

# Solid State Motor Contactor

## 3-Phase

### Types REC2B, REC3B

CARLO GAVAZZI



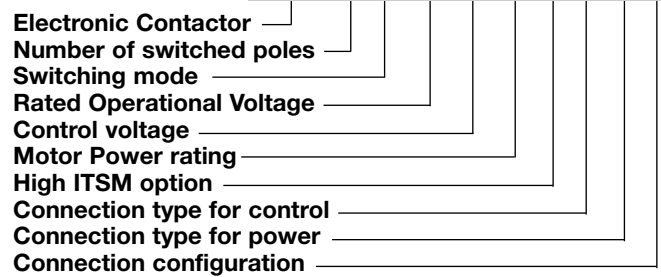
- AC electronic motor contactor
- Instantaneous Switching
- Three-pole with two-phase and three phase switching options
- Control status LED indication
- Two control input ranges: 15-32 VDC, 90-253 VAC
- Motor rating up to 4kW / 5.5hp
- Rated Operational Voltage up to 600 VAC
- Opto-isolation at 4kVrms
- Mechanical Contactor resemblance with covered heatsink
- DIN-rail and panel mounting

## Product Description

REC is an electronic contactor intended to replace the traditional mechanical counterpart used to switch three phase motors. The range includes 2 and 3 phase switching versions up to 4kW and 600Vrms. Options with high surge current and I<sup>2</sup>t for fusing purposes are also available. The relay switches instantaneously upon application of

the control voltage to emulate mechanical relay operation. A covered heatsink resolves any issues with regards to cables running close to the heatsink and eliminates the need for protective earth cabling. The product can be mounted on DIN-rail or on a panel. Note: Specifications stated at 25°C unless specified.

## Ordering Key **REC 3 B 48 A 3 0 G K E**



## Ordering Key

Switching poles	Switching mode	Rated operational voltage	Control voltage	Motor power rating	Itsm control	Connection control	Connection power	Configuration
REC2: 2 poles	B: Instant ON	48: 48-530 VAC	D: 24 VDC,	2: 2.2kW	0: Standard	G: Clamp	K: Screws	E: Contactor
REC3: 3 poles		60: 48-600 VAC	-15%, +20%	3: 3.0kW	Itsm	R: Spring*		
			A: 90 - 253 VAC	4: 4.0kW	1: High Itsm			

\* Available on request

## Selection Guide

Rated Voltage	No of Poles	Control voltage	Power Rating			
			2.2kW	2.2kW*	3.0kW	4.0kW
48-530Vrms	2	24Vdc, -15%, +20%**	REC2B48D20GKE	-	REC2B48D30GKE	REC2B48D40GKE
		90-253 VAC	REC2B48A20GKE	-	REC2B48A30GKE	REC2B48A40GKE
	3	24Vdc, -15%, +20%	REC3B48D20GKE	REC3B48D21GKE	REC3B48D30GKE	-
		90-253 VAC	REC3B48A20GKE	-	REC3B48A30GKE	-
48-600Vrms	2	24Vdc, -15%, +20%	-	-	REC2B60D30GKE	-
		90-253 VAC	-	-	REC2B60A30GKE	-
	3	24Vdc, -15%, +20%	REC3B60D20GKE	-	-	-
		90-253 VAC	REC3B60A20GKE	-	-	-

\* higher ITSM rating

\*\* according to EN61131-2

## General Specifications

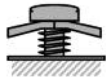
	REC..48...	REC..60...
Rated Operational voltage	480 VAC	600 VAC
Operational voltage Range	48-530 VAC +10%, -15%	48-600 VAC +10%, -15%
Blocking voltage	1200 Vp	1600 Vp
Operational frequency range	45 - 65 Hz	45 - 65 Hz
Power factor	>0.5 @ rated voltage	>0.5 @ rated voltage

## Control Specifications

	REC...D..	REC...A..
Rated Control input voltage	24 VDC	230 VAC
Control voltage range	15-32 VDC (according to EN61131-2)	90 - 253 VAC
Maximum Input current	10 mA	15 mA
Pick-up voltage	15 VDC	40 VAC
Maximum Reverse voltage	32 VDC	N/A
Drop-out voltage	1 VDC	10 VAC
Response time pick-up	1 ms	1.5 ms
Response time drop-out	10 ms	45 ms
Operational frequency range	N/A	45 - 65Hz
LEDs	Control ON: Green	Control ON: Green


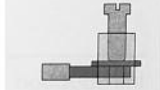
## Connection Specifications

### POWER CONNECTIONS (75°C,Copper Cables)

Connection Type	Screw terminal
Illustration of terminal	
Rigid (Solid & Stranded)	2 x 1.5..2.5mm <sup>2</sup> (2 x AWG16..14) 2 x 2.5..6mm <sup>2</sup> (2 x AWG14..10)
Flexible (Finely stranded with end sleeve)	2 x 1..2.5mm <sup>2</sup> (2 x AWG17..14) 2 x 2.5..6mm <sup>2</sup> (2 x AWG14..10) 1 x 10mm <sup>2</sup> (1 x AWG8)
Flexible w/o end sleeves	2 x 1.5..2.5mm <sup>2</sup> (2 x AWG16..14) 2 x 2.5..6mm <sup>2</sup> (2 x AWG14..10)
Stripping length	10mm
Tightening torque	2Nm (Pozidriv 2 bit)
Screw size	M4
Aperture for termination lug (fork type)	Max 11mm

\* Available on request

### CONTROL CONNECTIONS (75°C,Copper Cables)

Connection Type	Spring loaded*	Captive Clamp
Illustration of terminal		
Type	Pluggable	Pluggable
Stranded	-	1 x 0.05..1.5mm <sup>2</sup> ( 1 x AWG30..16)
Solid	1 x 0.05..2.5mm <sup>2</sup> ( 1 x AWG 24..14)	1 x 0.05..2.5mm <sup>2</sup> (1 x AWG30..14)
Stripping length	10mm	6 - 7.5mm
Tightening torque	N/A	0.5Nm (Phillips bit)
Screw Size	N/A	M3
Withdrawal Force	1.5N	1.5N
Insertion Force	3N	3N
Max Contact Resistance	15mΩ	15mΩ

## Load Specifications (45mm space between adjacent units)

	REC2B.....					REC3B.....				
	@ 40°	@ 50°	@ 60°	I <sub>min</sub>	I <sub>tsm</sub> *	@ 40°	@ 50°	@ 60°	I <sub>min</sub>	I <sub>tsm</sub> *
Rated Operational Current AC-53a @ 400Vrms, to IEC, for trip Classes 10, 20, 30										
REC..48..20	6.2A	5.8A	5.3A	150mA	325Ap	5.8A	5.3A	4.3A	150mA	325Ap
REC..60..20	-	-	-	-	-	5.8A	5.8A	4.9A	250mA	600Ap
REC...21	-	-	-	-	-	5.8A	5.3A	4.3A	250mA	600Ap
REC..48..30	7.6A	6.8A	5.8A	250mA	600Ap	7.6A	6.2A	5.3A	400mA	800Ap
REC..60..30	7.6A	6.8A	6.2A	250mA	600Ap	-	-	-	-	-
REC...40	9.2A	7.6A	6.2A	400mA	800Ap	-	-	-	-	-
No of poles	2					3				
Maximum On-state voltage drop @rated current	1.6 Vrms					1.6 Vrms				
Off-state leakage current @rated voltage and frequency	< 3 mArms					< 3 mArms				
Critical dv/dt (@ T <sub>j</sub> init = 25°C)	1000 V/μs					1000 V/μs				

## Load Specifications (0mm space between adjacent units)

	REC2B.....			REC3B.....		
	@ 40°	@ 50°	@ 60°	@ 40°	@ 50°	@ 60°
Rated Operational Current AC-53a @ 400Vrms, to IEC, for trip Classes 10, 20, 30						
REC..48..20	6.2A	5.8A	5.3A	5.3A	4.9A	4.3A
REC..60..20	-	-	-	5.8A	4.9A	4.3A
REC...21	-	-	-	5.3A	4.9A	4.3A
REC..48..30	6.8A	6.2A	5.3A	6.2A	5.3A	4.3A
REC..60..30	6.8A	6.2A	5.3A	-	-	-
REC...40	7.6A	6.2A	5.3A	-	-	-

## Motor Rating (45mm space between adjacent units)

	HP @ 40 / 50 / 60°C, according to UL508				kW @ 40 / 50 / 60°C, according to IEC60947-4-2			
	230V	400V	480V	600V	230V	400V	480V	600V
REC2...20	1½ / 1 / 1	3 / 2 / 2	3 / 3 / 3	-	1.5 / 1.1 / 1.1	2.2 / 2.2 / 2.2	3.0 / 3.0 / 2.2	-
REC2..48..30	2 / 2 / 1	3 / 3 / 2	5 / 3 / 3	-	1.5 / 1.5 / 1.1	3.0 / 2.2 / 2.2	4.0 / 3.0 / 3.0	-
REC2..60..30	2 / 2 / 1½	3 / 3 / 3	5 / 3 / 3	5 / 5 / 5	1.5 / 1.5 / 1.5	3.0 / 2.2 / 2.2	4.0 / 3.0 / 3.0	5.5 / 4.0 / 4.0
REC2...40	2 / 2 / 1½	3 / 3 / 3	5 / 5 / 3	-	2.2 / 1.5 / 1.5	4.0 / 3.0 / 2.2	4.0 / 4.0 / 3.0	-

	HP @ 40 / 50 / 60°C, according to UL508				kW @ 40 / 50 / 60°C, according to IEC60947-4-2			
	230V	400V	480V	600V	230V	400V	480V	600V
REC3..48..20	1 / 1 / 1	2 / 2 / 2	3 / 3 / 2	-	1.1 / 1.1 / 0.75	2.2 / 2.2 / 1.5	3.0 / 2.2 / 2.2	-
REC3...21	1 / 1 / 1	2 / 2 / 2	3 / 3 / 2	-	1.1 / 1.1 / 0.75	2.2 / 2.2 / 1.5	3.0 / 2.2 / 2.2	-
REC3..60..20	1 / 1 / 1	2 / 2 / 2	3 / 3 / 3	3 / 3 / 3	1.1 / 1.1 / 1.1	2.2 / 2.2 / 1.5	3.0 / 3.0 / 2.2	4.0 / 4.0 / 3.0
REC3...30	2 / 1½ / 1	3 / 3 / 2	5 / 3 / 3	-	1.5 / 1.5 / 1.1	3.0 / 2.2 / 2.2	4.0 / 3.0 / 2.2	-



## Environmental Specifications

Operating Temperature	-25°C to 60°C
Storage Temperature	-40°C to 100°C
RoHS compliant	Yes
Impact resistance	15/11 g/ms
Vibration resistance	2g
Relative humidity	< 95% non-condensing @ 40 °C
Pollution degree	2
Installation category	III
Degree of finger protection	IP20
Installation altitude	0- 1000m. Above 1000m derate linearly by 1% of FLC per 100m up to a maximum of 2000m

## Housing Specifications

Weight	approx 380g
Housing Material	Nylon PA66
Flame class	UL94-V0
Housing Colour	RAL7035
Dimensions (h x w x d) (without input plug)	105 x 45 x 99.4 mm

## Isolation

Dielectric withstand voltage input to output	≥ 4000V AC rms
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## Short Circuit Protection (according to EN/IEC 60947-4-2 and UL508)

	REC2B48.20 REC3B.....20	REC2B...30 REC3B48...30	REC2B48..40
Short Circuit Current Rating	5kA	5kA	5kA
Type of coordination: 1 UL rated short circuit current RK5 fuse	12A	15A	20A
	REC2B48.20 REC3B48.20	REC2B...30 REC3B60.20 REC3B48.21	REC2B....40 REC3B48.30
Type of coordination: 2 Rated short circuit Semiconductor fuse	J093802 6.6 CP URD 22.58 40	Y220913 6.9 CP GRC 22.58 50	X220912 6.9 CP GRC 22.58 63

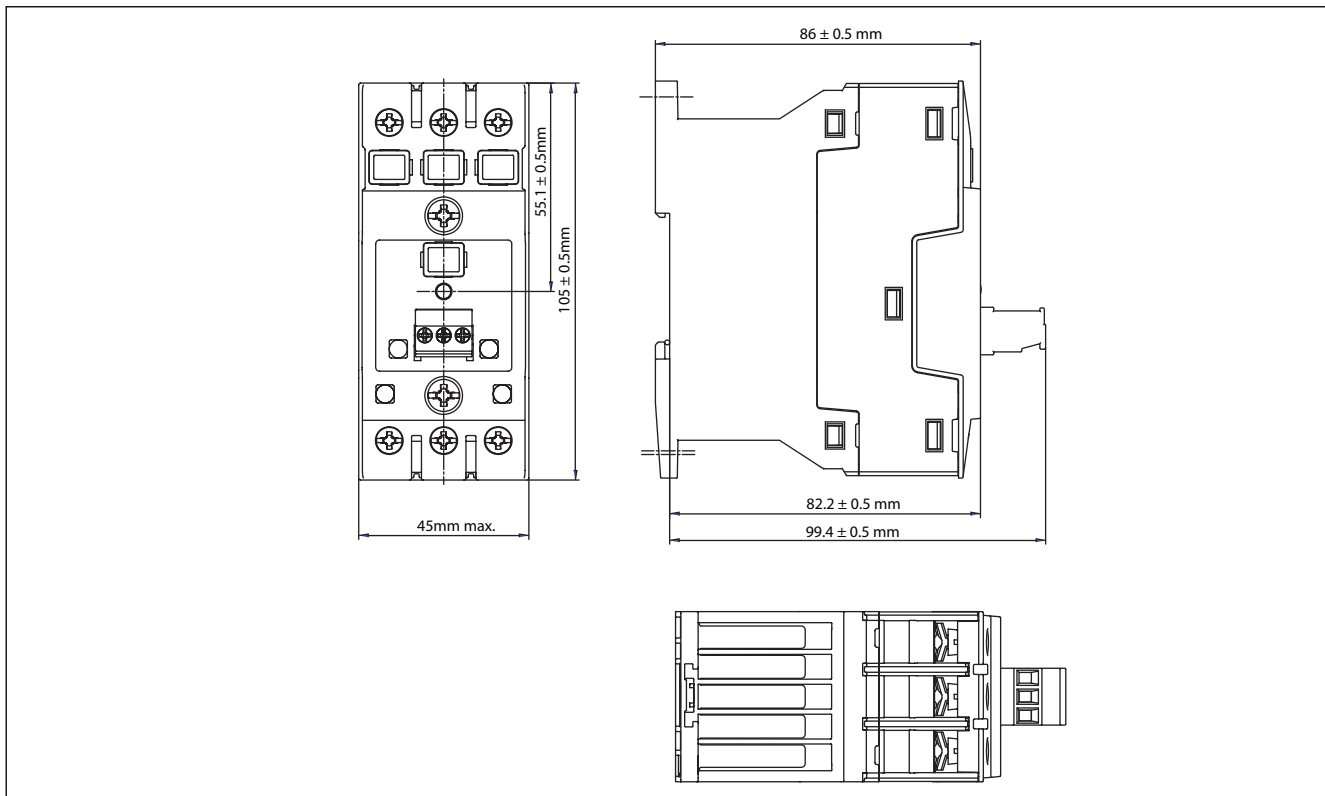
## Agency Approvals & EMC

<b>CE marking</b>		<b>UL Approval</b>	cULus listed (E172877)
Low Voltage Directive	IEC / EN 60947-4-2	<b>Restrictions of hazardous substances</b>	RoHS
EMC Immunity	IEC / EN 61000-6-2	<b>Radiated Radio Frequency Immunity</b>	EN 61000-4-3
EMC Emission	IEC / EN 61000-6-4	10 V/m, 80 - 1000 MHz, 1.4 - 2.0 GHz	Performance criteria 1
<b>Electrostatic Discharge (ESD) Immunity</b>	IEC / EN 61000-4-2 8kV, PC2 Air discharge 4kV, PC2 Contact	1 V/m, 2.0 - 2.7 GHz	Performance criteria 1
<b>Electrical Fast Transient Burst Immunity</b>	IEC / EN 61000-4-4	<b>Electrical Surge Immunity</b>	IEC / EN 61000-4-5
Output: 4kV / 5kHz	Performance criteria 1	Output, line to line	1kV, performance criteria 1
Output: 4kV / 100kHz	Performance criteria 2	Output, line to earth	2kV, performance criteria 2
Output: 2kV / 100kHz	Performance criteria 1*	Input, line to line	1kV, performance criteria 2
Input: 4kV / 5kHz	Performance criteria 1	Input, line to earth	2kV, performance criteria 2
Input: 2kV / 100kHz	Performance criteria 1	<b>Conducted Radio Frequency Immunity</b>	IEC / EN 61000-4-6
Input: 4kV / 100kHz	Performance criteria 2	10V/m, 0.15 - 80 MHz	Performance criteria 1
<b>Voltage Interruptions Immunity</b>	IEC / EN 61000-4-11	<b>Voltage Dips Immunity</b>	IEC / EN 61000-4-11
0% for 5000ms	Performance criteria 2	0% for 10ms/20ms, 70% for 500ms	Performance criteria 2
<b>Radio Interference voltage emissions (conducted)</b>	EC / EN 55011 Class A (industrial)**	40% for 200ms	Performance criteria 2
30 -1000MHz		<b>Radio Interference field emissions (radiated)</b>	IEC / EN 55011 Class B (light industry)

\* For DC Controlled versions. AC controlled version pass with performance criteria 2

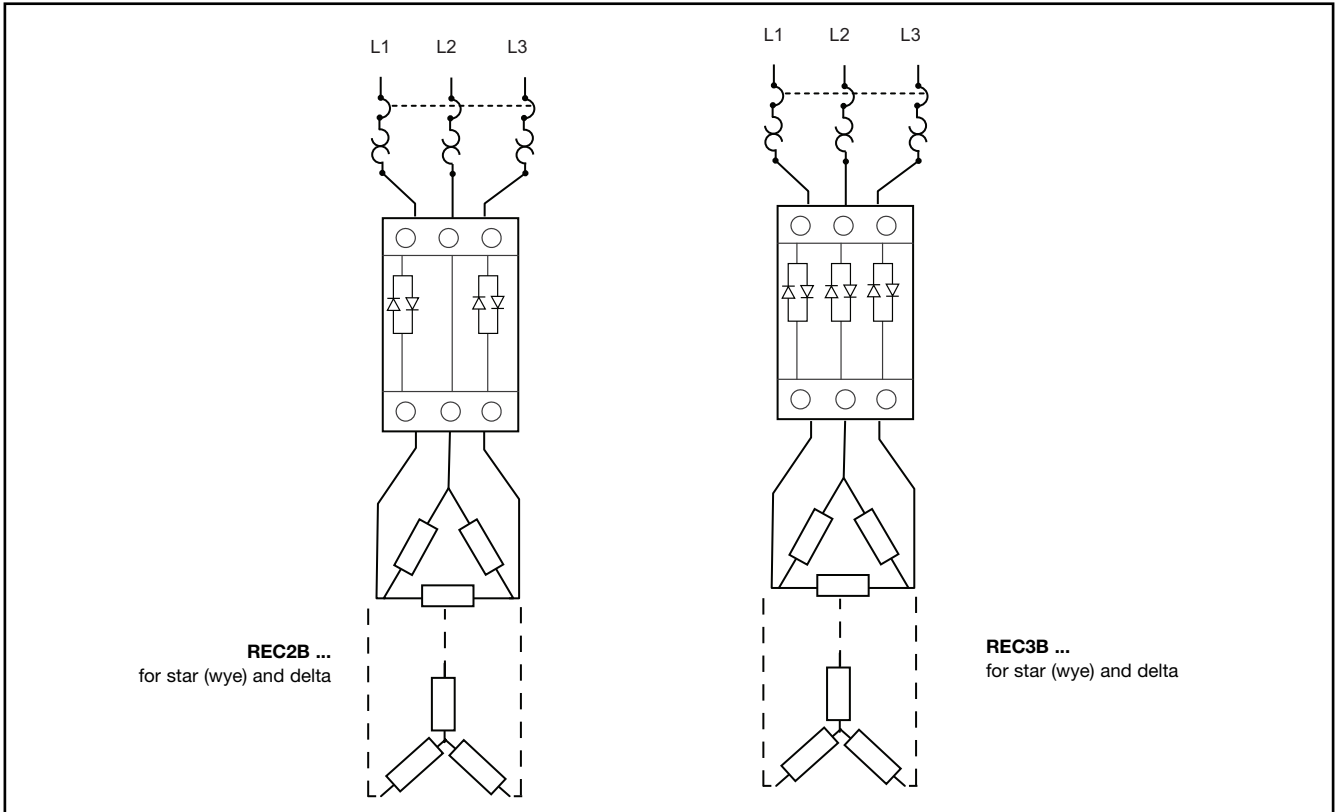
\*\* This product is designed and constructed as an EMC Class A device. The use of this product in residential applications could lead to radio interferences. In such applications, additional external filtering may be required.

## Dimensions

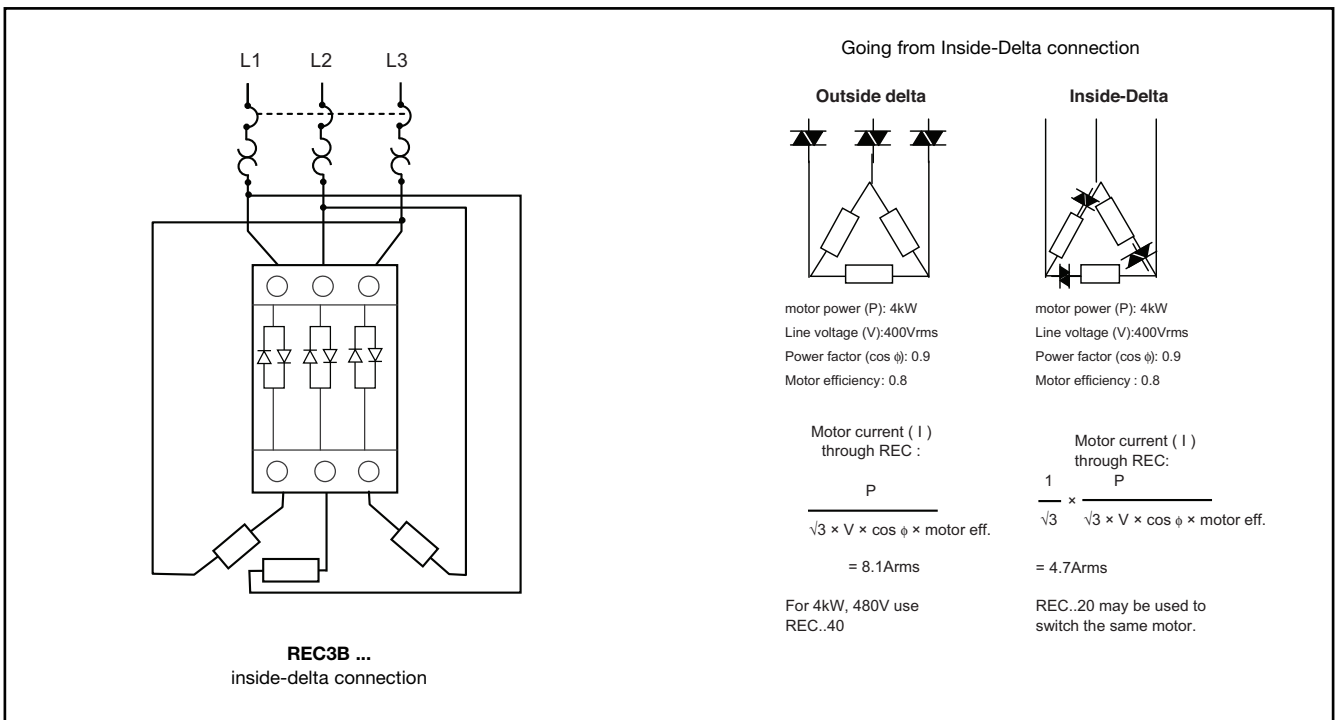


All dimensions in mm

## Connection Diagrams

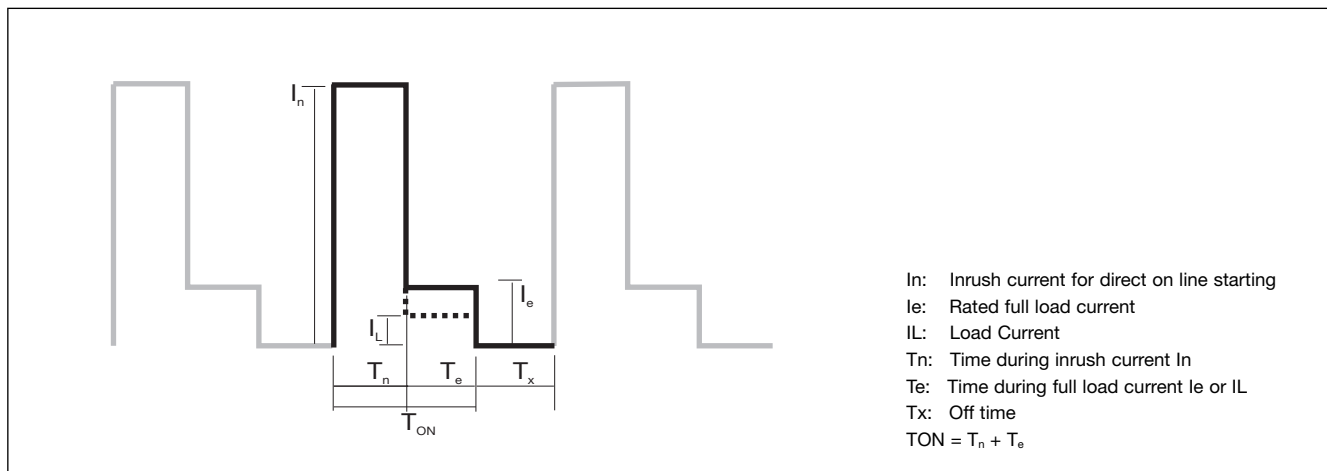


## Inside Delta Connection



## Characteristic Curves and Operating Cycles

Maximum allowable number of starts depending on the  $T_n$  and  $T_{on}$



Curves: No. of switching cycles per hour versus  $t_{on}$

Chart No. 1

$$\frac{I_n}{I_e} = 7.2, \frac{I_L}{I_e} = 1$$

$t_{ON}$ (s)	Number of Switches per Hour						
	$T_n = 0.05s$	$T_n = 0.1s$	$T_n = 0.2s$	$T_n = 0.4s$	$T_n = 0.8s$	$T_n = 1.6s$	$T_n = 3.2s$
0.1	1800	910	-	-	-	-	-
1	1500	800	420	220	102	-	-
10	280	300	25	160	90	40	15
100	38	38	38	35	35	25	6
1000	-	-	-	-	-	-	-

Chart No. 2

$$\frac{I_n}{I_e} = 7.2, \frac{I_L}{I_e} = 0.6$$

$t_{ON}$ (s)	Number of Switches per Hour						
	$T_n = 0.05s$	$T_n = 0.1s$	$T_n = 0.2s$	$T_n = 0.4s$	$T_n = 0.8s$	$T_n = 1.6s$	$T_n = 3.2s$
0.1	1900	900	-	-	-	-	-
1	1800	850	440	120	110	-	-
10	390	390	350	190	100	50	25
100	38	38	38	38	25	25	20
1000	-	-	-	-	-	-	-

Chart No. 3

$$\frac{I_n}{I_e} = 4, \frac{I_L}{I_e} = 1$$

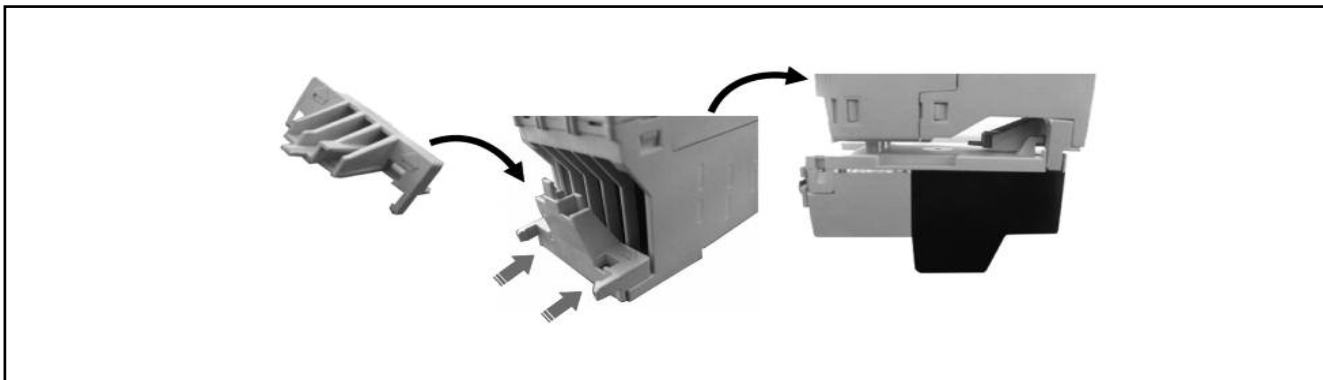
$t_{ON}$ (s)	Number of Switches per Hour						
	$T_n = 0.05s$	$T_n = 0.1s$	$T_n = 0.2s$	$T_n = 0.4s$	$T_n = 0.8s$	$T_n = 1.6s$	$T_n = 3.2s$
0.1	5100	2800	-	-	-	-	-
1	2700	1900	1100	650	350	-	-
10	250	250	250	290	200	140	75
100	36	36	36	36	36	36	30
1000	-	-	-	-	-	-	-

Chart No. 4

$$\frac{I_n}{I_e} = 4, \frac{I_L}{I_e} = 0.6$$

$t_{ON}$ (s)	Number of Switches per Hour						
	$T_n = 0.05s$	$T_n = 0.1s$	$T_n = 0.2s$	$T_n = 0.4s$	$T_n = 0.8s$	$T_n = 1.6s$	$T_n = 3.2s$
0.1	5500	2900	-	-	-	-	-
1	3400	2300	1400	700	350	-	-
10	350	350	350	350	280	170	80
100	36	36	36	36	36	36	36
1000	-	-	-	-	-	-	-

## Accessories



Motor overload Relay adapter\*.  
Part Number: REC3ADAPTOR  
Pack qty: 5pcs

Compatible with:

<b>Manufacturer</b>	<b>Series</b>	<b>Example</b>
ABB	TA	TA25DU-8.5
Siemens	3RU11	3RU1126-1FB0

\* 1 adaptor is shipped with every REC unit.



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