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Start-up instructions

Electronic soft-starter Type: Picostart XL



Contents

	Page
1. General information	2
2. Assembly	2
3. Installation	2
4. Wiring diagram	3
5. Operation	4-6
6. Survey of the individual types	7
7. Diagnostic diagram	8
8. Technical data	9

1. General information

The electronic motor control devices Picostart-XL... were developed for smooth and gentle start-up and running of three-phase squirrel-cage induction motors. When those motors are switched-on a high torque is produced which tends to damage the mechanical parts of the motor as well as the v-belt and the gearbox.

Picostart-XL... soft-starters make use of a phase angle control to achieve a smooth start of your motor. Ramp-up and ramp-down time as well as ramp-up and ramp-down torque can be adjusted independantly so that the devices can be adapted to numerous use cases.

2. Assembly

The electronic starting device Picostart-XL... is composed of several modules:

- power element with three anti-parallel thyristor pairs
- control unit with electronic starting and control system

3. Installation

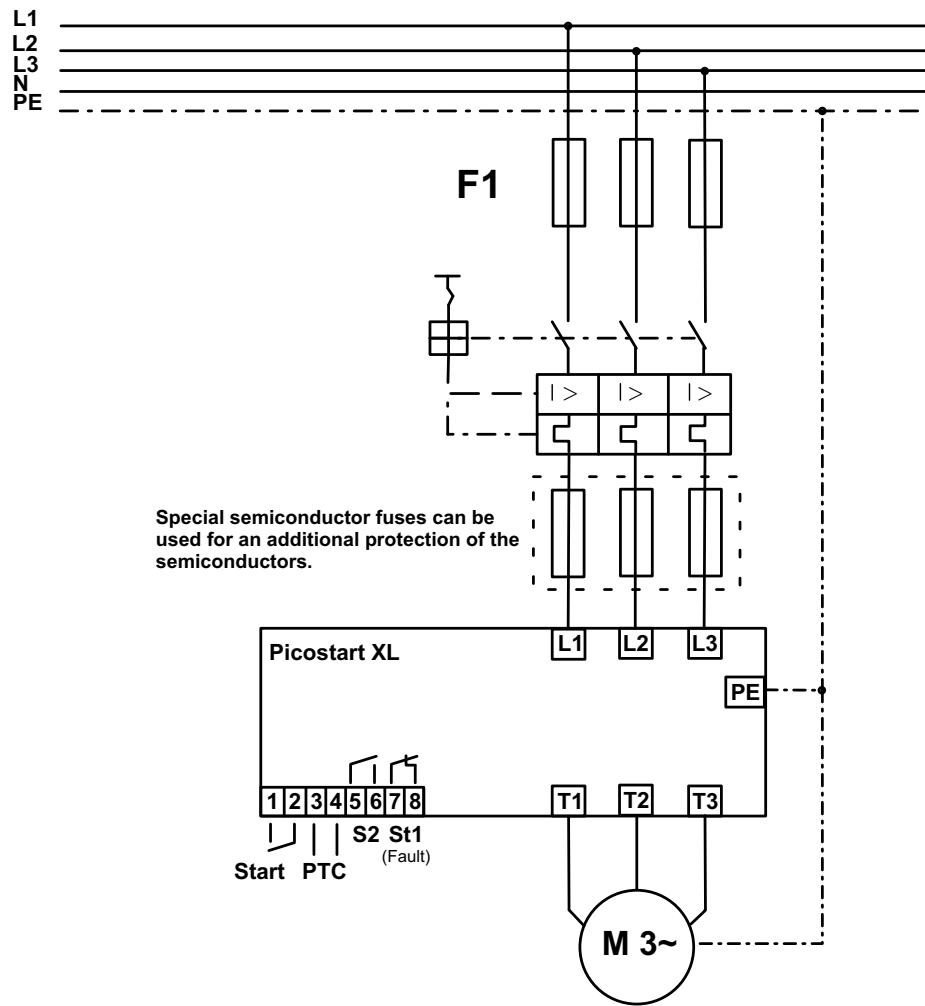
To begin with, all electrical connections are to be made according to the accompanying wiring diagrams: L1, L2, L3 (mains connection) via fused circuit breakers and T1, T2, T3 (motor power connection). On account of the internal wiring the neutral conductor mustn't be connected when the load is at operation.

Please ensure that the clamps 3-4 are either connected to the PTC of the motor or that they are bridged (factory setting).

The control wiring has to be placed in separate ducts or conduits. To avoid malfunction, it is advisable, to install the electronic signal wiring separated from the power supply and/or from the protective control wiring as well as to twist the feed and return signal lines or use shielded control lines. No other devices should be placed closer than 50-100mm to the device in order to provide adequate cooling.

It is essential for the electric installation to comply to the stipulations of the VDE (German Electrical Engineers Association), specifically to VDE 0100, VDE0113, VDE 160.

4. Wiring diagram



5. Operation

When putting the device into operation you have to ensure that the Picostart XL... device isn't overloaded by many ramp-ups within a short period of time or by too high starting currents. Therefore the current of the different phases should be monitored and appropriate intervals between the ramp-ups should be scheduled as well. Check that the device is connected properly - if questions should arise concerning this point consult the wiring diagram (p. 3).

If the supply voltage is available, LED 5 („power supply ok“) will light. The state “ready for operation“ is indicated by continuous flashing of the corresponding LED (for further details consult the part about “status and failure reporting“). In order to initiate ramp-up, the start contacts (1-2) have to be bridged. If “Start“ is active, LED 4 (“start“) lights at the beginning. If motor voltage has reached 100%, LED 1 (“end of ramp“) lights. Depending on the adjustment of the pots t_{up} and M_{up} different ramp-up characteristics can be achieved.

In order to control external applications the Picostart XL... devices possess potential-free relay contacts which work as follows:

- relay St1 (clamps 7-8): If no fault occurs the contacts 7-8 are closed. Otherwise they are opened. A error indication is at the same time with LED 2 (“fault“).
- relay S2 (clamps 5-6): The contacts 5-6 are closed after reaching a motor voltage of 100%. This indication is at the same time with LED 1 (“end of ramp“).

All Picostart XL... devices are equipped with starting current limitation which is set to a fixed value by default respectively to a value needed by the customer.

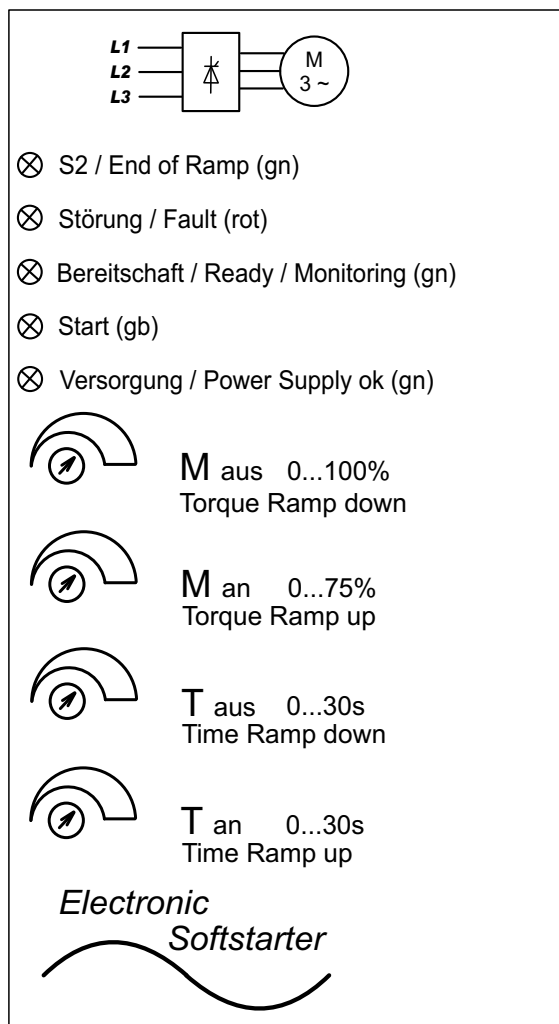
Deactivating the start contacts (1-2) results in initiating the ramp-down process. Consequently, LED 1 (“end of ramp“) goes out. If the motor voltage has reached 0%, LED 4 (“start“) goes out as well. As far as the ramp-down process is concerned, the pots t_{aus} and M_{aus} have to be adjusted.

In case of temperature exceedance of the heat sink, incorrect phase direction or indications of the motor thermistor the power unit will be switched off and the electronic will be locked. At the same time LED 2 (“fault“) will light if a failure has been registered. Moreover, the device will switch off if phase failure is reported (because of the internal voltage supply) and LED 2 (“fault“) lights.

After the failure has been removed the Picostart XL... must be reseted by deactivating the start contacts. Bridging them once again initiates a new ramp-up.

To ease the diagnosis of an existing fault, different errors are also indicated by a corresponding flashing pattern of LED 3 (“ready/monitoring“).

Meaning of the LEDs and description of possible adjustments



- Led 1: ⊗ S2 / End of Ramp (gn)
- Led 2: ⊗ Störung / Fault (rot)
- Led 3: ⊗ Bereitschaft / Ready / Monitoring (gn)
- Led 4: ⊗ Start (gb)
- Led 5: ⊗ Versorgung / Power Supply ok (gn)

LED 1:

S2: activated if end of ramp is reached

LED 2:

Fault: indicates the type of error that persists

LED 3:

indicates “ready for operation” or an error

LED 4:

activated if ramp-up process is started (clamps 1-2)

LED 5:

power supply is OK

Possible adjustments:

T_{an} : 0-30s T_{aus} : 0-30s
 M_{an} : 0-75% M_{aus} : 0-100%

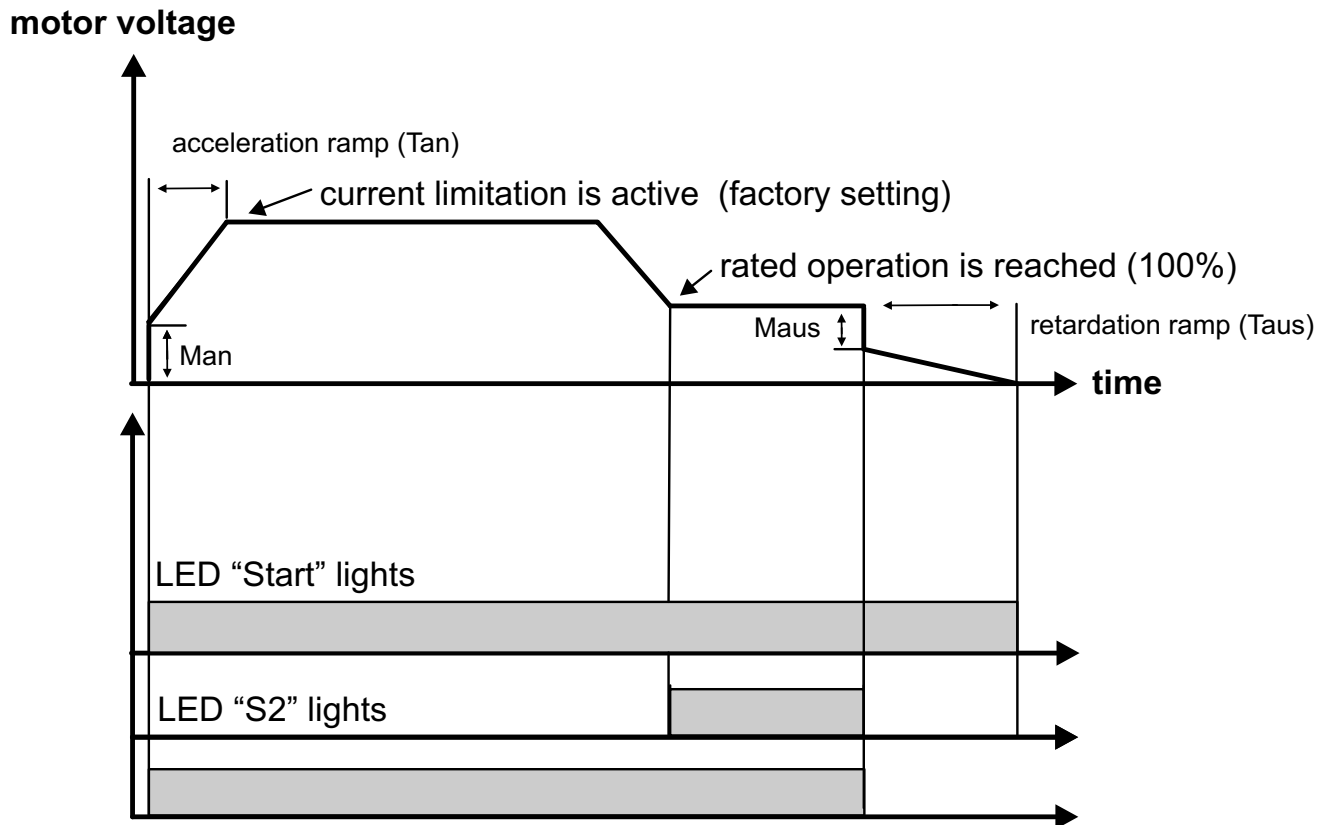
The internal current limitation is performed automatically and is set to values within the interval of $2,5xI_n$ - $3,5xI_n$.

Status and failure reporting

Signals of the LEDs		Meaning:
LED “fault” LED 2	LED “ready/monitoring” LED 3	
		phase or direction of rotation
		failure
		over temperature of heatsink
		PTC (Thermister)
		ready for operation

LED on

LED off

Illustration of a ramp-up and ramp-down process of a Picostart XL device

6. Survey of the individual types

Type	Motor power [kW]	Max. starting current [A]	Rec. semi-conductor fuses [A]	Mains fuse [A]	Rec. cross-section [mm ²]	Weight [kg]	Frame size	Dimensions WxHxD [mm]	Fault contact
Picostart XL 5,5	5,5	35	35	25	2,5	0,95	A	100x101x119	√
Picostart XL 7,5	7,5	48	40	25	4	0,95	A	100x101x119	√
Picostart XL 11	11	65	40	32	4	1,1	B	113x101x119	√
Picostart XL 15	15	95	50	35	6	1,1	B	113x101x119	√

Errors and technical modifications excepted (Date 04/2011)

7. Diagnostic diagram

Fault	Possible reason	Solution
<ul style="list-style-type: none"> no LED lights 	<ul style="list-style-type: none"> no supply voltage phase failure or other fault 	check connections of mains voltage
<ul style="list-style-type: none"> LED 2 (fault) and LED 5 (power supply ok) light 	failure of one phase or wrong rotary field	check wires and fuses of the installation
<ul style="list-style-type: none"> LED 2 (fault) lights LED 3 (ready/monitoring) indicates error signal 	<ul style="list-style-type: none"> bridge or PTC-sensor on ter. 3-4 is not available temperature exceedance of motor 	<ul style="list-style-type: none"> check for temperature exceedance and restart check PTC and wires for malfunction
<ul style="list-style-type: none"> immediate start of motor with decreased power after supply voltage is connected on activation of "Start" ramp-up is performed within the defined time 	star-wired motor and neutral point is connected with N	remove N from neutral point
<ul style="list-style-type: none"> immediate start of motor with decreased power after supply voltage is connected "Start" command has no influence on motor current 	<ul style="list-style-type: none"> incorrect wiring defect semiconductor 	<ul style="list-style-type: none"> check wires device needs to be repaired
<ul style="list-style-type: none"> LED 5 (power supply ok) lights LED 4 (start), LED 1 (end of ramp) light motor "hums", but doesn't start within ramp-up time 	<ul style="list-style-type: none"> incorrect wiring defect semiconductor device doesn't fit for the motor power or motor isn't intended for soft-start 	<ul style="list-style-type: none"> check wires devices needs to be repaired check motor data, contact your reseller

8. Technical data

Control voltage	110-440V AC +- 20% (default: 3x400V AC)
Frequency	50-60Hz +- 10% (mains or control voltage)
Rotary field	self-synchronizing
Number of controlled phases	L1, L2, L3 (W3C-circuit)
Start-up cycles	max. 30/h with 8s current limitation
Ambient temperature	-20°C-45°C
Storage temperature	-25°C-75°C
Relative humidity	95% (non-condensing)
Max. altitude	1000m
Kind of protection	IP 40
LED-indications	ready for operation, Start, 100% U_{motor}
Suitable motor powers	5,5-15kW (cf. table "Survey of the individual types")
Failure indication	<ul style="list-style-type: none"> • temperature exceedance of device • PTC-input • phase failure (only B and C devices)
Standards of use	AC-53a according to IEC
Mounting position	vertical, electronic connections below
Control inputs	electrically isolated
CE-regulations	EMC Directive 2014/30/EU LVD 2014/35/EU

Errors and technical modifications excepted (Date: 2016/05)