Softstarter - open design

- 3-phase control
- Reduced mechanical stress on drives
- Reduced starting current compared to direkt start
- Open loop connection possible
- Integrated bridging contactor control
- Open design

Technical data

1. Functions

Electronic motor softstarter for asynchronous motors reducing mechaical stress on drives.
Temperature monitoring of device and motor winding (max. 6PTC).
Phase failure monitoring

2. Adjustments

	Adjustment range	
Acceleration time	0s	45s
Retardation time	0s	45s
Starting torque	0	100%
Stopping torque	0	100%

additional for ESG-I only:
Maximum starting current settable from 0.3 to 3.5xI_N
Retardation current: max. 0 to 1xI_N

3. Indicators

Fault indicators (red):
LED1: Overtemperature heatsing (device)
LED2: Phase failure
LED3 Overtemperature PTC (motor winding)
Status indicators (green):
LED4: indication of supply voltage
LED_{Start}: indication of activation
LED_{Run}: indication control voltage
LED_{Perm}: 100% output voltage applies at T1 to T3

4. Mechanical design

Metal housing with plastic cover, IP rating IP 00
Mounting on mounting plate
Distance to other devices min. 100mm
Mounting position: Cooling fins have to be rightened
Terminals: depends on power class
standard terminals or Cu-rail
Initial torque: depends on power class
Terminal capacity: see table

5. Control circuit

Supply voltage: 230V AC terminals L1-N
(other voltages only on request)
Tolerance: ±15%
Rated fequency: 48 to 63Hz
Duration of operation: 100%

6. Control contact 1 - 2

1 potential free change-over contact
Pulse control:
Function: Activation via control pulse
Line length: max.10m, twisted pair
Loadable: No
Control pulse length: min.100ms

Permanent signal control:
Function: Activation of softstart via deplying signal to terminals, activation of decelleration via disconnecting the control signal from terminals
Line length: max. 10m, twisted pair
Loadable: No
Control pulse length: -

7. Control contact 3 - 4

For pulse control only
1 potential free normally closed contact
Function: activation of decelleration
Line length: max. 10m, twisted pair
Loadable: No
Control pulse length: min.100ms

8. Control contact 5 - 6

1 potential free normally open contact
Function: power modul lock. As long as the contact is closed the thyristor modules are locked. After unlocking (terminals 5-6 open) the ESG continues service without softstart or softstopp
Line length: max. 10m, twisted pair
Loadable: No
Control pulse length: -

9. Control contact 23-24

PTC-terminals (has to be bridged if not needed)
Function: PTC-monitoring of motor winding
Line length: max. 10m, twisted pair
Loadable: No
Control pulse length: -

10. Signaling contact S1

1 potential free change-over contact
Function: indication of activation
Terminals: 14 - 15 - 16
Switching capacity: 1500VA (6A/250V AC)
Fusing: 6A

11. Signaling contact S2

1 potential free change-over contact
Function: indication of 100% output voltage bypass contactor activated
Terminals: 17 - 18 - 19
Switching capacity: 1500VA (6A/250V AC)
Fusing: 6A

12. Signaling contact Fault

1 potential free change-over contact
Function: general fault
Terminals 20 - 21 - 22
Switching capacity: 1500VA (6A/250V AC)
Fusing: 6A

Technical data

13. Power circuit

Voltage range:	3~ 400V to 500V AC (L1-L2-L3)
Tolerance:	±20%
Rated frequency:	48 to 63Hz
Start-up cycles:	20 per hour
Bypass contactor:	external (not included)

14. Ambient condition

Ambient temperature:	-25 to +45°C (according to IEC 68-1)
Storage temperature:	-25 to +75°C
Transport temperature:	-25 to +75°C
Relative humidity:	5% to 95% not condensing
Pollution degree:	2 (according to IEC 664-1)

15. Power classes

Type	Max. motor power at 3x400V (kW)[1) 2) 3)]	Max. motor power at 3x500V (kW)[1) 2) 3)]	Max. starting current (5s) (A)	Recom-mended semiconductor fuse (A)	Weight (kg)	Size	Permanent operation of power circuit	Current limitation
ESG 2,2	2.2	2.7	15	12 /□	1.3	A	■	□
ESG 3	3.0	3.5	25	16 /□	1.4	A	■	□
ESG 4	4.0	5.5	35	30 /□	1.5	A	■	□
ESG 5,5	5.5	7.5	55	35 / □	2.8	B	■	□
ESG 7,5	7.5	11	70	50 / □	2.8	B	■	□
ESG 11	11.0	15	90	63 / □	3.0	B	■	□
ESG 15	15.0	18.5	120	80 / □	3.0	B	■	□
ESG 18,5	18.5	22	155	80 / □	3.0	B	■	□
ESG 22	22.0	30	200	100 / □	3.5	B	■	□
ESG 30	30.0	37	240	125 / □	8.0	C	□	□
ESG 37	37.0	45	280	160 / □	8.5	C	□	□
ESG 45	45.0	55	350	200 / □	8.5	C	□	□
ESG 55	55.0	75	420	250 / □	9.0	C	□	□
ESG 75	75.0	90	600	350 / □	9.5	C	□	□
ESG 90	90.0	110	700	350 / □	10.5	C	□	□
ESG-I 110	110.0	140	750	500 /■	18	D	■	■
ESG-I 140	140.0	160	920	500 /■	18	D	■	■
ESG-I 160	160.0	200	1250	500 /■	41	E	■	■
ESG-I 200	200.0	250	1400	630 /■	41	E	■	■
ESG-I 250	250.0	315	1800	630 /■	42	E	■	■
ESG-I 315	315.0	400	2100	750 /■	42	E	■	■
ESG-I 355	355.0	450	2800	800 / ■	44	E	■	■
ESG-I 400	400.0	500	3200	800 / ■	51	F	■	■
ESG-I 560	560.0	700	4500	1250 / ■	53	F	■	■

□ = optional ■ = series

1) All values refer to standardizied motors according to IEC 72 and UNE 20106.
2) At variant motor voltages max. connectable motor size changes similar.
3) If motor is connected in W3C (open loop) maximum connectable motor power inreases by factor 1.73.

16. Additional modules:

Current limitation (ESG-I)
(series for devices 110kW and higher)

Acceleration time:	45s
Retardation time:	45s
Current limitation settable from 0.3 to 3.5 x I_N	
Retardation current limit:	0% to 100%

Braking modul for ESG and ESG-I (DC-brake)

Braking time:	max. 45s
Braking current:	phase angle 0 to 100%
Braking current:	max. 3 x I_N
Overcurrent protection:	No

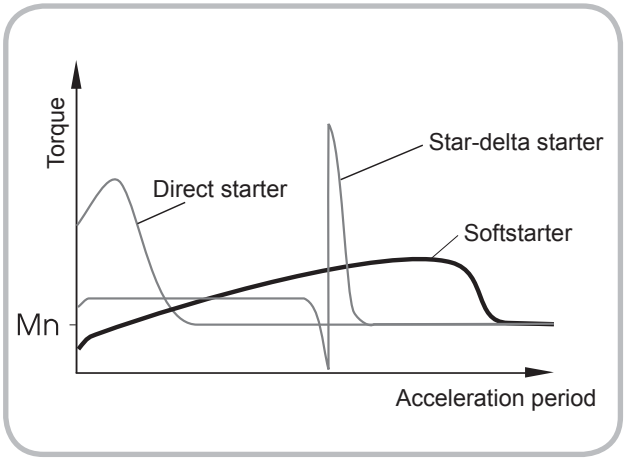
Dimensions:

		Dimensions				
		A (mm)	B (mm)	C (mm)	D (mm)	E (mm)
Size	A	140	125	200	160	115
	B	260	230	160	120	170
	C	360	300	200	140	200
	D	360	330	400	340	240
	E	600	A.A.	545	A.A.	346
	F	850	A.A.	715	A.A.	396

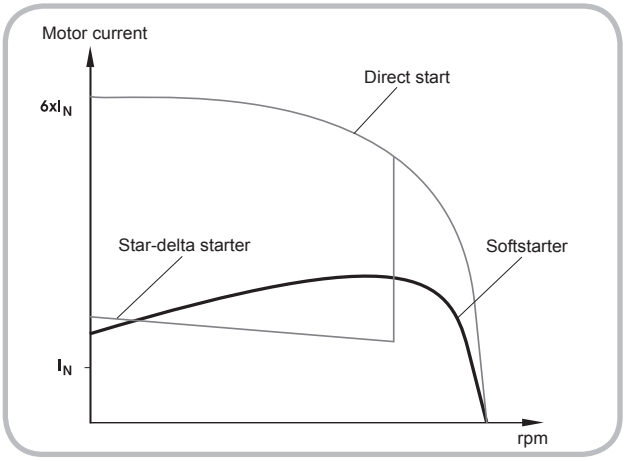
A.A. on request

Advantages of softstarters

The softstarters series ESG are optimized to reduce mechanical stress on drives during the start-up and retardation phase. Therefore the softstarters rise the motor voltage during the start-up phase within the adjusted time from zero to maximum supplying voltage. This ensures a steady increase of the motor torque and protects the machinery from torque shocks.



The slow rise of the motor voltage can be used to reduce the maximum start-up current. The maximum possible reduction of current depend on the type of machinery and adjusted softstarter settings.



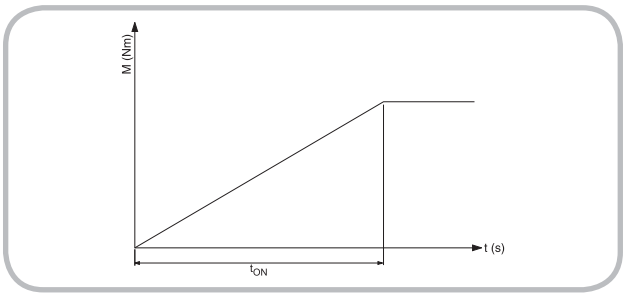
Functions

Sanftstart- and softstop

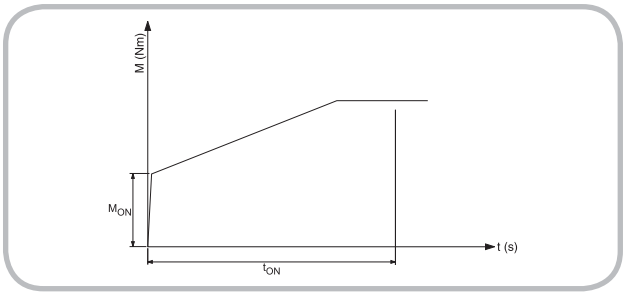
In the soft startup devices ESG series the main circuit is not controlled by mechanical switching elements but by semiconductor elements (thyristor modules).

Each phase contains two antiparallel thyristor modules which are partially or wholly conducting during a half-period. The conducting period is determined by the ignition angle of the thyristor, which in turn is determined by the internal control electronics.

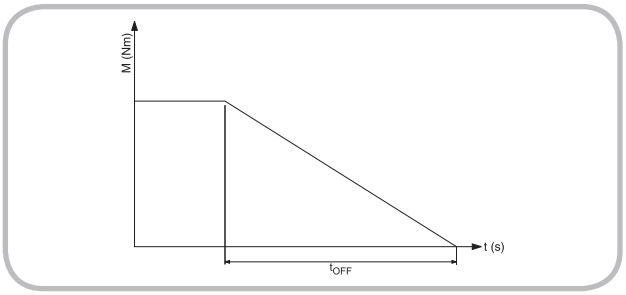
When the device is activated (the Start LED lights up) the voltage at the motor is increased linearly with the startup time to full AC voltage. The time for this voltage ramp can be set on the T_{ON} controller to any value from 0 to 45 seconds. As the voltage increases, so too does the torque, just rising above the load moment. The motor therefore starts with slow acceleration.



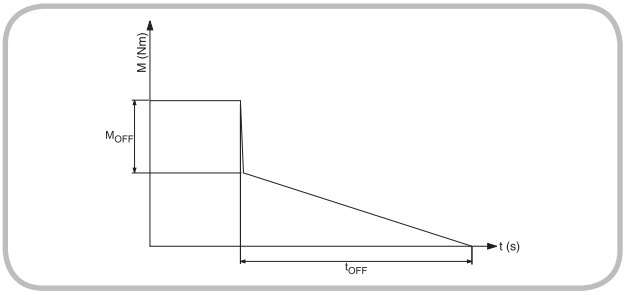
By specifying a system-specific startup moment the voltage (torque) increases rapidly when the soft startup device is activated, until the startup moment set on the M_{ON} controller is reached. Only then does the voltage start increasing slowly for the remaining startup time until full system voltage is reached. In this way, more effective use is made of the startup time and wear and tear is kept to a minimum.



Soft rundown is activated by opening contact 1-2. This causes a uniform reduction in the torque from 100% to 0% over the set period of time. This ensures a soft rundown of the motor but no braking torque is applied to the motor.

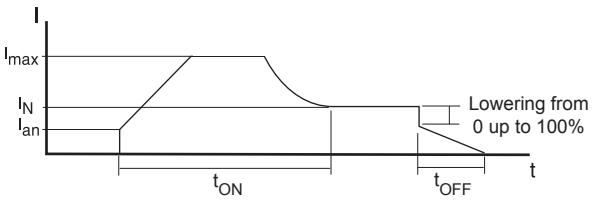


By specifying a system-specific rundown moment the voltage (torque) decreases rapidly when the soft startup device is deactivated, until the rundown moment set on the M_{OFF} controller is reached. Only then does the voltage start decreasing slowly for the remaining rundown time until full system voltage is reached. In this way, more effective use is made of the rundown time and wear and tear is kept to a minimum.

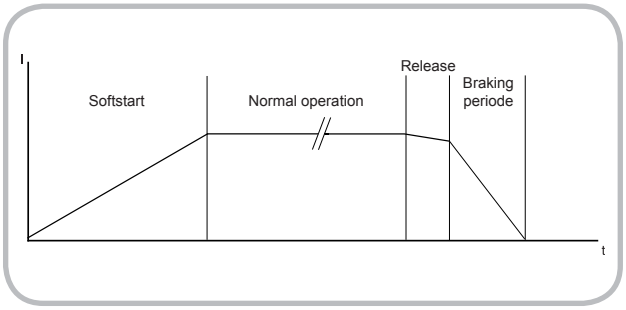


Functions

Current limiting modul
The current limiting module continually measures the motor current during the startup phase and limits it if it rises above the specified threshold value. To do this it reduces the ignition angle of the thyristor bridge as required.

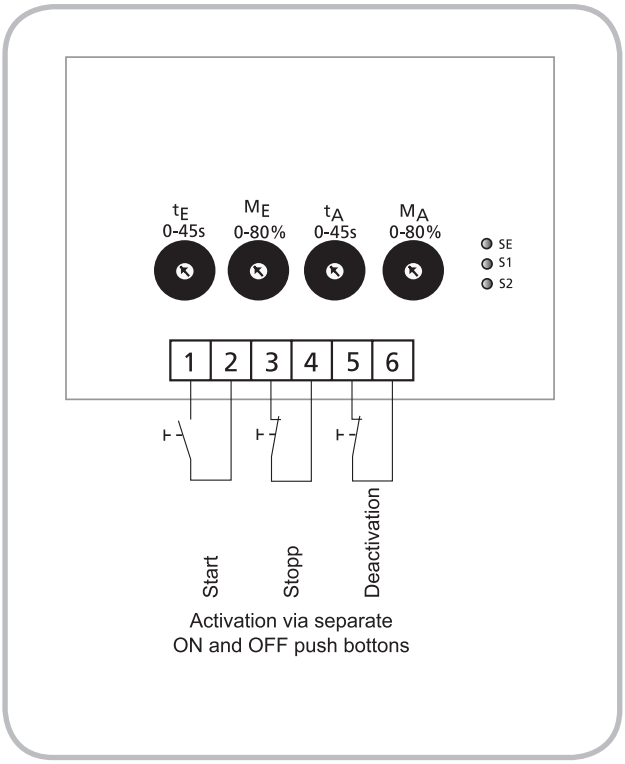


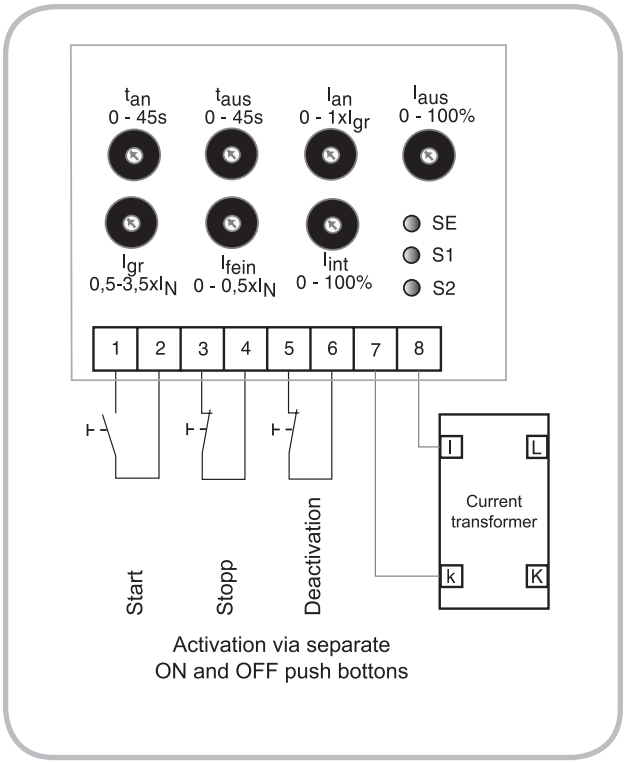
Brake modul
The brake module is an optional additional function designed for machines with high centrifugal mass or a short rundown time. If the rundown function is selected the module applies an adjustable dc voltage to a motor winding. The rotor attempts to follow the magnetic field induced in the stator and is braked by the resulting speed-dependent braking moment within the time set on the tB controller.
Experience shows that as the necessary information on all the moments of inertia and on the drive system for calculating the braking moment or braking current IB and the braking time tB is not known, the necessary braking moment must be measured on site in a test run. Note that the winding resistance changes constantly until the operating temperature is reached.
Because of DC braking, no current is induced in the rotor with the motor at standstill; the motor does not therefore have any holding moment at standstill.



Connections

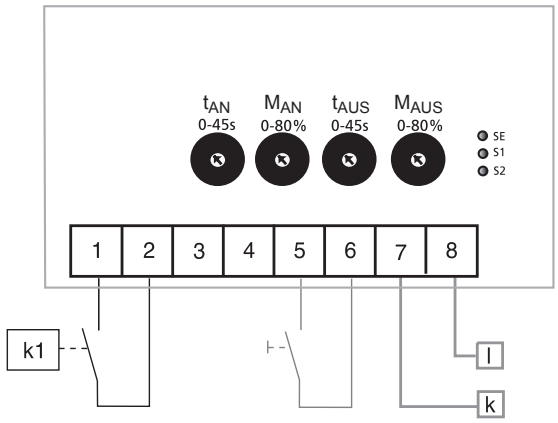
Control board



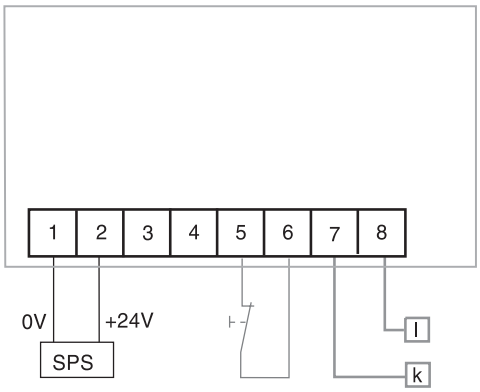


Connections

Control board

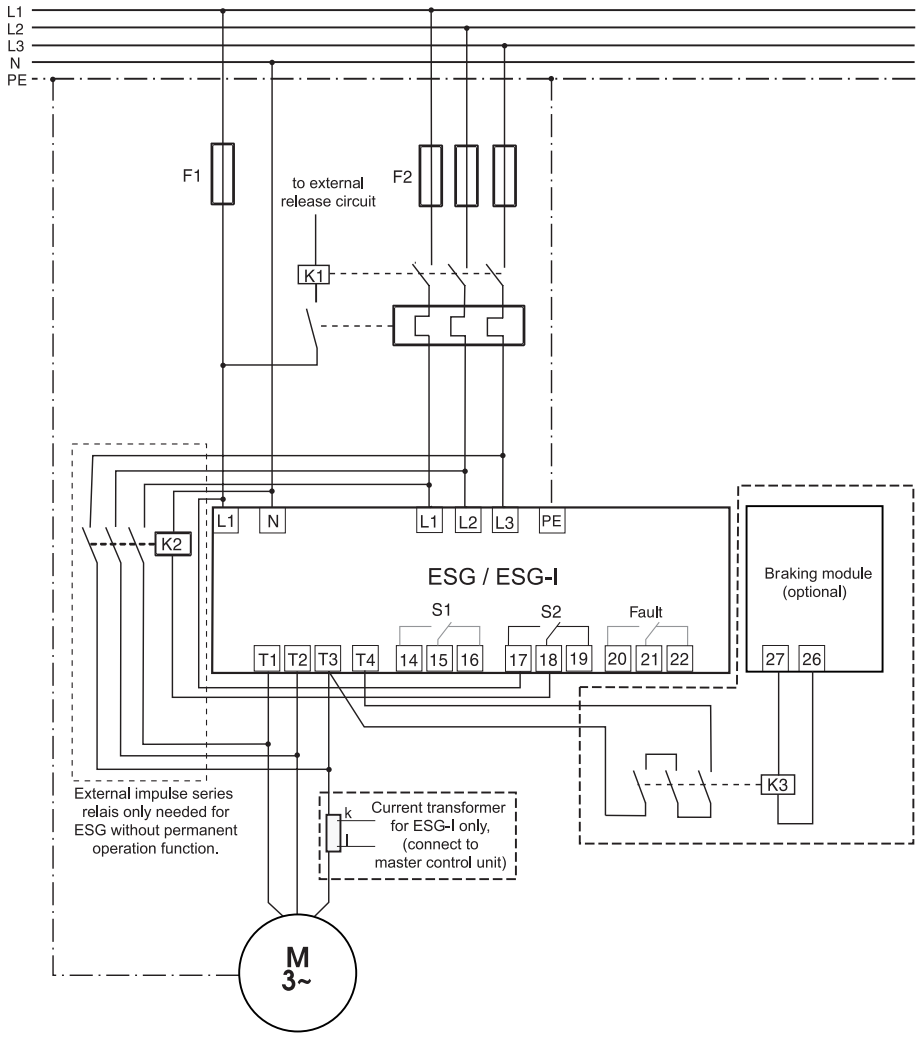


Activation of softstart and softstopp via one control contact.
Softstart is activated by closing contact (terminals 1-2 bridged), softstopp is activated by opening contact.



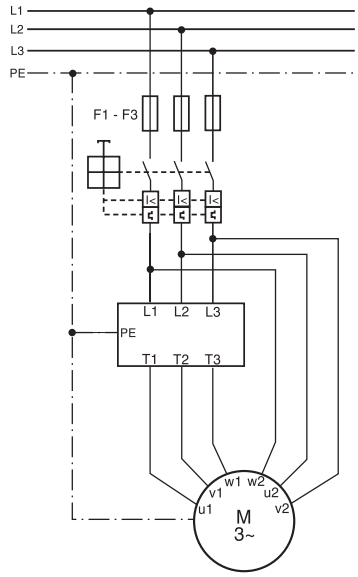
Activation via control voltage.
If control voltage is applied to 1-2, the softstart is activated, if voltage is disconnected, softstopp starts.

Power circuit at standard wiring

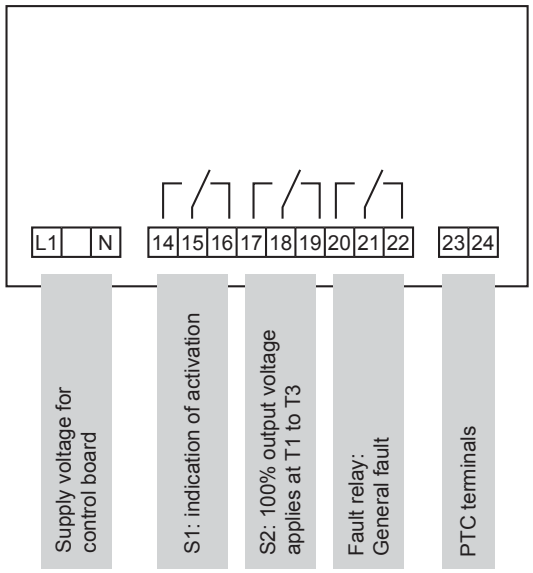


Connections

Power circuit using W3C-connection

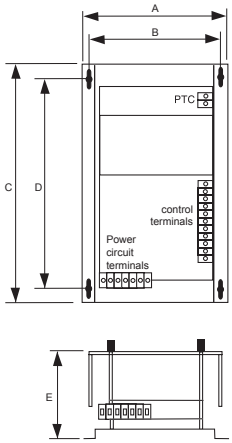


Control board output terminals

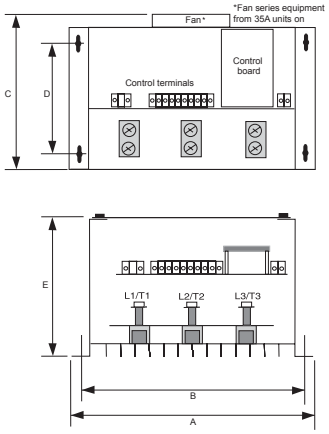


Dimensions

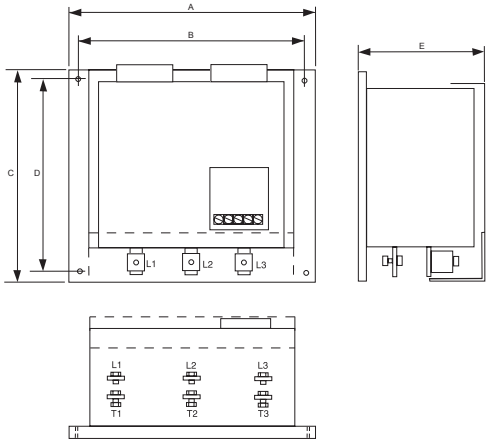
Size A



Size B



Size C,D



Size E,F