

Motor Controllers

AC Semiconductor Motor Controller

Type RSHL MIDI SMART

CARLO GAVAZZI



- Soft starting and stopping of 3-phase induction squirrel cage motors
- 2-phase control with integral bypassing of semiconductors
- Low inrush and reduced vibration during starting
- Rated operational voltage: up to 600 VAC, 50/60Hz
- Rated operational current: up to 18A AC-53b
- LED status indicators
- Integrated device over-temperature protection*
- Integrated motor over-temperature protection
- Integrated auxiliary relays for end of ramp and alarms
- DIN rail mounting
- Current limit setting for 150%, 250%, 350%, 450% of full load current.
- Integrated overload protection with options for class 10 or class 20
- Monitoring of phase sequence, phase loss and phase-imbalance

Product Description

The RSHL Midi Smart is a compact easy-to-use AC semiconductor motor controller with which 3-phase motors with nominal currents up to 18A can be soft started and/or soft stopped.

The RSHL Midi Smart controls 2 phases only, while the third phase is continuously connected to the load. Soft starting and soft stopping is achieved by controlling the motor voltage. During normal running operation (<20A) the semiconductors are bypassed by internal electromechanical relays. Ramp profile, overload

trip class, current limit settings and alarm parameters are user adjustable via the front panel. Eight LEDs on the front panel indicate the states and alarms of the softstarter. The RSHL MIDI Smart includes an End of ramp auxiliary relay, Alarm auxiliary relay, and overtemperature protection. The RSHL Midi Smart has an integrated Current Limit and Overload Protection. The RSHL Midi Smart comes with an integrated heatsink and is ready to mount on DIN rail.

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Ordering Key

RSH L 48 18 C V21

H-line Motor Controller
Current limit & overload protection
Rated operational voltage
Rated operational current
Control voltage
Options

Type Selection

Type	Rated Operational Voltage U _e	Rated Operational Current I _e	Control Voltage U _c	Options
RSHL: H-line motor controller with current limit and motor overload protection	22: 127/220VACrms, 50/60Hz 48: 230/400VACrms, 50/60Hz 277/480VACrms, 50/60Hz 60: 346/600VACrms, 50/60Hz	02: 0.6 - 2 A AC-53b 05: 2 - 5 A AC-53b 12: 4.5 - 12 A AC-53b 18: 5 - 18 A AC-53b	C: 24 - 550 VAC/DC	V21: End of Ramp Relay, Motor Over-Temperature Protection and Alarm Auxiliary Relay. Internal over-temperature protection*

* Internal over-temperature protection is only for RSHL...18CV21

Selection Guide

Rated operational voltage U _e	Rated operational current I _e			
	2A AC-53b	5A AC-53b	12A AC-53b	18A AC-53b
220VACrms	RSHL2202CV21	RSHL2205CV21	RSHL2212CV21	RSHL2218CV21
400/ 480VACrms	RSHL4802CV21	RSHL4805CV21	RSHL4812CV21	RSHL4818CV21
600VACrms	RSHL6002CV21	RSHL6005CV21	RSHL6012CV21	RSHL6018CV21

Conductor Data

Line conductors:

L1, L2, L3, T1, T2, T3

according to EN 60947-1

flexible	2.5 10mm ² 2.5 2 x 4mm ²
rigid (solid or stranded)	2.5 10mm ²
flexible with ferrule	2.5 10mm ²
UL/CSA rated data	
flexible	AWG14...8 AWG14...2 x 10
rigid (solid or stranded)	AWG14...8
Terminal screws	6xM4 (cage clamp)
Tightening torque	2.0Nm (22lb.in) with Posidrive bit 2
Stripping length	8.0mm

Secondary conductors:

A1, A2, A3, A4, P1, P2, 34, 31/41, 42

according to EN 60998

flexible	0.5 1.5mm ²
flexible with ferrule	0.5 1.5mm ²
rigid (solid)	0.5 2.5mm ²
UL/CSA rated data	AWG22...12
Terminal screws	9xM3 (cage clamp)
Tightening torque	0.5Nm (4.5lb.in) with Phillips bit 0
Stripping length	6.0mm

General Specifications

Form designation	1
Weight	620g (approx.)
Mounting	DIN Rail 35mm
Housing material	Polyamide (conforms to UL 94 V0)

Status Relays

Auxiliary relay	
End of ramp	Normally Closed (21 : 22) Normally Open (21 : 24)
Alarm relay output	Normally Closed (95 : 96)
Auxiliary relay contact capacity	2A, 250VAC 2A, 30VDC

Input Specifications

Rated control input voltage U _c A1: A2	24 - 550 VAC/DC
Rated AC frequency	50/60Hz ±10%
Max. control input current	3mA
Response time input to output	400 ms
Dielectric strength	
Dielectric withstand voltage	
Input to supply	2.5 kVrms
Input to heatsink	2.5 kVrms

Supply Specification

Rated operational voltage	
U _e through L1, L2 L3	RSHL22.. 127/220VAC -15% / +10% RSHL48.. 230/400VAC -15% / +10% 277/480VAC -15% / +10% RSHL60.. 346/600VAC -15% / +10%
Blocking voltage	RSHL 22... 800 V _p RSHL 48... 1200 V _p RSHL 60... 1600 V _p
Rated AC frequency	50/60Hz ±10%
Rated insulation voltage	630V, accord. to EN 60947-1
Dielectric strength	
Dielectric withstand voltage	
Supply to input	2.5 kVrms
Supply to heatsink	2.5 kVrms
Supply to external supply	2.5 kVrms
Integrated varistor	yes

External Supply Specifications

External supply voltage U _s ,	
A3:A4	24VAC/DC -15% / +10%
Rated AC frequency	50/60Hz ±10%
Rated supply current	250mAAC/DC
Dielectric strength	
Dielectric withstand voltage	
Supply to input	2.5 kVrms
Supply to heatsink	2.5 kVrms

Load Ratings

		RSHL22..CV21 / RSHL48..CV21	RSHL60..CV21
IEC rated operational current I _e (AC-53b)	RSHL..02CV21 RSHL..05CV21 RSHL..12CV21 RSHL..18CV21	2A 5A 12A 18A	2A 5A 12A 18A
Overload cycle according to EN/IEC 60947-4-2 ¹ @ 40°C surrounding temp.	RSHL..02CV21 RSHL..05CV21 RSHL..12CV21 RSHL..18CV21	2: AC-53b : 4-5 : 0 5: AC-53b : 4-5 : 2.4 12: AC-53b : 4-5 : 21 18: AC-53b : 4-5 : 62	2: AC-53b : 4-5 : 0 5: AC-53b : 4-5 : 2.4 12: AC-53b : 4-5 : 26 18: AC-53b : 4-5 : 62
Number of starts per hour @40°C ²	RSHL..02CV21 RSHL..05CV21 RSHL..12CV21 RSHL..18CV21	360 290 116 50	360 290 100 50
Minimum full load current	RSHL..02CV21 RSHL..05CV21 RSHL..12CV21 RSHL..18CV21	0.6 AAC rms 1.5 AAC rms 4.5 AAC rms 5 AAC rms	0.6 AAC rms 1.5 AAC rms 4.5 AAC rms 5 AAC rms

¹ Applicable with the overload profile specified in Overload Cycle and Starting Duty section

² Taken from tables referring to 45mm spacing.

Motor Ratings

IEC rated operational current I _e (AC-53b)	2A	5A	12A	18A
Assigned motor rating @60°C/UL rating @60°C				
220VACrms	0.5kW/ 0.5HP	1.1kW/ 1.5HP	3kW/ 3HP	4kW/ 5HP
400 VACrms	0.75kW/ 0.75HP	2.2kW/ 3HP	5.5kW/ 7.5HP	7.5kW/ 10HP
480VACrms	1.1kW/ 1HP	2.2kW/ 3HP	5.5kW/ 7.5HP	7.5kW/ 10HP
600VACrms	1.1kW/ 1HP	3kW/ 5HP	7.5kW/ 10HP	11kW/ 15HP

Environmental Specifications

Operating temperature	-20°C to +60°C (-4°F to +140°F)	Degree of Protection	IP20 (EN/IEC 60529)
Storage temperature	-50°C to +85°C (-58°F to +185°F)	Installation category	III
Relative humidity	<95% non-condensing @40°C	Installation Altitude	Above 1000m derate linearly by 1% of unit FLC per 100m to a maximum altitude of 2000m
Pollution Degree	2		

Current Limit Feature

% of full Load Current	Suitable for type of load	Time inrush current is limited (t _{inrush})	Function after (t _{inrush}) and RSHL is not fully ON
150%	Light	5s	Device continue with the Standard Profile settings (Parameter 1)
250%	Light	5s	
350%	Slightly heavy	10s	
450%	Heavy	20s	

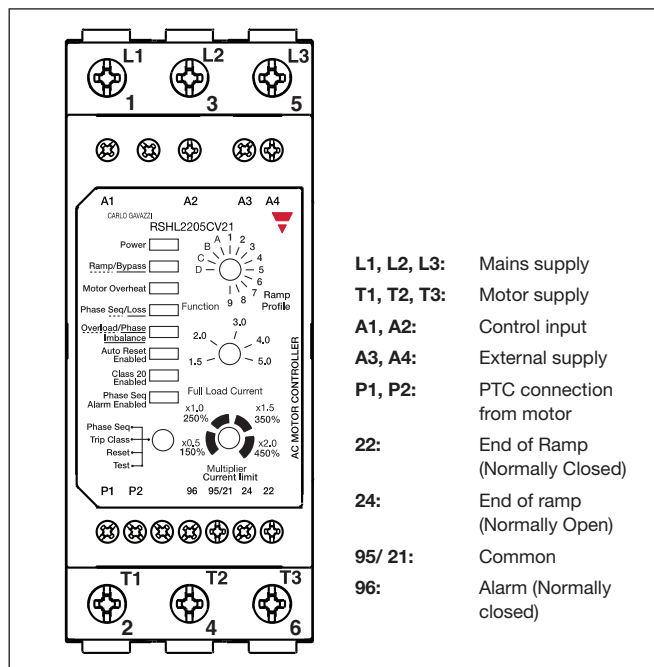
Note: In Current Limit Operation, no soft stop is offered. The motor is left coasting when control is removed.

Standards

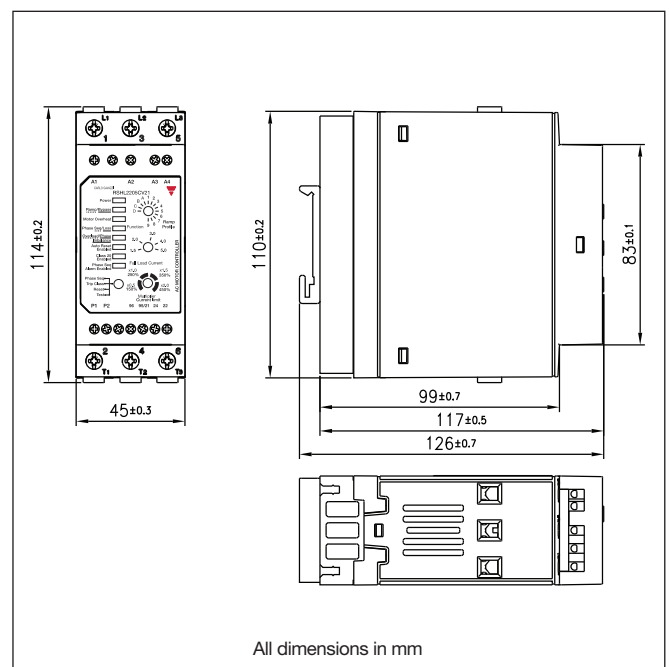
Approvals	UL (E172877), cUL	Conducted radio-frequency immunity	IEC/ EN 61000-4-6, PC1 10V/m, 0.15-80MHz
CE Marking	LVD EMCD : Immunity Emission	Voltage dips & interruptions	IEC/ EN 61000-4-11 100% Ue dip, 20ms, PC2 60% Ue dip, 200ms, PC2 30% Ue dip, 500ms, PC3 100% Ue interruption, 5000ms, PC3 60% Ue dip, 100ms, PC2 60% Ue dip, 1000ms, PC2 30% Ue dip, 10ms, PC2 100% Ue interruption, 5000ms, PC3
Electrostatic Discharge ESD Immunity	IEC/ EN 61000-4-2 8kV, PC2 Air discharge 4kV, PC2 Contact	EN60947-4-2	
Electrical fast transient/ Burst Immunity	IEC/ EN 61000-4-4 2kV, PC2 2kV, PC2	Radio interference field emissions (radiated)	CISPR 11 IEC/ EN 55011, Class A
Electrical Surge Immunity	IEC/ EN 61000-4-5, PC2 Output, line to line 1kV Output, line to earth 2kV Input, line to line 1kV Input, line to earth 1kV	Radio interference voltage emissions (conducted)	CISPR 11 IEC/ EN 55011, Class A
Radiated Radio Frequency (Does not meet EN61000-6-2-2005 requirements requesting tests up to 2.7GHz)	EN 61000-4-3, PC1 10V/m, 80-1000MHz		

Note: EMC testing was performed with the RSHL connected to representative motor loads of 1.1/ 4.0kW. The EMC performance of the controller would eventually have to be evaluated with the controller connected and fitted as part of the complete system in the end application.

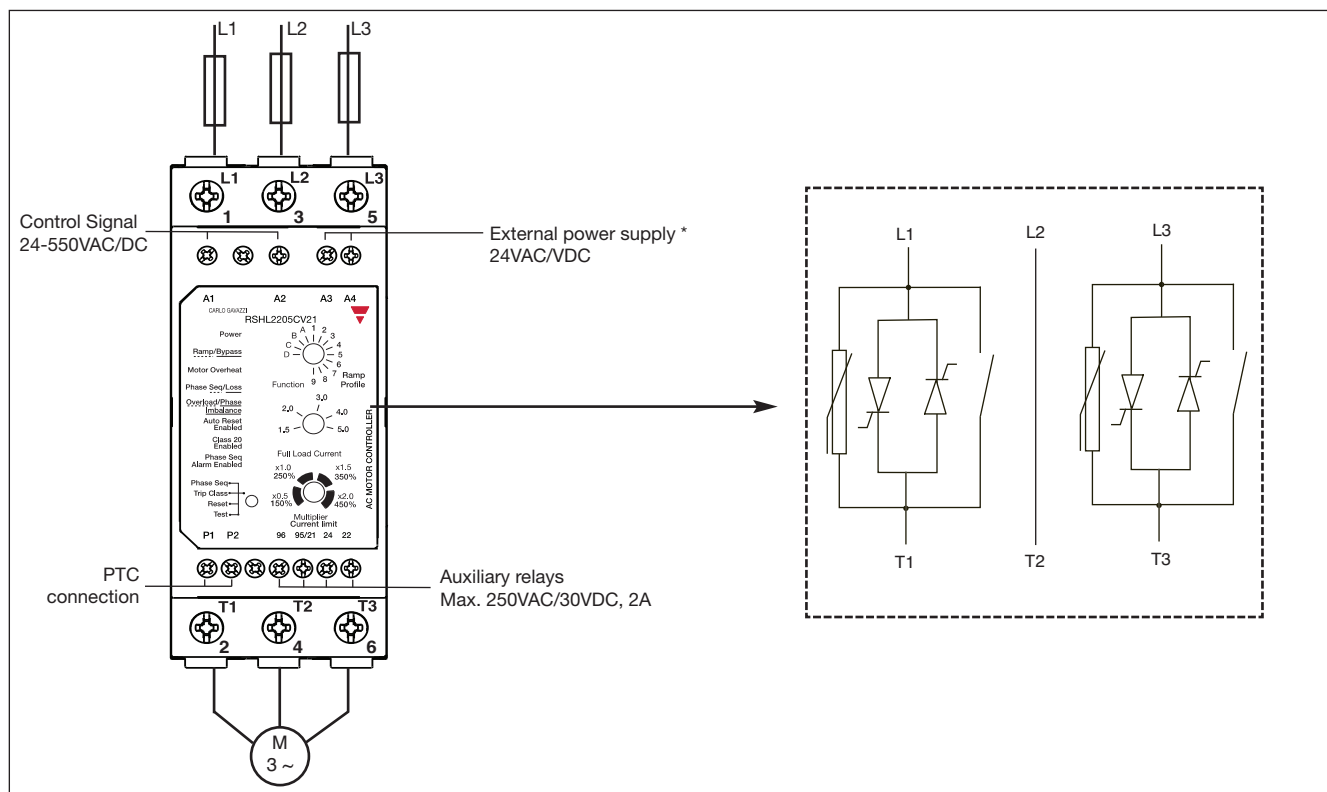
Terminal Diagram



Dimensions



Connection Diagram



* For the 24VDC external supply, CG power supply model SPD24051 can be used

Short circuit Protection (according to EN/IEC 60947-4-2) & UL508

Type of coordination: 1	RSHL..02CV21	RSHL..05CV21	RSHL..22/ 40/ 48 12CV21	RSHL..22/ 40/ 48 18CV21
Rated short circuit current	10kA when protected by RK5 fuses TRS 15R (15A)	10kA when protected by RK5 fuses TRS 15R (15A)	10kA when protected by RK5 fuses TRS 40R (40A)	10kA when protected by RK5 fuses TRS 40R (40A)
Type of coordination: 1			RSHL6012CV21	RSHL6018CV21
Rated short circuit current			10kA when protected by RK5 fuses TRS 35R (35A)	10kA when protected by RK5 fuses TRS 35R (35A)
Type of coordination: 2	RSHL..02CV21	RSHL..05CV21	RSHL..12CV21	RSHL..18CV21
Rated short circuit current	10kA when protected by semiconductor fuses Ferraz Shawmut 16A, Class URC Art. No. 6.9 CP gRC 14.51.16	10kA when protected by semiconductor fuses Ferraz Shawmut 25A, Class URC Art. No. 6.9 CP gRC 14.51.25	10kA when protected by semiconductor fuses Ferraz Shawmut 50A, Class A70QS Art. No. A70QS50-4	10kA when protected by semiconductor fuses Ferraz Shawmut 60A, Class A70QS Art. No. A70QS60-4
Semiconductor fuse				

Electronic Overload Relay

Overload Trip Class in accordance to IEC 60947-4-1

Overload Condition

@ 1.05xI_e (cold condition)
 @ 1.2xI_e (hot condition)
 @ 1.5xI_e (hot condition)
 @ 7.2xI_e (cold condition)

Class 10 (default)

trip cannot be within 2 hrs
 trip has to be within 2 hrs
 trip has to be within 240s
 trip has to be within 4 to 10s

Class 20 (user selected)

trip cannot be within 2 hrs
 trip has to be within 2 hrs
 trip has to be within 480s
 trip has to be within 6 to 20s

Note: Device remembers settings on loss of power but not overload condition.

Over-temperature Protection

Motor Overheat Protection

Motor PTC connection

P1:P2

PTC Resistance

< 500Ω	No Trip:	Normal Running
> 1000Ω	Trip:	Overheat Alarm LED & Alarm Relay Activated
< 300Ω	Reset	

Soft Starter Protection

Only available for RSHL..18CV21 units. In other models, the overload protection becomes active before the internal temperature protection

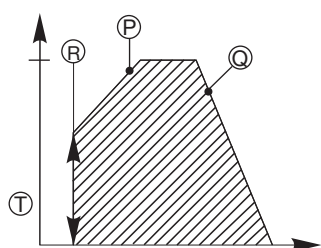
Alarms

Auxiliary Relays Connection 95/21: 96 ¹	Alarm Output (Normally Closed).	Phase Loss Alarm Ramping Idling (when power supply is ON and Control Input is OFF)	Not present
Phase Sequence Alarm	Available when Phase Sequence Alarm is enabled. In such condition device is disabled and alarm indicated. ²	Bypass Mode	All three phases must be present for the device to operate. If any phase is missing, alarm is indicated. Device will switch off motor, and alarm is indicated
		Phase Imbalance Alarm Bypass Mode ³	In Bypass mode, the device will trip if the amplitude of the current in one phase is greater than 50% of one of the other two phases for 3 seconds.

Notes:

- 1 Activated in case of phase loss, phase sequence, phase imbalance, overheat and overload conditions, and shorted power devices. The respective LED indicates the type of alarm. During alarm conditions, if RSHL is in the running mode, it will cease to operate or if in the idling mode it will not start.
- 2 To operate the device in reversing mode the Phase Sequence Alarm should be disabled.
- 3 Manual resettable only.

Operational Diagram



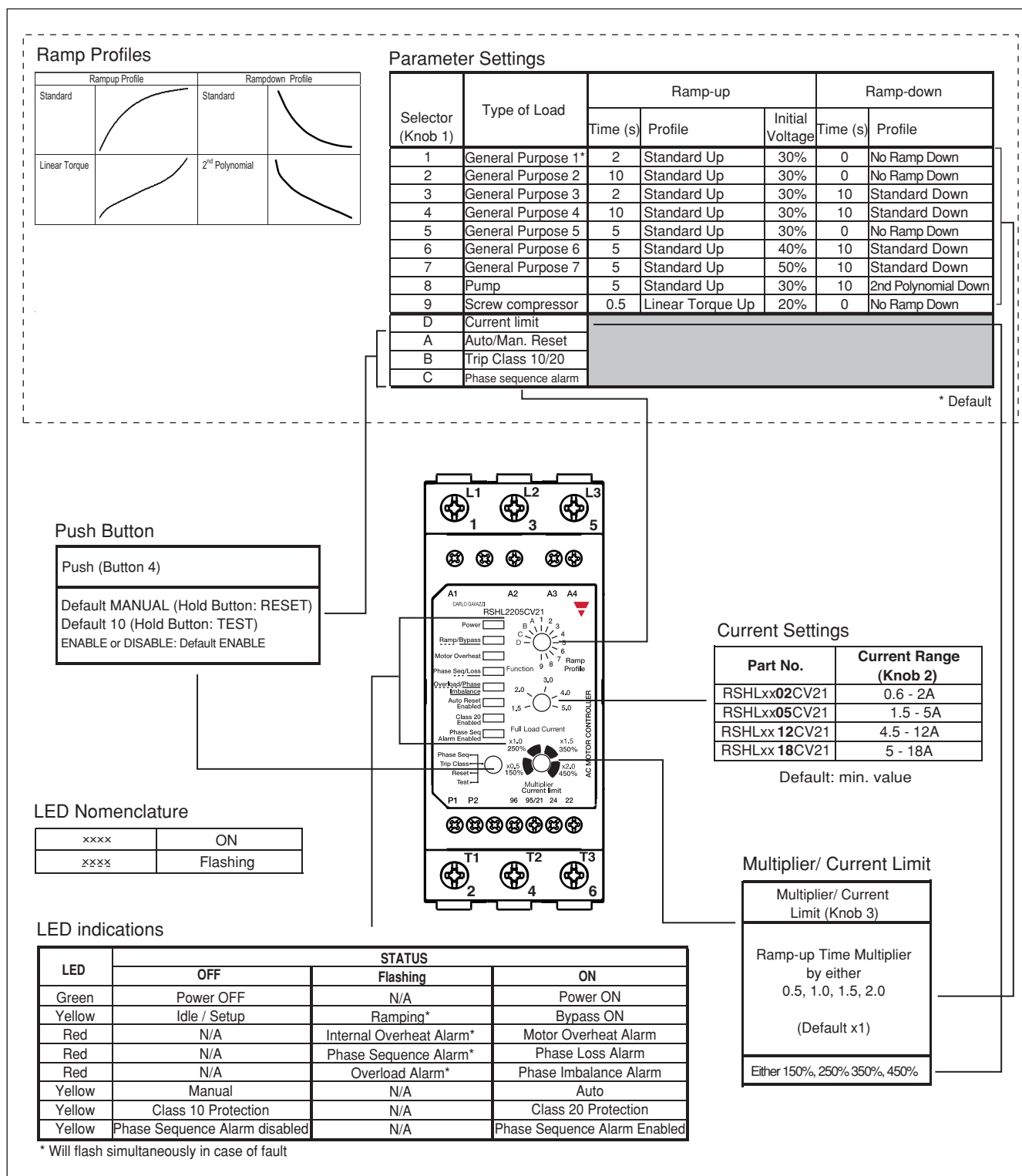
(P) Ramp-up time: time from zero load voltage to full load voltage.

(Q) Ramp-down time: time from full load voltage to zero load voltage.

(R) Initial voltage: voltage at the start of the ramp-up function..

(T) Initial Torque

Operational Diagram



Mode of Operation

1. Connections

1.1 Power supply

In order to energize the RSHL an **external power supply** (24V AC/DC, 50/60Hz) should be connected between terminals **A3:A4**.

1.2 Control input

The **control input** is to be applied between connections **A1:A2**. The RSHL soft starter supports a control input signal rating of 24-550V AC/DC

1.3 Mains supply

The three wires of the **three-phase mains supply** is to be connected in terminals marked **L1, L2** and **L3** respectively.

1.4 Motor Connections: windings

The **three-phase motor** (load) is to be connected with terminals marked **T1, T2** and **T3**. The configuration of inside-delta is not supported in this device.

1.5 Motor Connections: PTC

If the motor is equipped with a **PTC** device (for the measurement of temperature) it can be connected between terminals **P1:P2**. PTC Characteristics should be as per DIN44081/2. If motor PTC is not connected, terminals P1 and P2 should be bridged with the link provided. Unconnected P1 and P2 terminals will trigger the motor over temperature alarm.

1.6 End of Ramp and Alarms

The device is equipped with two **auxiliary relay** outputs as follows:

- (i) **End of Ramp** Normally Closed Terminals **21 : 22**, Normally Open Terminals **21 : 24**
- (ii) **Alarm** Normally Closed Terminals **95 : 96**

2. Getting Started

Please refer to the "Operational Diagram"

2.1 Setting the Motor Full Load Current (I_e)

This is set to the desired level by adjusting the **Full Load Current Knob 2**. Caution should be taken to set the correct value as this might cause damage in either the device and/or the motor. Unless changing the motor this setting

should never be changed.

2.2 Soft Start/Stop Settings

The user can chose either one of the **nine Standard ramping profiles** or a **Start with Current limit profile**. Please refer to the "Operational Diagram"

2.2.1 Selecting a Standard Ramping Profile

The selection of one of the nine Standard Ramping Profiles is made easy by turning the **Ramp Profile/Function (Selector Knob 1)** to the desired position according to the selection that is made after referring to **Parameter Setting Table** in the "Operational Diagram".
Example: The desired profile is [ramp up=5s, ramp down=10s, initial torque=30%]. Select **Pump** by setting the **Selector Knob 1** to position **8**. Then proceed to set the Multiplier as explained in the next step.

2.2.2 Changing the Ramp-up Time of a Standard Ramping Profile

The **Multiplier/Current Limit Knob 3** allows an increase or reduction of the ramp-up time of the selected Standard Ramping Program.
Example: The **selector knob 1** has been set to position **8** and a ramp up time of **10s** is desired. The default ramp up of this program is **5s**. By setting the Multiplier to position **x2.0** the ramp up is time changed to **10s**.

2.2.3 Selecting and Setting the Current Limit profile

If **Current Limit profile** is desired instead of a **Standard Ramping Profile**, this is selected by setting the **Ramp Profile/Function Selector Knob 1** to position **D**. In Current Limit profile the device limits the inrush current during ramp-up to the current limit set by the user. The current limit level is set by turning the **Multiplier/Current Limit knob 3** to the desired percentage of Full Load Current (I_e).
Example: The Full Load Current (I_e) is 10A. The desired current limit is ≤40A. The Ramp Profile/Function selector

knob 1 is turned to position **D**. The Multiplier knob 3 is turned to 350%. This will set the current limit to 35A which is within the desired range.

2.3 Overload Settings

The **overload functions** are set by using the **selector knob 1** in combination with the **push button 4**.

2.3.1 Selecting the Trip Class

This device can operate to either Trip Class 10 or Trip Class 20. The overload trip conditions are according to IEC 60947-4-1. These are summarised in the section entitled **Electronic Overload Relay**. Trip Class 10 is the default setting. To change to Trip Class 20, the Ramp Profile/Function **selector knob 1** is turned to position **B** and the **push button 4** is pressed once. The yellow LED marked **Class 20** goes ON. To change back to Trip Class 10, the **selector knob 1** is turned to position **B** and the **push button 4** is pressed once. The yellow LED marked **Class 20** goes OFF.

2.3.2 Setting the Overload Reset Mode (Manual or Automatic)

Manual Reset is the default setting. To change to **Automatic Reset**, the **Selector Knob 1** is turned to position **A** and the push button 4 is pressed once. The yellow LED marked **Auto Reset** goes ON. To change back to Manual Reset, the **Selector Knob 1** is turned to position **A** and the **push button 4** is pressed once. The yellow LED marked **Auto Reset** goes OFF.

2.3.3 Overload Function Test

The **overload function test** works only when the device is idle. This function is not available if the device is either in the running (ramping or bypass) or in the alarm mode. To perform an overload function test, the **Selector Knob 1** is turned to position **B** and the **push button 4** is pressed and held down until the device enters the Overload Function Test (approximately 2 seconds). In this condition the red

LED marked **Overload/Phase Imbalance** starts flashing. Further the load is disconnected and the Alarm Relay becomes active.

To exit the **overload function test** the user would need to turn **Selector Knob 1** to any Parameter Setting from 1 to 9 or to Position **D**, and **push button 4** is pressed and held down for approximately 2 seconds until the device exits the Overload Function Test.

2.4 Enabling and Disabling Phase Sequence Monitoring

Phase Sequence monitoring Enabled is the default setting. The yellow LED marked **Phase Seq Enable** is ON. To disable this function, the **Selector Knob 1** is turned to position **C** and the **push button 4** is pressed once. The yellow LED marked **Phase Seq Enable** goes OFF. To enable this function, the **Selector Knob 1** is turned to position **C** and the **push button 4** is pressed once. The yellow LED marked **Phase Seq Enable** goes ON. When using a reversing relay in combination with this device, this function should be disabled.

3. LED Indication

Refer to the section entitled **LED indication**

4. Alarms

Refer to the section entitled **Alarms**. Reset of alarms are the same as for the overload as in 2.3.2.

5. Over-temperature Protection

Refer to the section entitled **Over-temperature Protection**.

6. Short-circuit Protection

Refer to the section entitled **Short-circuit Protection**, as in figure 1 of the wiring diagram.

7. Device Malfunction

In the case where the supply LED is ON and the four LED under it are flashing, this would indicate that the device is Faulty and should be returned for servicing.

Wiring Diagram

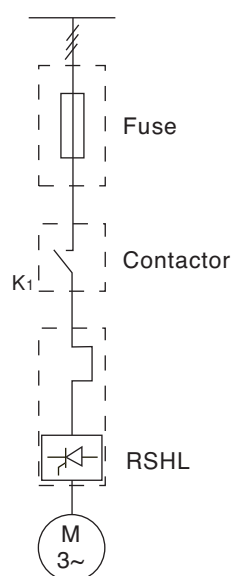


Fig. 1a

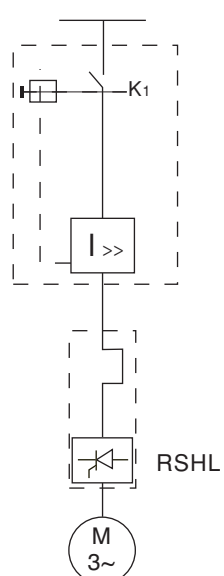


Fig. 2a

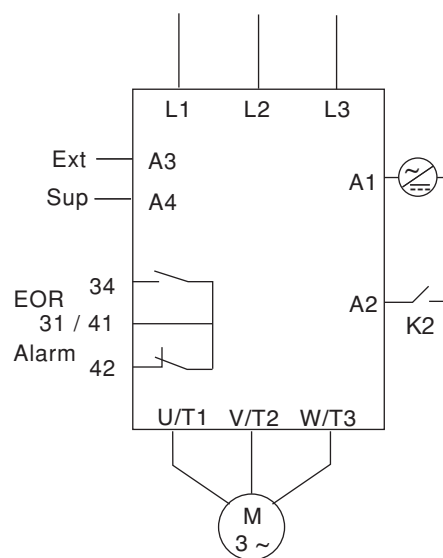


Fig. 3a

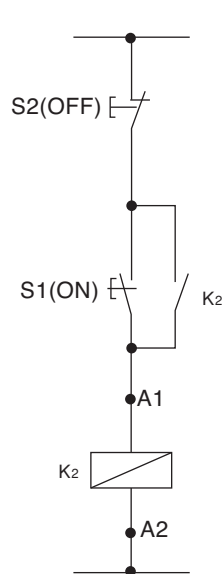


Fig. 4a

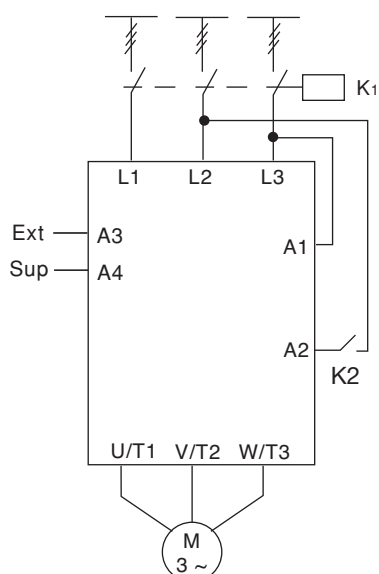


Fig. 5a

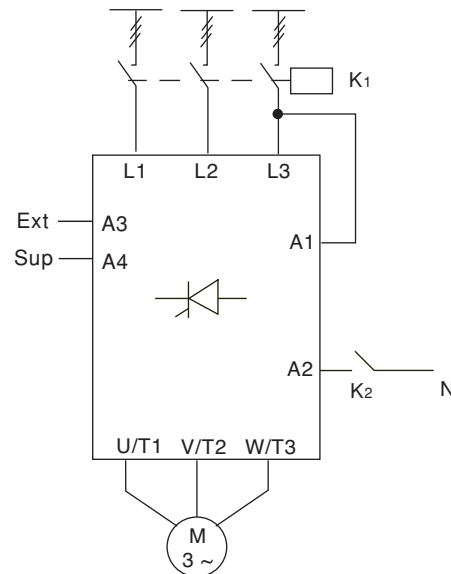


Fig. 6a

Wiring Diagram (cont.)

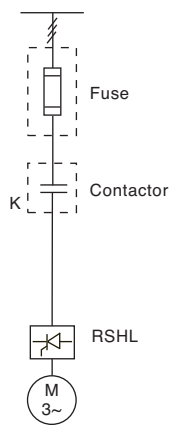


Fig. 1b

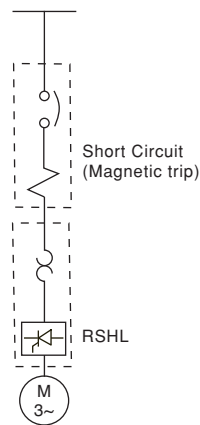


Fig. 2b

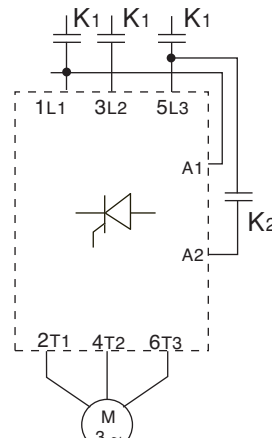


Fig. 5b

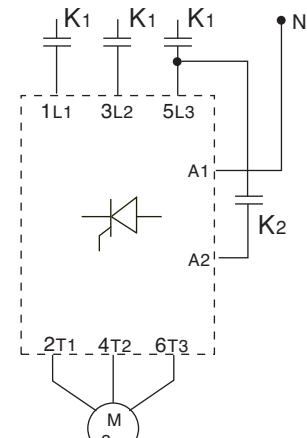


Fig. 6b

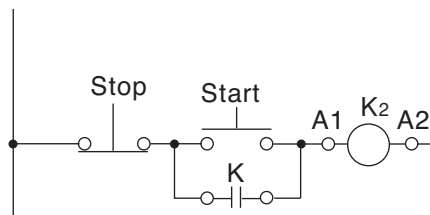


Fig. 4b

NEMA

On normal conditions the motor controller provides bypassing of the semiconductors during running operation. In case of Overload Conditions (current exceeds 20A) while in bypass mode, semi-conductors are again activated and bypass relays deactivated. Therefore the semiconductors can only be damaged by short-circuit currents during ramping (in normal conditions) or while in overload conditions. **Please note that the motor controller does not isolate the motor from the mains.**

Figure 1: Protection of the device when using fuses.

Protection with semiconductor fuses is intended to protect the motor feeder and motor controller from damage

due to short-circuit. RSHL protects motor load in overload conditions.

Figure 2: Protection using a magnetic trip.

In this configuration, the motor and its feeder are protected for the overload condition by the internal overload protection of the RSHL. However, due to the relatively slow response of the magnetic trip and the in the absence of semiconductor fuses, damage to the motor controller can occur in this circuit topology.

Figure 3: Secondary conductors.

3.1: Control using a 2-position switch. When K2 is closed, the control input is supplied to A1

and A2 and soft starting of the motor is performed. When K2 is opened, soft stopping is performed.

3.2: Auxiliary Relay

The End of Ramp (EOR) relay 34: 31/ 41 (Normally Open). If EOR is issued to activate external bypass contactors overload protection will be deactivated as current is shunted away from RSHL. Auxiliary alarm relay 31/ 41 : 42 is NC.

This relay is activated in case of any alarm.

Figure 4: Control using ON and OFF push buttons

Pushing S1 soft starts the RSHL. Pushing S2 soft stops the RSHL. K2 is an auxiliary contact of the mains contactor.

Figure 5: Control using 2 phases

Connecting input A1, A2 to two of the incoming lines will soft start the motor when K2 is operated. When K2 is switched off, the motor will soft stop. This configuration does not apply to the RSHL60.CV21 versions.

Figure 6: Control when using operational voltage greater than 550V

Connecting A1 to Neutral and A2 to one of the incoming phases (or vice-versa) will soft start the motor when K2 is closed. When K2 is opened, the motor will soft stop.

Timing Diagram

Diagram 1: Normal Operation (Factory Defaults)

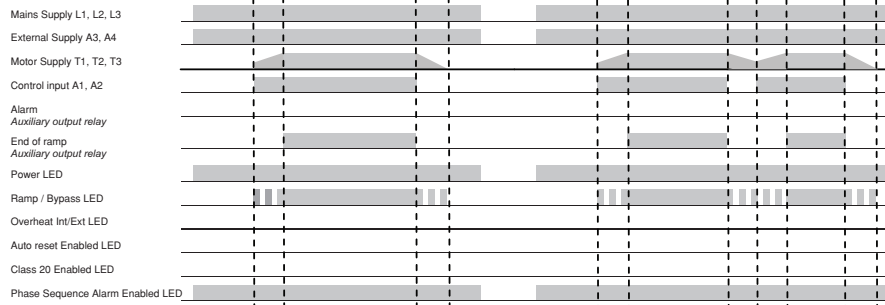


Diagram 2a: Over-temperature alarm during ramping mode

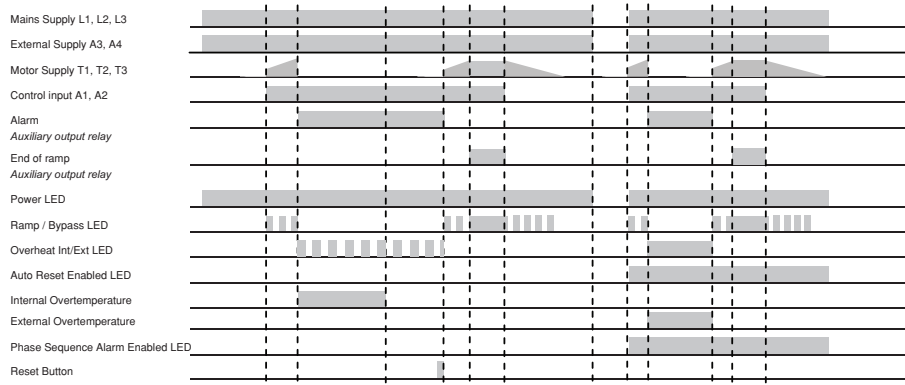
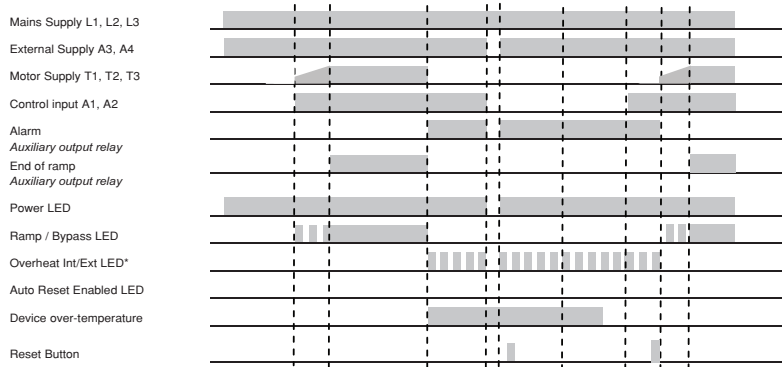
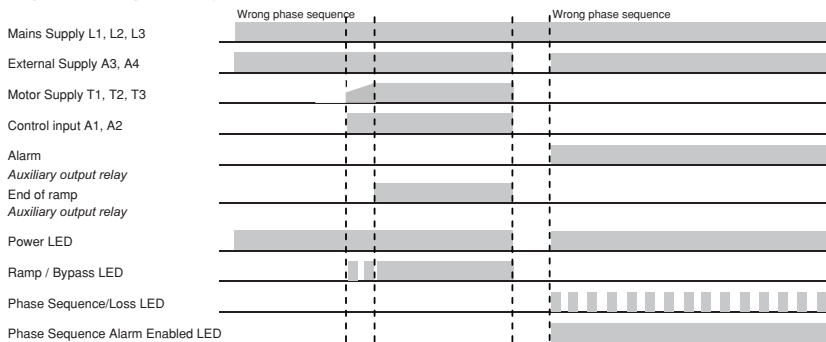


Diagram 2b: Over-temperature during bypass mode.



* Only for RSHL-18CV21

Diagram 2c: Wrong phase sequence alarm



Note:

1. If Phase Sequence Alarm is disabled (Phase Sequence Enabled LED is off); motor will rotate in the reverse direction, if any two phases are interchanged
2. Phase Sequence Alarm can either be reset manually or automatically

Timing Diagram (cont.)

Diagram 2d: Phase Loss during idling mode

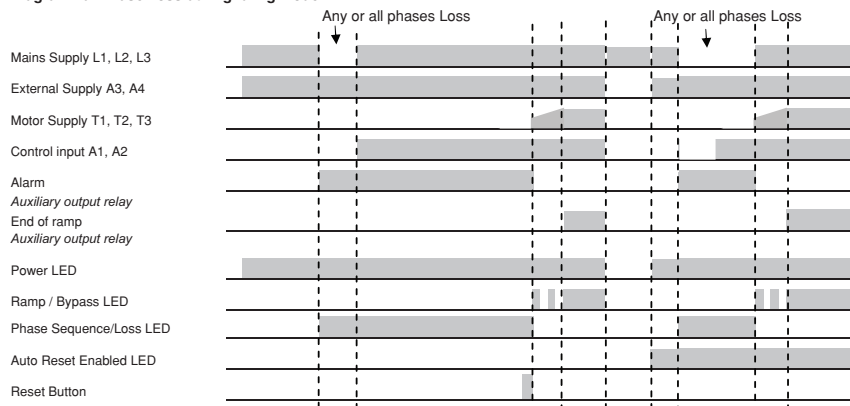


Diagram 2e: Phase Loss during bypass mode

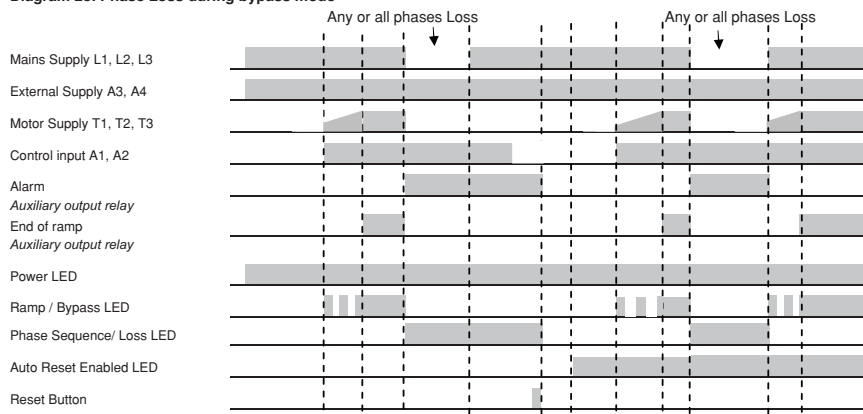
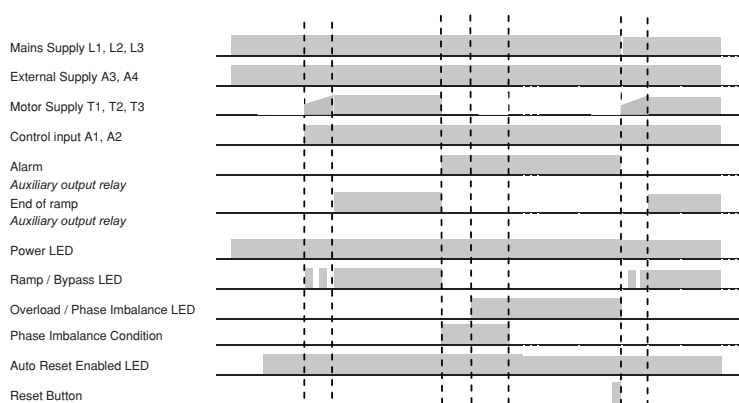


Diagram 2f: Phase Imbalance while in bypass mode

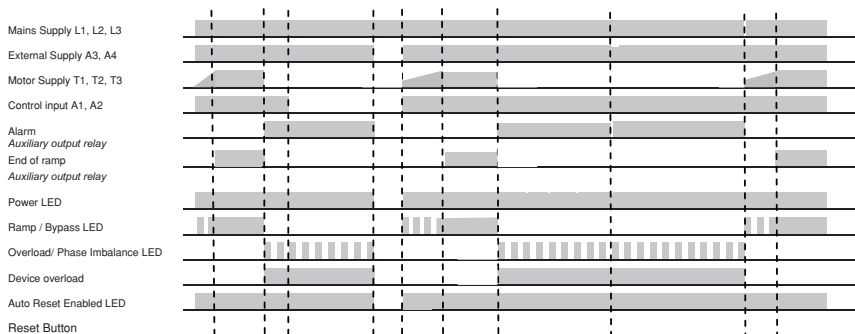


Note:

1. Phase Imbalance Alarm is indicated when the difference in current magnitude between respective phases is greater than 50% for more than 3s
2. Phase Imbalance Alarm can only be resetted manually.

Timing Diagram (cont.)

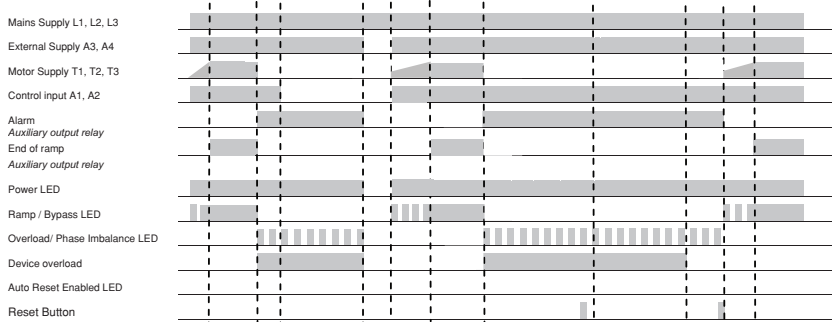
Diagram 2g: Overload alarm (Automatic Reset)



Note:

1. RSHL will only automatically reset Overload and resume normal running when sufficient cooling down time has passed.
2. In case of external supply cycling; user has to make sure that sufficient time for cooling is allowed.
In case of insufficient cooling time motor and/or device may be damaged.

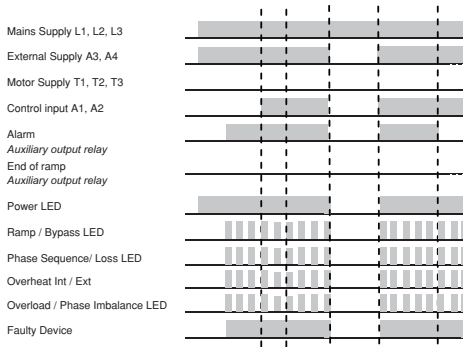
Diagram 2h: Overload alarm (Manual Reset)



Note:

1. After a current overload occurs; a manual reset is only executed after sufficient time has passed for motor to cool down.
2. This precaution can be bypassed by power cycling.
3. In case of power cycling; user has to be sure that sufficient time for cooling is allowed.
In case of insufficient cooling time motor and/or device may be damaged.

Diagram 2i: Faulty Device



Note:

1. This alarm can only be reset through External Power Supply Cycling. If Alarm does not reset with External Power Cycling, device is permanently damaged.

General Notes

Note 1: When a motor PTC is connected, electromagnetic noise may be conducted into the unit. Thus if abnormal function is observed, the use of ferrite beads on the PTC wire (at the end) is recommended.

Note 2: The overload alarm is determined by the Motor Current (Knob 2) setting and selection of the trip class. Please refer to operational diagram.

Note 3: Delay time between the moment of pressing the push button until the actual response is 2s.

Note 4: Since the RSHL Smart is a two-phase control the third-phase (L2 - T2) is always connected, and caution should be always observed.

Overload Cycle & Starting Duty

Overload profile

In: AC-53b: x-Tx: OFF time

where: I_e = nominal current through RSHL

x = overload current as a multiple of I_e

Tx = duration time for the controlled overload currents during starting

OFF time = minimum OFF time before a subsequent start may be initiated

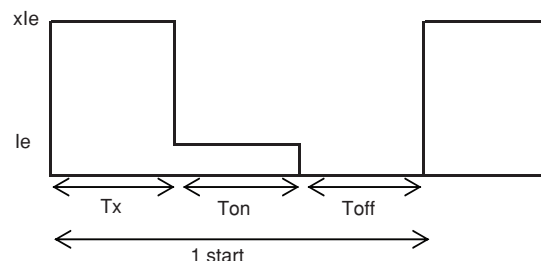
The following tables indicate the max. allowable no. of starts for Overload Profile:

I_e : AC-53b: 4-5: OFF time, Ton = 5sec

Example: To find the maximum no. of starts for RSHL4005CV21 at a nominal current of 10A at 50°C with 0mm spacing.

According to Table 1, the maximum no. of starts = 85, hence Overload Profile for this application would be:

10: AC-53b: 4-5: 32, i.e. an OFF time of 32s is required before any subsequent start may be initiated



Spacing: 0mm

Table 1: RSHRxxxyCV21, where xx = 22 or 48, yy = 02 or 05

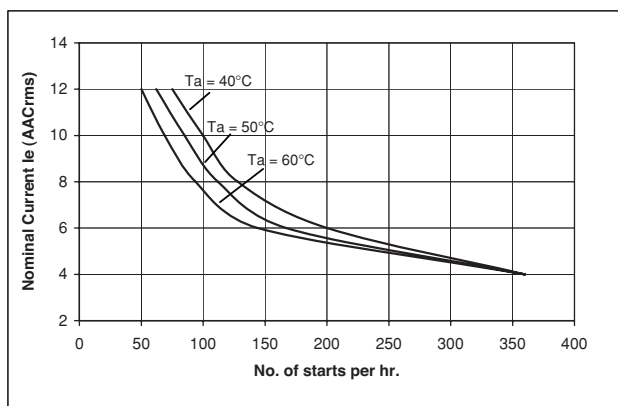


Table 2: RSHRxxxyCV21, where xx = 22 or 48, yy = 12 or 18

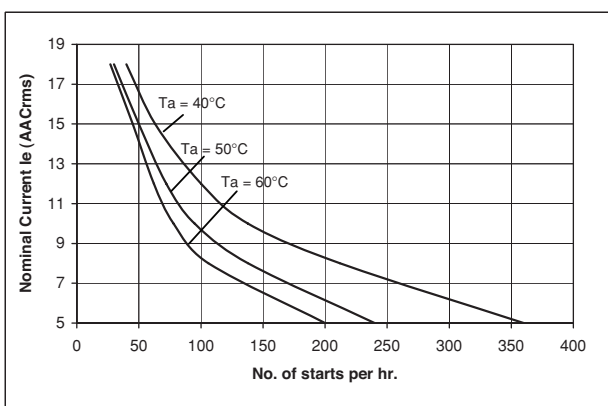
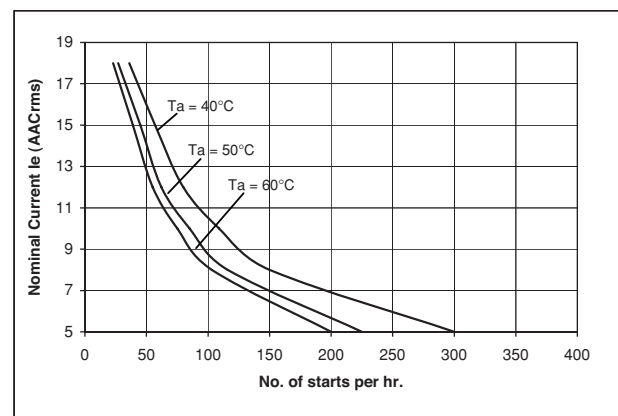


Table 3: RSHR60yyCV21, where yy = 02, 05, 12 or 18



Overload Cycle & Starting Duty (cont.)

Spacing: 45mm

Table 4: RSHRxxyyCV21, where xx = 22 or 48, yy = 02 or 05

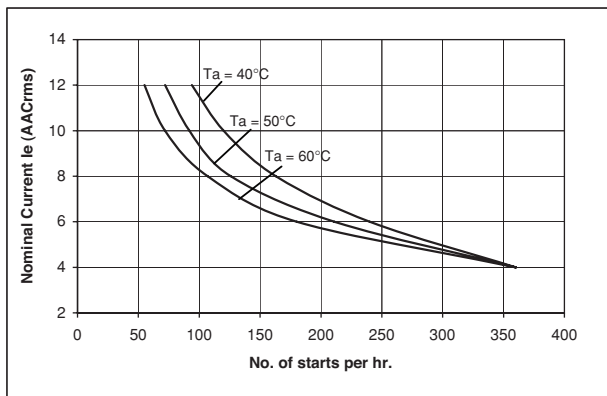


Table 5: RSHRxxyyCV21, where xx = 22 or 48, yy = 12 or 18

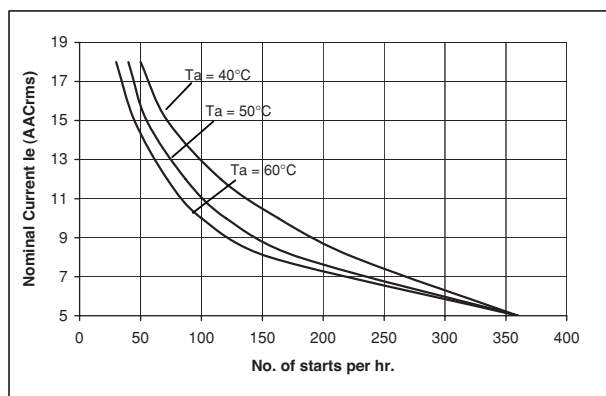
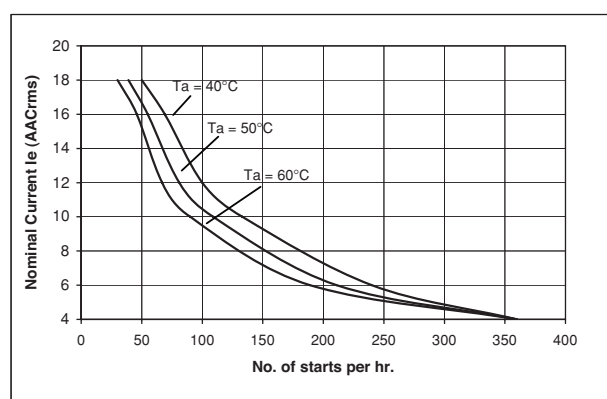


Table 6: RSHR60yyCV21, where yy = 02, 05, 12 or 18



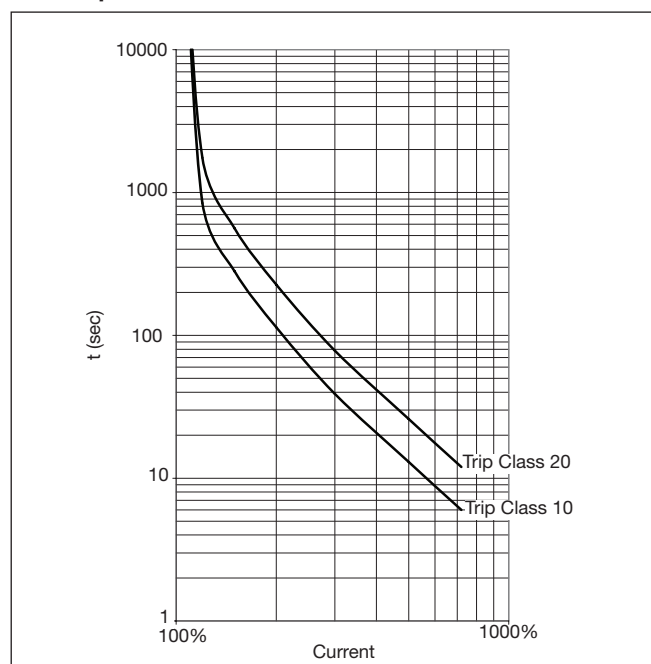
Accessories - External Power Supply 24VDC - SPD 2405 1

Rated input voltage	100-240	Voltage trim range	21.6 - 28.8VDC
Voltage range	AC 90 - 265VAC	Output voltage accuracy	± 1%
	DC 120 - 370VDC	Output current	0.21A
Frequency range	47 - 63Hz		

For further details refer to Carlo Gavazzi SPD series datasheet

Overload Characteristics

Cold Trip



Hot Trip

