

# Motor Controllers Industrial, 2-Phase Motor Reversing Type RR2A

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- Motor reversing for 3-phase induction motors up to 5.5 kW
- Rated operational voltage: Up to 480 VACrms
- Built-in interlock function
- DC or AC control voltage
- Built-in voltage transient protection
- LED indication for direction
- Isolation: Optocoupler (input-output) 4000 VACrms
- Direct copper bonding technology

## Product Description

This family of 2-Phase Motor Reversing Controller is designed to switch 3-phase motors rated up to 5.5 kW. The built-in interlocking circuitry prevents the relay from switching both directions at the same time. A dual colour LED indicates direction "forward" when green and direction "reverse" when red. The output is protected from excessive voltage fluctuations (transients) by built-in vari-

tors. Furthermore, optimum reliability is achieved by soldering the output thyristor chips directly on to the ceramic substrate (Direct Copper Bonding).

The housing is designed to incorporate a temperature limit switch. It is recommended to install an appropriate semiconductor fuse in series with the relay.

## Ordering Key

**RR 2 A 40 D 150**

- Motor reversing
- Number of phases
- Switching mode
- Rated operational voltage
- Control input type
- Motor power rating

## Type Selection

Switching mode	Rated operational voltage, Ue	Control voltage	Motor rating
A: Zero Switching	40: 400 VACrms 48: 480 VACrms	D: 10 - 40 VDC LA: 90 - 140 VAC HA: 180 - 265 VAC	150: 1.5 kW, 2 HP 220: 2.2 kW, 3 HP 400: 4.0 kW, 5 HP 550: 5.5 kW, 7.5 HP

## Selection Guide

Rated operational voltage	Control voltage	Motor rating			
		1.5 kW	2.2 kW	4.0 kW	5.5 kW
400 VACrms	10 to 40 VDC	<b>RR2A40D150</b>		<b>RR2A40D400</b>	
	90 to 140 VAC	<b>RR2A40LA150</b>		<b>RR2A40LA400</b>	
	180 to 265 VAC	<b>RR2A40HA150</b>		<b>RR2A40HA400</b>	
480 VACrms	10 to 40 VDC		<b>RR2A48D220</b>		<b>RR2A48D550</b>
	90 to 140 VAC		<b>RR2A48LA220</b>		<b>RR2A48LA550</b>
	180 to 265 VAC		<b>RR2A48HA220</b>		<b>RR2A48HA550</b>

## General Specifications

	RR2 A 40. ....	RR2 A 48 . 220	RR2 A 48 . 550
Operational voltage range	40 to 440 VACrms	40 to 530 VACrms	40 to 530 VACrms
Blocking voltage	≤ 1200 V <sub>p</sub>	≤ 1200 V <sub>p</sub>	≤ 1600 V <sub>p</sub>
Operational frequency range	45 to 65 Hz	45 to 65 Hz	45 to 65 Hz
Power factor	≥ 0.5 @ 400 VACrms	≥ 0.5 @ 480 VACrms	≥ 0.5 @ 480 VACrms

## Output Specifications

	RR2A40.150	RR2A48.220	RR2A40.400	RR2A48.550
IEC rated operational current I <sub>e</sub> (AC-53a) @ T <sub>a</sub> = 40°C	5 A	5 A	11 A	11 A
IEC rated operational current I <sub>e</sub> (AC-51) @ T <sub>a</sub> = 40°C	25 A**	25 A**	40 A**	40 A**
Assigned motor rating @ 40°C/ UL rating @ 40°C	1.5kW / 2HP	2.2kW / 3HP	4.0kW / 5HP	5.5kW / 7.5HP
Overload cycle according to EN/IEC 60947-4-2 @ 40°C	5A: AC53a: 6-6: 100-60	5A: AC53a: 6-6: 100-60	11A: AC53a: 8-3: 100-40**	11A: AC53a: 8-3: 100-40**
Number of starts/hr @ 40°C	60	60	40	40
Unlimited starts/hr @40°C	4A: AC53a: 6-6: 100 - unlimited**	4A: AC53a: 6-6: 100 - unlimited**	5A: AC53a: 6-3: 100 - unlimited**	5A: AC53a: 6-3: 100 - unlimited**
	3.5A: AC53a: 5-6: 100 - unlimited*	3.5A: AC53a: 5-6: 100 - unlimited*	4A: AC53a: 5-3: 100 - unlimited*	4A: AC53a: 5-3: 100 - unlimited*
	1.5A: AC53a: 4-6: 100 - unlimited	1.5A: AC53a: 4-6: 100 - unlimited	2A: AC53a: 5-3: 100 - unlimited	2A: AC53a: 5-3: 100 - unlimited
Minimum operational current	150 mArms	150 mArms	250 mArms	250 mArms
Off-state leakage current	≤ 1 mArms	≤ 1 mArms	≤ 1 mArms	≤ 1 mArms
I <sup>2</sup> t for fusing t= 10ms	525 A <sup>2</sup> s	525 A <sup>2</sup> s	1800 A <sup>2</sup> s	1800 A <sup>2</sup> s
On-state voltage drop	≤ 1.6 Vrms	≤ 1.6 Vrms	≤ 1.6 Vrms	≤ 1.6 Vrms
Critical dv/dt off-state	≥ 500 V/us	≥ 500 V/us	≥ 1000 V/us	≥ 1000 V/us

\* This overload cycle is applicable when device is mounted on heatsink type RHS300

\*\* Applicable only when device is mounted on heatsink type RHS301

## Environmental Specifications

Operating temperature	-20°C to +80°C (-4°F to +176°F)	Degree of Protection	IP10 (EN/IEC 60529)
Storage temperature	-40°C to +100°C (-40°F to +212°F)	Installation category	III
Relative humidity	<95% non-condensing @40°C	Installation Altitude	1000m
Pollution Degree	3	Vibration	
		Sinusoidal (IEC 60068-2-6)	13 to 25Hz: 2.0mm peak 25 to 150Hz: 20m/s <sup>2</sup>

## Short Circuit Protection (according to EN/IEC 60947-4-2 and UL 508)

	RR2A40.150 RR2A48.220	RR2A40.400 RR2A48.550
Type of coordination: 1		
UL rated short circuit current RK5 fuse	5kA when protected by RK5 fuses TRS10R 10A	10kA when protected by RK5 fuses TRS20R 20A
Type of coordination: 2		
Rated short circuit current	10kA when protected by semiconductor fuses	10kA when protected by semiconductor fuses
Semiconductor fuse	Ferraz Shawmut 25A, Class URC Art. No. 6.9 CP gRC 14.51 25	Ferraz Shawmut 50A, Class URC Art. No. 6.9 CP gRC 14.51 50

## Housing Specifications

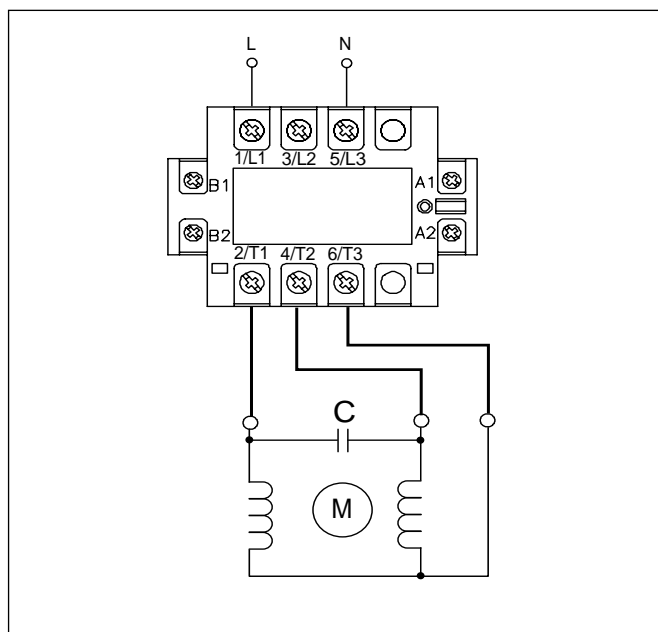
Weight	Approx. 430 g	Control terminal	
Housing material	Noryl, glass-reinforced	Mounting screws	M4
Colour	Black	Mounting torque	≤ 0.5 Nm
Base plate	Aluminium, nickel-plated	Wire size	Max. 2 x 2.5 mm <sup>2</sup> (AWG 14)
Potting compound	Polyurethane, black		Min. 2 x 1.0 mm <sup>2</sup>
Relay		Power terminal	
Mounting screws	M5	Mounting screws	M5
Mounting torque	≤ 1.5 Nm	Mounting torque	≤ 2.5 Nm
		Wire size	Max. 2 x 6 mm <sup>2</sup> (AWG 8)
			Min. 2 x 1 mm <sup>2</sup>

## Isolation

Dielectric withstand voltage	
Input to output	≥ 4000 VACrms
Input to case	≥ 4000 VACrms
Dielectric withstand voltage	
Output to case	≥ 4000 VACrms

## Applications

Reversing an Asynchronous single phase motor working with a phase-shifting capacitor



## Standards

Approvals	UL, cUL (E172877)
Markings	CE, EN 60947-4-2
EMC (Electromagnetic compatibility)	accord. to EN 61000-6-2
Wire conducted emission	Class A
Radiated emission	Class B
ESD Immunity (EN 61000-4-2)	4kV contact, PC1 8kV air discharge, PC2
Radiated RF immunity (EN 61000-4-3)	10V/m, PC1 (80-1000MHz)
Fast transient immunity (EN 61000-4-4)	Output 2kV, PC1 Input 2kV, PC1
Surge immunity (EN 61000-4-5)	Output: line to line 1kV, PC1 line to ground 2kV, PC1 Input: line to line 500V, PC1** (RR2AxxDxxx) line to ground 500V, PC1** (RR2AxxDxxx) line to line 1kV, PC1 (RR2AxxxAxxx) line to ground 2kV, PC1 (RR2AxxxAxxx)
Conducted RF immunity (EN 61000-4-6)	140dBuV, PC1* (0.15-80MHz)
Voltage Dips & Interruptions	EN 61000-4-11

\* It is suggested that the input lines be installed together (such as a 3 core cable) to enhance susceptibility.

\*\* Surge immunity level with an external transient voltage suppressor (47V) meets PC2 @ 1 kV between line to line and 2kV between line to ground.

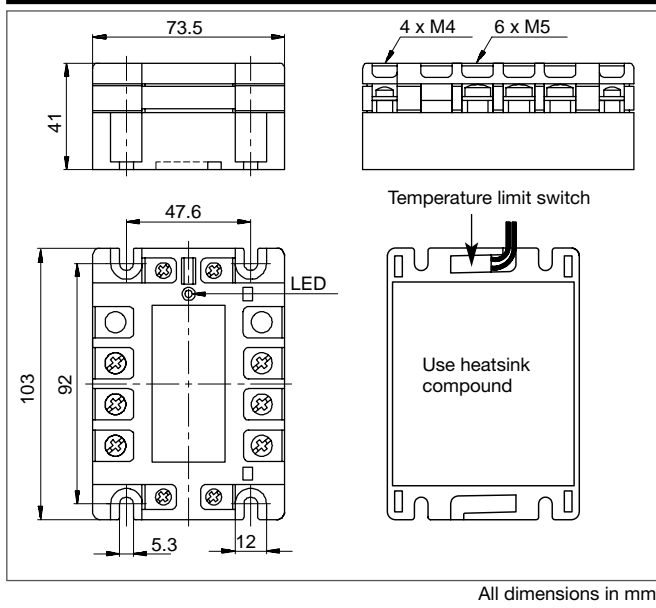
Note: EMC tests were performed with representative motor loads of 1.1kW and 4.0kW. The above is just an indication of the EMC performance. The performance of the controller would have to be evaluated with the device connected and fitted as part of the complete system in the end application.

## Input Specifications

	RR2A..D...	RR2A..LA...	RR2A..HA...
Control voltage range	10 - 40 VDC	90 - 140 VAC	180 - 265 VAC
Pick-up voltage	8.5 VDC	70 VAC	170 VAC
Input current range	10 - 20 mADC	7 - 12.5 mAAC	6 - 9.5 mAAC
Drop-out voltage	3.5 VDC	20 VAC	95 VAC
Response time input to output	≤ 10 ms	≤ 70 ms	≤ 100 ms
Time delay F → R, R → F	≤ 80 ms	≤ 200 ms*	≤ 200 ms*

\* ≤ 300 ms for surrounding temperatures ≥ + 60°C (140 °F)

## Dimensions

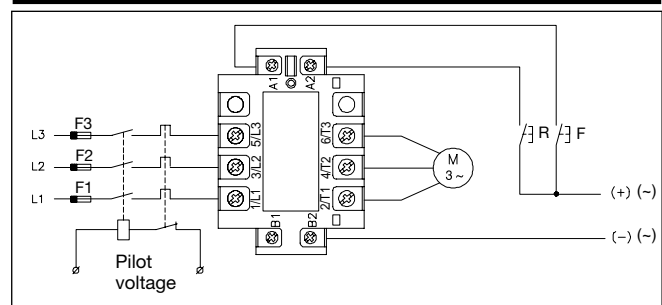


## Accessories

- Heatsinks
- Fuses
- Temperature limit switch

For further information refer to "General Accessories".

## Wiring Diagram



## Functional Diagram

