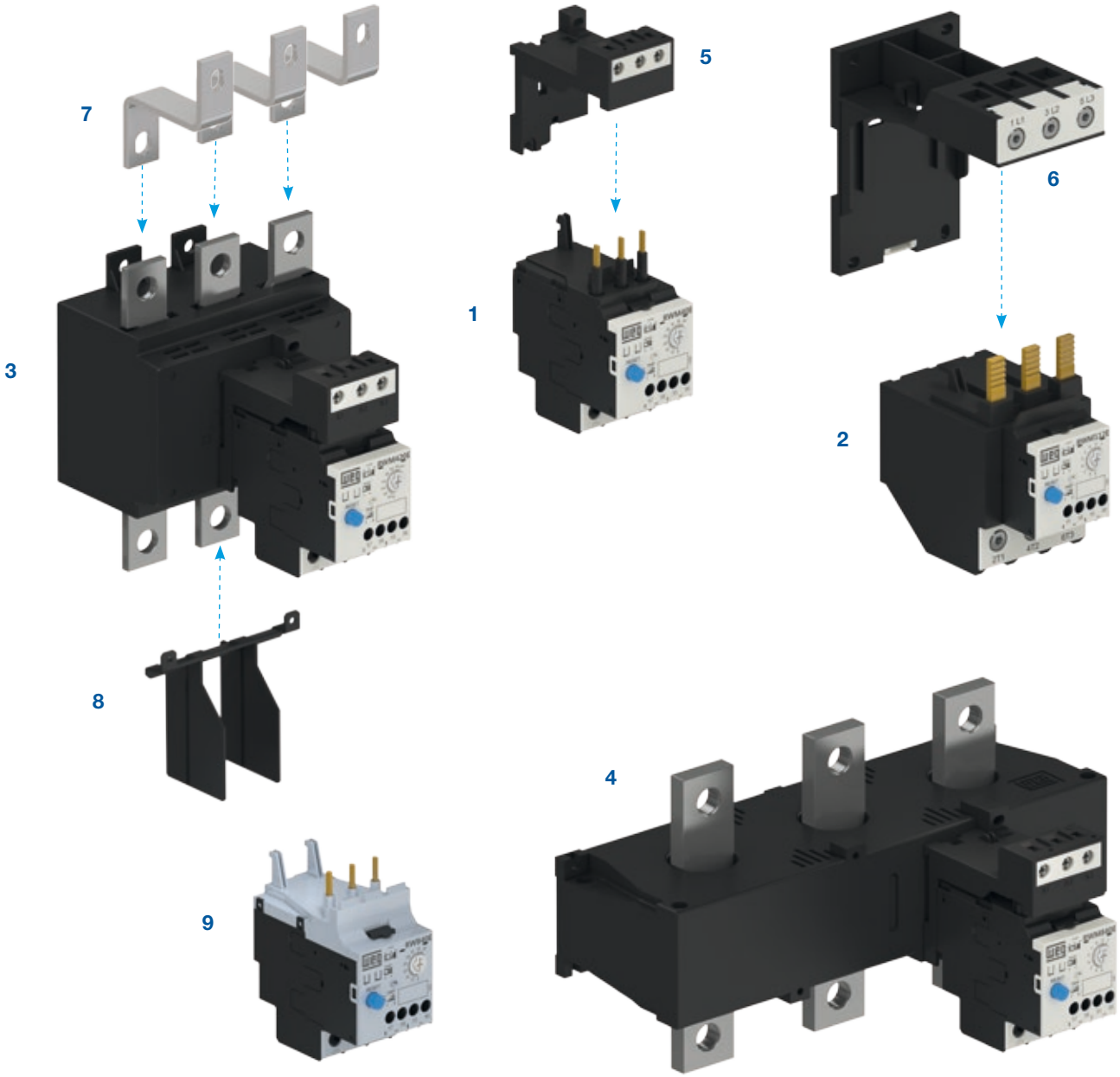


Trip class	Multiples of current setting			
	1.05 x Ir	1.2 x Ir	1.5 x Ir	7.2 x Ir
10	-	Tp <2 h	Tp <4 min	4 <Tp ≤10 s
20	-	Tp <2 h	Tp <8 min	6 <Tp ≤20 s
30	-	Tp <2 h	Tp <12 min	9 <Tp ≤30 s

IEC 60947-4-1



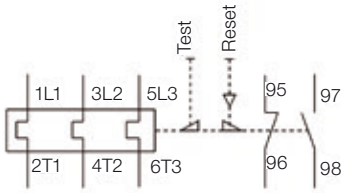
Solid-State Overload Relays RW_40...840E - Overview

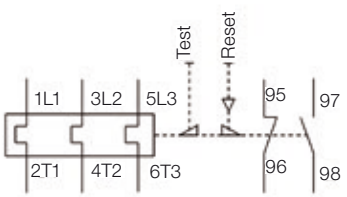


1 - RWM40E solid-state overload relay (direct mounting on CWM9...40 contactors)
2 - RWM112E solid-state overload relay (direct mounting on CWM50...105 contactors)
3 - RWM420E solid-state overload relay (for use with CWM112...500 contactors)
4 - RWM840E solid-state overload relay (for use with CWM400...800 contactors)
5 - BF27 mounting kit for direct panel mounting by screws or 35 mm DIN rail (for RWM40E)
6 - BF112 mounting kit for direct panel mounting by screws or 35 mm DIN rail (for RWM112E)
7 - GA Connector Links for direct mounting of overload relay on contactor
8 - IBRW317 phase barriers (for RWM420E)
9 - RWB40E solid-state overload relay (direct mounting on CWB9...38 contactors)

RW_E Solid-State Overload Relays from 0.4 up to 840 A

- 3-pole solid state overload relays with adjustable trip class: 10, 20 and 30
- Self-powered
- Wide adjustment range (5:1)
- Thermal memory
- Phase loss protection (less than 5 seconds)
- Phase unbalance protection (>40% between phases)
- Temperature compensated (-20 °C up to +60 °C)
- Manual or automatic reset modes
- Direct mounting on CWB9...38 and CWM9...105 contactors
- Separate mounting is possible with accessories
- 1NO + 1NC built in auxiliary contacts

For direct mounting on contactors	Current range A	Diagram	Max fuse (gL/gG) A	Reference code	Weight kg
CWB9...38	0.4...2		16	RWB40E-3-A4U002	0.250
CWB9...38	1.6...8		32	RWB40E-3-A4U008	
CWB9...38	5...25		63	RWB40E-3-A4U025	
CWB9...38	8...40		125	RWB40E-3-A4U040	
CWM9...40	0.4...2		16	RWM40E-3-A4U002	0.250
CWM9...40	1.6...8		32	RWM40E-3-A4U008	
CWM9...40	5..25		63	RWM40E-3-A4U025	
CWM9...40	8...40		125	RWM40E-3-A4U040	
CWM50...105	14...56		160	RWM112E-3-A4U056	0.918
CWM50...105	28...112		250	RWM112E-3-A4U112	

For separate mounting or by connector links[1)]	Current range A	Diagram	Max fuse (gL/gG) A	Reference code	Weight kg
CWM112...500	50...250		500	RWM420E-3-A4U250	2,520
	85...420		710	RWM420E-3-A4U420	
CWM150...800	170....840		1.250	RWM840E-3-A4U840	4,150

Note: 1) RWM840E model allows two different types of connection to contactor:
a) By connecting the contactor cables to relay busbars;
b) By removing the relay busbars and using the Ø32 mm window for the passage of the contactor cables.

Accessories

Mounting Kit

Illustrative picture	For use with relays	Description	Reference code	Weight kg
	RWM40E	Enables the overload relay to be mounted directly to a panel via screws or 35 mm DIN rail	BF27D	0.050
	RWM112E		BF112	0.230

Connector Links for Direct Mounting of Overload Relay on Contactor

Illustrative picture	For use with relays	For use with contactors	Reference code	Weight kg
	RWM112E	CWM112/150	GA117D	0.135
	RWM420E	CWM150	GA317-1D	0.250
		CWM180	GA317-2D	0.270
		CWM250/300	GA317-3D	0.630
		CWM400	GA317-10D	0.500

Phase Barriers

Illustrative picture	For use with relays	Description	Reference code	Weight kg
	RWM420E	Contains 1 set of plastic insulators (top / bottom) and fixing screws to be used where the overload relay power terminals external dimension exceed the busbar external dimension	IBRW317	0.044

Reset Pushbutton with Shaft

Illustrative picture	For use with relays	Description	Reference code	Weight kg
	RW_E	Blue Flush pushbutton - Engraved Reset - with shaft. Length: max. 250 mm and min. 22.5 mm	CSW-BHF437	0.032
		Blue extended pushbutton - Engraved Reset - with shaft. Length: max. 250 mm and min. 22.5 mm	CSW-BHS437	0.032

Technical Data

General Data

Product model			RWM40E / RWB40E	RWM112E	RWM420E	RWM840E
Standards			IEC 60947-4-1, IEC 60947-5-1, IEC 60947-1, UL 60947-1, UL 60947-4-1A and UL 508			
Rated insulation voltage U_i (pollution degree 3)	IEC 60947-4-1	(V)	690		1.000	
Rated impulse withstand voltage U_{imp} (IEC 60947-1)		(kV)	6		8	
Rated operational frequency (sinusoidal networks)		(Hz)	50/60			
Suitable for use	Three phase loads		Yes			
	Single phase / two phase loads		No			
	DC current loads		No			
Trip class (IEC 60947-4-1)			10, 20 or 30 - selectable			
Additional featured protections	Phase loss		Yes / less than <5 s			
	Phase unbalance		Yes / >40%			
Reset	Manual / minimum downtime for reset		Yes / instantaneous			
	Automatic / minimum downtime for reset		Yes / ≥90 s			
Maximum operation per hour		(ops./h)	30			
Protection degree (IEC 60529)	Main contacts		IP10		IP00	
	Auxiliary contacts		IP20			
Mounting			1)		2)	
Mechanical shock resistance - 1/2 sinusoid			15 g / 11 ms			
Vibration resistance (IEC 60068-2-6)			6 g / 30...300 Hz			
Ambient temperature	Transport and storage		-50 °C...+80 °C			
	Operating		-20 °C...+60 °C			
	Temperature compensation		-20 °C...+60 °C			
Altitude			2,000 m			

Notes: 1) Direct mounting on contactor or directly on the panel via screws or 35 mm DIN rail when using the mounting kit accessory (BF27D and BF112);
2) Direct mounting on contactor when using the Connector Link GA117 / GA317 accessory or directly on the panel via screws.

Main Contacts

Product model			RWM40E / RWB40E	RWM112E	RWM420E	RWM840E
Rated operational voltage U_e	IEC 60947-4-1	(V)	690		1,000	
Current setting / max fuse (gL/gG)		(A)	0.4...2 / 16 1.6...8 / 32 5...25 / 63 8...40 / 125	14...56 / 160 28....112 / 250	50...250 / 500 85...420 / 710	170...840 / 1.250
Setting current / average power dissipation per pole		(W)	0.4...2 / 0.07 1.6...8 / 0.06 5...25 / 0.38 8...40 / 1.5	14...56 / 2 28....112 / 2.6	50...250 / 12 85...420 / 12	170...840 / 14.5

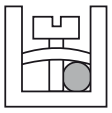
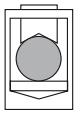
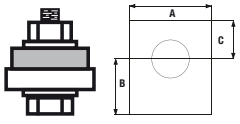
Notes: 1) Direct mounting on contactor or directly on the panel via screws or 35 mm DIN rail when using the mounting kit accessory (BF27D and BF112);
2) Direct mounting on contactor when using the Connector Link GA117 / GA317 accessory or directly on the panel via screws.

Technical Data

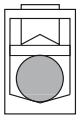
Auxiliary Contacts

Product model			RWM40...840E / RWB40E
Standards			IEC 60947-5-1
Rated insulation voltage U_i (pollution degree 3)	IEC	(V)	250
Rated impulse withstand voltage U_{imp} (IEC 60947-1)		(kV)	4
Rated operational voltage U_e	IEC	(V)	250
Rated thermal current I_{th} ($\Theta \leq 60$ °C)		(A)	5
Rated operational current I_e			
AC-14/AC-15 (IEC 60947-5-1)	24 V	(A)	3
	120 V	(A)	3
	250 V	(A)	1.5
DC-13 (IEC 60947-5-1)	24 V	(A)	2
	60 V	(A)	0.4
	110 V	(A)	0.22
	125 V	(A)	0.22
	250 V	(A)	0.1
Short-circuit protection with fuse		(A)	6
Minimum voltage / admissible current (IEC 60947-5-4)			12 V / 10 mA

Terminal Capacity and Tightening Torque - Main Contacts

Product model			BF27D	RWM40E / RWB40E	RW112E	BF112
Type of screw			M4 Flat / Phillips #2	M3.5 Flat / Phillips #2	M10 Allen #4	M10 Allen #4
Cable size						
Flexible cable	(mm²)		1.5...10	-	-	-
Cable with terminal / rigid cable	(mm²)		1.5...6	-	-	-
AWG wire			16...10	-	-	-
Tightening torque	(Nm)		2.3	-	-	-
Flexible cable	(mm²)		-	1...10	2.5...35	2.5...35
Cable with terminal / rigid cable	(mm²)		-	1...10	2.5...35	2.5...35
AWG wire			-	16...8	14...2	14...2
Tightening torque	(Nm)		-	1.7	6	6
Product model			**RWM420E**		**RWM840E**	
Type of screw			M10 Hexagon Head		M12 Hexagon Head	
Cable with terminal	(mm²)		2 x (25...150)		2 x (60 x 10)	
Busbar (A x B x C)	(mm)		25 x 18.5 x 12.5		31.7 x 28.3 x 15	
Tightening torque	(Nm)		26		26	

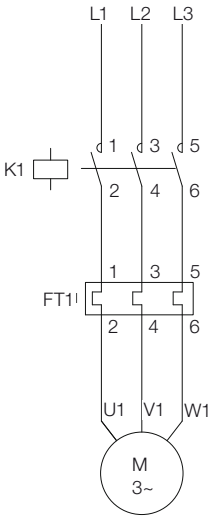
Terminal Capacity and Tightening Torque - Auxiliary Contacts

Product model			RWM40...840E / RWB40E
Type of screw			Flat / Phillips #1
Cable size			
Cable with or without terminal	(mm²)		1 x 1...2.5
AWG wire			16...12
Tightening torque	(Nm)		0.8

Technical Data

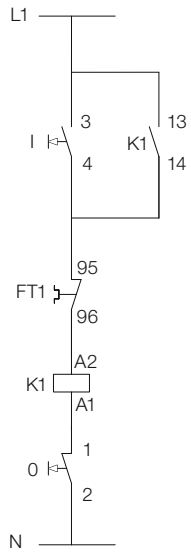
Motor Protection - Alternating Current

3-pole

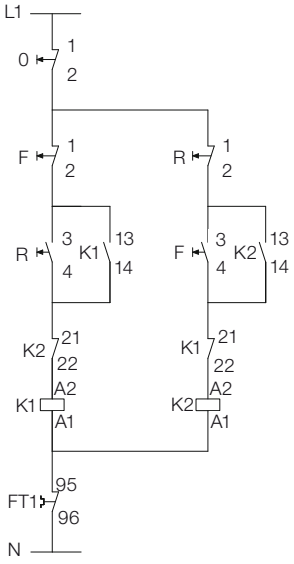


Typical Connection - Contactor + Overload Relay

Direct On Line Starter (1 Direction of Rotation)

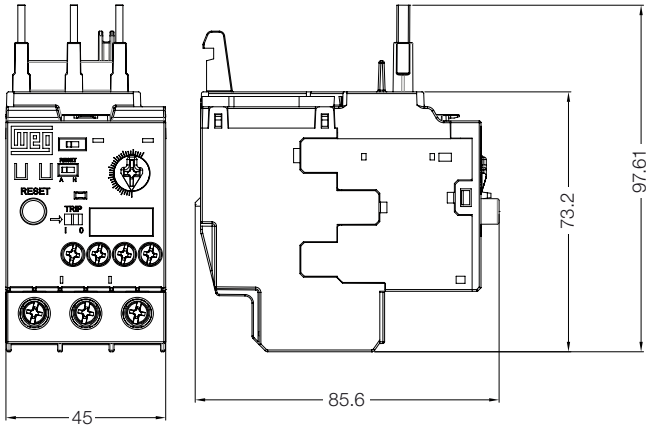


Direct On Line Starter (2 Directions of Rotation)

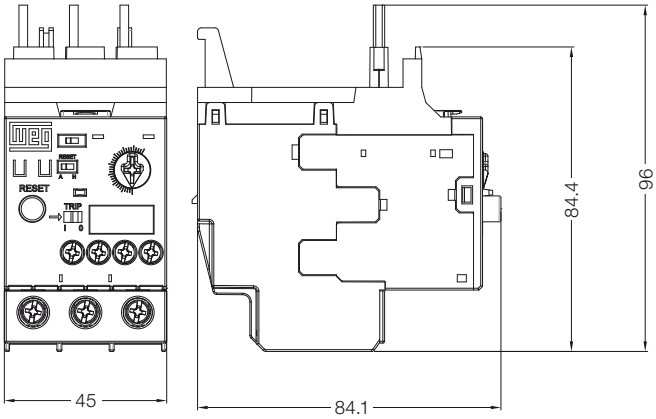


Dimensions (mm)

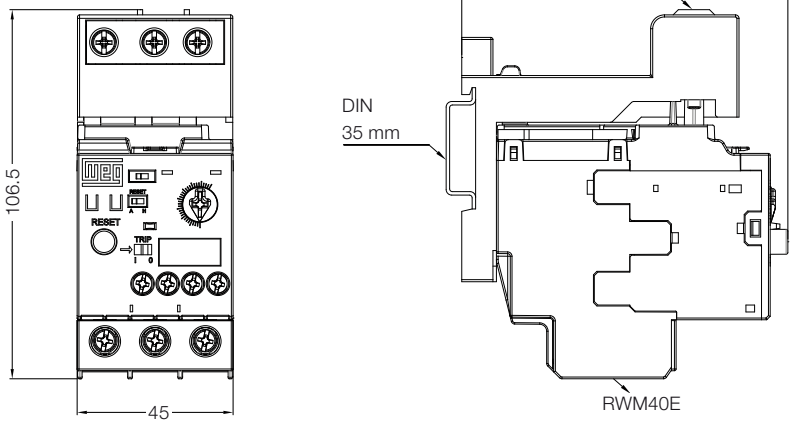
RWM40E

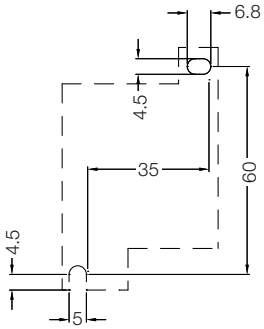


RWB40E



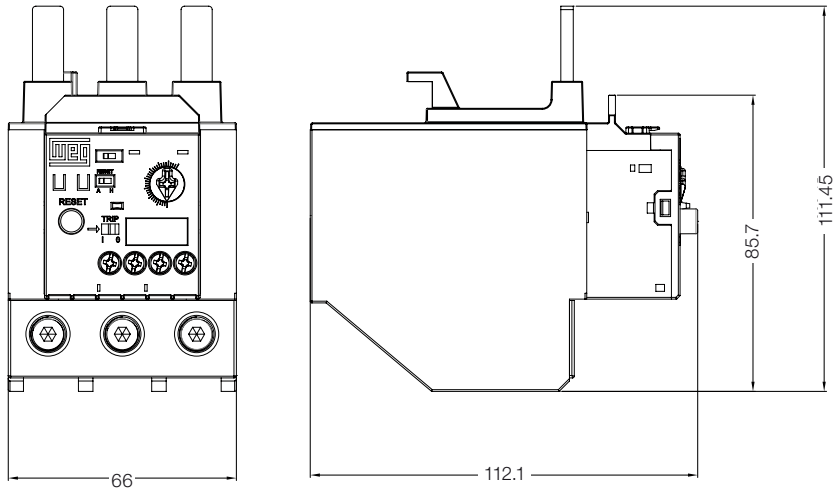
RWM40E + BF27



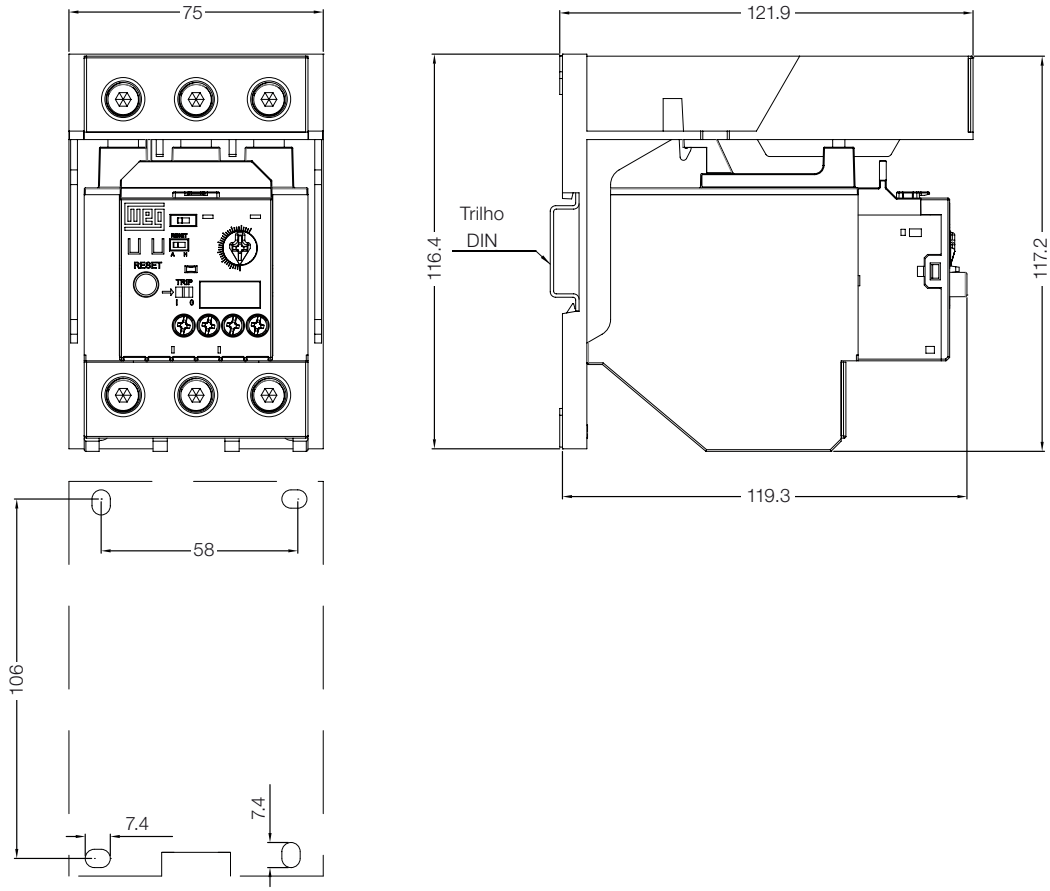


Dimensions (mm)

RWM112E

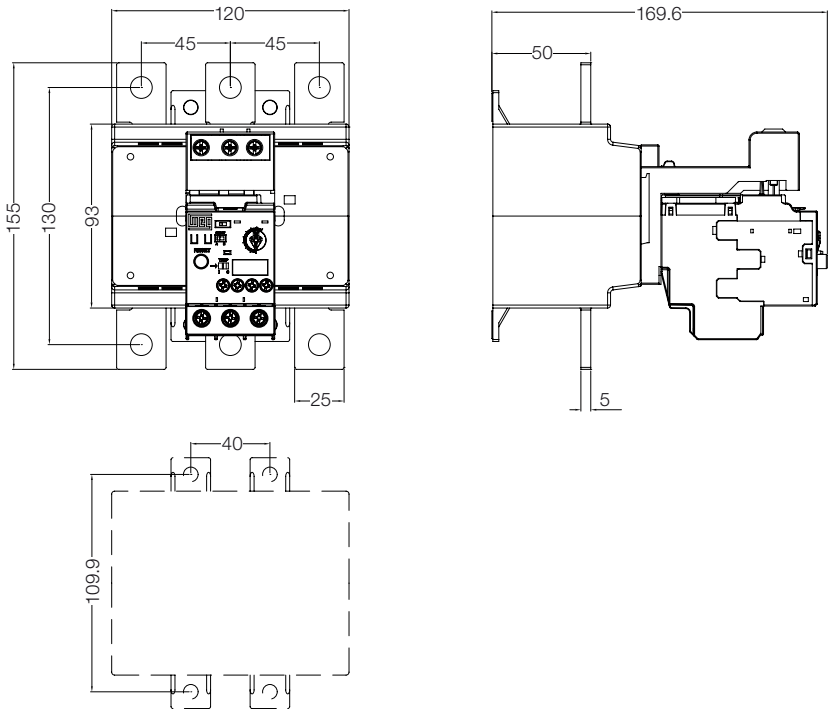


RWM112E + BF112

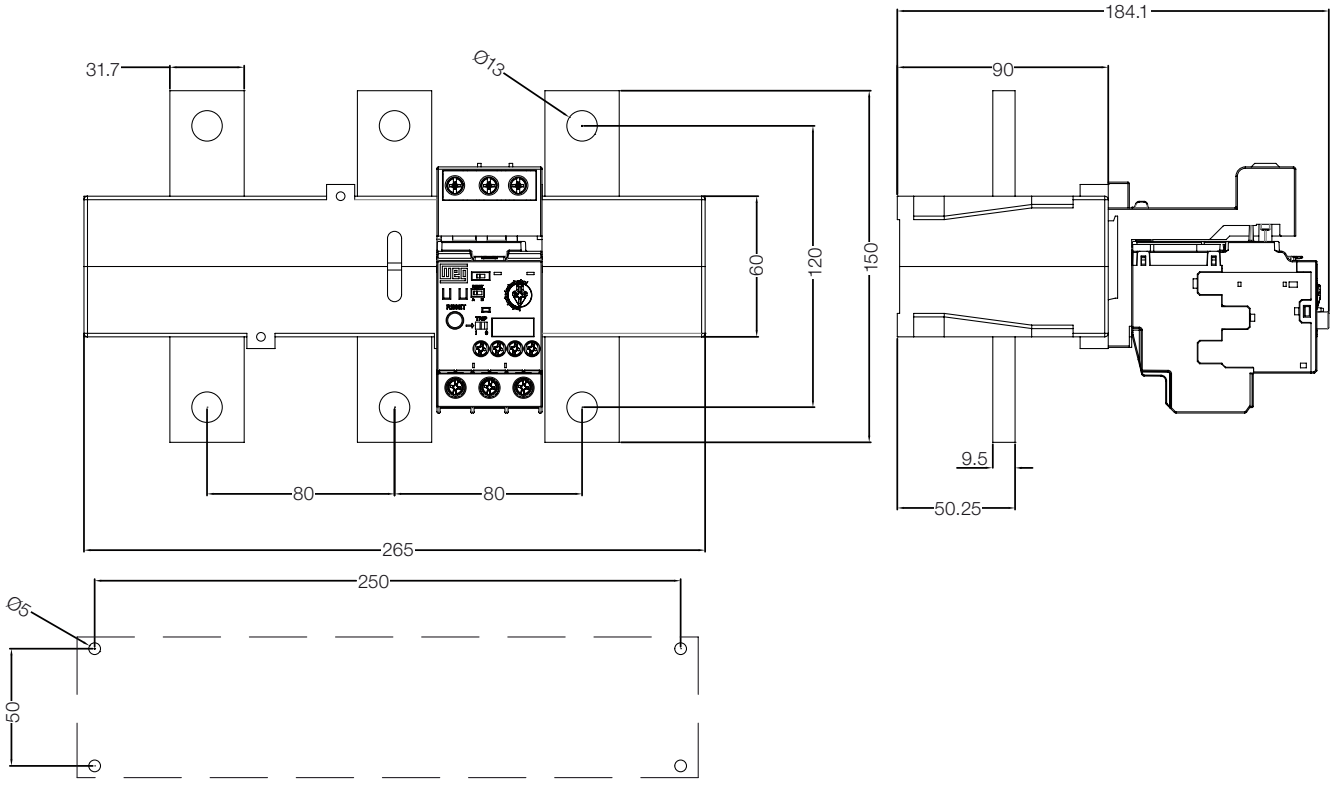


Dimensions (mm)

RWM420E

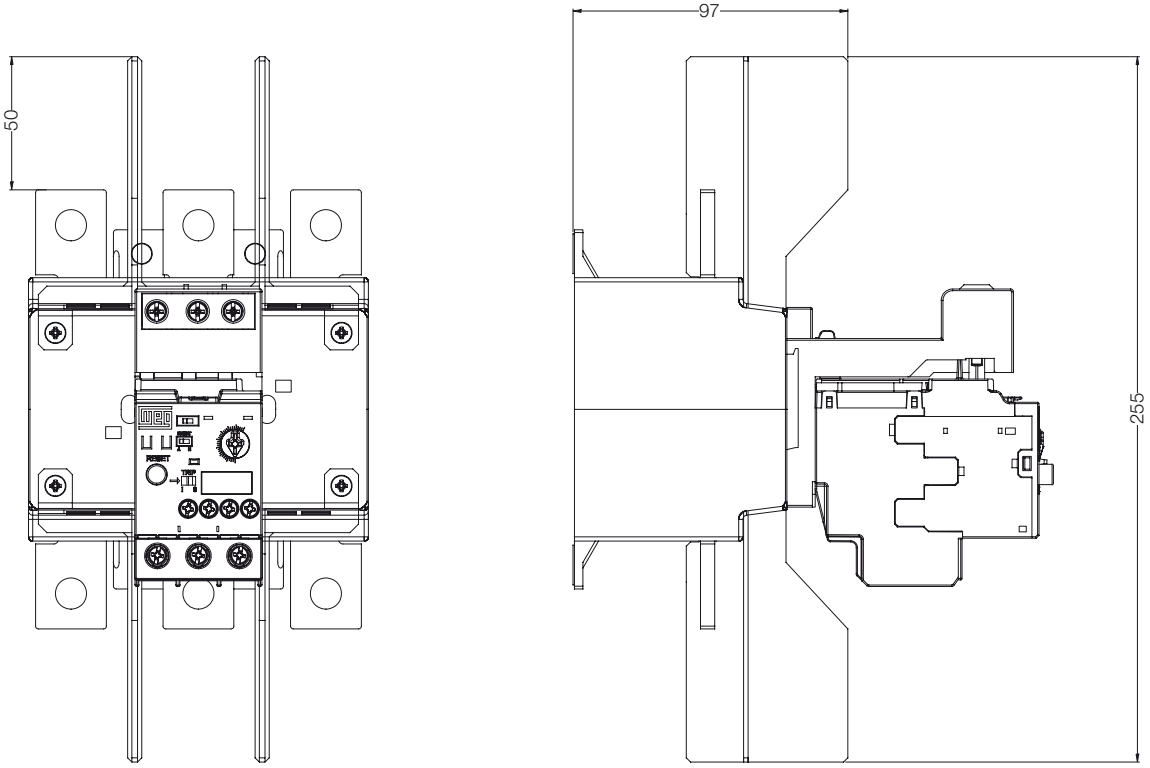


RWM840E

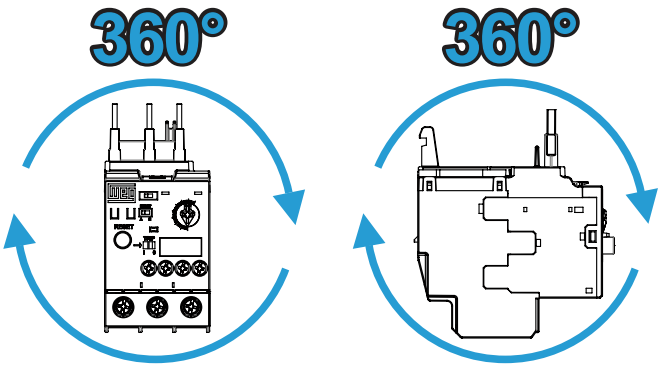


Dimensions (mm)

RWM420E + IBRW317



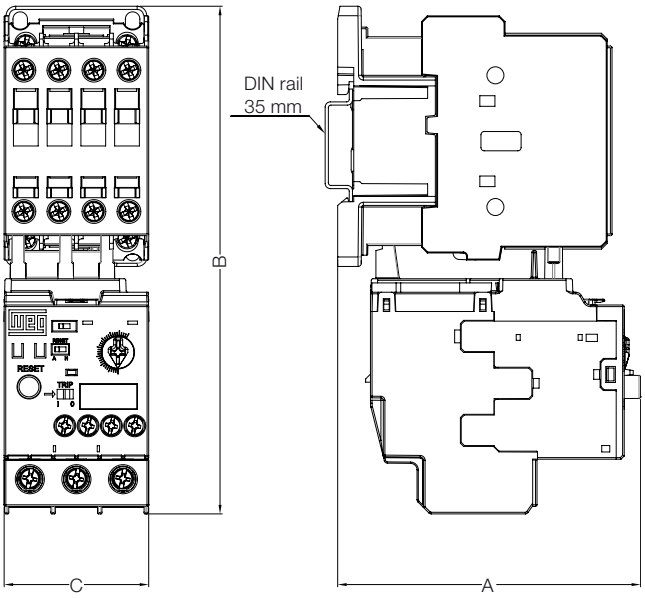
RWM40...840E / RWB40E



Mounting Position

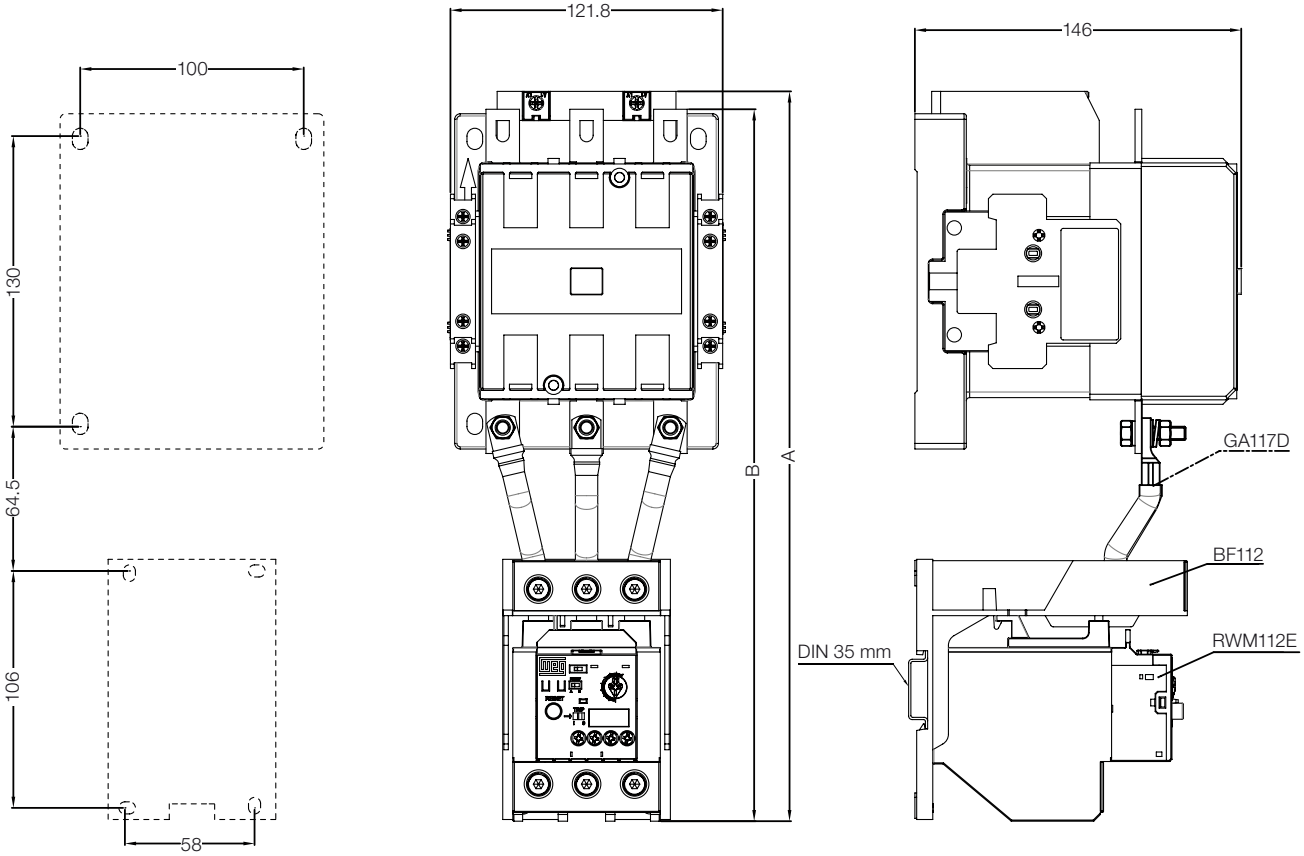
Dimensions (mm)

CWM9...105 + RWM40...112E and CWB9...38 + RWB40E



Contactor	Type of contactor coil	A	B	C
CWM9...18	CA	94.3	158	45
	CC	125.1		
CWM25	CA	94.9	159.3	45
	CC	124.8		
CWM32/40	CA	98.6	166.5	55
	CC	118.6		
CWM50...80	CA	122.6	202.7	66
	CC			
CWM95/105	CA	126	201.1	75.4
	CC			
CWB9...18	CA	89.5	163.1	45
	CC	98.7		
CWB25...38	CA	93	166.5	
	CC	102.2		

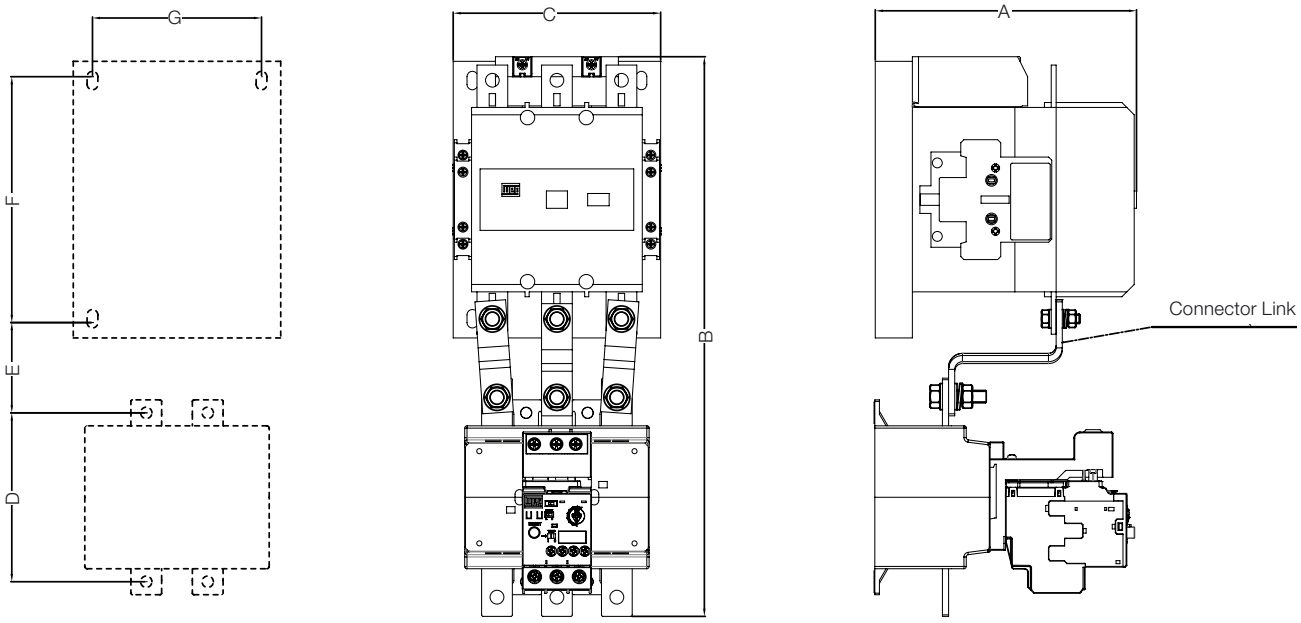
CWM112 + RWM112E + BF112



CWM112	A	B
AC conventional coil	-	318.5
Electronic coil	326.5	318.5

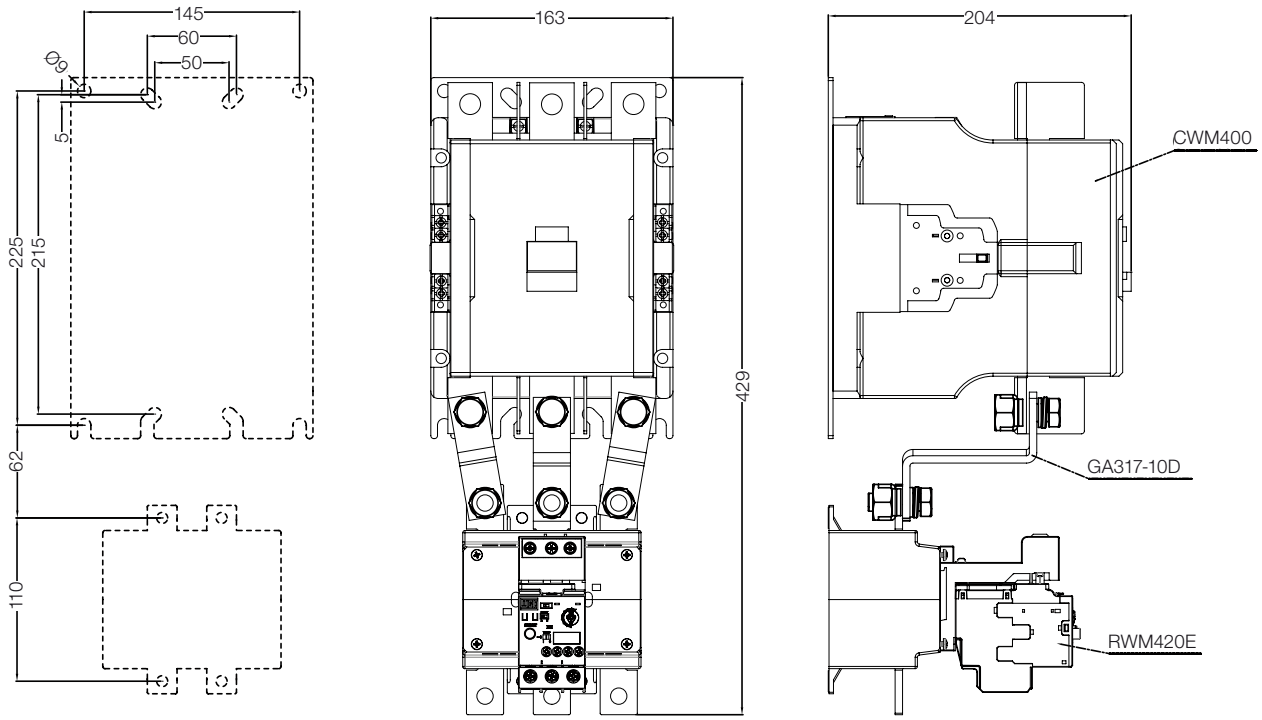
Dimensions (mm)

CWM112...300 + RWM112/420E



Contactor	Connector links	Overload relay	A	B	C	D	E	F	G
CWM112/150	GA117D	RWM112E	147	325	121.5	106	64	130	100
CWM112/150	GA317-1D	RW420E	166	343		110	60.5		
CWM180	GA317-2D	RW420E	172	358	139		52.5	160	110
CWM250/300	GA317-3D	RW420E	181	380	148.4		55	180	120

CWM400 + RWM420E



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