

# Motor Controllers

## Industrial, 2-Phase Motor Reversing

### Type RR2A

CARLO GAVAZZI



- 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 control the direction of 3-phase motors rated up to 5.5 kW. The built-in interlocking circuitry prevents the relay from switching both directions simultaneously and produce a short-circuit between the 2 phases of the output. A dual colour LED indicates direction "forward" when green and direction "reverse" when red. The output is protected from excessive voltage fluctu-

ations (transients) by built-in varistors. 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 90 to 140 VAC 180 to 265 VAC	RR2A40D150 RR2A40LA150 RR2A40HA150		RR2A40D400 RR2A40LA400 RR2A40HA400	
480 VACrms	10 to 40 VDC 90 to 140 VAC 180 to 265 VAC		RR2A48D220 RR2A48LA220 RR2A48HA220		RR2A48D550 RR2A48LA550 RR2A48HA550

## 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
LED on indication	Yes (Green for Forward, Red for Reverse)		

Specifications are subject to change without notice (05.06.2010)

## 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	50 VAC
Response time input to output	≤ 10 ms	≤ 70 ms	≤ 100 ms
Time delay F → R, R → F	Typical Minimum Maximum	200 ms* 30 ms 300 ms	200 ms* 30 ms 300 ms

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

## Output Specifications

	RR2A40.150	RR2A48.220	RR2A40.400	RR2A48.550
IEC and CCC rated operational current I <sub>e</sub> (AC-53a) @ Ta = 40°C	5 A	5 A	11 A	11 A
IEC rated operational current I <sub>e</sub> (AC-51) @ Ta = 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
	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 Ta = 25°C V <sub>out</sub> = 40Vrms	150 mArms	150 mArms	250 mArms	250 mArms
Off-state leakage current	≤ 1 mArms	≤ 1 mArms	≤ 1 mArms	≤ 1 mArms
Non-rep. surge current t=10ms	300A <sub>p</sub>	350A <sub>p</sub>	350A <sub>p</sub>	350A <sub>p</sub>
I <sup>2</sup> t for fusing t= 10ms	525 A²s	525 A²s	1800 A²s	1800 A²s
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/s²

## 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	5kA when protected by RK5 fuses	10kA when protected by RK5 fuses
RK5 fuse	TRS10R 10A	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

\* Applicable only for UL

\*\* Applicable for IEC/ CCC

## Housing Specifications

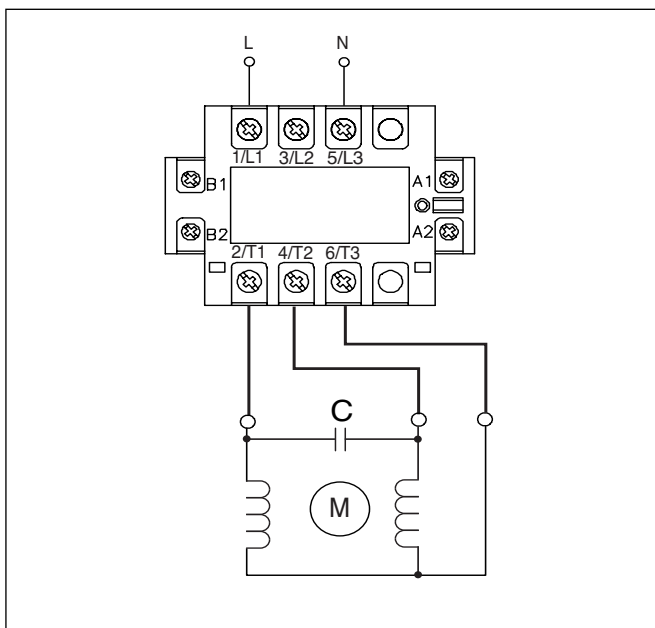
Weight	Approx. 430 g	Control terminal	
Housing material	Noryl, glass-reinforced	Mounting screws	M4
Colour	Black	Mounting torque	≤ 0.5 Nm
Base plate	Aluminium, nickel-plated	Wire size	Max. 2 x 2.5 mm <sup>2</sup> (AWG 14)
Potting compound	Polyurethane, black		Min. 2 x 1.0 mm <sup>2</sup>
Relay		Power 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), CCC
Markings	CE, EN 60947-4-2, GB 14048.6
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

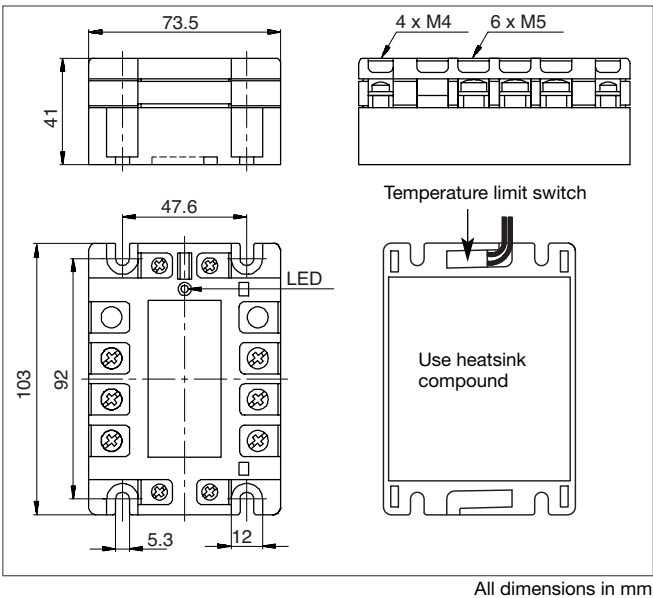
\* It is suggested that the input lines be installed together (such as a 3 core cable) to enhance susceptibility.

\*\* 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.



Dimensions

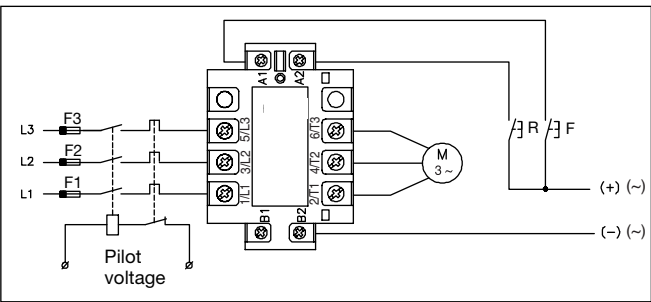


Accessories

- Heatsinks
- Fuses
- Temperature limit switch

For further information refer to "General Accessories".

Wiring Diagram



Functional Diagram

