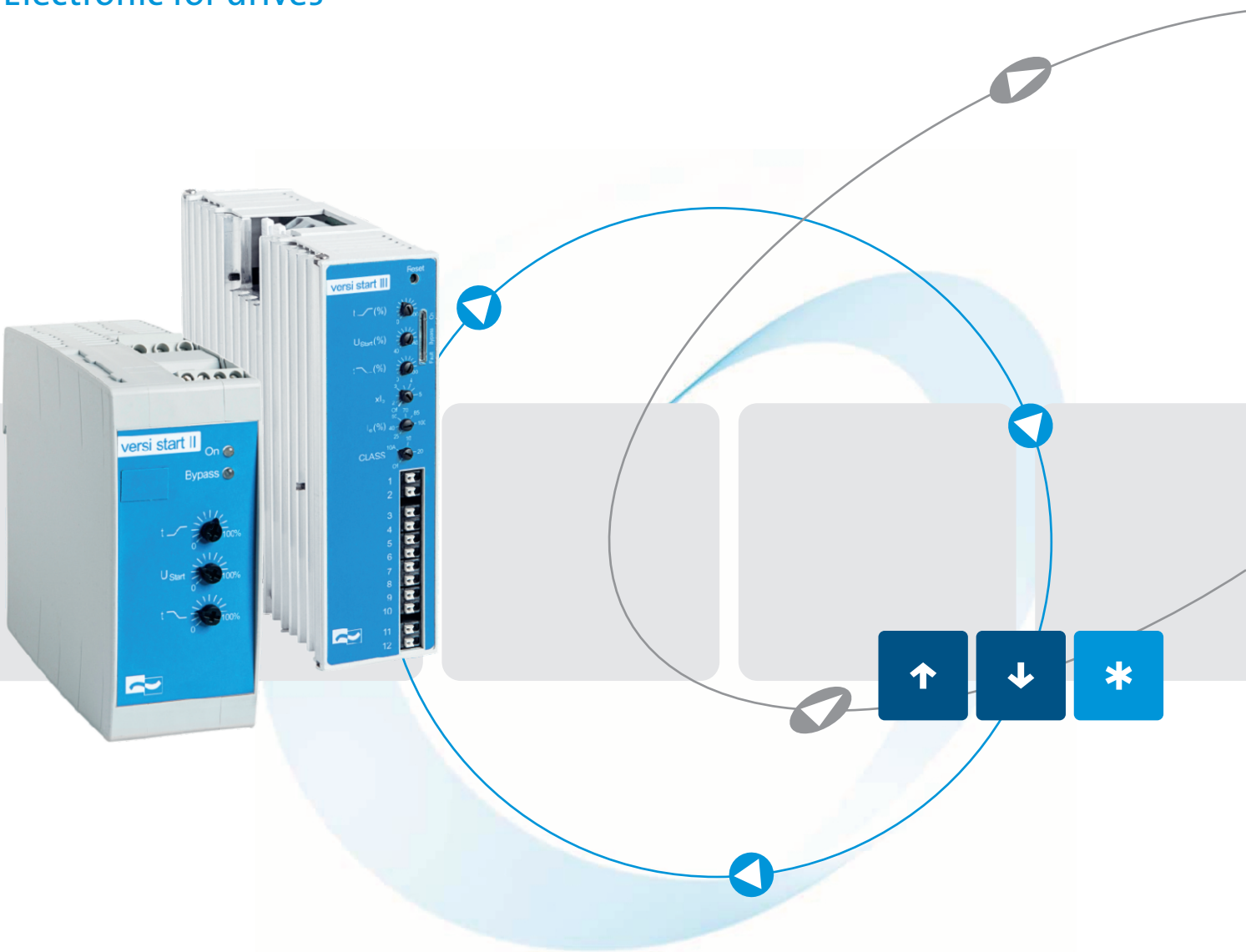
PETER electronic

SOFTSTARTER
Catalogue
Electronic for drives



LGA InterCert
Zertifiziertes QM System
ISO 9001:2008

Quality is our Drive.

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Our standard – your advantage 1

Our systems enable low-wear and gentle starting of your machines and plants by preventing unnecessary, jerky motions and high mechanical stress as well as current peaks otherwise occurring during the start-up of motors.

With soft starters from PETER electronic you keep routine maintenance costs low and extend the life of your equipment.
Our service personnel will be pleased to be at your disposal via Email at: mail@peter-electronic.com.
Rely on our competence and many years of experience. We will be happy to develop an individual solution for you, too.

Our soft starters can be used for these applications: saws, milling machines, planers, cutting machines, dryers, conveyors, passenger lifts, belt drives, chain drives, traveling/rotary mechanisms, mills, presses, crushers, door and gate drives, vibrators, transformer soft start, electric pumps, heat pumps, vacuum pumps, ventilators and fans, cranes, traveling cranes, exhaust systems, compressors, power agitators, centrifuges, pressure cleaners, vibration screening machines, vibrating conveyors, offset presses.

Features:

- two-phase controlled soft starter
- controlled by microcontroller
- optimized soft start
- current and torque reduction during acceleration
- easy mounting, for snap-mounting on 35mm standard rail
- integrated bypass relay
- parameterization by means of three potentiometers
- no additional control voltage required
- no mains neutral conductor (N) required
- economically priced substitute for star-delta starters
- compact design, 45mm
- degree of protection Ip20

Soft Starters

VS II ...-3,5...16

CE

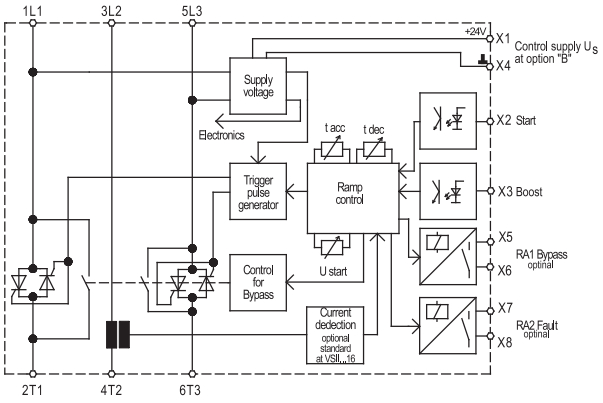
Function:

- soft acceleration and deceleration
- potential-free control input for soft acceleration and deceleration
- 3 separately adjustable parameters accel. Time, start voltage, decel. time
- boost-start selectable
- potential-free relay output for operating state - unit bypassed – and failure (optional)

Options:

(upon request)

- special voltages 230V and 480V
- wide voltage range 200-480V with external control supply voltage U_s 24VDC (B)
- signalling contact (I) bypass and failure
- motor-PTC (I)
- current control (standard at VS II 400-16) (I)
- heat sink temperature monitoring (I)
- √3 - connection (cost saving via smaller rating)
- signalling contact (M) (beginning of acceleration until end of deceleration)

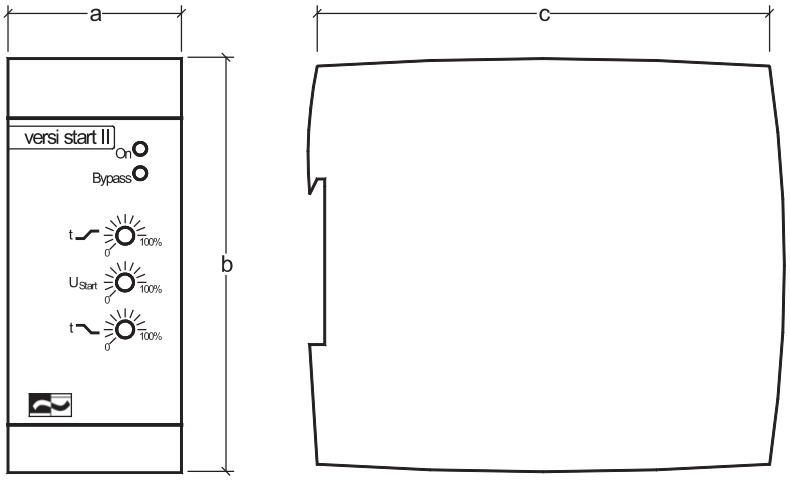


Typical Applications:

door and gate drives	fans	assembly lines
pumps	conveying machines	machine applications
ventilators	transport systems	

Typical designation (standard)	VS II 400-3,5	VS II 400-6,5	VS II 400-12	VS II 400-16
rated device current	3,5A	6,5A	12A	16A
rated operating voltage Ue	400V ±10% 50/60Hz			
control supply voltage Us only with option B	24V ±10% DC			
motor rating at Ue 400V	1,5kW	3kW	5,5kW	7,5kW
order number standard	25700.40003	25700.40006	25700.40012	25700.40016
order number option I	25703.40003	25703.40006	25703.40012	25703.40016
special voltages (optional)	230V/480V/wide voltage range 200-480V with external control voltage 24VDC			

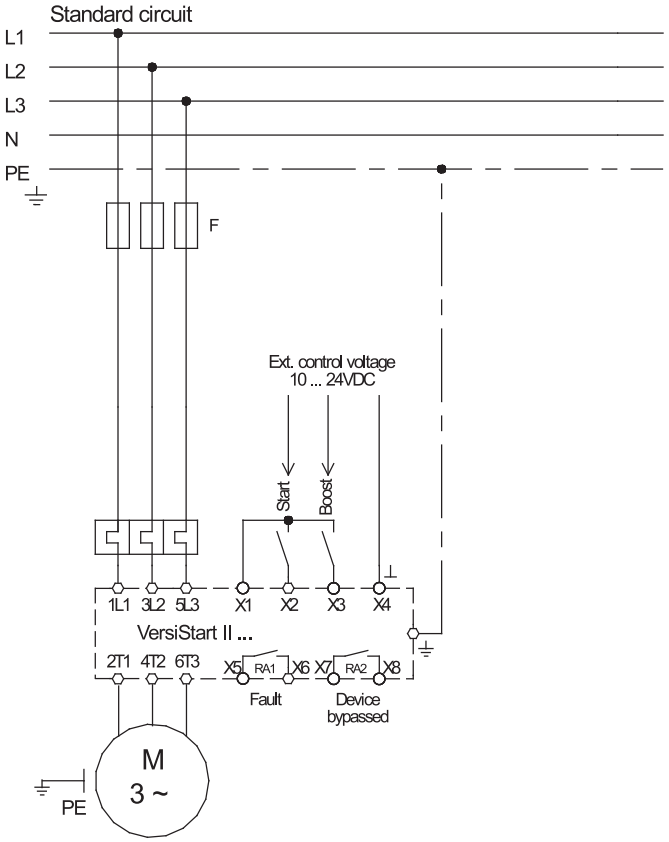
Dimensions:

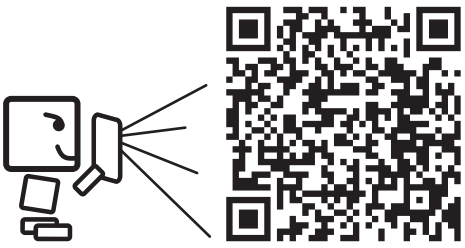


Mounting dimensions	a mm	b mm	c mm
VS II ...- 3,5...16	45	110	121

Technical data (standard)	VS II 400-3,5	VS II 400-6,5	VS II 400-12	VS II 400-16
rated device current	3,5A	6,5A	12A	16A
max. switching frequency at $3xI_N$ and 5s t_{an}	150/h	70/h	30/h	15/h
max. power dissipation				
- in operating related to max. starting frequency	11W	10W	9W	7W
- standby	2,5W	2,5W	2,5W	2,5W
I^2t-power semiconductors in A^2s	390	720	4000	4000
min. motor load	20% of device rating			
acceleration	Voltage ramp			Current limit
starting time	0,5 ... 10s			
starting voltage	40 ... 80%			
stopping time	0,25 ... 10s			
restart time	300ms			
input resistance control inputs	10kOhm			
contact rating of relay outputs RA1/RA2	2A / 250VAC / 30VDC			
installation class	4			
overvoltage category / pollution degree:				
control and auxiliary circuit	II / 2			
main circuit	III (TT / TN-systems) / 2			
rated impulse strength U_{imp}:				
control and auxiliary circuit	2,5kV			
main circuit	4kV			
rated insulation voltage U_i:				
main circuit	500V			
control and auxiliary circuit	250V			
max. cross-sectional arey for connection:				
control terminals	1,5mm²			
power terminals	2,5mm²			
max. tightening torque: control terminals	1,2 - 1,5 Nm / 11 - 13 lbs in			
main circuit	1,5 - 1,7 NM / 13 - 15 lbs in			
ambient / storage temperature	0°C ... 45°C up to an altitude of 1000m / -25°C ... 70°C			
weight	400g			

Connection Diagram:





Features:

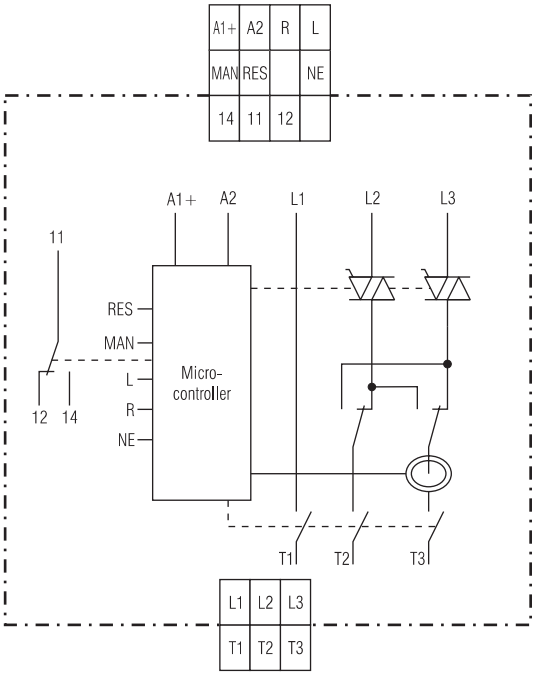
- two-phase controlled soft starter with reversing function
- controlled by microcontroller
- currentless reversing with relay, soft start with thyristors
- 4 potentiometers to adjust starting torque, stopping torque, acceleration/deceleration time and overcurrent limit
- electrically isolated 24V inputs for clockwise/anti clockwise rotation
- reset via device panel or external reset switch
- 4 LEDs as status indicators
- current and torque reduction during start-up
- integrated bypass relay
- integrated mains contactor
- ultra-slim compact design, width: 22,5mm
- degree of protection IP20

Soft Starter with
reversing function
VersiStart II 9 PS

CE

Function:

- soft start and soft stop
- reversing function
- current monitoring
- blocking protection
- potential-free relay outputs for operational status
- signalling output programmable acc. to customer requirements



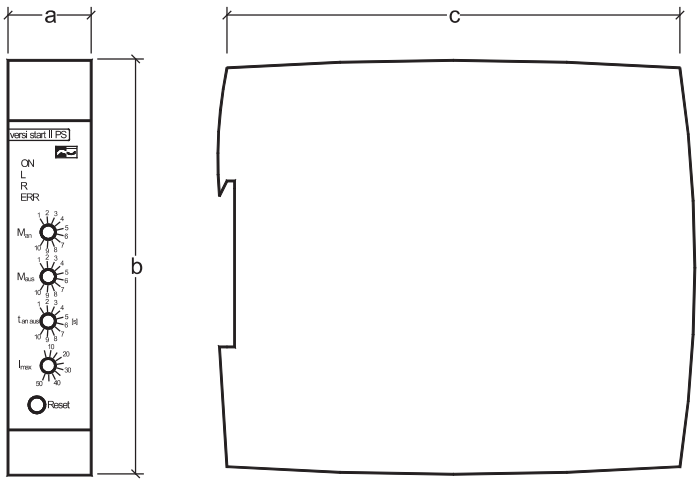
Typical Applications:

reversing drive for door and gate control
bridge drives and hoisting gear with blocking protection
conveying systems with blocking protection
actuators in process technology with blocking protection
points drives

VersiStart II 9 PS

Typical designation	VersiStart II 9 PS
rated device current	9A
mains / motor voltage acc. to DIN EN 50160 (IEC 38)	200-480V ±10% 50/60Hz
motor rating at 400V mains voltage	4kW
order number	2S610.40009

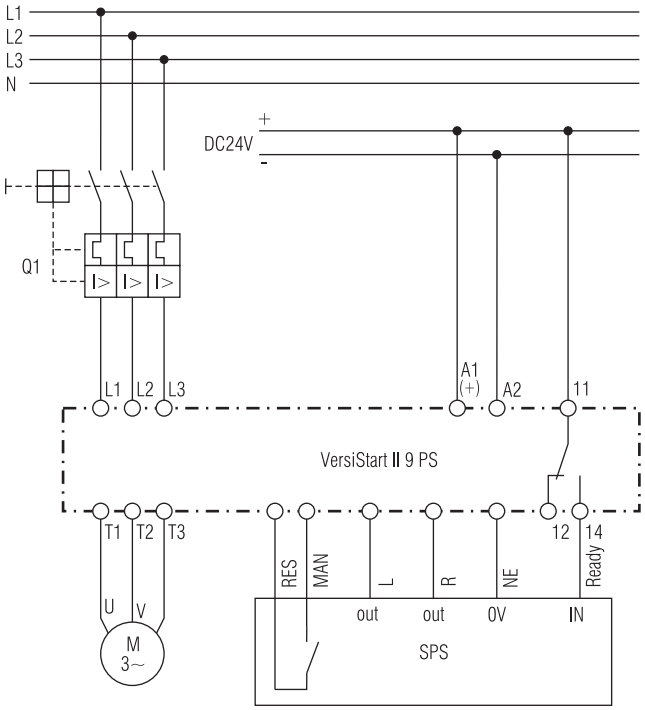
Dimensions:



Mounting dimensions	a mm	b mm	c mm
VersiStart II 9 PS	22,5	105	120,3

Technical data	VersiStart II 9 PS
mains / motor voltage acc. to DIN EN 50160 (IEC 38)	200-480V ±10% 50/60Hz
rated device current	9A
motor rating at 400V mains voltage	4kW
power consumption	2W
min. motor rating	25W
operating mode	9,0A: AC 53a: 6-2 100-30
auxiliary voltage	24VDC ± 10%
acceleration time	1 ... 10s
start voltage	30 ... 80%
deceleration time	1 ... 10s
restart time	250ms
I^2t-power semiconductor in A^2s	200
overcurrent measuring unit	5 ... 50A
cross-sectional area for connetion	0,34 ... 2,5mm^2
switching capacity relay output open/close contact	3A/230VAC; 1A/230VAC
ambient / storage temperature	0 ... 60°C (derating)
weight / kg	0,25

Connection Diagram:



Subject to change without notice.

Features:

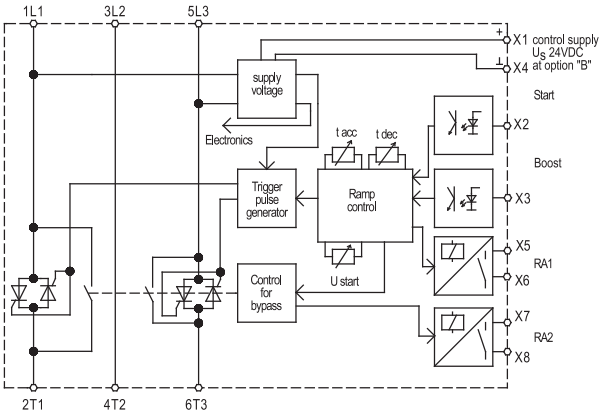
- two-phase controlled soft starter
- controlled by microcontroller
- optimized soft start
- Aconnection in the motor delta winding (cost saving via smaller rating)
- current and torque reduction during acceleration
- easy mounting, for snap-mounting on 35 mm standard rail
- integrated bypass relay
- parameterization by means of three potentiometers
- no additional control voltage required
- no mains neutral conductor (N) required
- economically priced substitute for star-delta starters
- plug-in power terminals
- control outputs with spring-loaded terminals
- heat sink temperature monitoring
- compact design, 45mm up to 32A and 52,5mm at 45A
- degree of protection IP20

Soft Starters

VS II ...-17...45

Function:

- soft acceleration and deceleration
- potential-free control input for soft acceleration and deceleration
- 3 separately adjustable parameters accel. time, start voltage, decel. time
- boost-start selectable
- potential-free relay output for operating state -unit bypassed – and failure



Options:

(upon request)

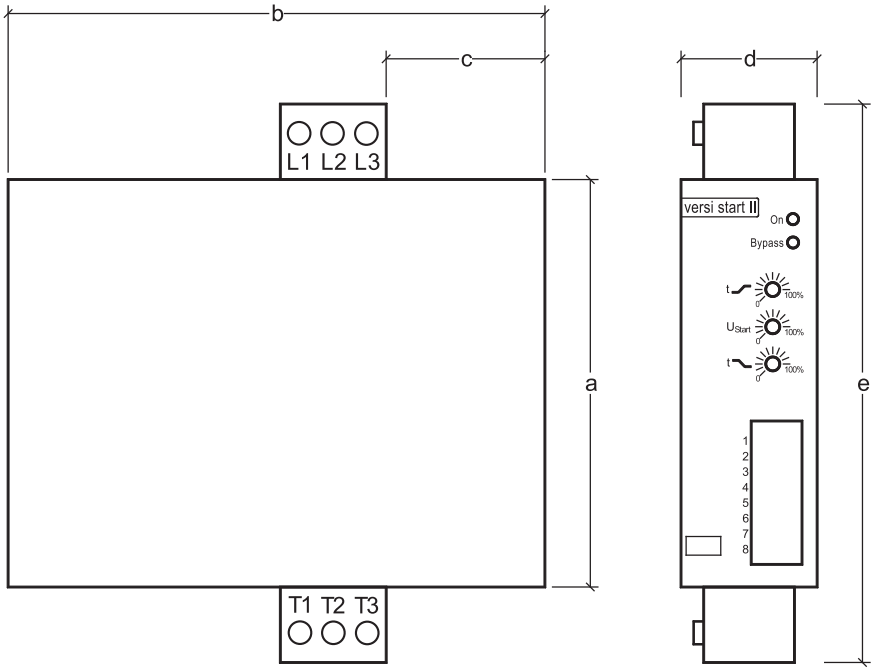
- special voltages 230V and 480V
- wide voltage range 400-600V with external control supply voltage U_s 24VDC (B)
- signalling contact (M) beginning of acceleration until end of deceleration
- motor PTC

Typical Applications:

door and gate drives	fans	transport systems
pumps	conveying systems	assembly lines
ventilators	packaging machines	machine applications

Typical designation	VS II 400-17	VS II 400-25	VS II 400-32	VS II 400-45
rated device current	17A	25A	32A	45A
motor rating at 400V mains voltage	7,5kW	11kW	15kW	22kW
mains / motor voltage according to DIN EN 50160 (IEC 38)	400V ± 10% 50/60Hz			
order number	25700.40017	25700.40025	25700.40032	25700.40045

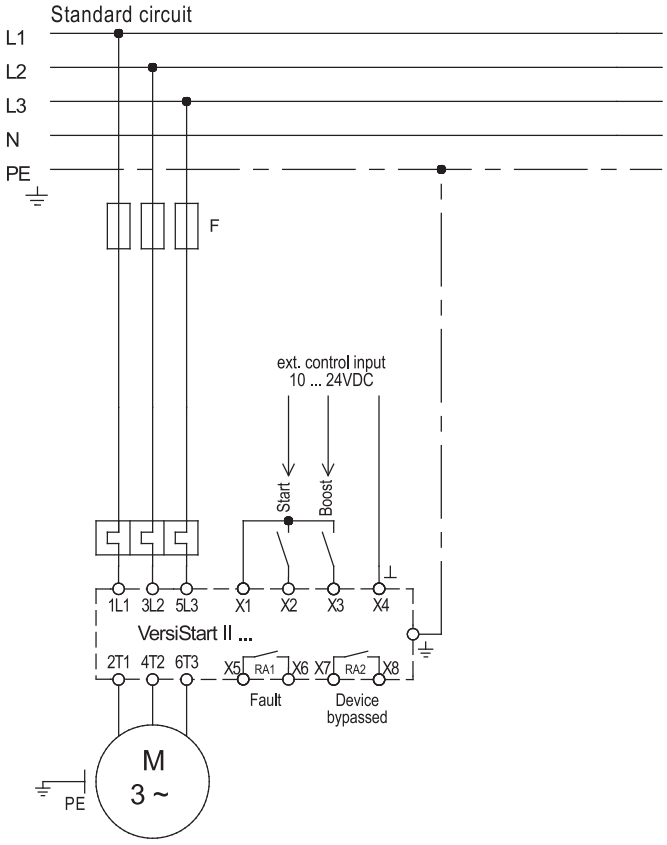
Dimensions:

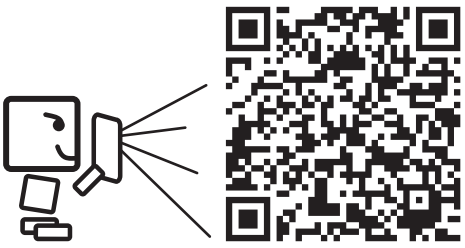


Mounting dimensions	a mm	b mm	c mm	d mm	e mm
VS II ...- 17...32	125	158	53	45	173
VS II ...- 45	125	158	53	52,5	178

Technical data	VS II 400-17	VS II 400-25	VS II 400-32	VS II 400-45
mains / motor voltage according to DIN EN 50160 (IEC 38)	400V ± 10% 50/60Hz			
rated device current	17A	25A	32A	45A
motor rating at 400V mains voltage	7,5kW	11kW	15kW	22kW
max. power dissipation- - in operation	29,5W	29,5W	28,5W	27W
- in standby	7,5W	7,5W	7,5W	7,5W
min. motor current	20% of the device rated current			
acceleration time	0,5 ... 10s			
start voltage	40 ... 80%			
deceleration time	0,5 ... 10s			
restart time	200ms			
max. switching frequency at 3xIe and 5s t_{an}	60/h	40/h	30/h	10/h
cross-sectional area control terminals	1,5mm² / AWG 16		1,5mm² / AWG 16	
power terminals	6mm² / AWG 10		16mm² / AWG 8	
I^2t-power semiconductor in A^2s	4000	4000	9100	16200
tightening torque	1,2-1,5 Nm 11-13 lbs in			1,5-1,7 Nm 13-15 lbs in
input resistance control input	10kΩ			
switching rating of relay output RA1/RA2	3A/250VAC; 3A/30VDC			
overvoltage category / pollution degree	III (TT / TN-systems) / 2			
installation class	3			
surge strength	4kV			
ambient / storage temperature	0°C ... 45°C up to an altitude of 1000m / -25°C ... 70°C			
weight / kg	1			
special voltages (optional)	230V / 480V / wide voltage range 400-600V with external control supply voltage US 24VDC±10%/150mA (option B)			

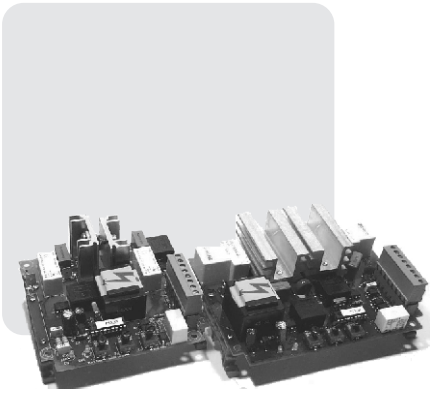
Connection Diagram:





Features:

- two-phase controlled soft starter
- controlled by microcontroller
- easy mounting, also for retrofitting into existing plants
- integrated bypass relay
- no additional control voltage required
- no mains neutral conductor (N) required
- parameterization by means of three potentiometers
- economically priced substitute for star-delta starters
- current reduction during acceleration
- circuit-board version for mounting onto DIN rail
- plug-in control terminals
- degree of protection IP00



Soft Starters

VS II 3 ... 15LDS

CE

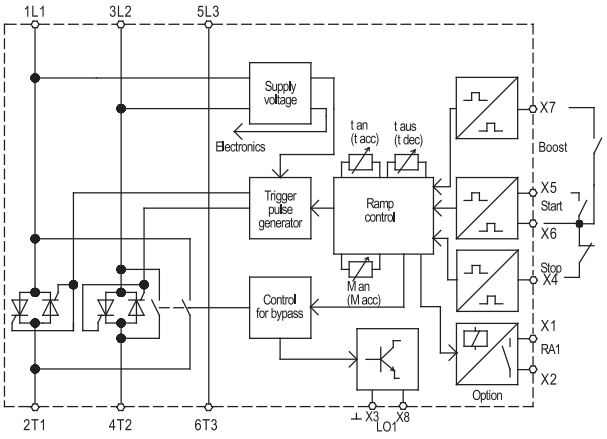
Function:

- soft acceleration and deceleration
- potential-free control input for soft acceleration and deceleration
- 3 separately adjustable parameters starting torque, accel. time, decel. time
- two wire or three wire control via contact or voltage 10-42VDC
- boost-start selectable

Options:

(upon request)

- special voltages 230V and 480V

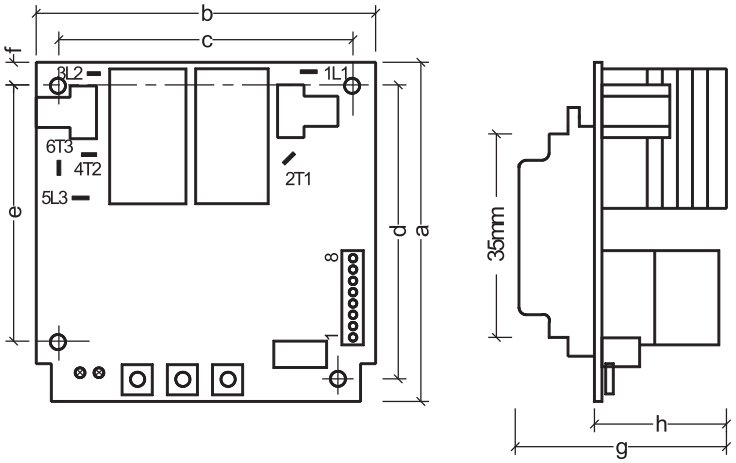


Typical Applications:

door and gate drives
pumps
ventilatorsg
conveying systems
packaging machines

Typical designation	VS II 3 LDS	VS II 5,5 LDS	VS II 7,5 LDS	VS II 11 LDS	VS II 15 LDS
rated device durrent	6,5A	12A	15A	25A	32A
motor rating at 400V mains voltage	3kW	5,5kW	7,5kW	11kW	15kW
mains / motor voltage according to DIN EN 50160 (IEC 38)	400V ± 10% 50/60Hz				
order number	25723.40003	25723.40005	25723.40007	25723.40011	25723.40015

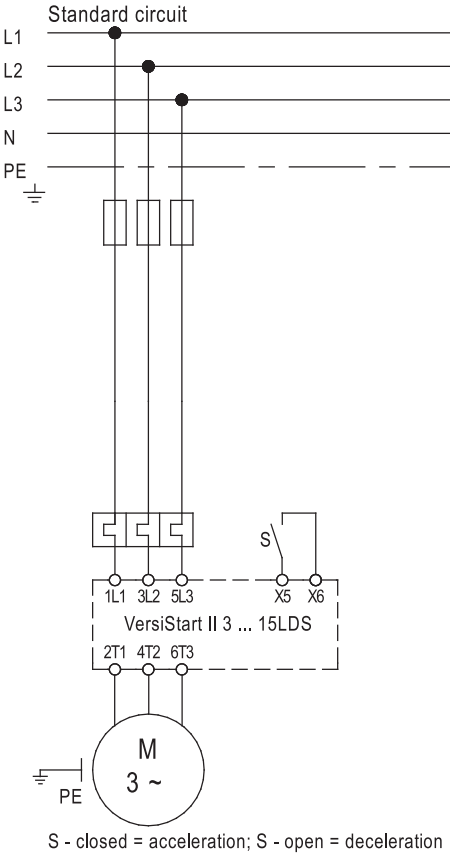
Dimensions:



Mounting dimensions	a mm	b mm	c mm	d mm	e mm	f mm	g mm	h mm
VS II 3 ... 5,5LDS	102,5	108,5	98,5	92,5	82,5	5	55	40
VS II 7,5 ... 15LDS	102,5	139	129	92,5	82,5	5	55	40

Technical data	VS II 3 LDS	VS II 5,5 LDS	VS II 7,5 LDS	VS II 11 LDS	VS II 15 LDS
mains / motor voltage according to DIN EN 50160 (IEC 38)	400V ± 10% 50/60Hz				
rated device current	6,5A	12A	15A	25A	32A
motor rating at 400V mains voltage	3kW	5,5kW	7,5kW	11kW	15kW
min. motor current	20% of the device rated current				
starting torque	0 ... 80%				
acceleration time	0,5 ... 10s				
deceleration time	0,5 ... 10s				
restart time	200ms				
max. switching frequency at 3xIe and 5s t_{an}	120/h	65/h	100/h	65/h	35/h
cross-sectional area FASTON 6,3	1,5mm²		2,5mm²		strand 2,5mm²
I^2t-power semiconductor in A^2s	265	610	4900	4900	6050
techn. parameter of relay output RA1	3A/250VAC; 3A/30VDC				
techn. parameter of open-collector LO1	24VDC / 200mA				
ambient / storage temperature	0°C ... 40°C / -25°C ...75°C				
weight / kg	0,27		0,4		
special voltages (optional)	230V / 480V				

Connection Diagrams:



S - closed = acceleration; S - open = deceleration

Features:

- two-phase controlled soft starter
- controlled by microcontroller
- optimized soft start
- heat sink temperature detection
- connection in the motor delta winding (cost saving via smaller rating)
- current and torque reduction during acceleration
- easy mounting, also for retrofitting into existing plants
- integrated bypass relay
- parameterization by means of 4 potentiometers
- no additional control voltage required
- no mains neutral conductor (N) required
- economically priced substitute for star-delta starters
- control outputs with spring-loaded terminals
- compact design, 103 mm width
- degree of protection IP20

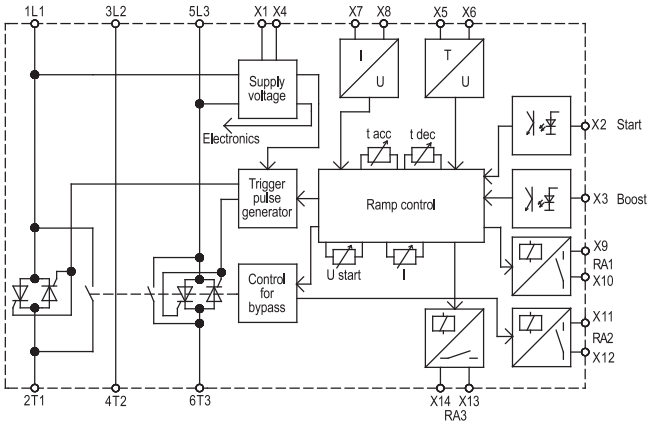
Soft Starters

VS II ...-50...75

CE

Function:

- soft acceleration and deceleration
- potential-free control input for soft acceleration and deceleration
- 4 separately adjustable parameters accel. time, start voltage, decel. time, max. start current
- boost-start selectable
- motor PTC
- current controlled start-up with external transformer (transformer is included in delivery)
- potential-free control output for operating state -unit bypassed – and failure



Options:

(upon request)

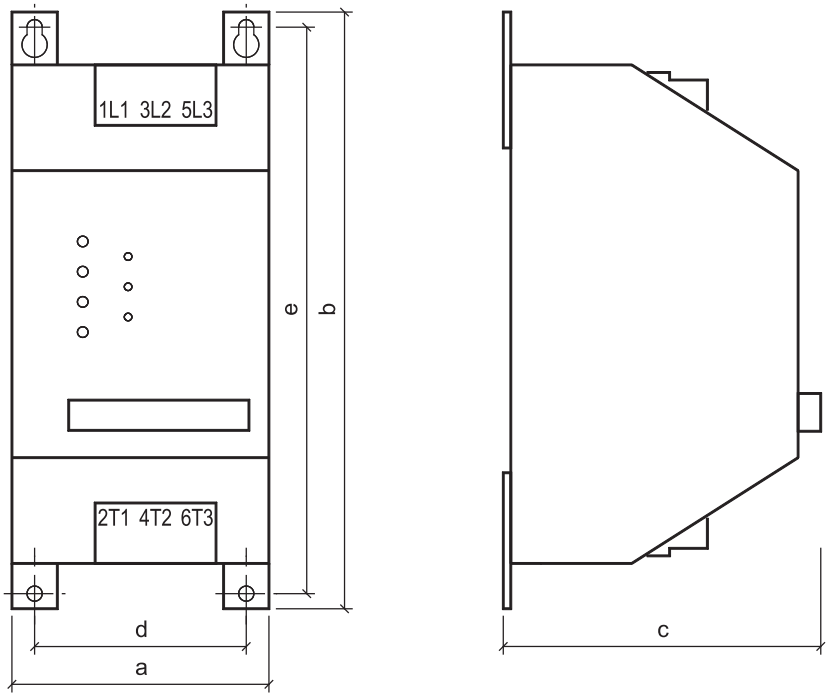
- special voltages 230V and 480V
- wide voltage range 200-400V or 400-600V with external supply voltage US 24VDC (option B)

Typical Applications:

door and gate drives	fans	transport systems
pumps	conveying systems	assembly lines
ventilators	packaging machines	machine applications

Typical designation	VS II 400-50	VS II 400-65	VS II 400-75
rated device current	50A	65A	75A
motor rating at 400V mains voltage	25kW	30kW	37kW
mains / motor voltage according to DIN EN 50160 (IEC 38)		400V ± 10% 50/60Hz	
order number	25700.40050	25700.40065	25700.40075

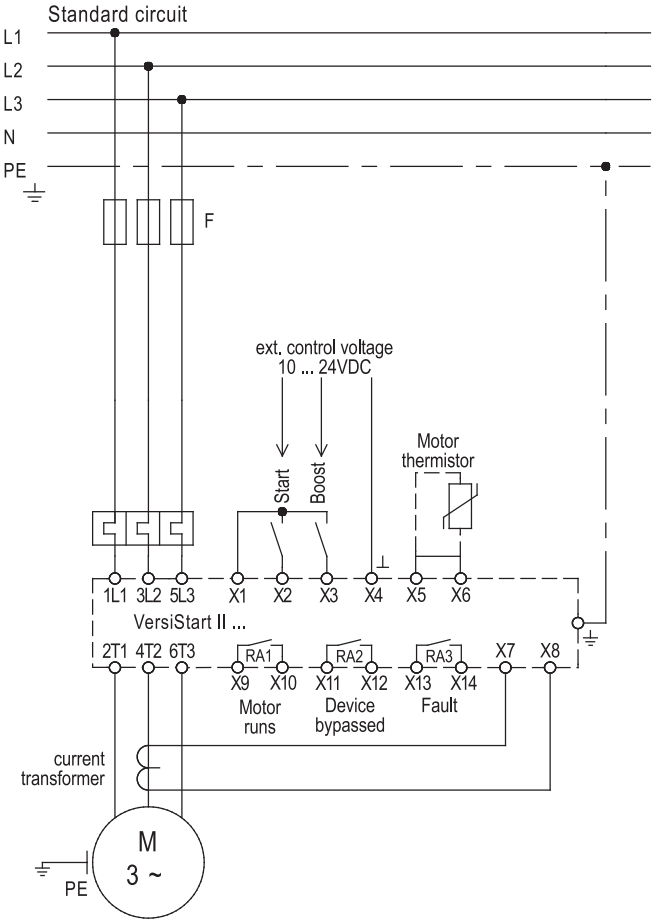
Dimensions:



Mounting dimensions	a mm	b mm	c mm	d mm	e mm
VS II ...- 50...65	103	230	125	86	220
VS II ...- 75	103	230	140	80	220

Technical data	VS II 400-50	VS II 400-65	VS II 400-75
mains / motor voltage according to DIN EN 50160 (IEC 38)	400V ± 10% 50/60Hz		
rated device current	50A	65A	75A
motor rating at 400V mains voltage	25kW	30kW	37kW
max. power dissipation - in operation	30W		
- in standby	10W		
min. motor current	20% of the device rated current		
acceleration time	0,5 ... 10%		
start voltage	40 ... 80%		
deceleration time	0,5 ... 10s		
max. start current	200% - 500% of the device rated current		
restart time	200ms		
max. switching frequency at 3xIe and 5s t_{an}	35/h	25/h	20/h
I^2t-power semiconductors in A^2s	6600	11200	25300
cross-sectional area: control terminals	0,2 - 2,5mm²/24 - 12 AWG		
power terminals	solid 1 - 35mm² , 18 - 2 AWG / stranded 1 - 25mm² , 18 3 AWG		
tightening torque (power terminals)	25mm² = 2,5 NM 35mm² = 4,5 NM 25mm² = 22 lbs in 35mm² = 40 lbs in		
input resistance control inputs	10kΩ		
switching rating of relay output RA1/RA2/RA3	3A/250VAC; 3A/30VDC		
overvoltage category / pollution degree	III (TT / TN-systems) / 2		
installation class	3		
surge strength	4kV		
ambient / storage temperature	0°C ... 45°C up to an altitude of 1000m / -25°C ... 70°C		
weight / kg	1,5	1,5	2,2
special voltages (optional)	230V / 480V / wide voltage range 200-400 or 400-600V with external control supply voltage 24VDC ±10%/150mA		

Connection Diagram



Features:

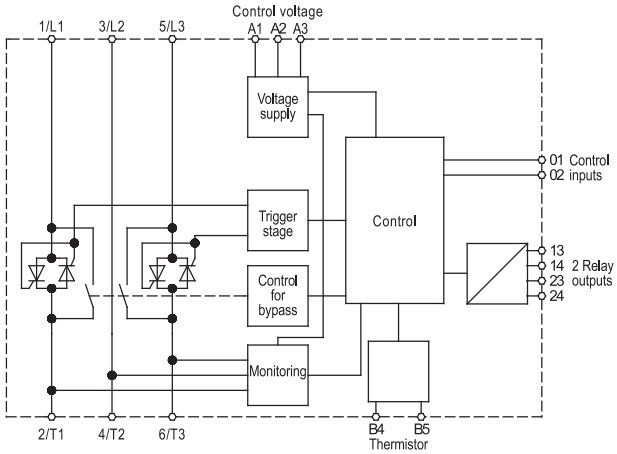
- two-phase controlled soft starter
- controlled by microcontroller
- integrated bypass relay
- current and torque reduction during acceleration
- integrated motor overload protection
- motor-PTC connection
- voltage range 200 - 440V or 200 - 575V
- degree of protection IP20 (up to 100A), IP00 (from 140A up)

Soft Starters

VS i II 18 ... 200

Function:

- 2 relay outputs
- acceleration time monitoring
- adjustable parameters:
  - rated motor current
  - current ramp
  - current limit
  - soft stop - ramp time
  - motor protection class
  - output relay function
  - phase rotation protection



Accessories:

- ext. operating panel and interface (29000.25901)
- USB module (29000.25910)
- DeviceNet module (29000.25903)
- Modbus module (29000.25904)
- Profibus module (29000.25905)
- finger protection (from 140A up, 29000.25907)

Typical Applications:

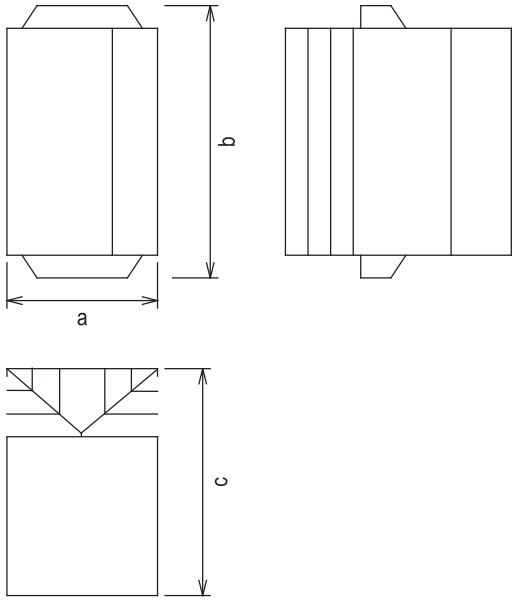
pumps	mills	conveying machines
ventilators	crushers	drives with high-inertia starting
compressorsg	presses	

Typical designation	VS i II 440 -										
	18C1	34C1	42C1	48C1	60C1	75C1	85C1	100C1	140C1	170C1	200C1
	18C2	34C2	42C2	48C2	60C2	75C2	85C2	100C2	140C2	170C2	200C2
mains voltage	200-440V 45-66Hz										
Typical designation	VS i II 575-										
	18C1	34C1	42C1	48C1	60C1	75C1	85C1	100C1	140C1	170C1	200C1
	18C2	34C2	42C2	48C2	60C2	75C2	85C2	100C2	140C2	170C2	200C2
mains voltage	200-575V 45-66Hz										
rated device current	18A	34A	42A	48A	60A	75A	85A	100A	140A	170A	200A
order number:											
bei 440V/C1 25900.44...	018	034	042	048	060	075	085	100	140	170	200
bei 440V/C2 25901.44...	018	034	042	048	060	075	085	100	140	170	200
bei 575V/C1* 25900.57...	018	034	042	048	060	075	085	100	140	170	200
bei 575V/C2* 25901.57...	018	034	042	048	060	075	085	100	140	170	200

*units with 575V are not available ex stock, upon request

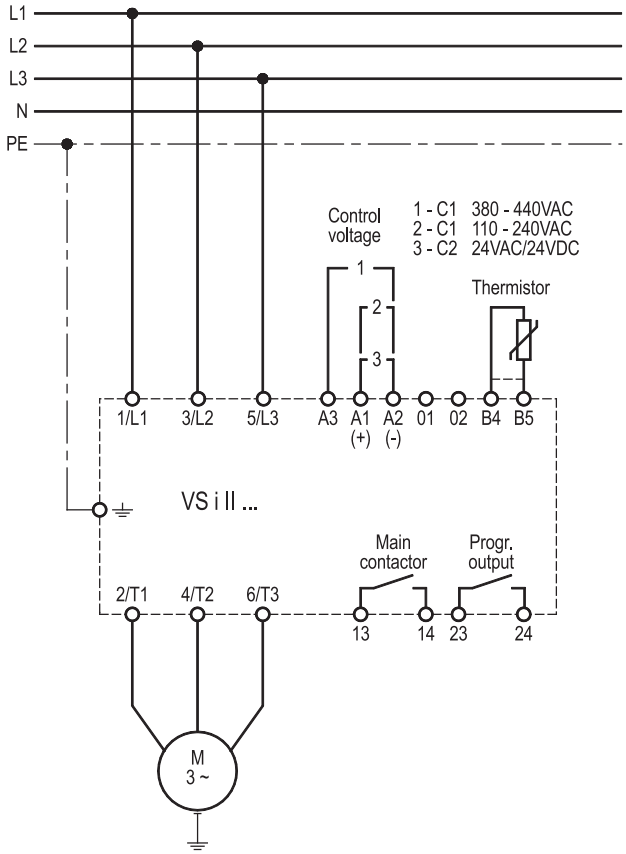
Dimensions:

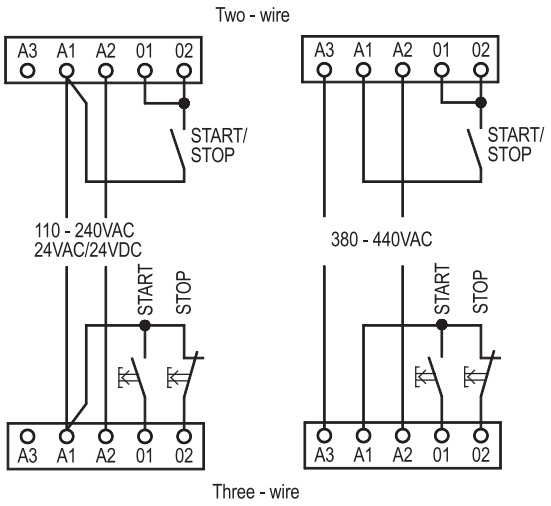
	a (mm)	b (mm)	c (mm)
VS i II...-18	98	203	165
VS i II...-34	98	203	165
VS i II...-42	98	203	165
VS i II...-48	98	203	165
VS i II...-60	98	203	165
VS i II...-75	145	215	193
VS i II...-85	145	215	193
VS i II...-100	145	215	193
VS i II...-140	202	240	214
VS i II...-170	202	240	214
VS i II...-200	202	240	214

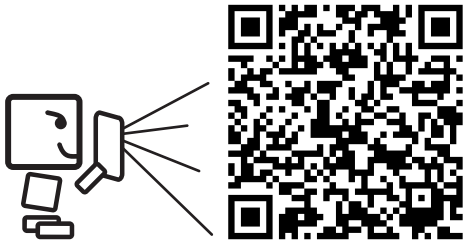


Technical data	VS i II 440 -										
	18C1	34C1	42C1	48C1	60C1	75C1	85C1	100C1	140C1	170C1	200C1
	18C2	34C2	42C2	48C2	60C2	75C2	85C2	100C2	140C2	170C2	200C2
mains voltage	200-440V 45-66Hz										
Typical designation	VS i II 575-										
	18C1	34C1	42C1	48C1	60C1	75C1	85C1	100C1	140C1	170C1	200C1
	18C2	34C2	42C2	48C2	60C2	75C2	85C2	100C2	140C2	170C2	200C2
mains voltage	200-575V 45-66Hz										
rated device current	18A	34A	42A	48A	60A	75A	85A	100A	140A	170A	200A
motor rating at 400V in kW	7,5	15	18,5	22	30	37	45	55	75	90	100
current ramp	2s, 5s, 15s with 150%, 200% and 250% In										
current limit	250%, 275%, 300%, 325%, 350%, 375%, 400%, 425%, 450% In										
motor protection class	adjustable										
deceleration time	2s - 20s										
switching frequency at 4x Ie and 6s	AC 53b 10/h					AC 53b 6/h					
techn. parameter of relay outputs	6A/30VDC; 2A/400VAC										
ambient temperature	-10°C...+40°C (+60°C derating)										
control voltage	C1: 110-240VAC -15%/+10% 380-440VAC -15%/+10%; C2: 24VDC/24 VAC ±20%										
weight / kg	2,4					4,3			6,8		

Connection Diagram:







Features:

- three-phase controlled soft starter
- controlled by microcontroller
- optimized soft start and current control
- connection in the motor delta winding (cost saving via smaller rating)
- current and torque reduction during acceleration
- easy mounting, for snap-mounting on 35 mm standard rail
- integrated bypass relay
- parameterization by means of potentiometers
- no additional control voltage required
- no mains neutral conductor (N) required
- economically priced substitute for star-delta starters
- spring-loaded terminals
- heat sink temperatur monitoring
- compact design, 45mm up to 32A and 52,5mm at 45A
- degree of protection IP20
- motor protection
- thermal device protection

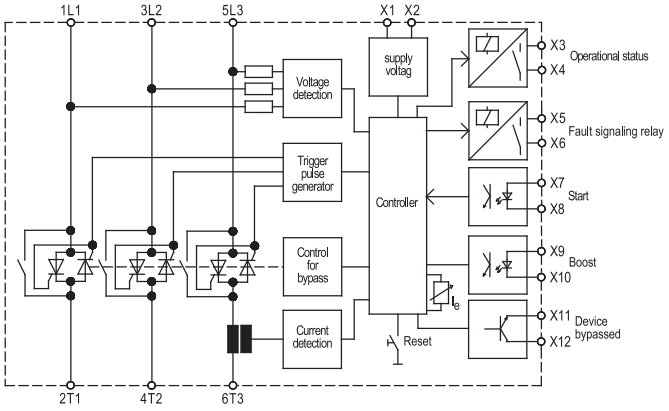
Soft Starters

VS III ...-9...45

CE

Function:

- soft acceleration and deceleration
- potential-free control input for soft acceleration and deceleration
- separately adjustable parameters accel. time, start voltage, decel. time, current limiting, rated device current and tripping class
- boost-start selectable
- potential-free relay output for operating state
- transistor output – unit bypassed



Options:

(upon request)

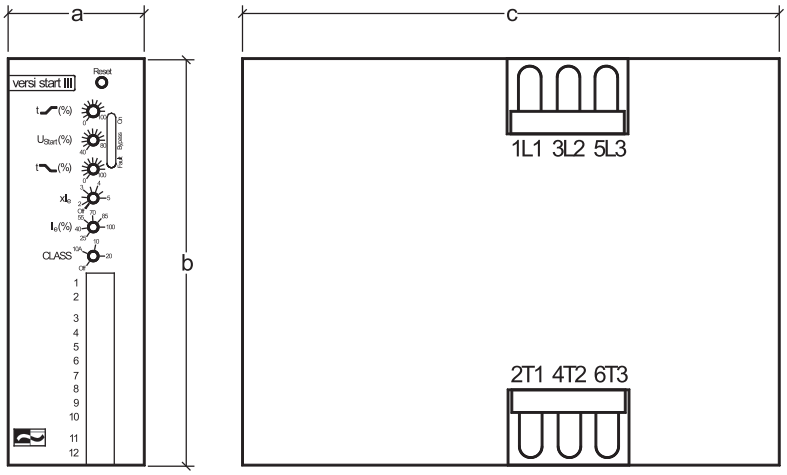
- special voltages 230V and 480V
- wide voltage range 200-480V with external control supply voltage U_s 230VAC (B)
- signalling contact (M) beginning of acceleration until end of deceleration

Typical Applications:

door and gate drives	fans	transport systems
pumps	conveying systems	assembly lines
ventilators	packaging machines	machine application

Typical designation	VS III 400- ...				
	9	16	25	37	45
rated device current	9A	16A	25A	37A	45A
rated operating voltage U_e	400V 10% 50/60Hz				
control supply voltage U_s only with option B	230V ±10% AC 50/60Hz				
motor rating at U_e 400V	4kW	7,5kW	11kW	18,5kW	22kW
order number	2S500.40009	2S500.40016	2S500.40025	2S500.40037	2S500.40045
special voltages (optional)	230V/480V/wide voltage range 200-480V with external control voltage 230VAC				

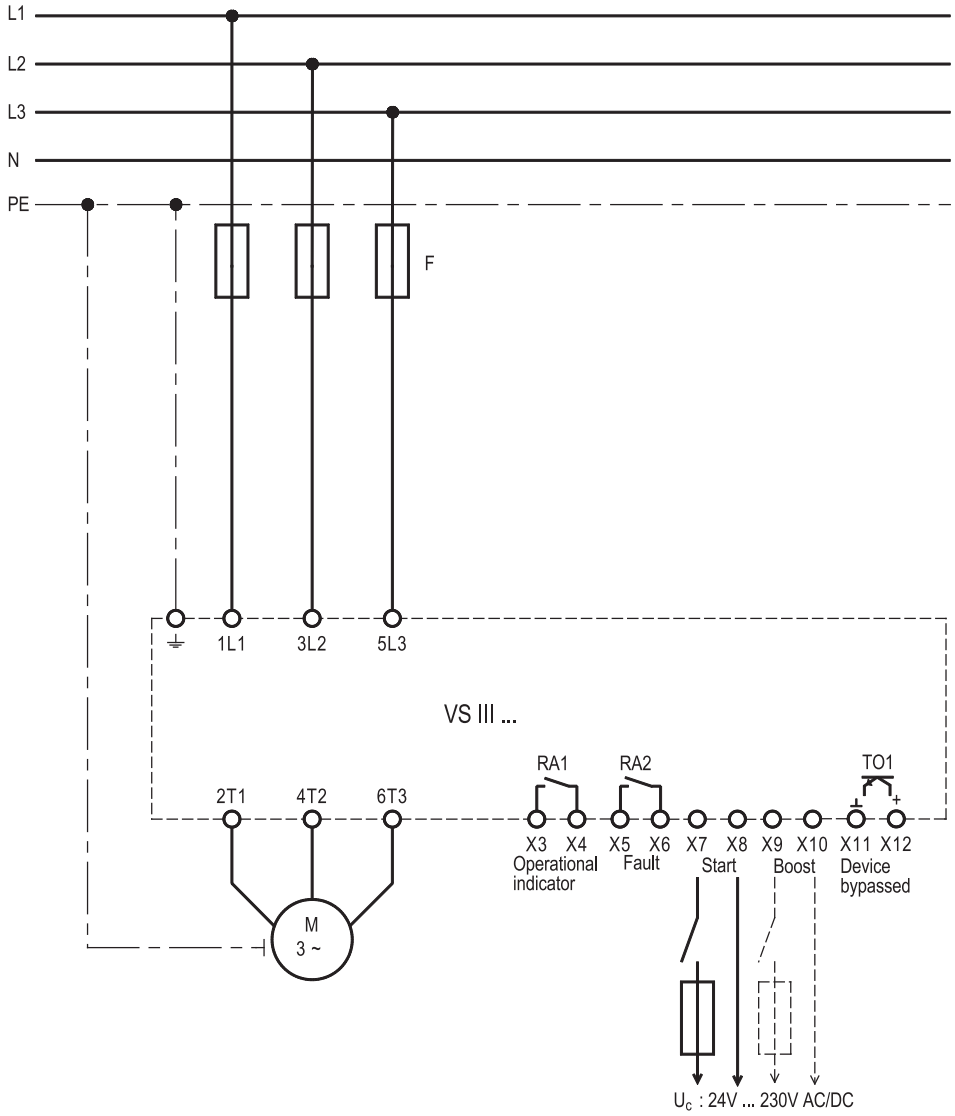
Dimensions:

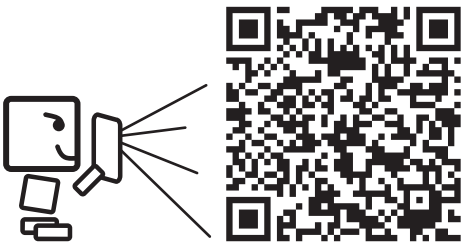


Mounting dimensions	a mm	b mm	c mm
VS III ...-9...25	45	147	158
VS III ...-37...45	52,5	147	158

Technical data VS III 400- ...	9	16	25	37	45
rated device current	9A	16A	25A	37A	45A
switch. frequency/hour at $3xI_N$ and t_{an} = 5s	50	30	20	15	10
utilization category	9A:AC-53b:6-3:69	16A:AC-53b:6-3:117	25A:AC-53b:6-3:177	37A:AC-53b:6-3:237	45A:AC-53b:6-3;360
max. power dissipation					
- in operation related to max. starting frequency	20W	20W	20W	20W	20W
- standby	5W	5W	5W	5W	5W
I^2t-power semiconductors in A^2s	390	720	4000	9100	16200
min. motor load	20% of the device rating				
starting time	0,5 ... 10s				
starting voltage	40 ... 80%				
stopping time	0,25 ... 10s				
restart time	200ms				
input resistance contol inputs	80kOhm				
control voltage U_c	24VCD ... 230VAC				
contact rating of relay outputs RA1/RA2	2A / 250VAC / 30VDC				
contract rating of transistor output	20mA / 30VDC				
installation class	3				
overvoltage category / pollution degree:					
control and auxiliary circuit	II / 2				
main circuit	III (TT / TN-systems) / 2				
rated impulse strength U_{imp}:					
control and auxiliary circuit	2,5kV				
main circuit	4kV				
rated insulation voltage U_i:					
main circuit	500V				
control and auxiliary circuit	250V				
cross-sectional area for connection:					
control terminals	1,5mm²			1,5mm²	
power terminals	6mm²			16mm²	
max. tightening torque: control terminals	- spring-loaded terminals				
main circuit	- spring-loaded terminals				
ambient / storage temperature	- 0°C ... 45°Cup tp an altitude of 1000m / -25°C ... 75°C				
weight	1100g				

Connection Diagram:





Features:

- three-phase controlled soft starter
- controlled by microcontroller
- optimized soft start and current control
- current and torque reduction during acceleration
- easy mounting, for snap-mounting on 35mm standard rail
- integrated bypass relay
- parameterization by means of a potentiometer
- no mains neutral conductor (N) required
- economically priced substitute for star-delta starters
- spring-loaded terminals
- heat sink temperature monitoring
- compact design, 45mm up to 45A
- degree of protection IP20
- motor protection
- thermal device protection

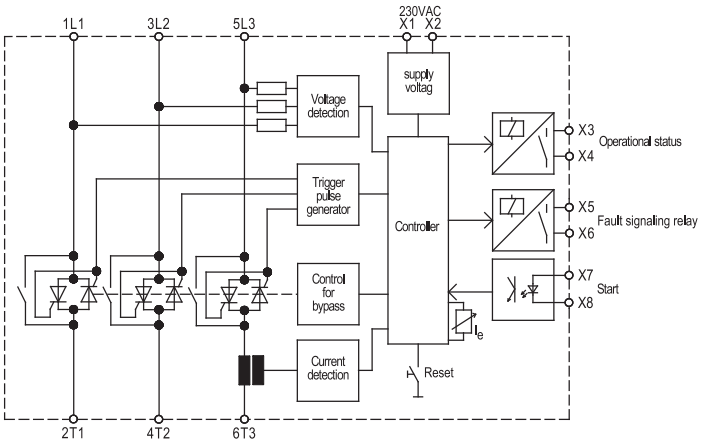
Soft Starters

VS III ...-9...45L B

CE

Function:

- soft acceleration and deceleration
- potential-free control input for soft acceleration and deceleration
- potential-free relay output for operating state failure

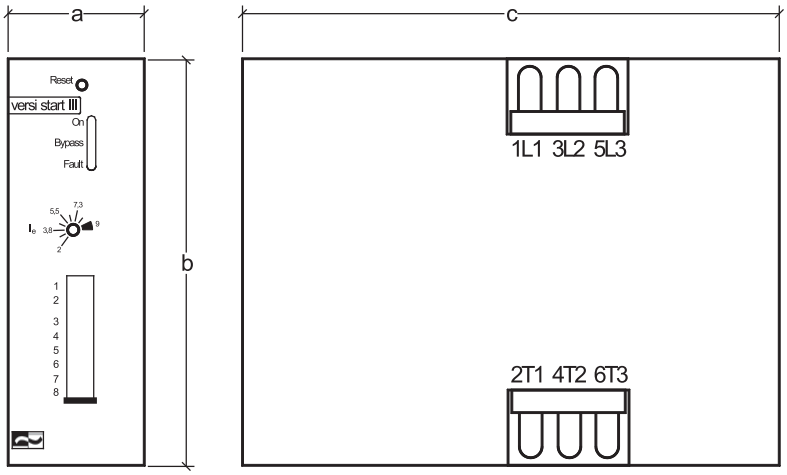


Typical Applications:

heat pumps and compressors

Typical designation	VS III 480- ...L B				
	9	16	25	37	45
rated device current	9A	16A	25A	37A	45A
rated operational voltage U_e	200V - 480V 10% 50/60Hz				
control supply voltage U_s	230V ±10% AC 50/60Hz				
motor rating at U_e 400V	4kW	7,5kW	11kW	18,5kW	22kW
order number	2S511.48009	2S511.48016	2S511.48025	2S511.48037	2S511.48045

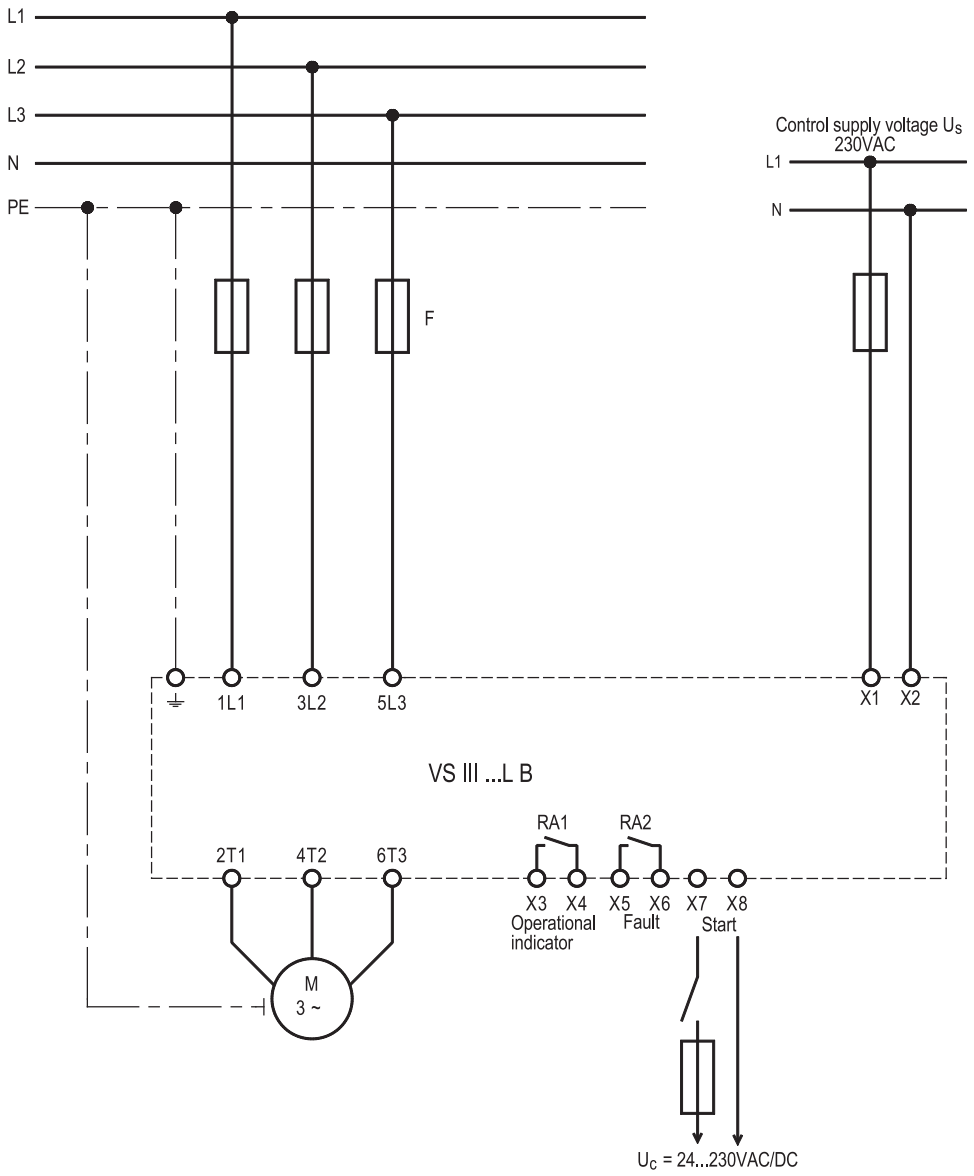
Dimensions:

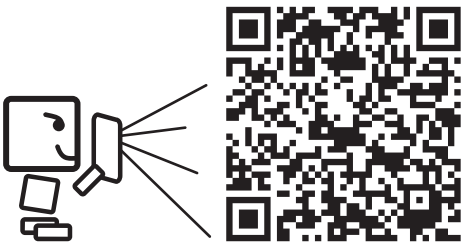


Mounting dimensions	a mm	b mm	c mm
VS III ...-9...45L B	45	147	158

Technical data VS III 480- L B	9	16	25	37	45
rated device current	9A	16A	25A	37A	45A
switch. frequency/hour at $3xI_N$ and t_{an} = 5s	10	6	4	3	2
$3xI_N$ and t_{an} = 1s	40	24	16	12	8
utilization category	9A:AC-53b:6-3:69	16A:AC-53b:6-3:117	25A:AC-53b:6-3:177	37A:AC-53b:6-3:237	45A:AC-53b:6-3:360
max. power dissipation					
- in operation related to max. starting frequency	9W	9W	9W	9W	9W
- standby	5W	5W	5W	5W	5W
I^2t-power semiconductors in A^2s	390	720	4000	9100	16200
min. motor load	20% of device rating				
starting time	0,6s				
stopping time	0,25s				
restart time	200ms				
input resistance control inputs	80kOhm				
control voltage U_c	24VCD ... 230VAC				
contact rating of relay outputs RA1/RA2	2A / 250VAC / 30VDC				
installation class	3				
overvoltage category / pollution degree:					
control and auxiliary circuit	II / 2				
main circuit	III (TT / TN-systems) / 2				
rated impulse strength U_{imp}:					
control and auxiliary circuit	2,5kV				
main circuit	4kV				
rated insulation voltage U_i:					
main circuit	500V				
control and auxiliary circuit	250V				
max. cross-sectional area for connection:					
control terminals	1,5mm²			1,5mm²	
power teminals	6mm²			16mm²	
max. tightening torque: control terminals	- spring-loaded terminals				
main circuit	- spring-loaded terminals				
ambient / storage temperature	- 0°C ... 45°C up to an altitude of 1000m / -25°C ... 75°C				
weight	950g				

Connection Diagram:





Features:

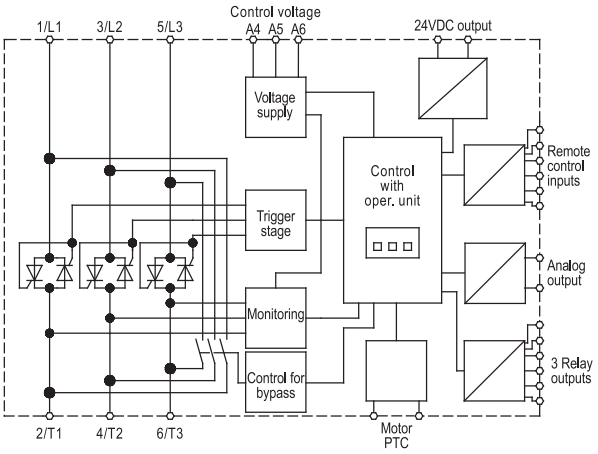
- three-phase controlled digital-soft starter (7,5-800kW)
- integrated bypass up to 110kW
- current and torque reduction during acceleration
- comprehensive and customizable motor protection
- DC braking (contactorless)
- display graphical LCD - real time graphs of motor operating performance
- inside delta (6-wire) connection
- degree of protection IP20 (up to 105A), IP00 (from 145A up)
- motor PTC connection

Soft Starters

VS i III ...-23 ... 220

Function:

- emergency run
- forward or reverse jog direction
- remote control inputs (3x fixed, 1x programmable)
- relay outputs (3x programmable)
- 24VDC output
- analog output
- divers soft start/stop control types
- units with 690V upon request



Accessories:

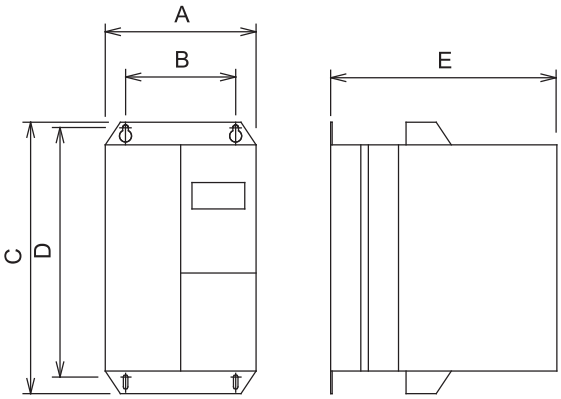
- control software
- DeviceNet module (29000.25903)
- Modbus module (29000.25904)
- Profibus module (29000.25905)
- USB module (29000.25910)
- finger protection (from 145A up to 220A, 29000.25909)

Typical Applications:

pumps	crushers	machines with gear units
ventilators	presses	belt or chain drives
compressors	conveying systems	
mills	drives with high-inertia starting	

Typical designation	VS i III 525 -							
	23C1	43C1	53C1	76C1	105C1	145C1	170C1	220C1
	23C2	43C2	53C2	76C2	105C2	145C2	170C2	220C2
mains voltage according to DIN EN (IEC 38)	200-525V 45-66Hz							
Typical designation	VS i III 690-							
	23C1	43C1	53C1	76C1	105C1	145C1	170C1	220C1
	23C2	43C2	53C2	76C2	105C2	145C2	170C2	220C2
mains voltage according to DIN EN (IEC 38)	380-690V 45-66Hz							
rated device current	23A	43A	53A	76A	105A	145A	170A	220A
order number:								
bei 525V/C1 2S000.50...	023	043	053	076	105	145	170	220
bei 525V/C2 2S001.50...	023	043	053	076	105	145	170	220

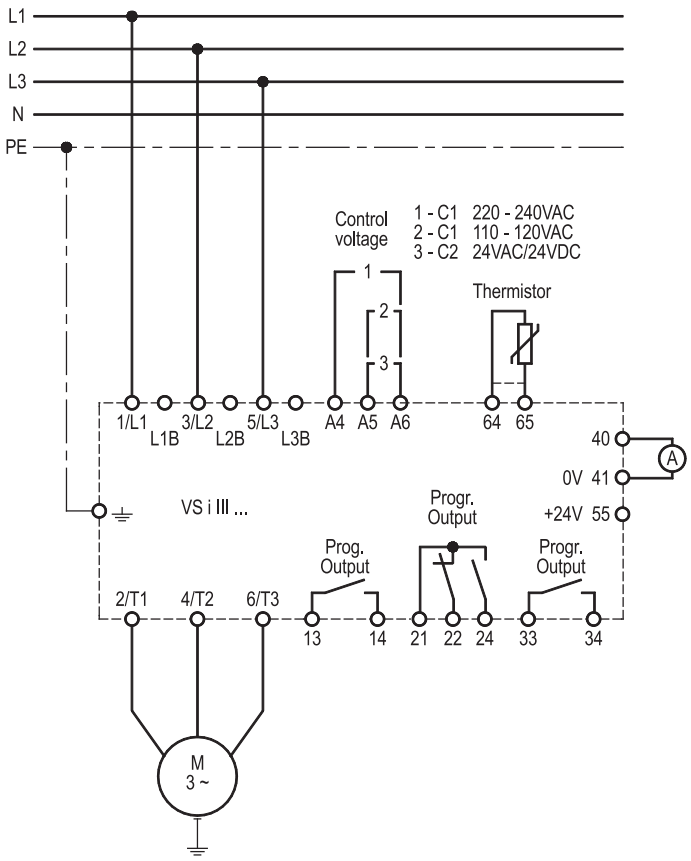
Dimensions:

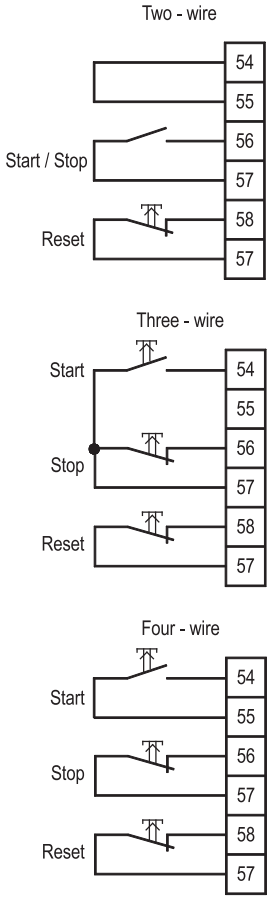


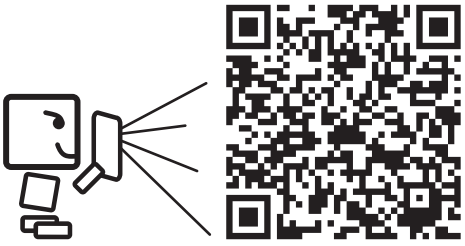
	A mm	B mm	C mm	D mm	E mm
VS i III...-23	150	124	295	278	183
VS i III...-43	150	124	295	278	183
VS i III...-53	150	124	295	278	183
VS i III...-76	150	124	295	278	213
VS i III...-105	150	124	295	278	213
VS i III...-145	275	250	438	380	248
VS i III...-170	275	250	438	380	248
VS i III...-220	275	250	438	380	248

Technical data	VS i III 525 -							
	23C1	43C1	53C1	76C1	105C1	145C1	170C1	220C1
	23C2	43C2	53C2	76C2	105C2	145C2	170C2	220C2
mains voltage according to DIN EN (IEC 38)	200-525V 45-66Hz							
Typical designation	VS i III 690-							
	23C1	43C1	53C1	76C1	105C1	145C1	170C1	220C1
	23C2	43C2	53C2	76C2	105C2	145C2	170C2	220C2
mains voltage according to DIN EN (IEC 38)	380-690V 45-66Hz							
rated device current	23A	43A	53A	76A	105A	145A	170A	220A
motor rating at 400V in kW	-7,5	-15	-22	-30	-55	-60	-75	-110
I^2T-value power semiconductors in kA^2s	1,15	8	15	15	125	125	320	320
acceleration	constant current, current ramp, "adaptive acceleration control", torque control							
deceleration	timed voltage ramp, soft stopp, brake							
switching frequency at 3x Ie and 10s	AC53b 3.0 10:350 10/h			AC53b 3.0 10:590 10/h				
techn. parameter of relay output	10A/250VAC resistive; 5A/250VAC AC15							
ambient temperature	-10°C...+40°C (+60°C derating)							
control voltage	C1: 110VAC; 220VAC; -15%/+10%; C2: 24VDC/24VAC ±20%							
weight / kg	4,3			4,5	5	15		

Connection Diagram:







Features:

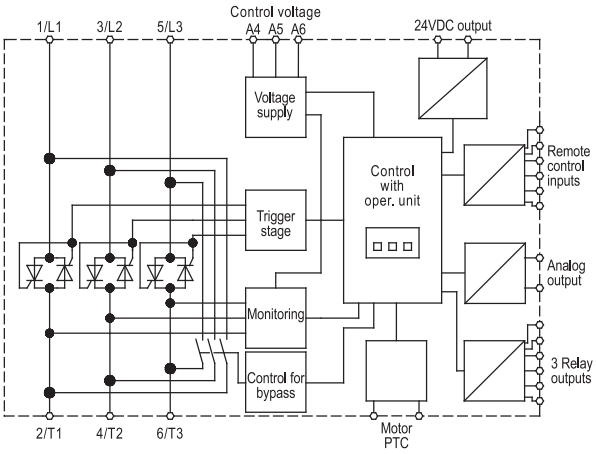
- three-phase controlled digital-soft starter (7,5-800kW)
- integrated bypass
- current and torque reduction during acceleration
- comprehensive and customized motor protection
- DC braking (contactorless)
- display graphical LCD - real time graphs of motor operating performance
- inside delta (6-wire) connection
- degree of protection IP00
- motor PTC connection

Soft Starters

VS i III ...-255 ...1000

Function:

- emergency run
- forward or reverse jog direction
- remote control inputs (3x fixed, 1x programmable)
- relay outputs (3x programmable)
- 24VDC output
- analog output
- divers soft start/stop control types
- units with 690V upon request



Accessories:

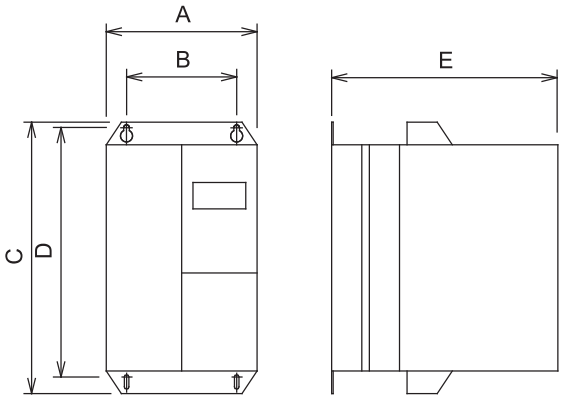
- PC software
- DeviceNet module (29000.25903)
- Modbus module (29000.25904)
- Profibus module (29000.25905)
- Ethernet (IP, Modbus TCP, Profinet)
- USB module (29000.25910)
- remote keypad (29000.25911)

Typical Applications:

pumps	crushers	machines with gear units
ventilators	presses	belt or chain drives
compressors	conveying systems	
mills	drives with high-inertia starting	

Typical designation		VS i III 525 -								
		255 C1/C2	350 C1/C2	425 C1/C2	500 C1/C2	580 C1/C2	700 C1/C2	820 C1/C2	920 C1/C2	1000 C1/C2
rated device current		255A	350A	425A	500A	580A	700A	820A	920A	1000A
mains voltage		200-525V 45-66Hz								
control voltage		C1: 110VAC; 220VAC -15%/+10% 600mA; C2: 24VDC/24 VAC ±20% 2.8A								
motor rating at 400V		132kW	185kW	220kW	250kW	315kW	400kW	450kW	500kW	550kW
order number:										
C1	2S000.50...	255	350	425	500	580	700	820	920	101
C2	2S001.50...	255	350	425	500	580	700	820	920	101

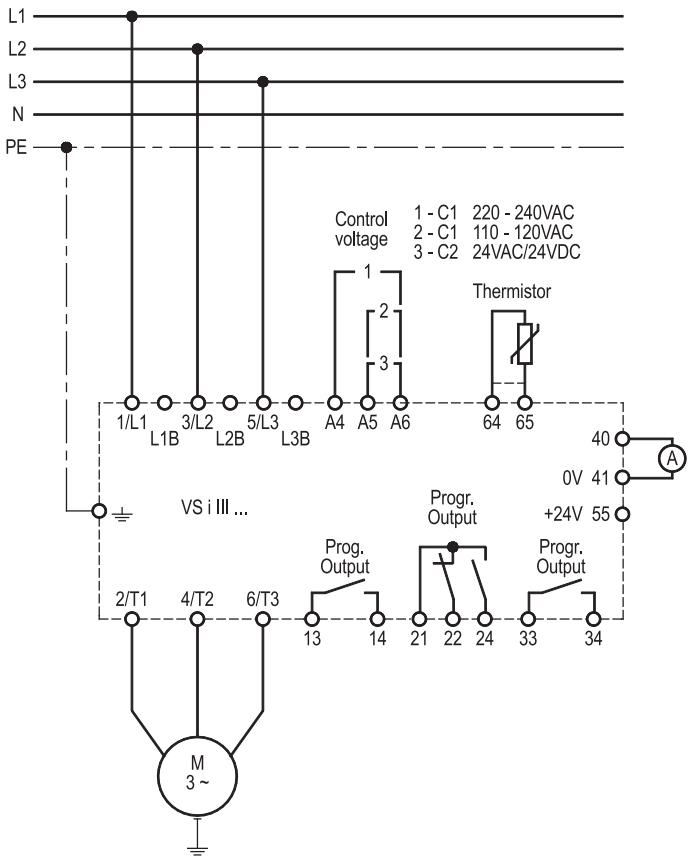
Dimensions:

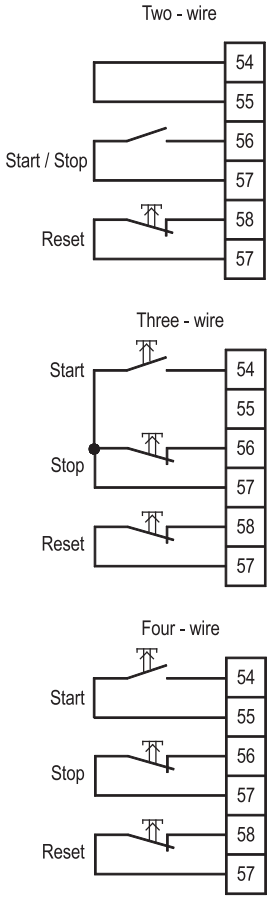


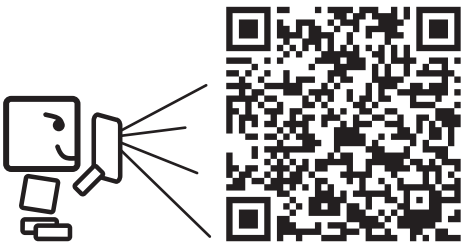
	A mm	B mm	C mm	D mm	E mm
VS i III...-255	424	376	440	392	296
VS i III...-350	424	376	440	392	296
VS i III...-425	424	376	440	392	296
VS i III...-500	433	320	640	600	295
VS i III...-580	433	320	640	600	295
VS i III...-700	433	320	640	600	295
VS i III...-820	433	320	640	600	295
VS i III...-920	433	320	640	600	295
VS i III...-1000	433	320	640	600	295

Technical data	VS i III 525 -								
	255 C1/C2	350 C1/C2	425 C1/C2	500 C1/C2	580 C1/C2	700 C1/C2	820 C1/C2	920 C1/C2	1000 C1/C2
max. power dissipation									
- during start	4,5W pro A				4,5W pro A				
- in operation	ca. 140W				ca. 357W				
I^2t-value power semiconductor A^2s	320000	202000	320000	320000	781000	781000	1200000	2530000	2530000
min. motor load	51A	70A	85A	100A	116A	140A	164A	184A	200A
utilization category	AC53b								
EMC	meets EU-standard 89/336/EEC; IEC 60947-4-2 class B; IEC 60947-4-2								
ambient / storage temperature	-25°C up to +60°C (derating) / -25°C up to +60°C								
inputs	activ 24VDC about 8mA, motor PTC (trip >3,6kOhm, reset <1,6kOhm)								
relay output	10 A at 250 VAC resistive, 5 A at 250 VAC AC15 Lf 0,3								
analog output	0 up to 20 mA or 4 up to 20 mA								
24VDC output	max. 200mA								
kinds of start	constant current. current ramp, adaptive control, kick start								
kinds of stop	soft stop via voltage drop in an allowed time, DC brake, free deceleration								
adaptable protection functions	motor overload, min. current, max. starting time, short time over-current, current unbalance, mains frequency, phase sequence								
certification	C✓, CE, RoHS conform, UL / cUL								
weight	26	30,2	30,2	49,5	49,5	60	60	60	60

Connection Diagram:







Features:

- single-phase controlled soft starter
- all devices for pole-changing motors
- dual-voltage, for 400V and 230V networks
- terminal arrangement suitable for switchgear connection
- for snap-mounting on 35mm standard rail
- integrated bypass relay
- no mains neutral conductor (N) required
- special voltages up to 640V
- also for single-phase applications
- degree of protection IP 20 (SAS 3 ... SAS 11)
  degree of protection IP 00 (SAS 11PUST, 22PUST)

Soft Starters

SAS 3 ... 11

SAS 11PUST, 22PUST

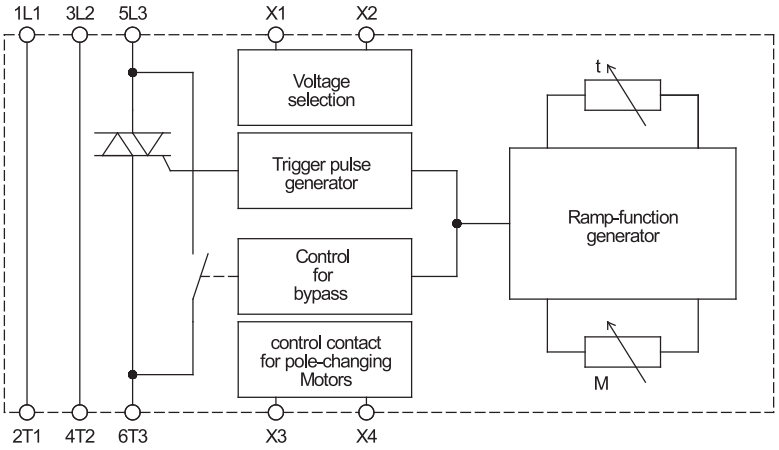
CE

Function:

- soft start
- 2 separately adjustable parameters
  starting torque, starting time
- control contact for pole-changing motors

Upon request:

- Apotential-free input
  control voltage 10 ... 30VDC
- SAS 3 up to SAS 11:
  standard up to 480V
  special voltages 500V up to 640V
  (all types in 100mm-housing)
- SAS 11PUST and SAS 22PUST:
  special voltages up to 690A



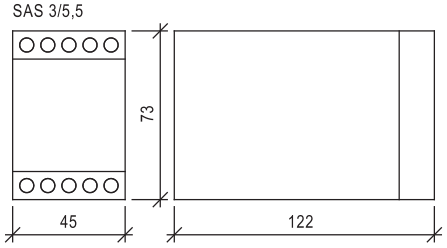
Typical Applications:

packaging machinery	conveying machinery
sliding doors	door drives of passenger and goods lifts
belt drives	limitation of starting current for transformers

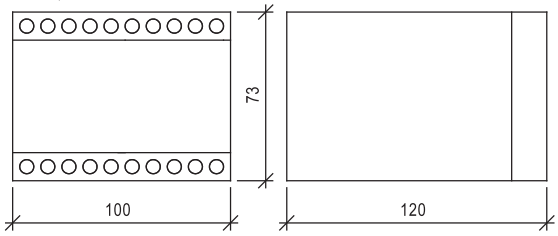
Typical designation	SAS 3	SAS 5,5	SAS 7,5	SAS 11	SAS 11PUST	SAS 22PUST
motor rating at 230V	1,5kW	3kW	4kW	5kW	-	-
motor rating at 400V	3kW	5,5kW	7,5kW	11kW	11kW	22kW
mains/motor voltage X1-X2 jumpered according to DIN EN 50160 (IEC 38)	160 ... 240V ± 10%				400V ± 15%	
mains/motor voltage X1-X2 not jumpered according to DIN EN 50160 (IEC 38)	380 ... 480V ± 10%					
order number	20700.40003	20700.40005	20700.40007	20700.40011	20800.38011	20800.38022

Dimensions:

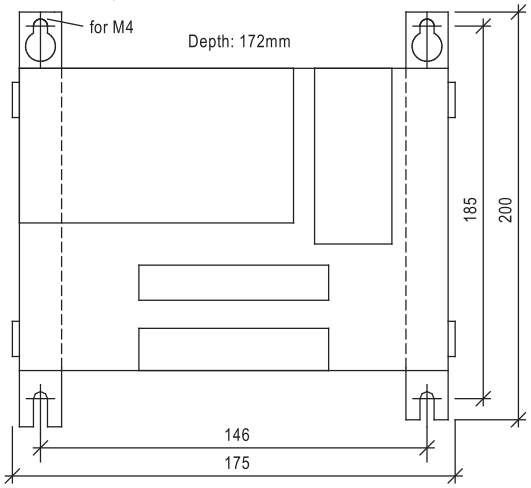
SAS 3/5,5



SAS 7,5/11



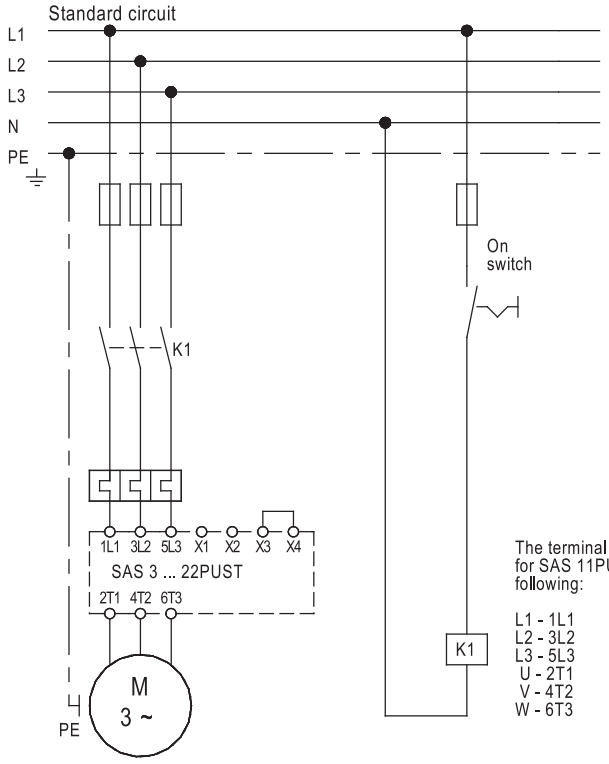
SAS 11PUST, 22PUST



All dimensions indicated in mm

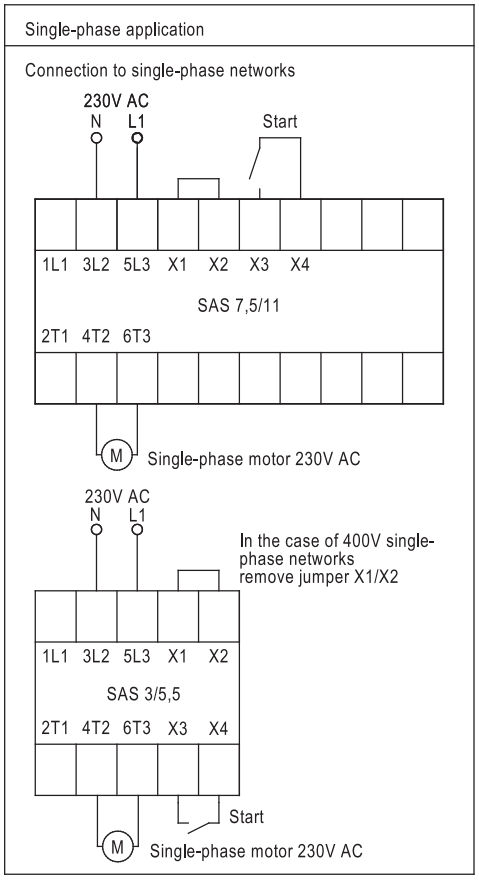
Technical data	SAS 3	SAS 5,5	SAS 7,5	SAS 11	SAS 11PUST	SAS 22PUST
mains/motor voltage X1-X2 jumpered according to DIN EN 50160 (IEC 38)	160 ... 240V ± 10%				400V ± 15%	
mains/motor voltage X1-X2 not jumpered according to DIN EN 50160 (IEC 38)	380 ... 480V ± 10%					
rated device current	6,5A	12A	15A	25A	25A	32A
mains frequency	50/60Hz					
rated power at 230V	1,5kW	3kW	4kW	5,5kW	-	-
rated power at 400V	3kW	5,5kW	7,5kW	11kW	11kW	22kW
min. motor current	10% of device rating					
starting torque	0 ... 50%					
starting time	0,5 ... 5s					
restart time	200ms					
max. switching cycle at 3xIe and 5s t_{an}	240/h	200/h	120/h	70/h	240/h	120/h
max. cross-sectional are	2,5mm²				16mm²	
ambient / storage temperature	0°C ... 45°C / -25°C ... 75°C					
weight / kg	0,3	0,3	0,5	0,5	2,7	3,0

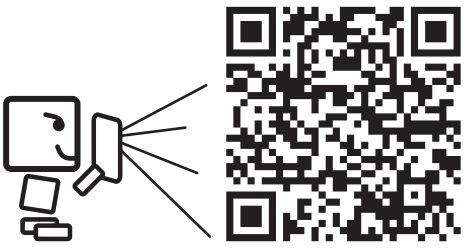
Connection Diagram:



The terminal destination for SAS 11PUST and SAS 22PUST are like following:

L1 - 1L1
L2 - 3L2
L3 - 5L3
U - 2T1
V - 4T2
W - 6T3





Features:

- two-phase controlled soft starter
- easy mounting, also for retrofitting into existing plants
- integrated bypass relay
- no mains neutral conductor (N) required
- parameterization by means of three potentiometers
- conomically priced replacement for star/delta switches
- for mounting on top hat rail
- current reduction during acceleration
- very compact design, overall width from 45mm on
- degree of protection IP20

Soft Starters

DUOSTART 1,5 ... 5,5

CE

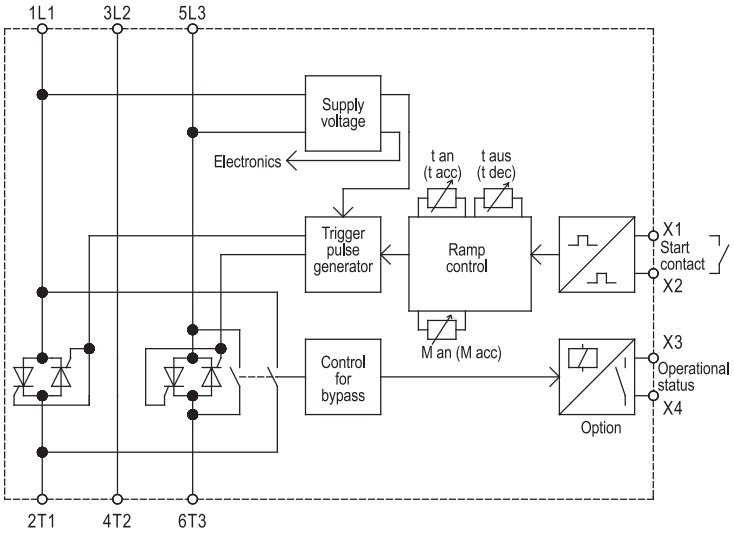
Function:

- soft start and soft stopp
  potential-freecontrol input for soft start
  and soft stopp
- 3 separately adjustable parameters
  starting torque, acceleration time, deceleration time
- control (start/stop) with contact or voltage
  10-42VDC

Options:

(upon request)

- DUOSTART ... M
  (beginning of acceleration until
  end of deceleration)
- DUOSTART ... S
  control (start/stop)
  with voltage 10-42VDC
- external 24V supply voltage
  (wide voltage range capability)

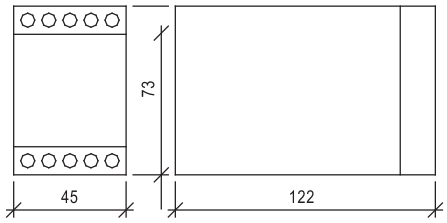


Typical Applications:

door and gate drives	conveyors
pumps	packaging machinery
ventilators	transformer soft start

Typical designation	DUOSTART 1,5	DUOSTART 3	DUOSTART 5,5
motor rating at 400V mains voltage	1,5kW	3kW	5,5kW
mains / motor voltage according to DIN EN 50160 (IEC 38)	400V ± 10% 50/60Hz		
order number	21500.40001	21500.40003	21500.40005
option „M“	21501.40001	21501.40003	21501.40005
option „S“	21502.40001	21502.40003	21502.40005

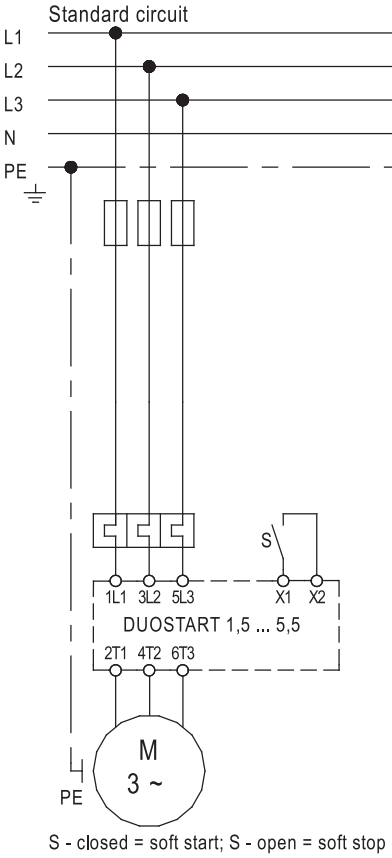
Dimensions:



All dimensions indicated in mm

Technical data	DUOSTART 1,5	DUOSTART 3	DUOSTART 5,5
mains / motor voltage according to DIN EN 50160 (IEC 38)	400V ± 10% 50/60Hz		
device nominal current	3,5A	6,5A	12A
motor rating at 400V mains voltage	1,5kW	3kW	5,5kW
min. motor current	40% of the device rated current		
starting torque	0 ... 80%		
acceleration time	0,5 ... 12s		
deceleration time	0,5 ... 12s		
reset time	200ms		
max. switching cycle at 3xIe and 5s t_{an}	200/h	120/h	70/h
max. cross-sectional area solid	2x 2,5mm²		
stranded	2x 1,5mm²		
ambient / storage temperature	0°C ... 45°C / -25°C ... 75°C		
weight / kg	0,4	0,4	0,4
special voltages	230V	230V 480V	230V 480V

Connection Diagram:



S - closed = soft start; S - open = soft stop

Features:

- three-phase controlled soft starter
- easy mounting, also for retrofitting into existing plants
- terminal arrangement suitable for switchgear connection
- for snap-mounting on 35mm standard rail
- integrated bypass relay
- no mains neutral conductor (N) required
- functional peak current reduction
- degree of protection IP20

Soft Starters

MICROSTART 1,5 / 3

CE

Function:

- soft acceleration and deceleration
- 4 separately adjustable parameters
  starting torque, acceleration time,
  soft stop torque, deceleration time
- soft start and soft stop via control contact possible

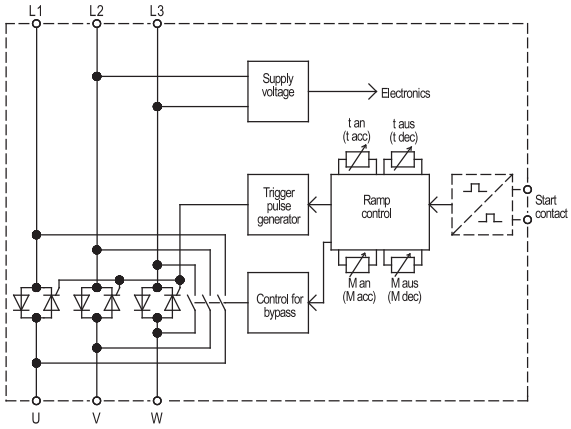
Upon Request:

- Apotential-free input
  control voltage 10 ... 30VDC

Option:

(upon request)

- „SST“ - pluggable



Typical Applications:

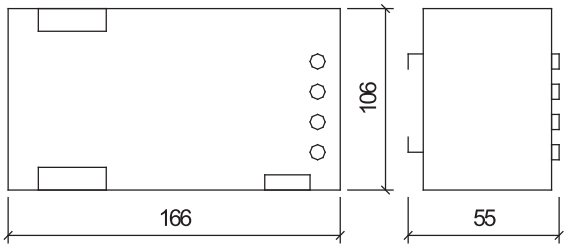
pumps	coil winders
ventilators	conveying machinery
belt drives	compressors
driving pulleys	

MICROSTART 1,5 / 3

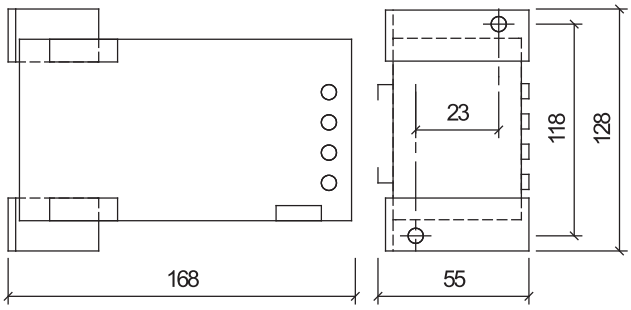
Typical designation	MICROSTART 1,5	MICROSTART 3
motor rating at 400V mains voltage	1,5kW	3kW
mains / motor voltage according to DIN EN 50160 (IEC 38)	400V ± 15% 50/60Hz	
order number	21300.38001	21300.38003
option „SST“	21304.38001	21304.38003

Dimensions:

MICROSTART 1,5/3



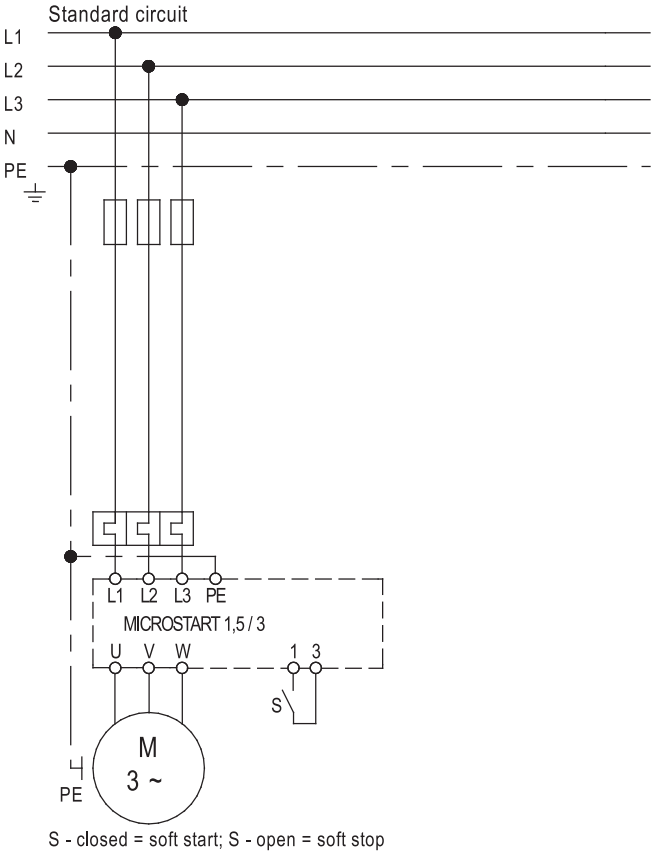
Option "SST"

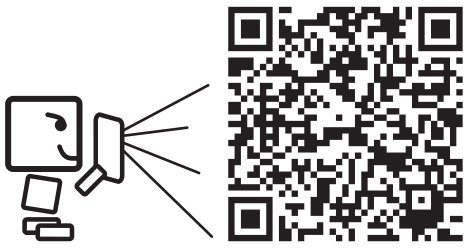


All dimensions indicated in mm

Technical data	MICROSTART 1,5	MICROSTART 3
mains / motor voltage according to DIN EN 50160 (IEC 38)	400V ± 15% 50/60Hz	
device nominal current	4A	6,5A
motor rating at 400V mains voltage	1,5kW	3kW
min. motor current	10% of the device rated current	
adjustment range of starting torque	0 ... 80%	
adjustment range of of acceleration time	1 ... 15s	
adjustment range of soft stop torque	20 ... 80%	
adjustment range of deceleration time	0 ... 15s	
reset time	200ms	
max. switching cycle at 3xIe and 5s t_{an}	120/h	60/h
max. cross-sectional area	2,5mm²	
I^2t-value power semiconductor in A^2s	40	450
ambient / storage temperature	0°C ... 45°C / -25°C ... 75°C	
weight / kg	0,75	0,75

Connection Diagram:





Subject to change without notice.

Features:

- three-phase controlled soft starter
- easy mounting, also for retrofitting into existing plants
- terminal arrangement suitable for switchgear connection
- for snap-mounting on 35mm standard rail
- integrated bypass relay
- extensive monitoring functions
- robust metal housing
- no mains neutral conductor (N) required
- special voltages up to 600V
- functional peak current reduction
- degree of protection IP 20

Soft Starters

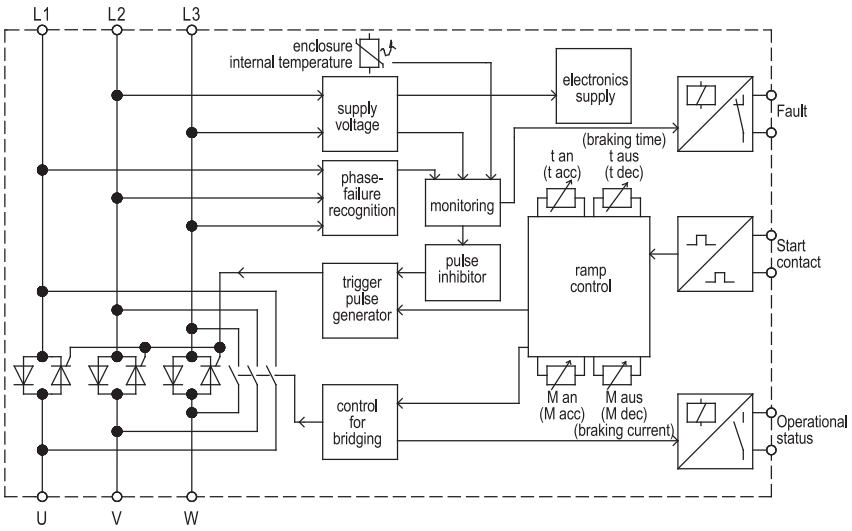
MINISTART 1,5 ... 11

CE

Function:

- soft acceleration and deceleration
- 4 separately adjustable parameters
  starting torque, acceleration time, soft stop torque, deceleration time
- potential-free input for soft start or soft stop-control voltage 10 ... 30VDC
- potential-free output for fault indication
- potential-free output for operational status *- loadable with 0 250V/8A each
- temperature monitoring
- phase-failure monitoring during ramp-up

*
- with standard devices closed, when power semiconductors are bridged
- with option „S“ closed from start of acceleration to end of deceleration

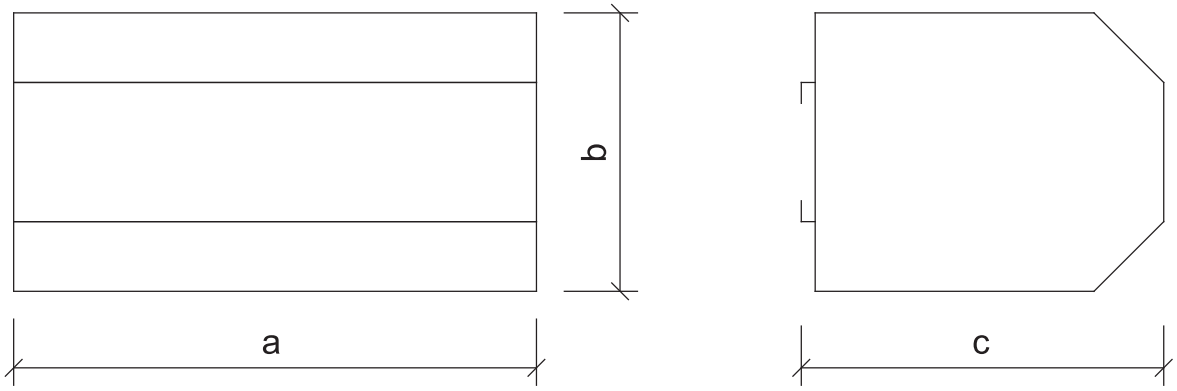


Typical Applications:

pumps
ventilators
cranes
travelling and rotary operating mechanismus
conveying machinery
washing machines
linen dryers

Typical designation	MINISTART 1,5	MINISTART 3	MINISTART 5,5	MINISTART 7,5	MINISTART11
motor rating at 400V mains voltage	1,5kW	3kW	5,5kW	7,5kW	11kW
mains / motor voltage according to DIN EN 50160 (IEC 38)	400V ± 15% 50/60Hz				
order number	21200.38001	21200.38003	21200.38005	21200.38007	21200.38011

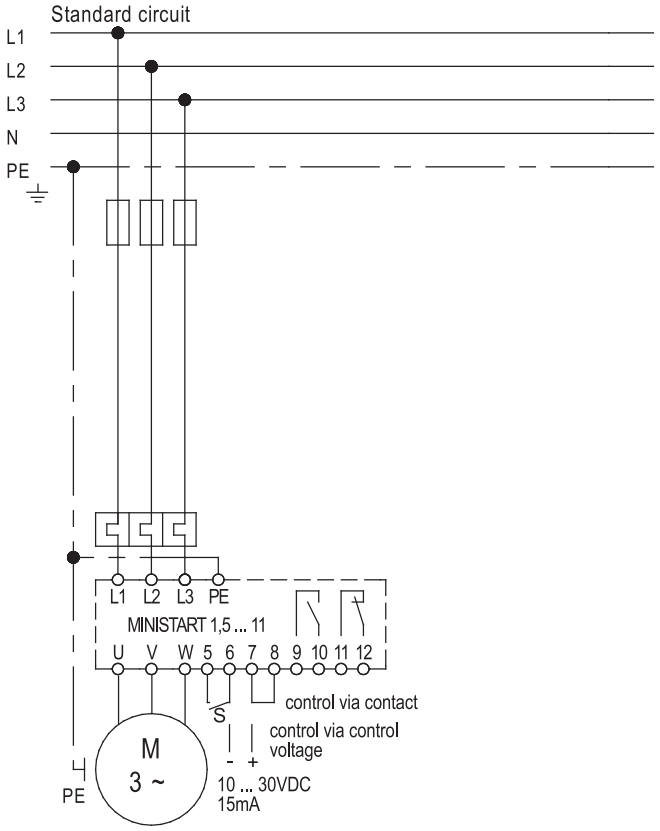
Dimensions:



Mounting dimensions	a mm	b mm	c mm
MINISTART 1,5 ... 11	166	106	117

Technical data	MINISTART 1,5	MINISTART 3	MINISTART 5,5	MINISTART 7,5	MINISTART 11
mains / motor voltage according to DIN EN 50160 (IEC 38)	400V ± 15% 50/60Hz				
device nominal current	4A	6,5A	12A	16A	25A
motor rating at 400V mains voltage	1,5kW	3kW	5,5kW	7,5kW	11kW
min. motor current	10% of the device rated current				
starting torque	0 ... 80%				
acceleration time	1 ... 20s				
soft stop torque	20 ... 80%				
deceleration time	0 ... 20s				
reset time	200ms				
max. switching cycle at 3xIe and 5s t_{an}	120/h			60/h	20/h
max. cross-sectional area: control terminals	1,5mm²				
power terminals	4,0mm²				
I^2t-value power semiconductor in A^2s	40	450	550	9100	9100
ambient / storage temperature	0°C ... 45°C / -25°C ... 75°C				
weight / kg	1,2	1,2	1,35	1,5	1,5

Connection Diagram:



Features:

- three-phase controlled soft starter
- easy mounting, also for retrofitting into existing systems
- terminal arrangement suitable for switchgear connection
- integrated bypass contactor
- no mains neutral conductor (N) required
- functional peak current reduction
- monitoring for heat sink temperature
- monitoring of motor temperature via motor thermistor
- potential-free control inputs and outputs
- special voltages up to 690V
- robust metal enclosure
- degree of protection IP 20

Soft Starters

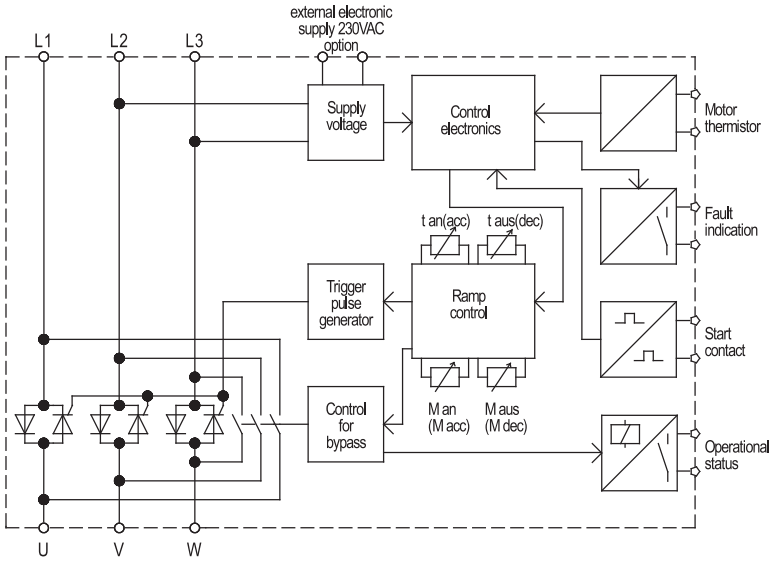
DAS-T 7,5 ... 55

CE

Function:

- soft acceleration and deceleration
- acceleration/deceleration via control contact or control voltage 10 ... 42VDC (selectable)
- 4 separately adjustable parameters
  starting torque, acceleration time, soft stop torque, deceleration time
- potential-free output for operational status* 250VAC/8A
- fault signalling contact (250VAC/8A)
- input for motor thermistor
- for special voltages higher than 500V external electronic supply 230VAC necessary

* closed when power semiconductors are bridged, or closed from start of acceleration to end of deceleration

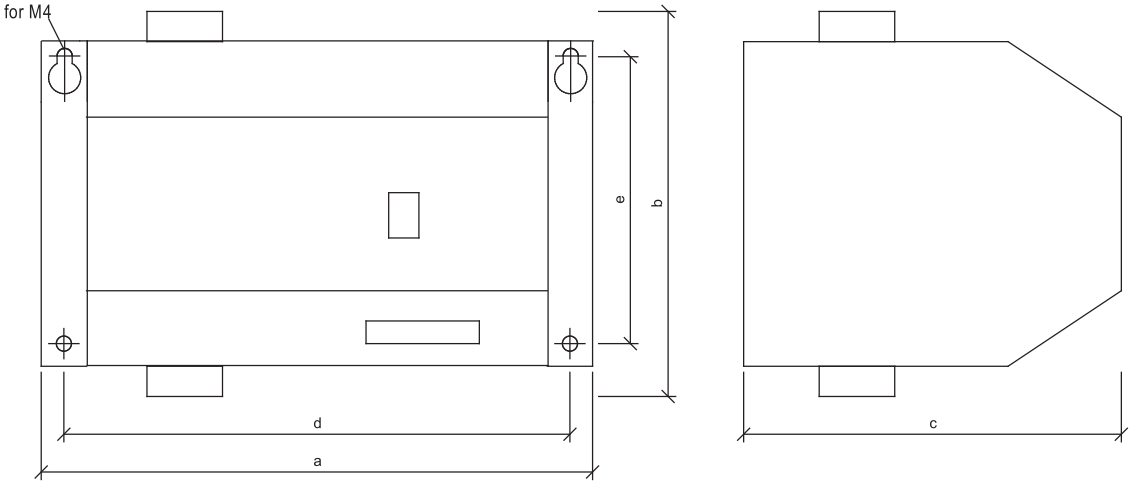


Typical Applications:

pumps	dryers	cranes
ventilators	washing machines	trolleys
conveying systems	compressors	

Typical designation	DAS-T 7,5	DAS-T 11	DAS-T 15	DAS-T 22	DAS-T 30	DAS-T 37	DAS-T 55
motor rating at 400V mains voltage	7,5kW	11kW	15kW	22kW	30kW	37kW	55kW
mains / motor voltage according to DIN EN 50160 (IEC 38)	400V ± 15% 50/60Hz (up to 690V upon request)						
order number	20900. 40007	20900. 40011	20900. 40015	20900. 40022	20900. 40030	20900. 40037	20900. 40055

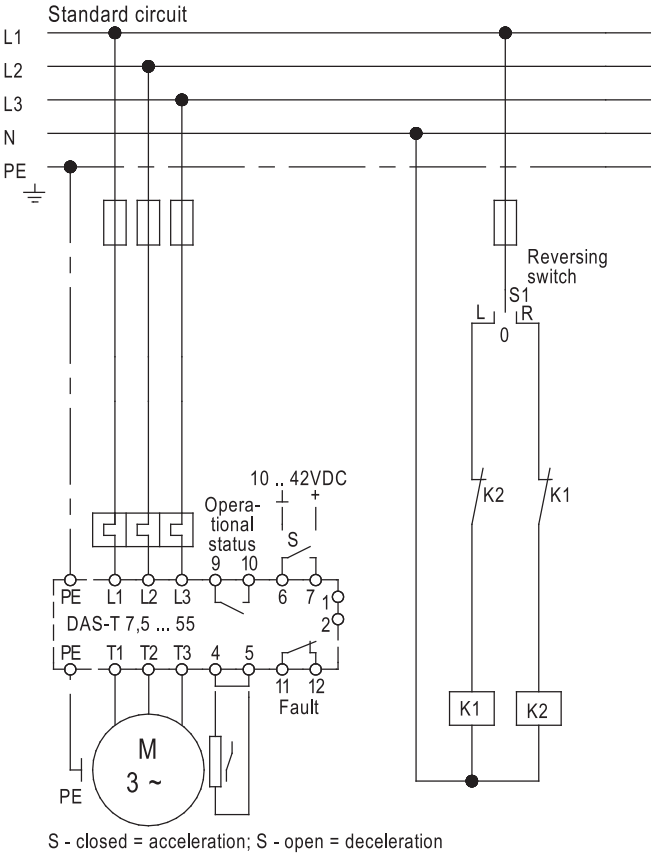
Dimensions:

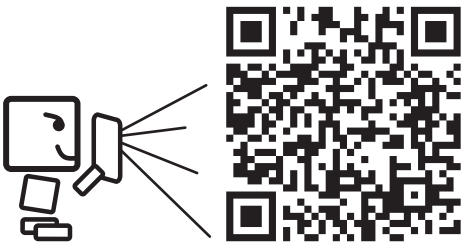


	a mm	b mm	c mm	d' mm	e' mm
DAS-T 7,5	235	245	140	218	170
DAS-T 11	235	245	140	218	170
DAS-T 15	235	245	140	218	170
DAS-T 22	235	245	140	218	170
DAS-T 30	335	245	170	318	170
DAS-T 37	335	245	170	318	170
DAS-T 55	335	245	170	318	170

Technical data	DAS-T 7,5	DAS-T 11	DAS-T 15	DAS-T 22	DAS-T 30	DAS-T 37	DAS-T 55
mains / motor voltage according to DIN EN 50160 (IEC 38)	400V ± 15% 50/60Hz (up to 690V upon request)						
device rated current	17A	25A	32A	48A	63A	75A	105A
motor rating at 400V mains voltage	7,5kW	11kW	15kW	22kW	30kW	37kW	55kW
min. motor current	10% of the device rated current						
starting torque	0 ... 80%						
acceleration time	0,5 ... 25s						
soft stop torque	20 ... 80%						
deceleration time	0 ... 15s						
reset time	200ms						
max. switching cycle at 3xIe and 5s t_{an}	120/h	120/h	120/h	120/h	120/h	120/h	120/h
max. cross-sectional area control terminals	1,5mm²						
power terminals	16mm²				35mm²		
I^2t-value power semiconductor in A^2s	3600	3600	8000	10500	18000	51200	125000
ambient / storage temperature	DAS-T 22						
weight / kg	3,8	3,8	4	4	7,8	8	8,2

Connection Diagram:





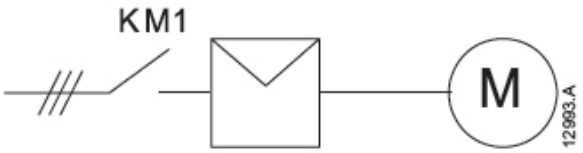
What are main contactors?
Soft starters can be installed with or without a main contactor.

A main contactor:
• May be required to meet local electrical regulations.
• Provides physical isolation when the starter is not in use and in the event of a soft starter trip.

Even in the off state SCRs do not offer a high degree of isolation due to leakage through the SCR and protection networks.
• Protects the soft starter SCRs from severe overvoltage situations (eg lightning strikes).

SCRs are most susceptible to overvoltage damage when in the off state. A main contactor disconnects the SCRs from the supply when the motor is not running, preventing possible damage.

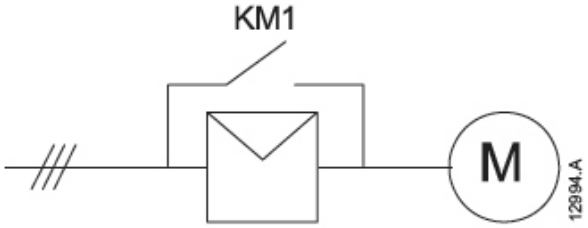
Main contactors should be AC3 rated for the motor FLC.



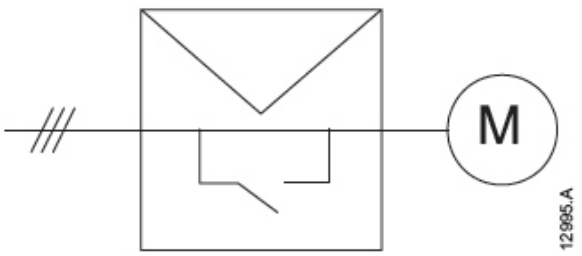
What are bypass contactors?
Bypass contactors bridge out a soft starter's SCRs when the motor is running at full speed. This eliminates heat dissipation from the SCRs during run state.

Some soft starters include built-in bypass contactors, others require an external bypass contactor.

External bypass



Internal bypass



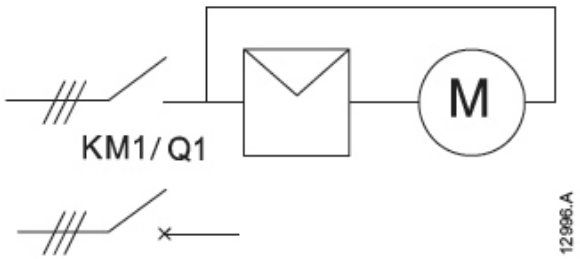
Bypass contactors:
- Allow soft starters to be installed in sealed enclosures
- Eliminate the cost of forced-air cabinet ventilation
- Save energy by eliminating SCR losses during run

Bypass contactors should be AC1 rated for the motor FLC. The AC1 rating is adequate because the bypass contactor does not carry start current or switch fault current.

What is an inside delta connection?

Inside delta connection (also called six-wire connection) places the soft starter SCRs in series with each motor winding. This means that the soft starter carries only phase current, not line current. This allows the soft starter to control a motor of larger than normal full load current.

When using an inside delta connection, a main contactor or shunt trip MCCB must also be used to disconnect the motor and soft starter from the supply in the event of a trip.



(shunt trip)

Inside delta connection:
- Simplifies replacement of star/delta starters because the existing wiring can be used.
- May reduce installation cost. Soft starter cost will be reduced but there are additional cabling and main contactor costs. The cost equation must be considered on an individual basis.

Only motors that allow each end of all three motor windings to be connected separately can be controlled using the inside delta connection method.

Not all soft starters can be connected in inside delta.

What is the maximum length of cable run between a soft starter and the motor?

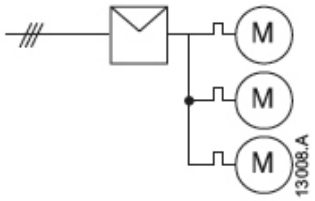
The maximum distance between the starter and motor is determined by the voltage drop and the cable capacitance.

Voltage drop at the motor terminals must not exceed the limit specified in local electrical regulations when the motor is running fully loaded. Cabling should be sized accordingly.

Cable capacitance can be a factor for cable runs that are longer than 500 metres. Consult the soft starter manufacturer for advice - you will need to provide details about mains voltage, mains frequency and the soft starter model.

Can one soft starter control multiple motors for parallel starting?
Yes. The circuit configuration and soft starter selection depends on the application.

1. Each motor must have its own overload protection.
2. If the motors are the same size and are mechanically coupled, a constant current soft starter can be used.
3. If the motors are different sizes and/or the loads are not mechanically interlocked, a soft starter with a timed voltage ramp (TVR) start profile should be used.
4. The combined motor FLCs must not exceed the soft starter FLC.



What are the key benefits of soft start?
Soft start enhances motor start performance in many ways including:
- Smooth acceleration without the torque transients associated with electro-mechanical reduced voltage starters.
- Voltage or current is applied gradually, without the voltage and current transients associated with electro-mechanical reduced voltage starters.
- Lower start currents and/or shorter start times because constant current control gives higher torque as motor speed increases.
- Easy adjustment of start performance to suit the specific motor and load.
- Precise control over the current limit.
- Consistent performance even with frequent starts.
- Reliable performance even if load characteristics vary between starts (eg loaded or unloaded starts).

In addition to superior starting performance, soft starters also provide a range of features not available from other reduced voltage starters. This includes areas such as:
- Soft stop (which helps eliminate water hammer)
- Braking
- Motor and system protection
- Metering and monitoring
- Operating history and event logs
- Communication network integration

NOTE
The extra features built into soft starters can reduce the overall installed cost of the equipment and reduce the long-term maintenance requirement.

How does soft start compare with star/delta starting?

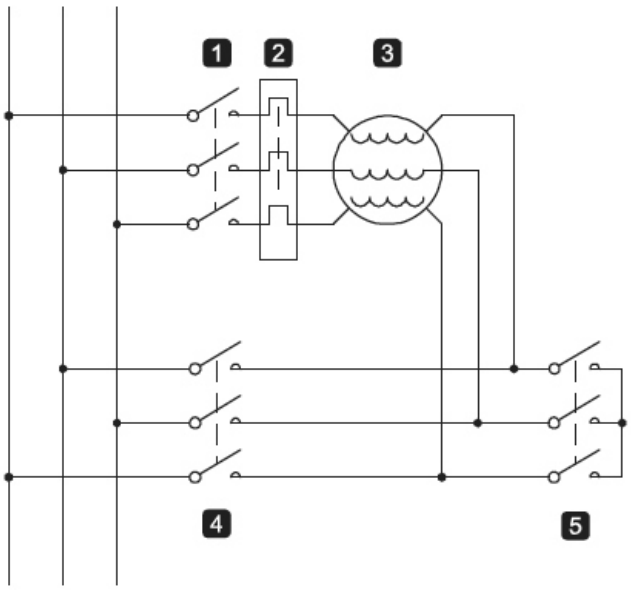
Compared with star/delta starters, soft starters are much more flexible and provide a smooth start with no risk of transients.

Star/delta starters offer limited performance because:

- Start torque cannot be adjusted to accommodate motor and load characteristics.
- There is an open transition between star and delta connection that results in damaging torque and current transients.
- They cannot accommodate varying load conditions (eg loaded or unloaded starts).
- They cannot provide soft stop.

The main advantages of star/delta starters are:

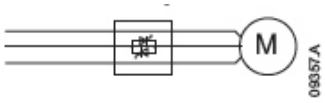
- They may be cheaper than a soft starter.
- When used to start an extremely light load, they may limit the start current to a lower level than a soft starter. However, severe current and torque transients may still occur.



1 Main contactor
2 Thermal overload
3 Motor (three-phase)
4 Delta contactor
5 Star contactor

Are all three phase soft starters the same?

No. There are different styles of soft starter which control the motor in different ways and offer different features.

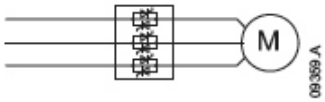


Single phase control

These devices reduce torque shock at start but do not reduce start current. Also known as torque controllers, these devices must be used in conjunction with a direct on-line starter.

Two phase control

These devices eliminate torque transients and reduce motor start current. The uncontrolled phase has slightly higher current than the two controlled phases during motor starting. They are suitable for all but severe loads.



Three phase control

These devices control all three phases, providing the optimum in soft start control. Three phase control should be used for severe starting situations.

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