# Thermal Overload Relays RW Series – Bi-Metallic



RW67-5D3-U040

#### Overview

An extended operational service life is one of the main features you'll find in RW overload relays. WEG'S RW Thermal Overload Relays are designed for use with, and as perfect complement to, WEG contactors. RW overload relays can be mounted directly under WEG contactors, assuring electrical and mechanical operation as an open across-the-line starter. Accessories are also available for separate mounting.

#### **Features**

- 3-pole version available
- Direct mounting to WEG contactors with no accessory required (accessories also available for separate mounting)
- Phase-loss and current unbalance sensitivity protection
- Class 10 trip characteristics
- Selectable RESET button (auto or manual)
- Isolated 1NO and 1NC auxiliary contacts



**UL File No. E189202** 

## **RW Series Contactor Catalog Number Sequence**

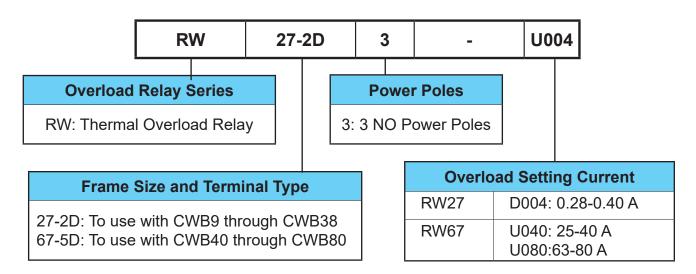


Table intended as reference only and not to create part numbers. For complete list of overload setting ranges, refer to selection guide tables.



### Multifunction Reset/Test Button

The thermal overload relay has a multifunction RESET/TEST button that can be set in four different positions:

> A - Automatic RESET only AUTO - Automatic RESET / TEST HAND - Manual RESET / TEST H - Manual RESET only

In HAND and AUTO positions, when the RESET button is pressed, both NO (97-98) and NC (95-96) contacts change states.



RW67-5D3-U040

## **Operation**

In the H (manual RESET only) or A (automatic RESET only) position, the test function is blocked. However, in the HAND (manual RESET/ TEST) or AUTO (automatic RESET/TEST) positions it is possible to simulate the test and the trip functions by pressing the RESET button.

When set in the H or HAND position, the RESET button must be pressed manually to reset the overload relay after a tripping event. On the other hand, when set in A or AUTO position, the overload relay will reset automatically after a tripping event.

The H, HAND, AUTO or A function settings are selected by rotating without pressing the red button and placing it in the desired position.

When changing from HAND to AUTO, the RESET button must be slightly pressed while the red button is rotated.

Function	Н	HAND	AUTO	Α
Relay Reset	Manual1	Manual1	Automatic	Automatic
Auxiliary Contact Trip Test 95-96 (NC)	Function is disabled	Test is allowed	Test is allowed	Function is disabled
Auxiliary Contact Trip Test 97-98 (NO)	Function is disabled	Test is allowed	Test is allowed	Function is disabled

Note: A recovery time of a few minutes is necessary before resetting the thermal overload relay.

### Recovery Time

The RW thermal overload relays have thermal memory. After tripping due to an overload, the relay requires a certain period of time (the "recovery time") for the bimetal strips to cool down. The relay can only be reset once it has cooled down. The recovery time depends on the characteristic tripping curves and the level of the tripping current. After tripping due to overload, the recovery time allows the load to cool down.

### **Operation in the Output Side of Frequency Inverters**

The RW27-2D thermal overload relays are designed for operation on 50/60 Hz up to 400Hz, and the tripping values are related to the heating by currents within this frequency range. Depending on the design of the frequency inverter, the switching frequency can reach several kHz and generate harmonic currents at the output that result in additional temperature rise in the bimetal strips. In such applications, the temperature rise depends not only on the rms value of the current but also on the induction effects of the higher frequency currents in the metal parts of the device (skin effect caused by eddy currents). Due to these effects, the current settings on the overload relay should be higher than the motor rated current.

# **Dial FLA Setting**

The trip current is set via a continuously adjustable dial designed with the motor's full load current (FLA) in mind.

# Temperature compensation

Because RW thermal overload relays include a forth bimetallic strip in addition to the three that are directly heated by the motor current, ambient temperature variations in the range of -4°F to +140°F [-20°C to +60°C] are no obstacle for accurate protection of your motors even in the toughest conditions.

# **Phase Failure Sensitivity**

WEG overload relays include phase failure sensitivity protection as a standard. This feature ensures fast tripping in case of phase-loss, protecting your motor and avoiding expensive repairs/corrective maintenance.



# Three-Pole Thermal Overload Relay Class 10 For Use With CWB Contactors







RW27-2D3-D008

RW67-5D3-U080

RW67-5D3-U040

#### **Features**

- Adjustable trip current
- Phase-loss sensitivity
- Trip Class 10
- Built-in auxiliary contacts: 1
   NO and 1 NC
- Ambient temperature compensation
- (-4°F to +140°F [-20°C to +60°C])
- Multi-function button: Hand/ Auto/Reset

	RW Series Bi-Metallic Thermal Overload Relays Selection Guide							
Dout Number	Drice	Matching Contactor	Setting I	Range (A)	May Fues (4)	Dimensional Brawing		
Part Number	Price	Matching Contactor	Minimum	Maximum	Max. Fuse (A)	Dimensional Drawing		
RW27-2D3-D008			0.56	0.80	15	PDF		
RW27-2D3-D012			0.80	1.20	15	PDF		
RW27-2D3-D018			1.20	1.80	15	PDF		
RW27-2D3-D028			1.80	2.80	15	PDF		
RW27-2D3-U004		CWB9	2.80	4.00	15	PDF		
RW27-2D3-D063		CWB12 CWB18	4.00	6.30	25	PDF		
RW27-2D3-U008		CWB25 CWB32	5.60	8.00	30	PDF		
RW27-2D3-U010			7.00	10.0	40	PDF		
RW27-2D3-D125		- CWB38	8.00	12.5	50	PDF		
RW27-2D3-U017			11.0	17.0	60	PDF		
RW27-2D3-U023			15.0	23.0	90	PDF		
RW27-2D3-U032			22.0	32.0	90	PDF		
RW27-2D3-U040			32.0	40.0	90	PDF		
RW67-5D3-U040			25.0	40.0	90	PDF		
RW67-5D3-U050		CWB40	32.0	50.0	125	PDF		
RW67-5D3-U057		CWB50 CWB65	40.0	57.0	150	PDF		
RW67-5D3-U063			50.0	63.0	150	PDF		
RW67-5D3-U070		CWB80	57.0	70.0	175	PDF		
RW67-5D3-U080			63.0	80.0	200	PDF		



# **Separate Mounting Bracket**



RW Series Bi-Metallic Thermal Overload Relays Mounting Bracket Selection Guide									
Part Number	Price Description Mounting on Overload Relays Dimensional (2- or 3-Pole) Drawing								
BF27-2D		Enables overload relay to be directly mounted to a back panel via screws or DIN rail	RW27-2D	PDF					
BF67-5D		Enables overload relay to be directly mounted to a back panel via screws or DIN rail	RW67-5D	PDF					

BF27-2D

# Thermal Overload Relays RW Series – Bi-Metallic

RW Series Bi-Metall	ic Thermal O	verload Re	lays Specifications – Genera	Data and Main Contacts		
			RW27	RW67		
Standards			IEC 6094	7 / UL 508		
Setting Current A			0.28-40	25-80		
Tripping Class			1	0		
Temperature Compensation			Conti	nuous		
Rated Insulation Voltage U <sub>i</sub> IEC 60947		7 V	69	90		
(Pollution Degree 3)	UL/CSA	V	600			
Rated Impulse Withstand Voltage U <sub>imp</sub> kV			6			
Rated Operational Frequency	•	Hz	0-400			
Degree of protection Protection against direct contact by a perpendicular test finger (IEC		hen actuated	IP20 Finger and back-of-hand proof			
Ambient Temperature	Operating temper	rature	-25°C to +60°C [-13°F to +140°F]			
Ambient Temperature	Storage tempera	ture	-40°C to +70°C [-40°F to +158°F]			
Environmental Testing (IEC 60 068-2-3, IEC 60 068-2-30)			Damp heat. Constant			
	Current Heat Loss					
Lower Value of Setting Range W			0.9	1.5		
Higher Value of Setting Range		W	1.7	4.7		

RW Series Bi-Me	RW Series Bi-Metallic Thermal Overload Relays Specifications – Auxiliary Contacts					
			RW27	RW67		
Standards			IEC 60947	7-4-1, UL 508		
Rated Insulation Voltage Ui	Rated Insulation Voltage U; IEC V		(	690		
Pollution Degree 3) UL/CSA		V	(	600		
Pated Operational Voltage II	IEC	V	(	690		
Rated Operational Voltage U <sub>e</sub>	UL/CSA	V	(	600		
Rated Thermal Current I <sub>th</sub> (θ≤55°C) A			6			
		Rated	Operational Current l <sub>e</sub>			
AC-14 / AC-15 (IEC 60947-5-1)	24V	Α		4		
	60V	Α		3.5		
	125V	Α		3		
	230V	A		2		
	400V	Α		1.5		
	500V	Α		0.5		
	690V	Α	0.3			
UL, CSA			C600			
DC-13 / DC-14 (IEC 60947-5-1)	24V	Α	1			
	60V	Α		0.5		
	110V	A		0.25		
	220V	Α		0.1		
UL, CSA			F	2300		
Short-Circuit Protection With Fuse (I	RK5)	Α	6			
Minimum Voltage / Admissible Curre	nt (IEC 60947-5	5-4)	17\	/ / 5ma		

# Thermal Overload Relays RW Series – Bi-Metallic

RW Series Bi-Metallic Thermal Overload Relays Specifications Terminal Capacity and Tightening Torque – Main Contacts						
			RW27	RW67		
Current Setting		Α	0.28-40	25-80		
		Cable Size	(75°C [167°F]) / Cu Cable)			
Florible Oable	1 cable	mm <sup>2</sup>	1.5-10	6.0-35		
Flexible Cable	2 cables	mm <sup>2</sup>	1.5-10	-		
Cable Mith Tamainel or Binid Cable	1 cable	mm <sup>2</sup>	1.5-6	6.0-35		
Cable With Terminal or Rigid Cable	2 cables	mm <sup>2</sup>	1.5-6	-		
Busbar		mm <sup>2</sup>	-	-		
Tightening Torque		N•m [lb•ft]	2.3 [1.69]	4.0 [2.95]		
UL Cable Size (75°C [167°F]) / Cu Cable	)	AWG	16 to 8	10 to 3		
Tightening Torque (UL)  N•m [lb•in]			2.26 [20]	3.95 [35]		

RW Series Bi-Metallic Thermal Overload Relays Specifications Terminal Capacity and Tightening Torque – Auxiliary Contacts								
			RW27	RW67				
Type of Screws			M3.5x10 Philips	M3.5x10 Philips				
	Cable Size (75°C [167°F]) / Cu Cable)							
Cable With or Without Terminal	mm <sup>2</sup>	ПслП	2 x 1-2.5	2 x 1-2.5				
Wire	AWG		16-12	16-12				
Tightening Torque	N•m [lb•in]		1.5 [13]	1.5 [13]				

RW Series Bi-Metallic Thermal Overload Relays Specifications – General Technical Data				
			RW27	
Standards			IEC 60947-1, UL 508	
Rated insulation voltage Ui	IEC/EN 60947-4-1	V	690	
(Pollution Degree 3)	UL, CSA	V	600	
Rated impulse withstand voltage Ui	mp (IEC 60947-1)	kV	6	
Rated operational frequency		Hz	25-400	
Use with direct current?			Yes	
Maximum operation per hour		ops/h	15	
	Main contacts		IP10	
Protection degree (IEC 60529)	Auxiliary contacts		IP20	
	Frontal		IP20	
Mounting			Direct on the contactor	
Resistance to Impact (IEC 60068-2-2	27 - 1/2 sinusoid)	g/ms	10/11	
	Transport and storage		-50°C to +80°C [-58°F to +176°F]	
Ambient Temperature	Operating		-20°C to +70°C [-4°F to +158°F]	
	Temperature compensa	ation	-20°C to +60°C [-4°F to +140°F]	
Altitude		m [ft]	2000 [6562]	

RW Series Bi-Metallic Thermal Overload Relays Specifications – Main Contacts					
			RW27		
Botad Operational Voltage II	IEC 60947-4-1	V	690		
Rated Operational Voltage U <sub>e</sub>	UL, CSA	V	600		
			0.28-0.4 / 2		
			0.43-0.63 /2		
			0.56-0.8 / 2		
			0.8-1.2 / 4		
			1.2-1.8 / 6		
			1.8-2.8 / 6		
			2.8-4 / 10		
Softing Current / May Eugo (Class BKE)		A	4-6.3 / 16		
Setting Current / Max Fuse (Class RK5)		^	5.6-8/20		
			7-10 / 25		
			8-12.5 / 25		
			10-15 / 35		
			11-17 / 40		
			15-23 / 50		
			22-32 / 63		
			32-40 / 90		
Average Power Dissipation Per Pole		W	≤3		



## **RW Tripping Characteristics**

These tripping characteristics show the tripping of RW in relation to the current. They show the mean values of the tolerance ranges at on ambient temperature of 68°F (20°C), starting from cold stats. The tripping time of the overload releases at operational temperature is reduced to approximately 25% of the values shown. Under normal operational conditions, all Three-Phases of the RWs should be loaded.



Derating of an RW overload relay is based on two possible factors.

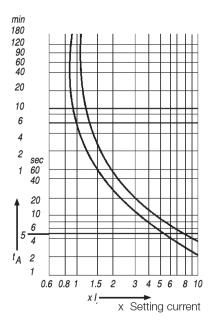
#### **Ambient temperature:**

Temperature compensation considers a factor according to which the rated current must be reduced when ambient temperature is higher than 60°C [140°F].

#### Altitude:

Altitude compensation involves both rated current and voltage.

- Current compensation considers a factor according to the rated current must be reduced.
- For voltage, altitude limits the higher operating voltage the overload relay can be used.



### **Derating Calculation**

The derating of the permissible operating current for installation altitudes above 2000m (6667 ft) and ambient temperatures over 60°C (140°F) is calculated according to the following formula:

Total derating = Derating altitude x Derating ambient temperature

### **Derating Example**

Here is an example of how derating is calculated.

- Altitude: 3000m (10,000 ft)
- K1 = 0.96
- Ambient temperature: 70°C (158°F)
- K2 = 0.87

Total current derating = 0.96 x 0.87 = 0.84 x Ie

In this case, the maximum rated voltage that can be connected to the RW overload relay is 550V.

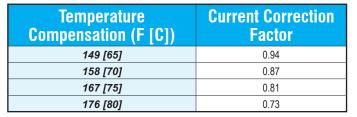
In order to select the proper overload relay, choose a device with a current range that accommodates the following:

Overload Setting Point = FLA motor / (K1 x K2)

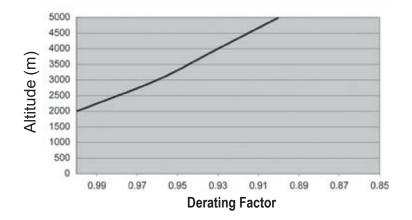
As in the example above,  $K1 \times K2 = 0.84$ 

For a motor with FLA = 20A:

Overload Setting Point = 20 / 0.84 = 23.8A



Altitude	Voltage Correction (U <sub>e</sub> )
Up to 2000m (6667ft)	690
Up to 3000m (10,000 ft)	550
Up to 4000m (13,333 ft)	480
Up to 5000m (16,667ft)	420







RWB40E-3-A4U002

#### **Overview**

**RW-E Series Solid State Overload** relays are developed with cutting-edge technology to meet the most demanding standards worldwide. With their wide current/AMP setting range, RW-E Series OL Relays can be used for protection of electric motors of different power ratings. The benefit is versatility and flexibility for manufacturers due to the possibility of standardization of control panels. This Solid State Overload Relay can be directly mounted on WEG Contactors (CWB line) providing very reliable and flexible motor starter units. The RW-E Series counts on two independent and highly reliable built in auxiliary contacts that assure the motor is switched off when a failure occurs.

#### **Features**

- 3-pole solid state overload relays with adjustable trip class: 10, 20 and 30
- Self-powered
- Wide 5:1 adjustment range
- Thermal memory
- Phase-loss protection (less than 5s)
- Phase unbalance protection (>40% between phases)
- Temperature compensated (-20°C [-4°F] up to +60°C [+140°F])
- · Manual or automatic reset modes
- Direct mounting on CWB9-38 contactor
- Separate mounting is possible with accessories
- 1NO + 1NC built in auxiliary contacts



UL File No. E189202

## **RW-E Solid-State Overload Relay Catalog Number Sequence**

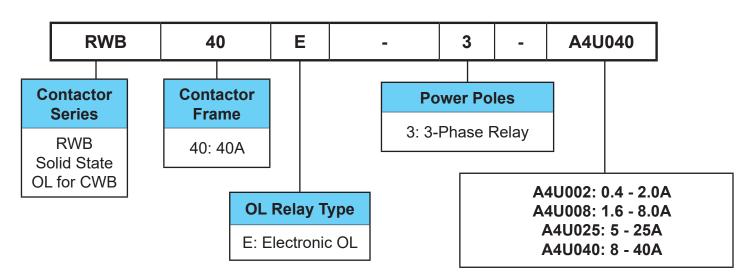


Table intended as reference only and not to create part numbers.

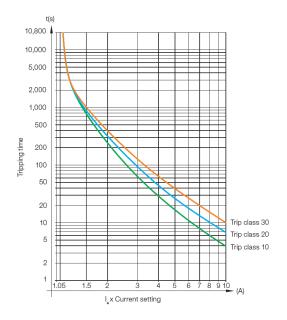


# **Suitable for a Wide Range of Applications**

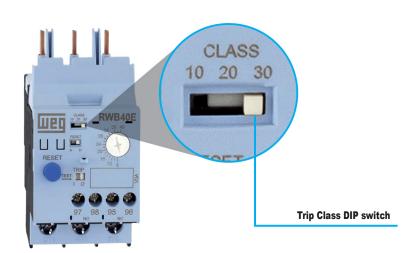
RW-E Series solid-state overload relays are suitable for protecting motors in a wide range of industrial applications including those where long starting time is required. Motors used in low, medium or heavy duty applications can be properly protected just by selecting the proper trip class (10, 20 or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

Additionally, the microprocessor electronic circuits of RW Series solid-state overload relays are temperature compensated according to IEC 60947-4-1, which means that throughout the temperature range of -20°C [-4°F] up to +60°C [140°F], the tripping point is not affected and performs consistently without undesirable tripping.

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



Trip Class -		Multiples of	Current Setting	
	1.05 x I <sub>r</sub>	1.2 x I <sub>r</sub>	1.5 x I <sub>r</sub>	7.2 x I <sub>r</sub>
10	-	T <sub>p</sub> <2h	T <sub>p</sub> <4min	4 <t<sub>p≤10s</t<sub>
20	-	T <sub>p</sub> <2h	T <sub>p</sub> <8min	6 <t<sub>p≤20s</t<sub>
30	-	T <sub>p</sub> <2h	T <sub>p</sub> <12min	9 <t<sub>p≤30s</t<sub>



# RW-E Series Solid State Overload Relays







RWB40E-3-A4U040

	RW-E Series Solid-State Overload Relays Selection Guide								
Part Number	Price	For Direct Mounting on Contactors	Current Range A	Max. Fuse (gL/gG) A	Diagram	Weight (kg [lb])	Dimensional Drawing		
RWB40E-3-A4U002			0.4-2	16	Reset Test		PDF		
RWB40E-3-A4U008		CM/D0 through CM/D20	1.6-8	32		0.25 [0.55]	PDF		
RWB40E-3-A4U025		CWB9 through CWB38	5-25	63	G G G	0.25 [0.55]	PDF		
RWB40E-3-A4U040			8-40	125	2T1 4T2 6T3 96 98		PDF		

Note: Not to be used in single-phase applications.



# **Mounting Kit**



RW-E Series Solid-State Overload Relays Mounting Kit Selection Guide							
Part Number	Price	Description	For Use With	Weight (kg [lb])	Dimensional Drawing		
BF27-2D		Enables the overload relay to be mounted directly to a panel via screws or 35mm DIN rail	RWB40E	0.05 [0.11]	PDF		

BF27-2D

# RW-E Series Solid State Overload Relays

RW-E Series	Series Solid	State Ove	erload Relays Specifications – General Data	
			RWB40E	
Standards			IEC 60947-4-1, IEC 60947-5-1, IEC 60947-1, UL 60947-1, UL 60947-4-1A and UL 508	
Nated Ilisulation Voltage o	IEC 60947-4-1	V	690	
	UL/CSA	V	600	
Rated impulse withstand voltage U	e U <sub>imp</sub> kV		6	
Rated Operational Frequency (Sinusoidal Networks)		Hz	50/60	
	Three-phase loads		Yes	
Suitable for use	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, <5s	
Additional realtired protections	Phase unbalance		Yes, >40%	
Reset	Manual/minimum downtime for reset		Yes / instantaneous	
neset	Automatic/minimum downtime for reset		Yes / ≥90s	
Maximum Operations Per Hour			30	
Protection degree (IEC 60529)	Main contacts		IP10	
Trotection degree (IEO 00029)	Auxiliary contacts		IP20	
Mounting			Direct mounting on contactor or directly on the panel via screws or 35mm DIN rail when using the mounting kit accessory (BF27-2D)	
Mechanical shock resistance 1/2 sinusoid			15g / 11ms	
Vibration resistance (IEC 60068-2-6)			6g / 30-300 Hz	
	Transport and storage		-50°C to +80°C [-58°F to +176°F]	
Ambient Temperature	Operating		-20°C to +60°C [-4°F to +140°F]	
	Temperature compensation		-20°C to +60°C [-4°F to +140°F]	
Altitude			2000m [6562ft]	

RW Series Series Solid State Overload Relays Specifications – Main Contacts				
			RWB40E	
Rated Operational Voltage Up	IEC 60947-4-1	V	690	
(Pollution Degree 3)	UL/CSA	V	600	
Current Setting / Max Fuse (RK5)		А	0.4-2 / 16 1.6-8 / 32 5-25 / 63 8-40 / 125	
Setting Current / Average Power Dissipation Per Pole			0.4-2 / 0.07 1.6-8 / 0.06 5-25 / 0.38 8-40 / 1.5	

# RW-E Series Solid State Overload Relays

RW-E Series Series Solid State Overload Relays Specifications – Auxiliary Contacts				
			RWB40E	
Rated Insulation Voltage U <sub>i</sub> (Pollution Degree 3)	IEC 60947-4-1	V	250	
	UL/CSA	V	600	
Rated Impulse Withstand Voltage U <sub>imp</sub> (IEC 60947-1)		kV	4	
Rated Operational Voltage U <sub>e</sub>	IEC 60947-4-1	V	250	
	UL/CSA	V	600	
Rated Thermal Current Ith ≤60°C		Α	5	
Rated Operational Current I <sub>e</sub>				
	24V	Α	3	
AC-14/AC-15 (IEC 60947-5-1)	120V	Α	3	
	250V	Α	1.5	
	24V	Α	2	
DC-13 (IEC 60947-5-1)	60V	Α	0.4	
	110V	Α	0.22	
	125V	Α	0.22	
	250V	Α	0.1	
NEMA Control Circuit Ratings	UL, CSA		C300 / R300	
Short-Circuit Protection With Fuse A		Α	6	
Minimum Voltage / Admissible Current (IEC 60947-5-4)		i-4)	12V / 10mA	

RW-E Series Series Solid State Overload Relays Specifications Terminal Capacity and Tightening Torque – Main Contacts					
			RWB40E		
Time of Course			M3.5		
Type of Screw			Flat / Phillips #2		
Cable Size					
Flexible Cable	mm <sup>2</sup>		-		
Cable With Terminal / Rigid Cable	mm <sup>2</sup>		-		
AWG Wire			-		
Tightening Torque	N•m [lb•ft]		-		
Flexible Cable	mm <sup>2</sup>		1-10		
Cable With Terminal / Rigid Cable	mm <sup>2</sup>		1-10		
Wire	AWG		16-8		
Tightening Torque	N•m [lb•ft]		1.7		

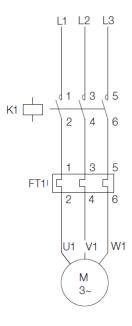
RW-E Series Series Solid State Overload Relays Specifications Terminal Capacity and Tightening Torque – Auxiliary Contacts						
			RWB40E			
Type of Screw			Flat / Phillips #1			
Cable Size						
Cable With or Without Terminal	mm <sup>2</sup>		1 x 1-2.5			
Wire	AWG		16-12			
Tightening Torque	N•m [lb•ft]		0.8 [0.59]			



### **Technical Data**

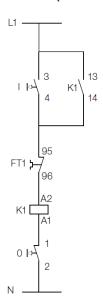
**Motor Protection - Alternating Current** 

#### 3-pole

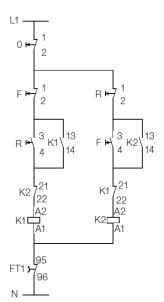


#### Typical Connection – Contactor + Overload Relay

**Direct On Line Starter (1 Direction of Rotation)** 

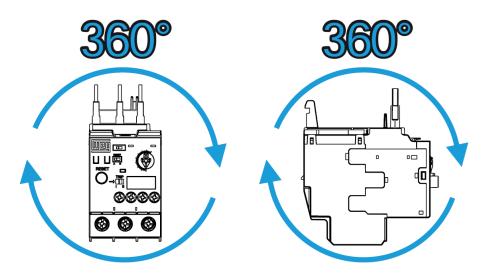


#### **Direct On Line Starter (2 Directions of Rotation)**





# **RWB40E Mounting Position**



Mounting Position