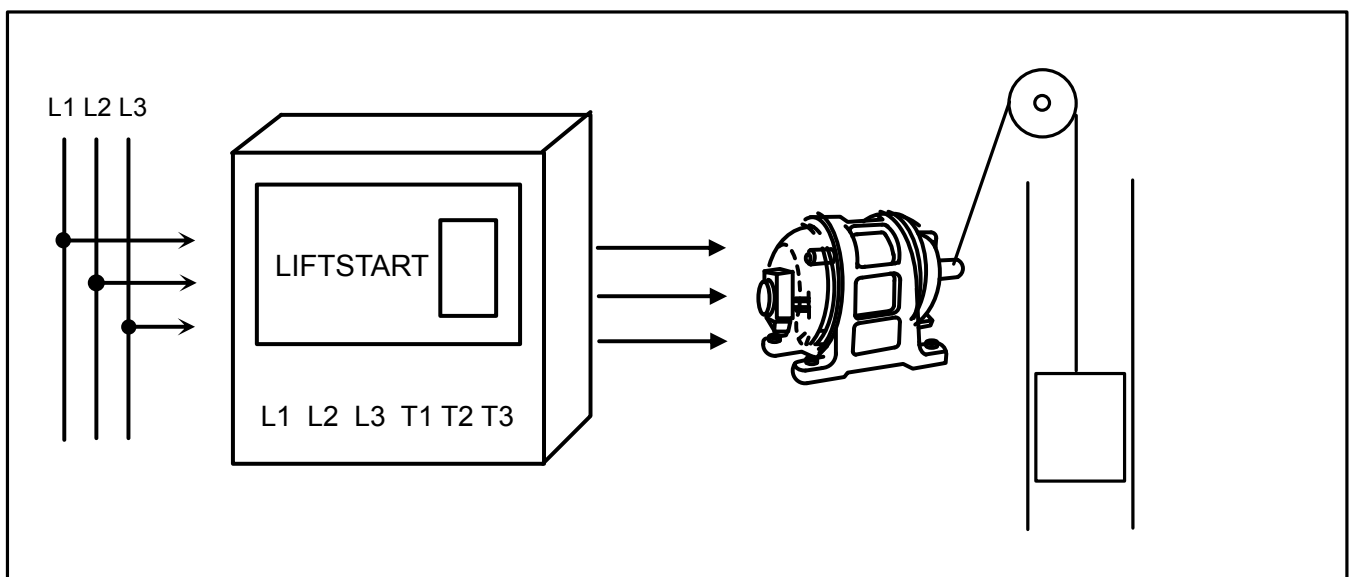




Start-up instructions

Electronic soft-starter Type: LIFTSTART



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Operation diagram	6
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1. General information

The electronic softstarters “LIFTSTART” have been designed for starting and stopping three phase electric motors without risking of uneven or jerky starts and stops. This greatly reduces the wear on mechanical parts and prevents big current peak loads.

Starting and stopping the three phase motor without steps or transitions lengthens the life of power-driven machine mechanical elements, greatly reducing stress on transmission and coupling parts.

The “LIFTSTART” range of solid state soft starters are electronic controlled 6 thyristors devices designed to provide progressive acceleration for 3 phase induction motors.

The electronic softstarters type LIFTSTART consist of two parts:

- power unit (thyristor moduls)
- control unit

2. Installation of the soft-starter LIFTSTART

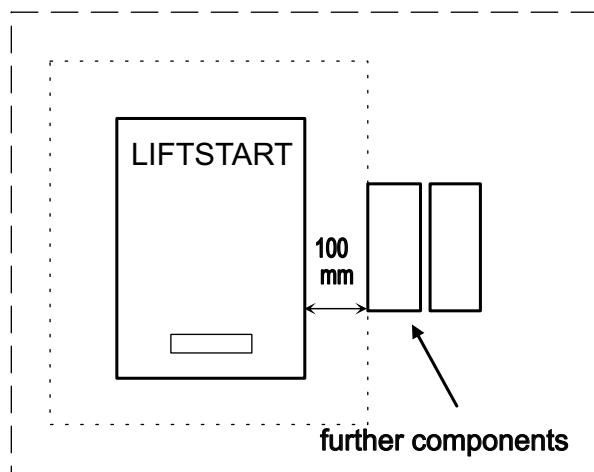
The LIFTSTART device (IP 22) should be mounted vertically in a housing. The upper and lower side of the heatsink must be kept free to allow cooling air to circulate freely. Controllers with cooling fans must be mounted on a flat surface to ensure that cooling air is channelled to the heat sink.

Additional points that must be considered when mounting the unit:

- vibration free environment
- protection against hazardous environments
- protection against dust and humidity

Please avoid to mount other components in distance of 100mm around the controller because the cooling system can be affected.

The LIFTSTART versions “LUK” (with fuses, operation and fault indications) and “AIP54” are built according to IP 54. Therefore these versions can be mounted in areas where they are not protected by dust and humidity.



3. Wiring

When wiring consider the following points to ensure correct and reliable operation:

- dangerous voltage are present to the LIFTSTART during operation
- the operation of the softstarter with a capacitive load at the output (e.g. for power factor compensation) is not allowed
- using an installation tester can damage the LIFTSTART
- connect the controller as shown in the following recommended connection.

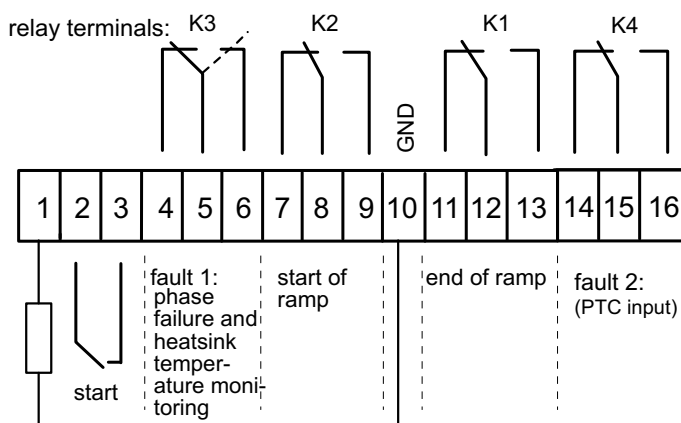
Confirm the power side L1, L2 and L3 and motor side T1, T2 und T3. Take care of the following parts in regard to the control signals: Install a surge suppressor on the relay exciting coil. Use a shielded wire for twisted wire for the control circuit wiring. Distance this from the main circuit wiring. High voltage wiring (L1, L2, L3, T1, T2, T3) should be physically and electrically separated from low voltage signal wires or control wires. Only qualified persons should work on or near these controllers. The successful and safe operation of these controllers depends on proper transport, storage, planning and installing as well as commissioning. Please regard established safety practices like VDE 0100, VDE 0113, VDE 160.

The LIFTSTART device can cause the movement of dangerous machinery or moving constructions. The general safety precautions must be taken before putting into operation.

Fuses:

Conventional short circuit protection of the connections to the controller and to the motor in accordance with the wiring regulations must be provided. Circuit breakers, motor starters or additional fuses can be used. The control voltage should be protected with 2A.

Connection of the control terminals:



Start (Enable):

Command: "START" connect terminal 2 to terminal 3.

Monitoring signal "End of ramp":

Terminals 12/11 switch to 12/13 (K1) (S2-function) when the end of ramp is reached.

External control voltage:

230V 50/60Hz, terminals: look examples of standard wiring.

Temperature exceedance:

The controller is equipped with a temperature control circuit. This module continuously monitors the temperature of the heat sink and as soon as the values exceeds 75°C the LIFTSTART will be shut down.

The red "Fault-LED St1" flashes and the terminals 5/6 switch to 5/4.

4. Operation

Confirm that no parts have been damaged during shipping. If the LIFTSTART is not used immediately after purchase, store it in a place with no dust and with good ventilation. The adjusting and connection work are to be accomplished according to established safety practices.

For damages or accidents, caused by unsatisfactory installation or inexperienced interferences in the LIFTSTART, the manufacturer can not be made liable.

The indicated mains voltage must agree with engine performance and the same applies to the existing frequency.

Connection:

The devices can be connected on either with the six-pole circuit of the three-phase motor (W3 - circuit) or between main and motor (see example wirings).

The start instruction can be released via bridging terminal 2 and 3.

As of LIFTSTART X-6/TS, i.e. with two separate contactors, activation is caused with creation of 230V AC-starting voltage. The two separation contactors pull up and activate by auxiliary contacts switched into row the electronic system of the LIFTSTART.

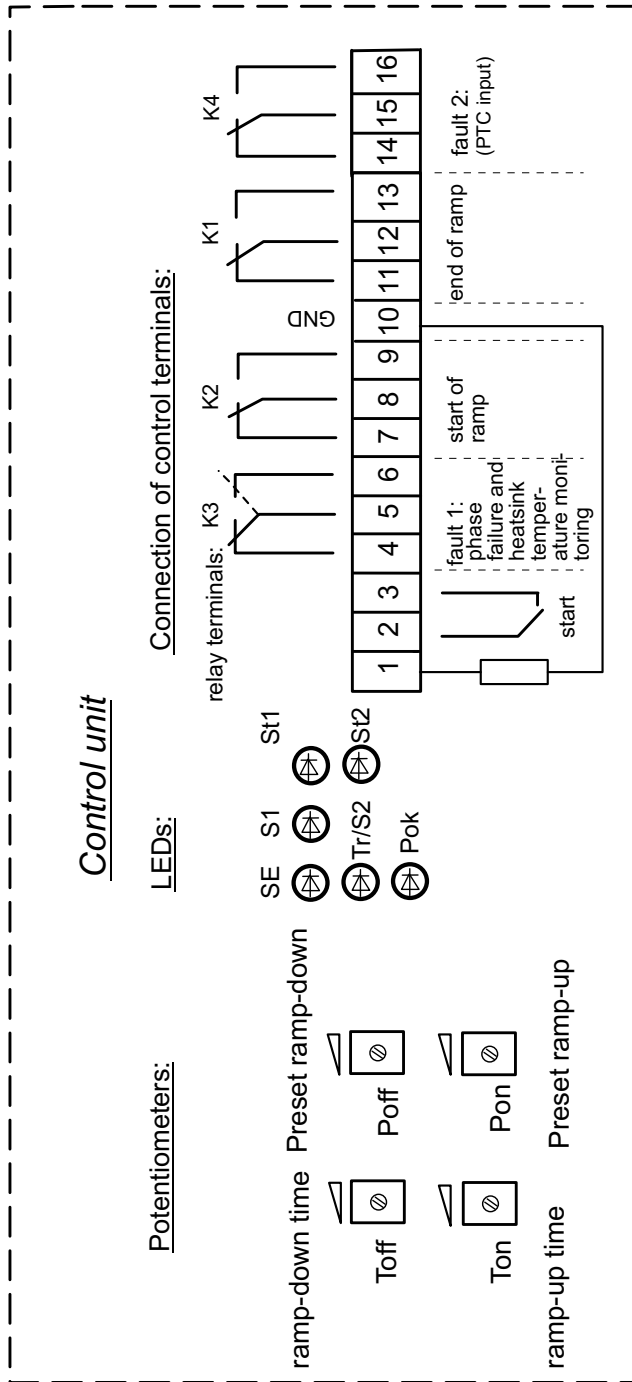
Diagnostic LEDs:

In order to indicate the different function states the LIFTSTART provides six LEDs which light depending on its current state:

LED	Bedeutung	
Pok	power ok	mains voltage available
Tr/S2	top of ramp	top of ramp has been reached
SE	activated	ramp-up process initiated
S1	ramp-up active	on-going ramp-up process, continuous operation, on-going ramp-down process
St2	Fault 2	lights if PTC-input is activated
St1	Fault 1	lights in case of phase failure, phase follow-up failure and temperature exceedance of heatsink

If fault 1 occurs, the LEDs Tr and S1 will expire, whereas LED St1 will light. Any type of error message can be reset by connecting the control or mains voltage or activating the ramp-up process. Alternatively, automatic auto-reset is also available upon request.

5. Connection diagram



ATTENTION:
 If fault St1 occurs (terminals 4, 5, 6) the power unit will be switched off. If fault St2 occurs, however, only an error message is indicated (terminals 14, 15, 16) aus. The power unit will not be switched off.

Adjustment of potentiometers:

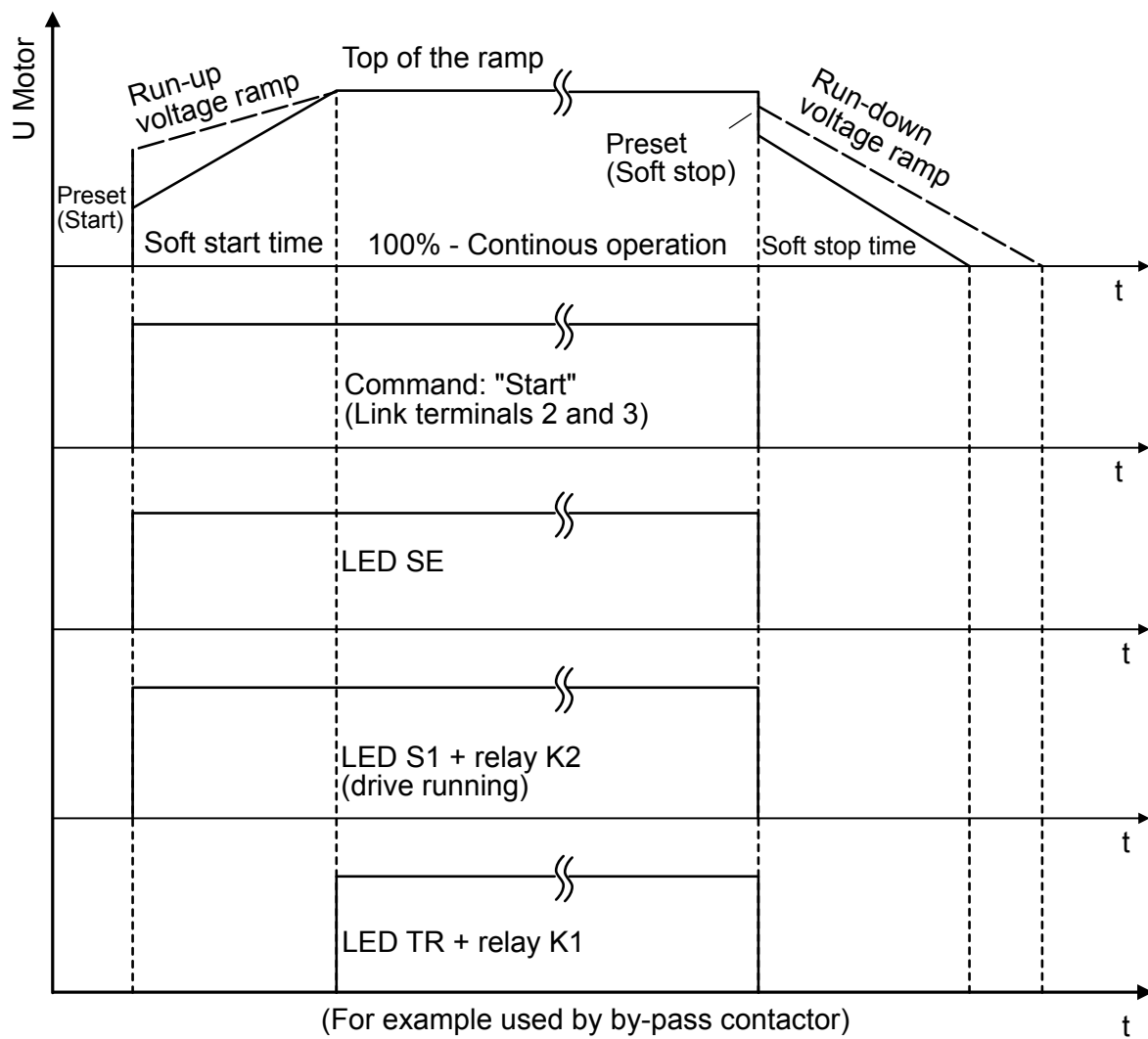
T _{on}	ramp-up time	2-8s
T _{off}	ramp-down time	2-8s
P _{on}	ramp-up torque	0-90%
P _{off}	ramp-down torque	0-100%

(other values are possible upon request)

LEDs:

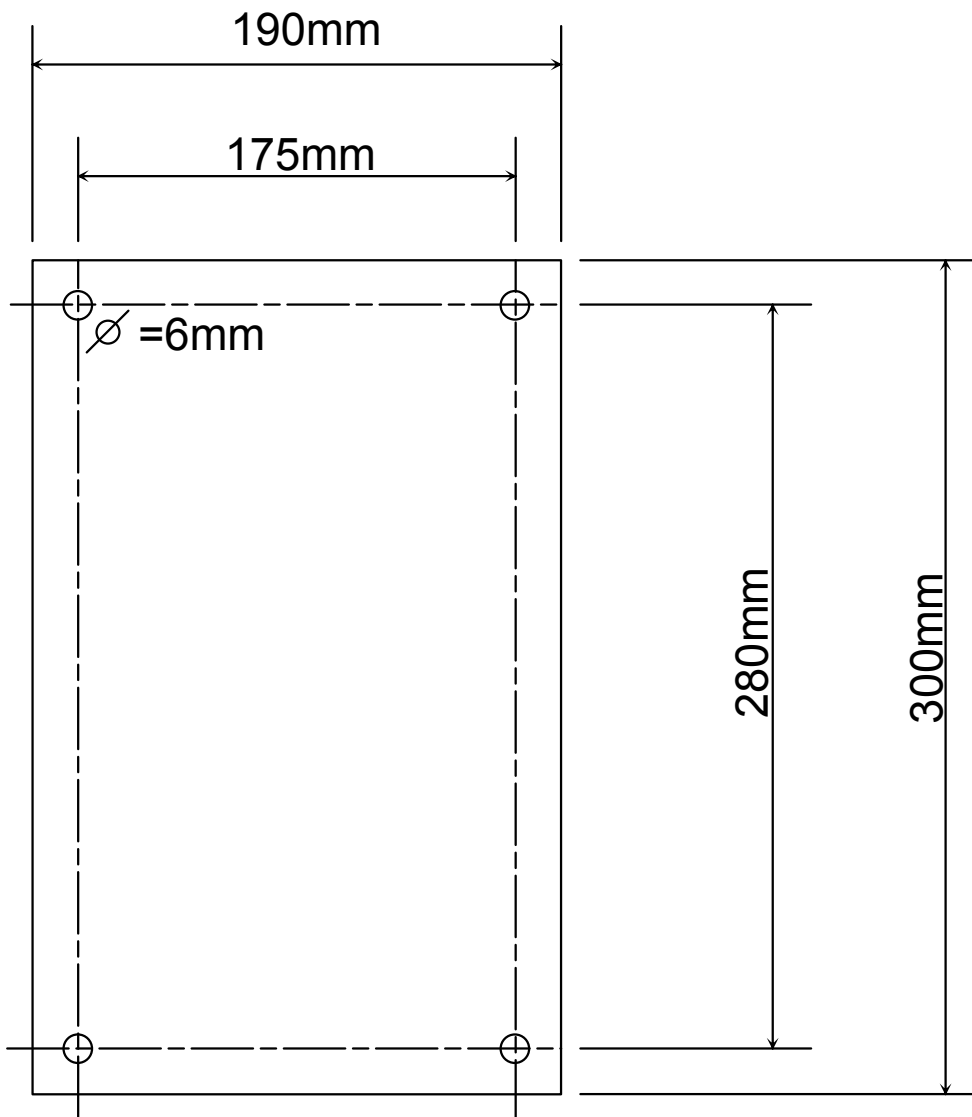
Pok (gn)	supply voltage available (ready for operation)
SE (gn)	start terminals activated
Tr/S2 (gn)	ramp-up process has finished (100%), at the same time K1 switches
S1 (gn)	at operation (LIFTSTART active), at the same time K2 switches
St1 (rd)	indicates faults involving phase failure, undervoltage, temperature exceedance of heat-sink; relay contacts K3 switch from 5-4 to 5-6
St2 (red)	indicates faults concerning the temperature exceedance of the motor (PTC), terminals 15-14 switch to 15-16

6. Operation diagram



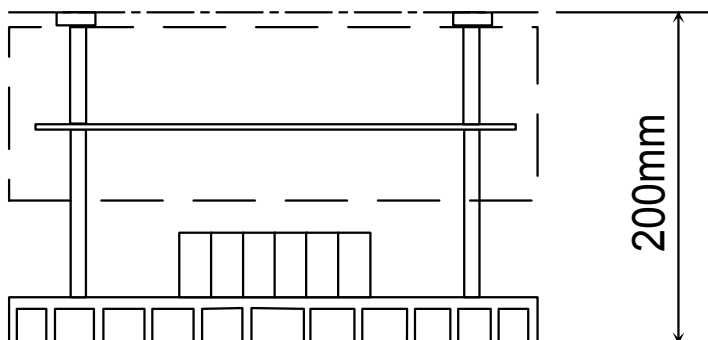
7. Frame sizes

Frame size: A

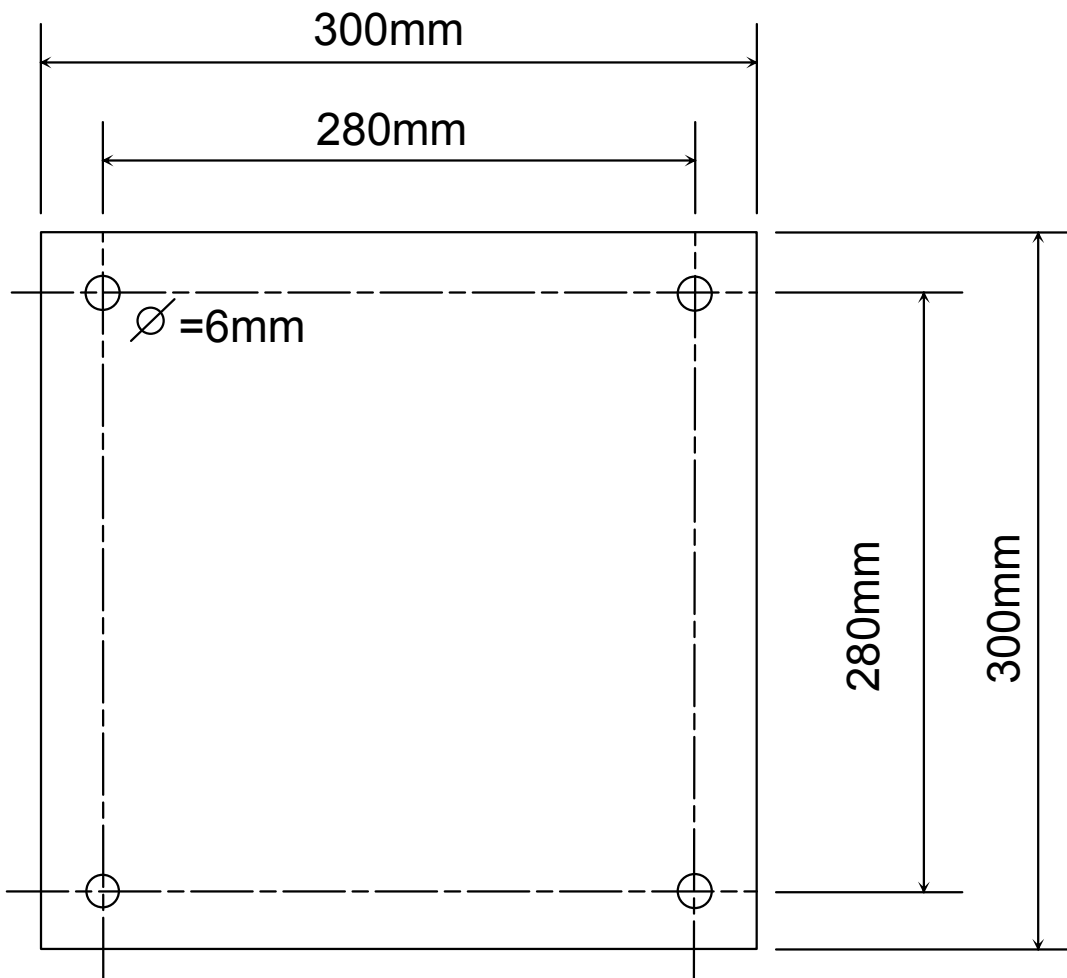


Types:

- LIFTSTART 9
- LIFTSTART 12
- LIFTSTART 16
- LIFTSTART 24
- LIFTSTART 33

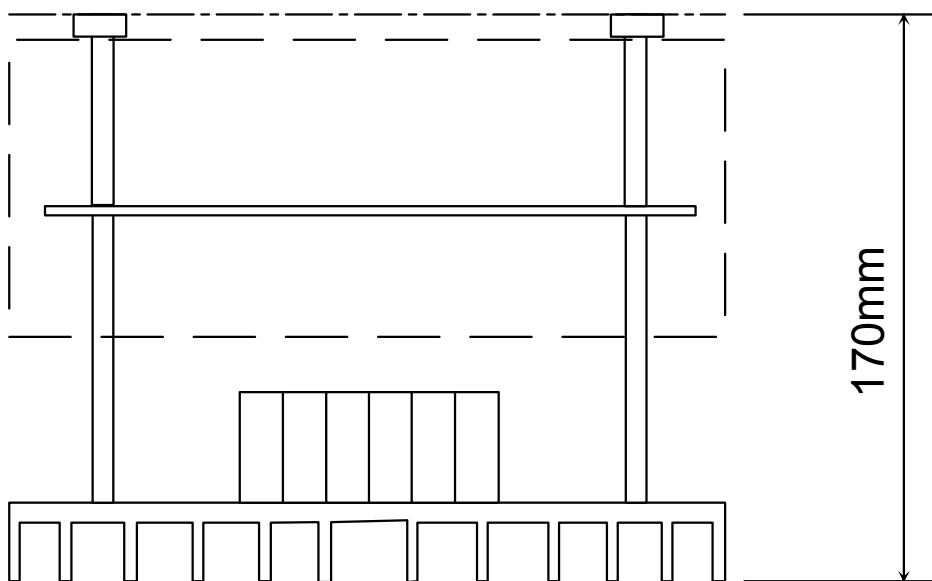


Frame size: B



Types:

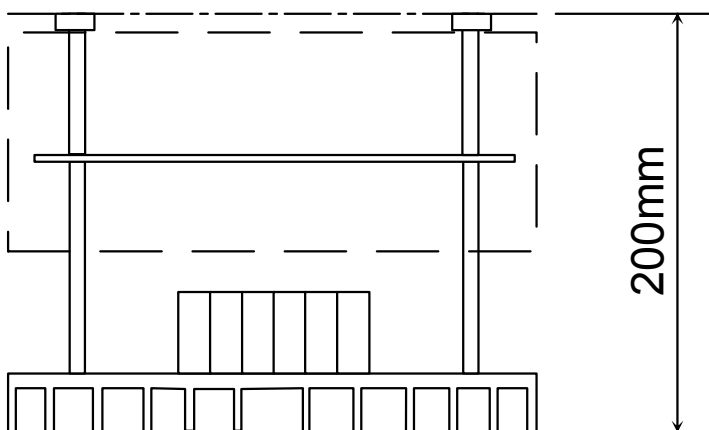
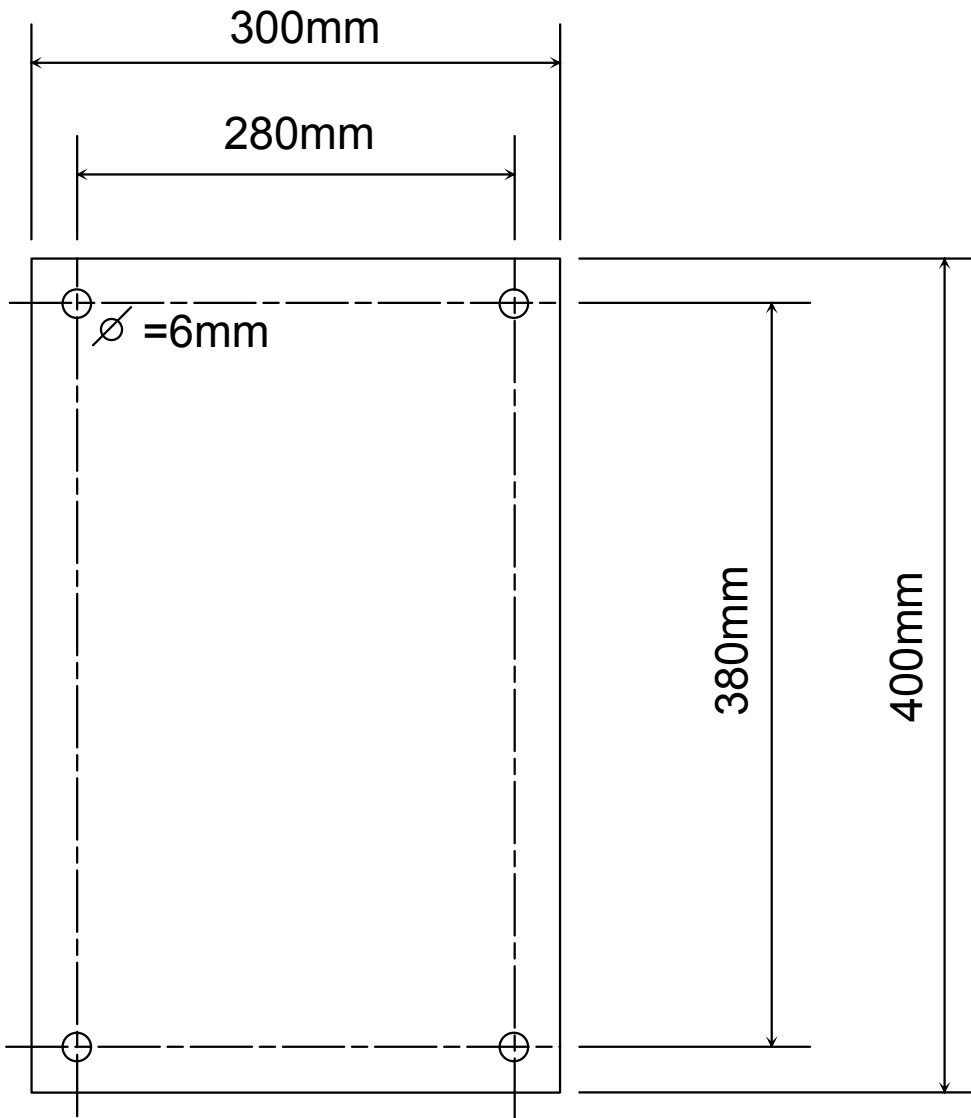
- LIFTSTART 40
- LIFTSTART 60



Frame size: C

Types:

- LIFTSTART 77
- LIFTSTART 90

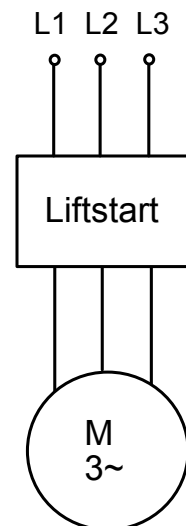


8. Summary of available LIFTSTART models

Type:

- LIFTSTART 9-3
- LIFTSTART 12-3
- LIFTSTART 16-3
- LIFTSTART 24-3
- LIFTSTART 33-3
- LIFTSTART 40-3
- LIFTSTART 60-3
- LIFTSTART 77-3
- LIFTSTART 90-3

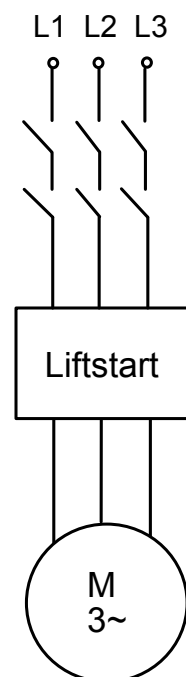
The LIFTSTART is placed between line and three-phase motor.



Type:

- LIFTSTART 9-3/TS
- LIFTSTART 12-3/TS
- LIFTSTART 16-3/TS
- LIFTSTART 24-3/TS
- LIFTSTART 33-3/TS
- LIFTSTART 40-3/TS
- LIFTSTART 60-3/TS
- LIFTSTART 77-3/TS
- LIFTSTART 90-3/TS

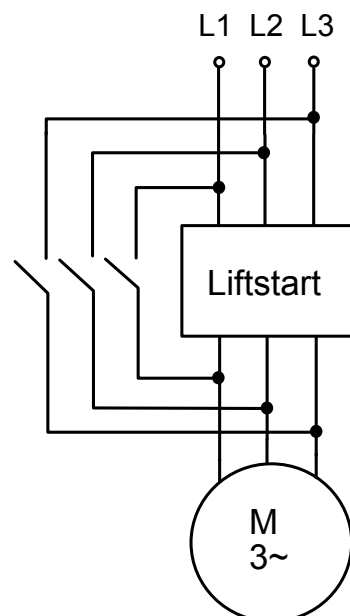
The LIFTSTART is placed between line and three-phase motor by two separation contactors.



Type:

- LIFTSTART 9-3/BY
- LIFTSTART 12-3/BY
- LIFTSTART 16-3/BY
- LIFTSTART 24-3/BY
- LIFTSTART 33-3/BY
- LIFTSTART 40-3/BY
- LIFTSTART 60-3/BY
- LIFTSTART 77-3/BY
- LIFTSTART 90-3/BY

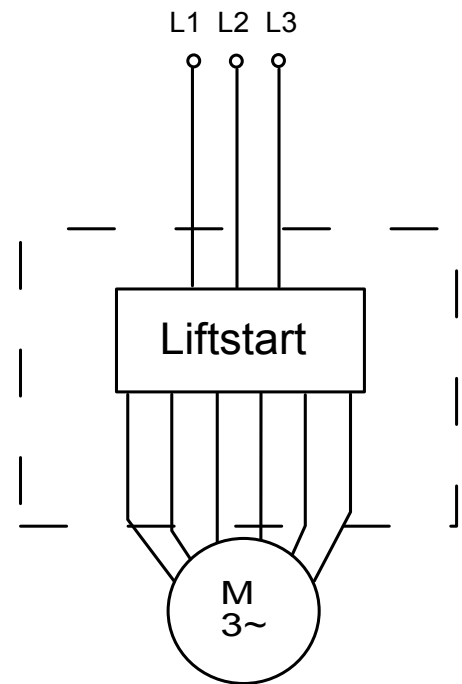
Version with integrated bypass-contactors.



Type:

- LIFTSTART 9-6
- LIFTSTART 12-6
- LIFTSTART 16-6
- LIFTSTART 24-6
- LIFTSTART 33-6
- LIFTSTART 40-6
- LIFTSTART 60-6
- LIFTSTART 77-6
- LIFTSTART 90-6

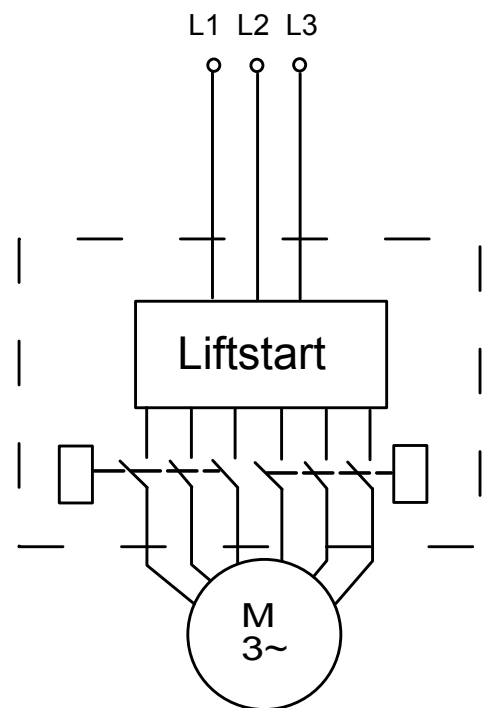
Six-clamps version without separation contactors.



Type:

- LIFTSTART 9-6/TS
- LIFTSTART 12-6/TS
- LIFTSTART 16-6/TS
- LIFTSTART 24-6/TS
- LIFTSTART 33-6/TS
- LIFTSTART 40-6/TS
- LIFTSTART 60-6/TS
- LIFTSTART 77-6/TS
- LIFTSTART 90-6/TS

Six-clamps version with two separation contactors.



9. Survey of the individual types

Type	Motor power [kW]	Motor current [A]	Max. starting current [A]	Number of starts /h	Rec. semi-conductor fuses [A]	Weight [kg]	Rec. cross section [mm ²]	Frame size	Rec. reactance coil
LIFTSTART 9-3	9	30	80	75	60	3,5	4,0	A	NDR 36
LIFTSTART 12-3	12	42	110	75	60	2,8	4,0	A	NDR 50
LIFTSTART 16-3	16	53	145	75	80	4,0	6,0	A	NDR 50
LIFTSTART 24-3	24	68	220	75	100	4,2	10,0	A	NDR 75
LIFTSTART 33-3	33	76	300	75	125	5,5	16,0	A	NDR 75
LIFTSTART 40-3	40	110	360	75	200	5,9	25,0	B	NDR 120
LIFTSTART 60-3	60	138	480	75	250	6,4	35,0	B	NDR 160
LIFTSTART 77-3	77	180	600	40	400	8,5	50,0	C	NDR 220
LIFTSTART 90-3	90	220	750	30	500	10,2	70,0	C	NDR 220

Type	Motor power [kW]			Motor current [A]		Max. starting current (W3-connection) [A]	Number of starts /h	Rec. semi-conductor fuses [A]	Weight [kg]	Rec. cross section [mm ²]		Frame size	Rec. reactance coil
	3-pole version	W3-connection	3-pole version	W3-connection	input 3-pole					output 6-pole			
LIFTSTART 9-6	9	12	39	50	110	75	60	3,6	4,0	4,0	A	NDR 36	
LIFTSTART 12-6	12	16	42	70	145	75	60	3,0	6,0	4,0	A	NDR 50	
LIFTSTART 16-6	16	24	53	100	220	75	80	4,2	10,0	6,0	A	NDR 50	
LIFTSTART 24-6	24	33	68	120	290	75	100	4,5	16,0	10,0	A	NDR 75	
LIFTSTART 33-6	33	40	76	130	360	75	125	6,0	25,0	16,0	A	NDR 75	
LIFTSTART 40-6	40	60	110	190	480	75	200	6,3	35,0	25,0	B	NDR 120	
LIFTSTART 60-6	60	77	138	235	600	40	250	7,0	50,0	35,0	B	NDR 160	
LIFTSTART 77-6	77	90	180	310	750	30	400	9,0	70,0	50,0	C	NDR 220	
LIFTSTART 90-6	90	125	220	380	900	30	500	10,5	95,0	70,0	C	NDR 220	

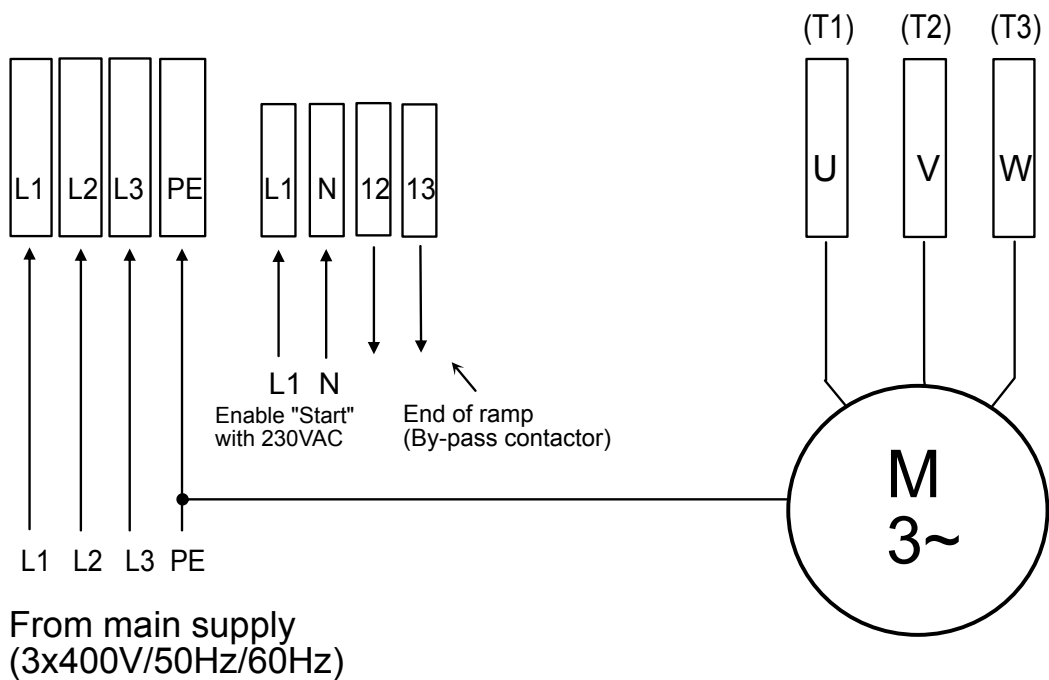
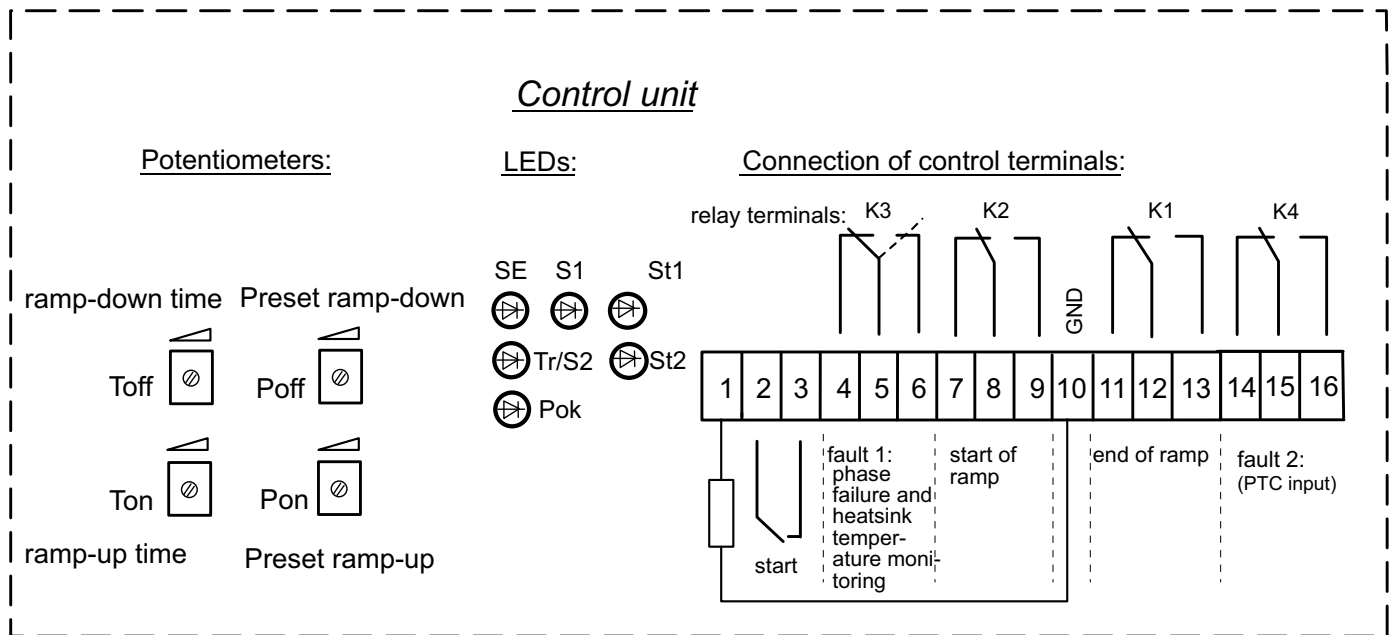
The specified values are approximated. Consequently, they can vary in practice.

10. Technical data

Mains voltage:	3x400V AC (-15...+10%) (optional: 3x500V AC, 3x690V AC)
Control voltage:	400V/230V AC (-15...+15%) (optional: 24V DC, generated internally)
Frequency:	45-65Hz (self-synchronizing)
Power loss of control electronic:	4W
Number of controlled phases:	3 (L1, L2, L3)
Operation temperature:	-10...55° (at rated operation)
Relative Humidity:	95% (non-condensing)
Pollution degree:	3
Vibration:	13,2Hz – 100Hz: +/- 0,7g (IEC 60068 Test, sinusoidal)
Installation altitude:	1500m
Potential-free outputs:	250V AC / 8A or 24V DC / 3A
Failure monitoring:	<ul style="list-style-type: none"> • temperature exceedance of heat sink • PTC monitoring • phase monitoring • phase failure
Mounting:	vertically, electrical connections below
Control inputs:	seperated galvanically
Regulations:	EN60947-4-2 (1996), CE conformity, IEC 536 (1976), IP22 (EN60529)

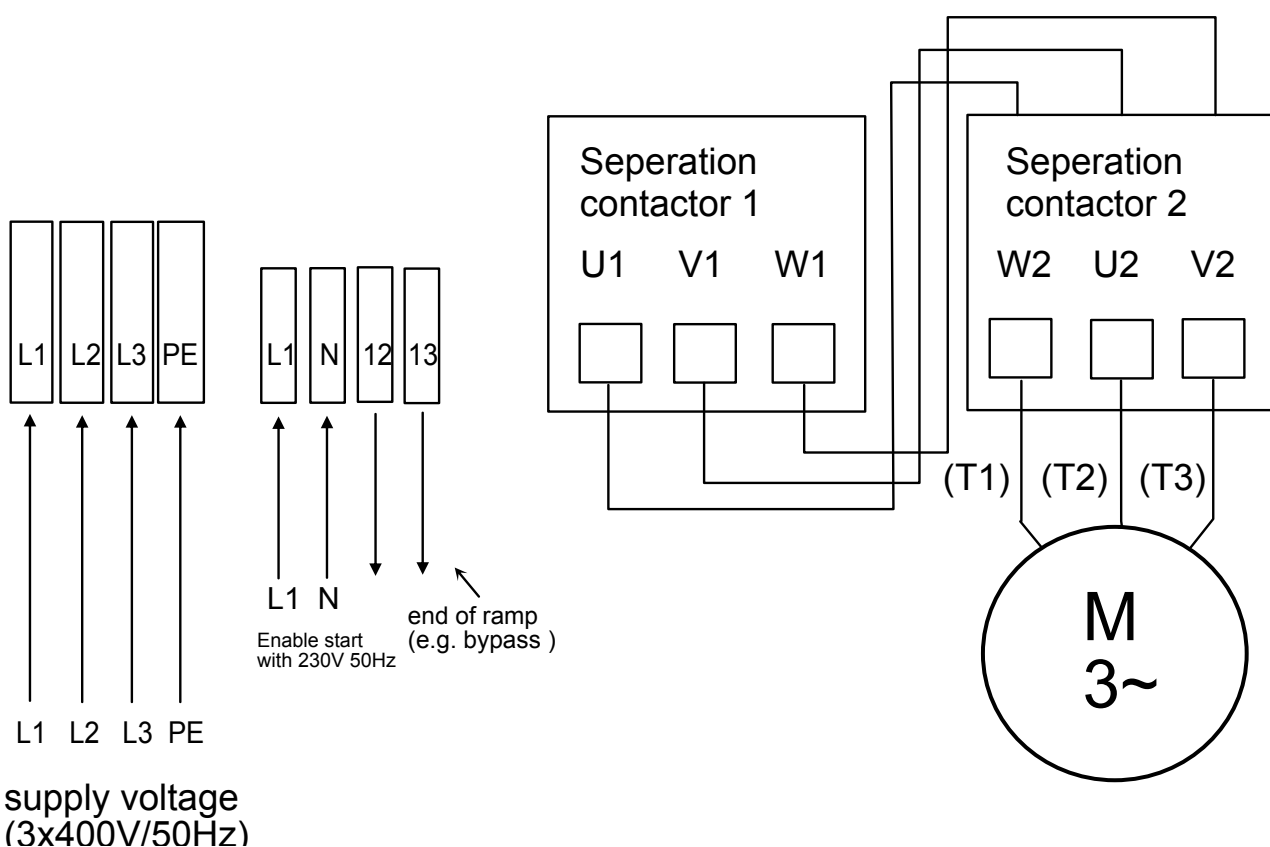
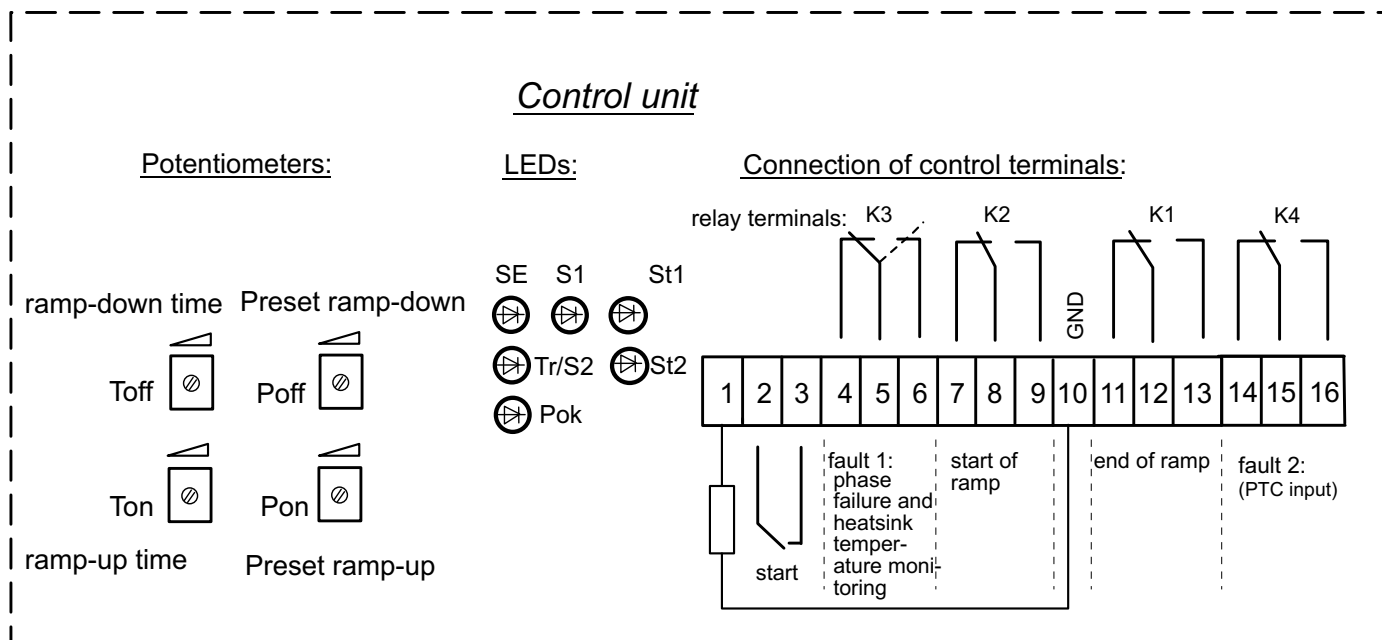
11. Examples: basic connection

LIFTSTART 9-3 to LIFTSTART 90-3



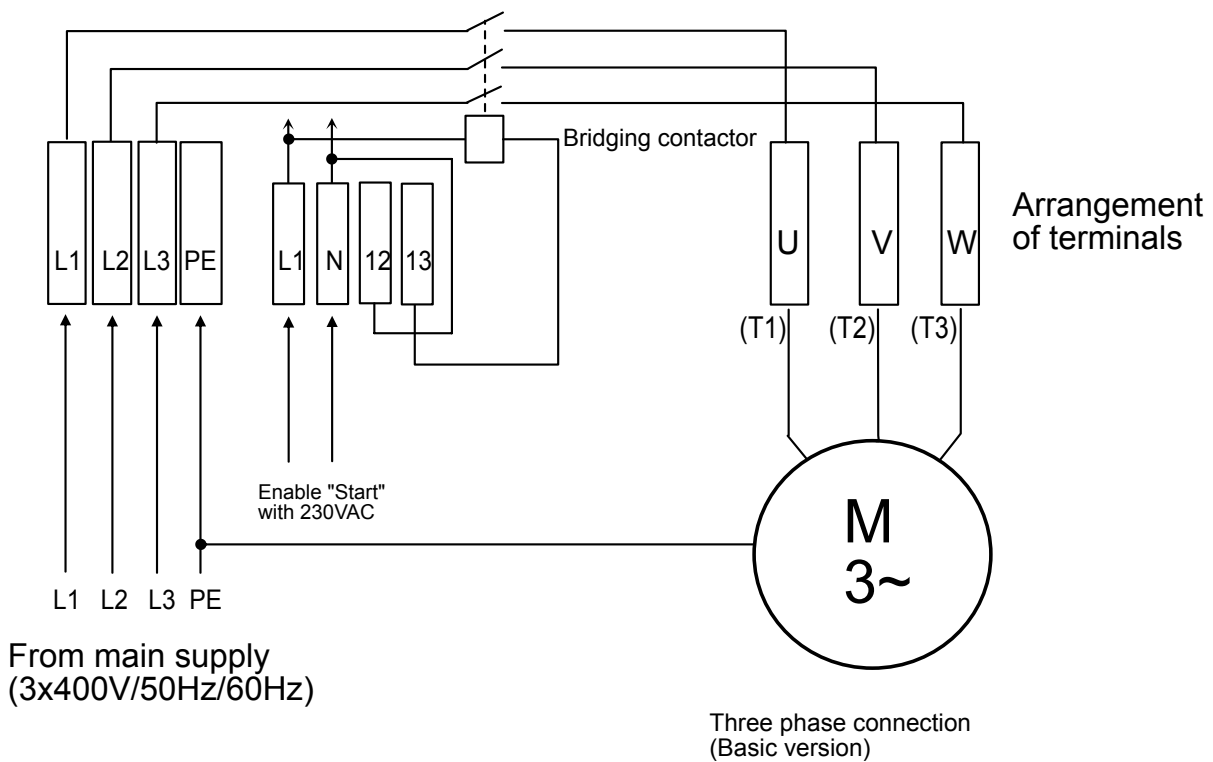
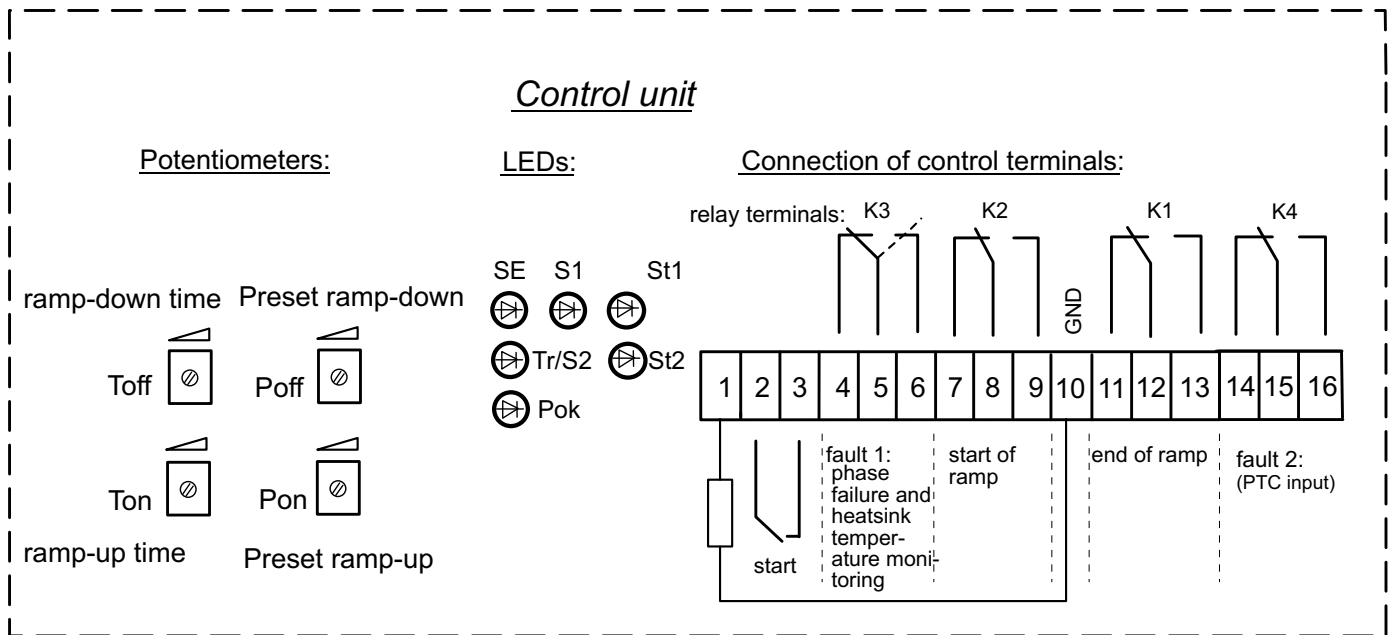
The main circuits are connected to the clamps L1, L2 and L3. The output of the LIFTSTART has to be connected to U, V, W (T1, T2, T3).

LIFTSTART 9-3/TS to LIFTSTART 90-3/TS



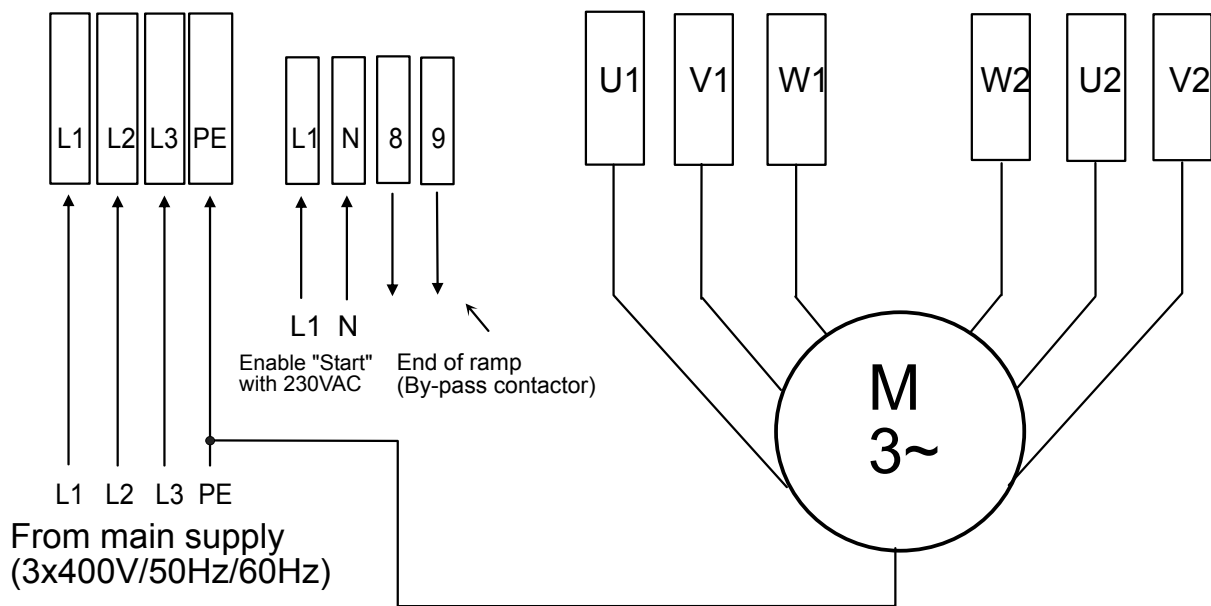
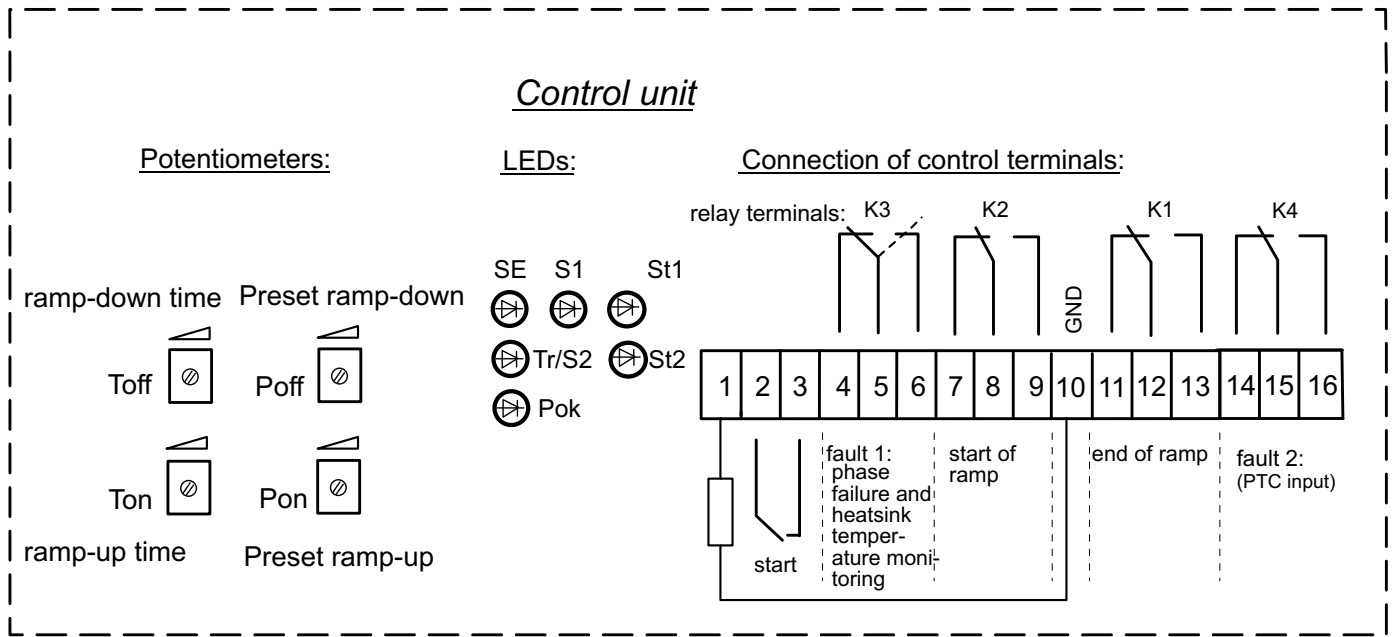
The main circuits are connected to the clamps L1, L2 and L3. The output of the LIFTSTART has to be connected to W2, U2, V2 (T1, T2, T3).

LIFTSTART 9-3/BY to LIFTSTART 90-3/BY



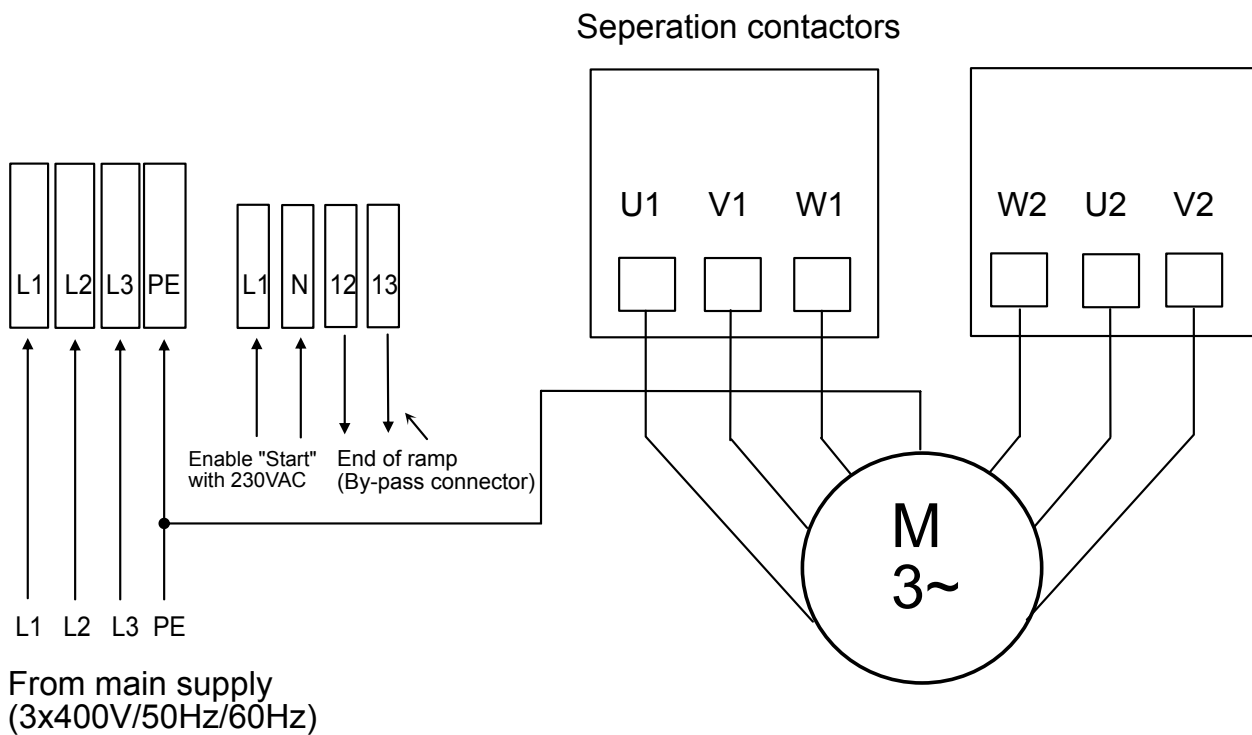
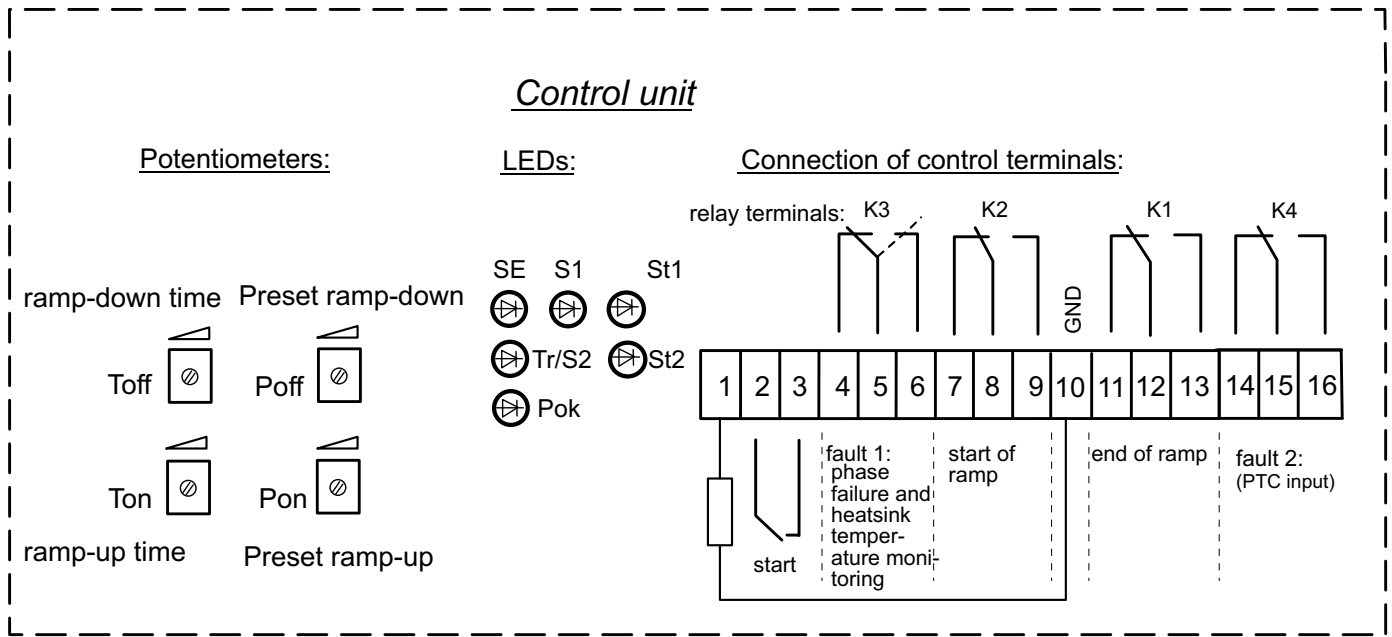
The main circuits are connected to the clamps L1, L2 and L3. The output of the LIFTSTART has to be connected to U, V, W (T1, T2, T3).

LIFTSTART 9-6 to LIFTSTART 90-6



The main circuits are connected to the clamps L1, L2 and L3. The output of the LIFTSTART has to be connected to U1, V1, W1, W2, U2 and V2.

LIFTSTART 9-6/TS to LIFTSTART 90-6/TS



The main circuits are connected to the clamps L1, L2 and L3. The output of the LIFTSTART has to be connected to U1, V1, W1, W2, U2 and V2.