

Solid State Motor Contactor

3-Phase

Types REC2B, REC3B

CARLO GAVAZZI



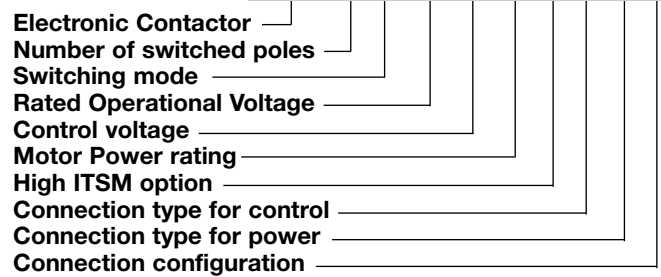
- AC electronic motor contactor
- Instantaneous Switching
- Three-pole with two-phase and three phase switching options
- Control status LED indication
- Two control input ranges: 15-32 VDC, 90-253 VAC
- Motor rating up to 4kW / 5.5hp
- Rated Operational Voltage up to 600 VAC
- Opto-isolation at 4kVrms
- 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 I²t 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, -15%, +20% | 2: 2.2kW | 0: Standard Itsm | G: Clamp | K: Screws | E: Contactor |
| REC3: 3 poles | | 60: 48-600 VAC | A: 90 - 253 VAC | 3: 3.0kW | | R: Spring* | | |
| | | | | 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

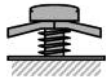
| | REC..48... | REC..60... |
|-----------------------------|-----------------------|-----------------------|
| Rated Operational voltage | 480 VAC | 600 VAC |
| Operational voltage Range | 48-530 VAC +10%, -15% | 48-600 VAC +10%, -15% |
| Blocking voltage | 1200 Vp | 1600 Vp |
| Operational frequency 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 |


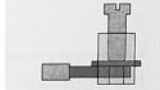
Connection Specifications

POWER CONNECTIONS (75°C,Copper Cables)

| Connection Type | Screw terminal |
|--|--|
| Illustration of terminal |  |
| Rigid (Solid & Stranded) | 2 x 1.5..2.5mm ² (2 x AWG16..14) 2 x 2.5..6mm ² (2 x AWG14..10) |
| Flexible (Finely stranded with end sleeve) | 2 x 1..2.5mm ² (2 x AWG17..14) 2 x 2.5..6mm ² (2 x AWG14..10) 1 x 10mm ² (1 x AWG8) |
| Flexible w/o end sleeves | 2 x 1.5..2.5mm ² (2 x AWG16..14) 2 x 2.5..6mm ² (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 ² (1 x AWG30..16) |
| Solid | 1 x 0.05..2.5mm ² (1 x AWG 24..14) | 1 x 0.05..2.5mm ² (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 _{min} | I _{tsm} * | @ 40° | @ 50° | @ 60° | I _{min} | I _{tsm} * |
| 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 _j 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 |
|---|----------------|

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 |

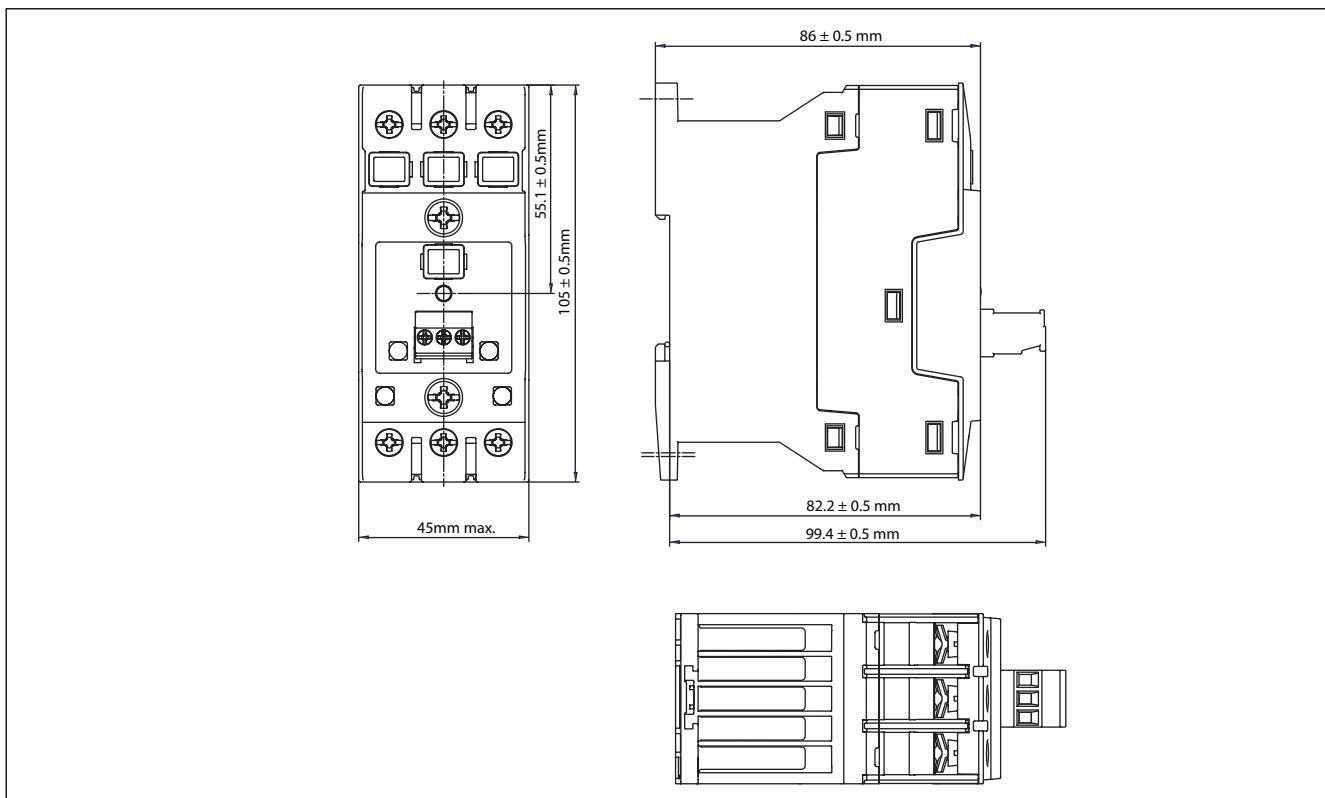
Agency Approvals & EMC

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

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

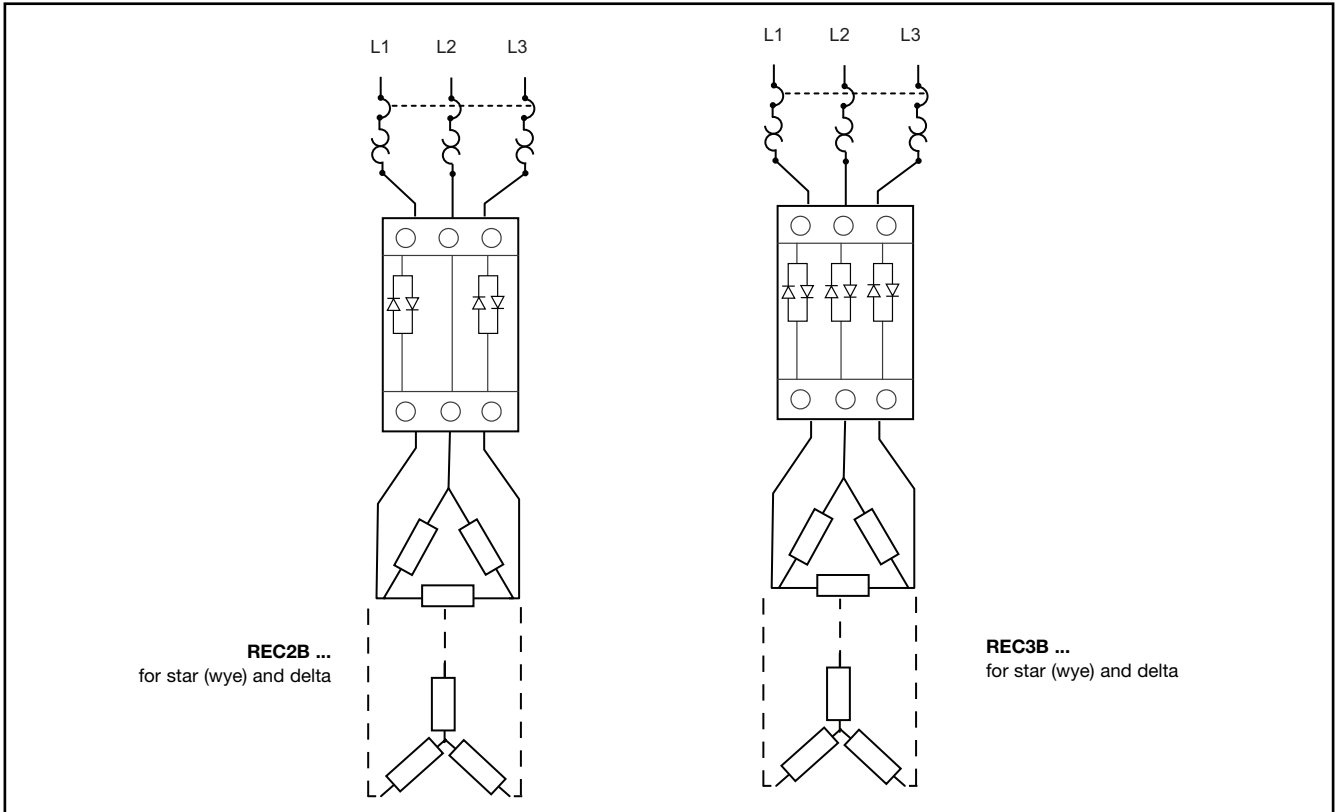
** This product is designed and constructed as an EMC Class A device. The use of this product in residential applications could lead to radio interferences. In such applications, additional external filtering may be required.

Dimensions

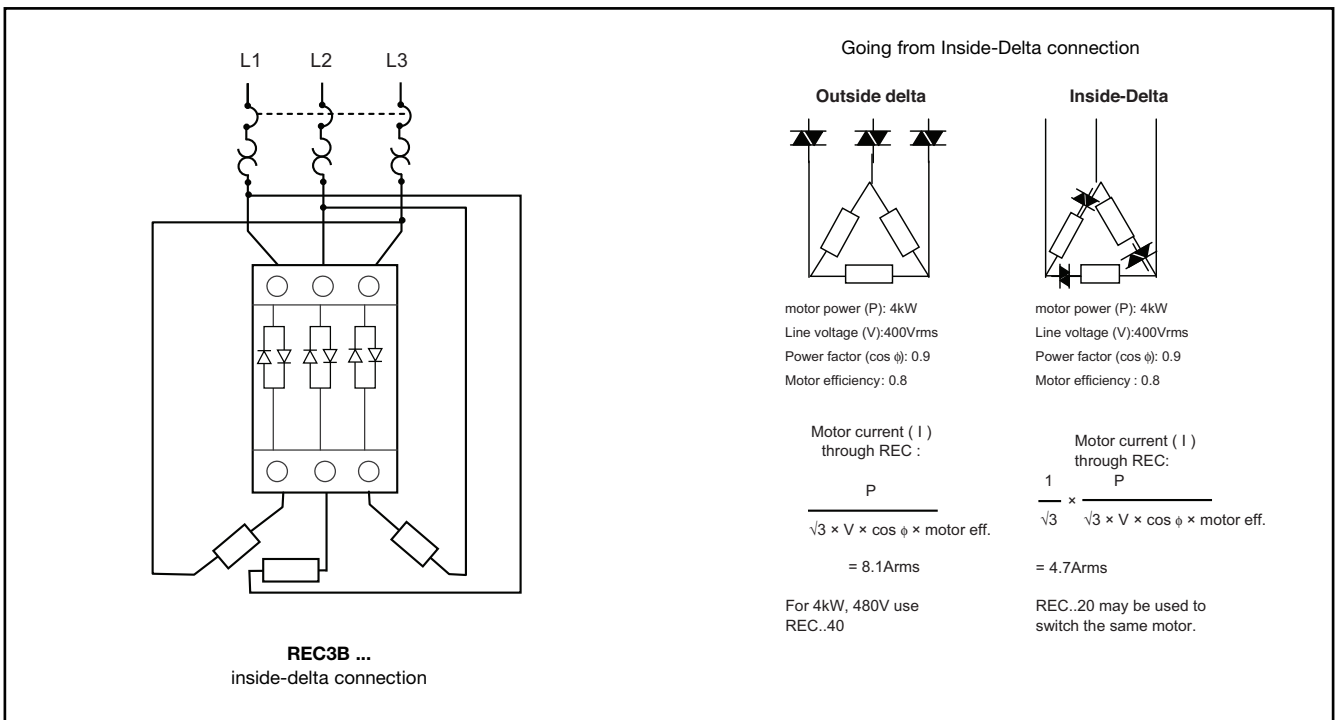


All dimensions in mm

Connection Diagrams

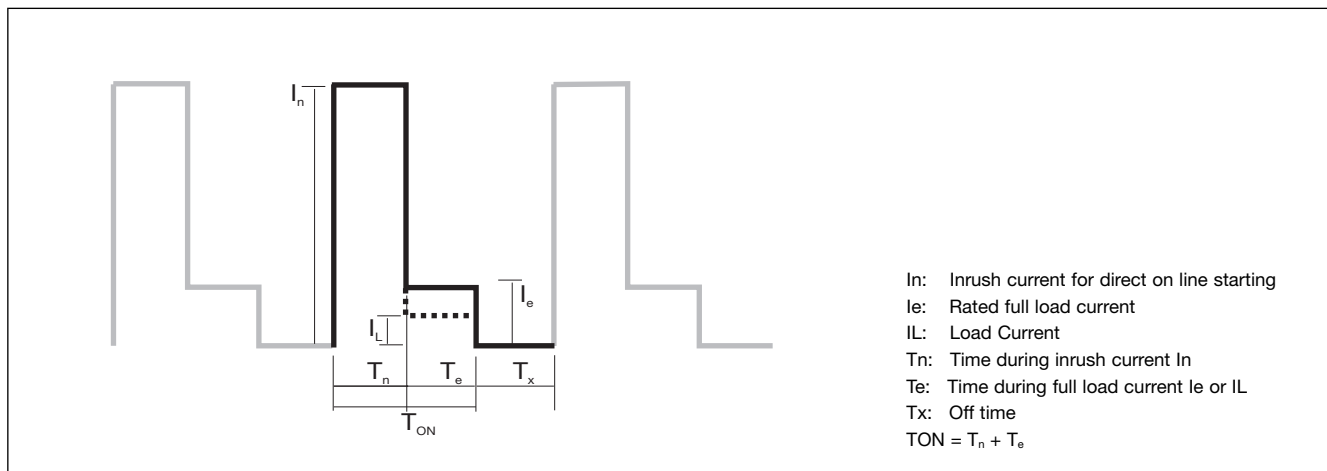


Inside Delta Connection



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

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

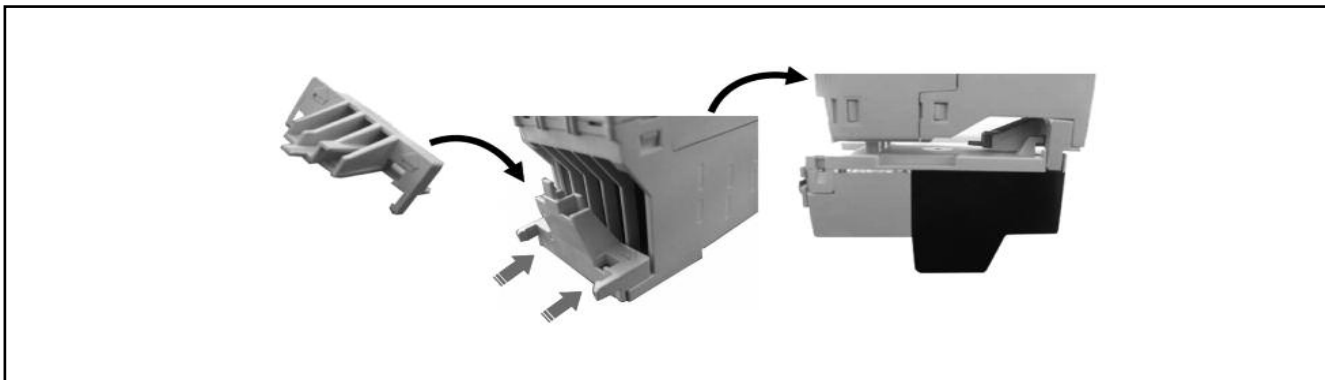
| t_{ON} (s) | Number of Switches per Hour | | | | | | |
|--------------|-----------------------------|--------------|--------------|--------------|--------------|--------------|--------------|
| | $T_n = 0.05s$ | $T_n = 0.1s$ | $T_n = 0.2s$ | $T_n = 0.4s$ | $T_n = 0.8s$ | $T_n = 1.6s$ | $T_n = 3.2s$ |
| 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:

| Manufacturer | Series | Example |
|---------------------|---------------|----------------|
| ABB | TA | TA25DU-8.5 |
| Siemens | 3RU11 | 3RU1126-1FB0 |

* 1 adaptor is shipped with every REC unit.

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