TOSHIBA INTERNATIONAL CORPORATION

Creating technology and solutions that power Australian industry

TMS11
SOFT STARTER

LOW VOLTAGE SOFT STARTER

STARTING...

...EASY

Motors do most of the arduous mechanical work in modern manufacturing processes. For over 40 years, Toshiba International Corporation has been supplying motors to Australian industry. When we recommend Electronic Soft Starters for motors, we know the exact selection to suit your application ensuring that you always benefit.

The new generation TMS11 is the latest offering in our LV Soft Starter range.

Toshiba International Corporation has over many years installed Soft Start Technology in a variety of applications from simple water pumping to more sophisticated and demanding applications such as high pressure fans, compressors, crushers and conveyors.

Soft starters reduce damaging high motor inrush currents. It is widely proven that the installation of an electronic soft starter protects and extends the life of not only motors, but also of the connected equipment such as belts, pulleys, conveyor belts etc. by eliminating torque transients. This helps in reduced maintenance requirements and/ or unplanned downtime and thus increasing overall productivity.

Advantages of a TMS11 Electronic Soft Starter

- Minimise motor inrush current
- Eliminate torque transients on motor shaft
- Control application of motor torque
- Provide soft stop capability for motor
- Reduce risk of water hammer in pumping applications
- No harmonics are generated during running
- No additional cooling is required
- Ease of cabling & installation
- Local/Remote operation
- Advanced Communication options
- Can connect in a three (3) wire or six (6) wire configuration
- Primary & Secondary settings for starting TWO different motors sequentially or same motor under two different conditions e.g. loaded & unloaded
- ‘Powerthrough’ function to continue motor operation reliably
- ‘Emergency Run’ function for critical applications

The new generation TMS11 is our latest offering in LV Soft Starter range

Features at a glance

General

- Wide kW range - 15 ~ 700 kW at 3 Ph, 400V
- Internally By-passed
- Suitable for 3-wire or 6-wire connection
- Suitable up to 60 Deg C (with de-ration)
- Easy installation

Keypad Option

- Start, Stop, Reset, Local / Remote pushbuttons
- Graphical LCD display
- Status LEDs indicating operational status
- Power meter / Hours Run / Current Graph
- Remote mounting up to 3 metres away

Energy Efficient

- Internally bypassed arrangement
- Maximum energy efficiency and power savings
- Zero harmonics when running–no filters required

Communication

- Ethernet/IP (includes IoT MQTT and OPC UA)
- Modbus RTU
- Modbus TCP (includes IoT MQTT and OPC UA)
- DeviceNet
- Profibus
- Profinet (includes MQTT and OPC UA)

Additional features

- Ground fault detection with adjustable trip threshold
- Built-in USB / RTD / 4-20mA transducer ports
- IOT- Ready: Sync with nearly all major protocols
- Smart functionality & extended integration
- Five (5) control outputs and five (5) control inputs
- Dual Motor Start for sequential operation

TMS11 soft starters not only extend the life of your equipment by reducing transients, the advanced built-in motor protection features also provides operational security and enhanced reliability.

Remote Keypad
TM-RCP-03
(Max. 3m away)

The new generation TMS11 is packed with features

Detailed List

Extensive range of models

- 24 A~1250 A (nominal) current rating
- 200~525 VAC
- 380~690 VAC
- Bypassed or continuous options
- In-line or inside delta connection

Easy to understand interface

- Multi-language menus and displays
- Descriptive option names and feedback messages
- Real-time performance graphs

Supports energy efficiency

- IE3 compatible
- 99% energy efficient in by-passed mode
- Soft start technology avoids harmonic distortion during running

Streamlined setup process

- Configuration profiles for common applications
- Built-in metering and inputs/outputs

Extensive input and output options

- Remote control inputs (2 x fixed, 2 x programmable)
- Relay outputs (2 x fixed, 2 x programmable)
- 4-20 mA Analog output

When it is critical to continue operation in an emergency, TMS11 can ignore alarms & trip commands and continue to operate even with one phase of the starter damaged.

Versatile starting and stopping options

- Controlled Start & Stop
- Adaptive Control
- Constant Current Start
- Current Ramp Start
- Pump Clean function before start
- Timed voltage ramp soft stop
- Coast To Stop
- DC Brake
- Soft Brake
- Reverse Direction

Customisable protection

- Motor overload
- Excess Start Time
- Undercurrent/Overcurrent
- Underpower/Overpower
- Undervoltage/Overvoltage
- Current imbalance
- Input Trip
- Motor thermistor

Optional features for advanced applications

- Communication options: DeviceNet, Ethernet/IP, Modbus RTU, Modbus TCP, Profibus, Profinet
- Ground fault protection
- ‘Smart card’ for pumping application

With its in-built advance features, TMS11 does much more than any typical soft starter

Quick Setup Process

The streamlined TMS11 setup process incorporates a variety of configuration options for most common applications, such as conveyor, compressor, centrifuge, fan, mill, pump and more, to make commissioning as quick and easy as possible.

Wide Selection of Voltage and Current Options

TMS11 offers a wide range of available voltage options to choose from; 200v to 525v and 380v to 690v 50/60Hz

Feature-Packed and Easy-to-Use Remote Keypad

The TMS11 multi language remote operation keypad is packed with features, including starter status information for quick diagnosis, a performance graph for quick access to operation information, and a user configurable screen that displays the most important information. The keypad is rated IP65 and can be mounted directly on switchboard panel door up to 3 metres away.

Network Communication for Advanced Applications

In addition to the local and remote keypads and digital inputs, TMS11 can be operated by a PLC or SCADA systems using a wide range of industry standard communication protocols such as Ethernet/IP, DeviceNet, Modbus, Profibus, and Profinet.

Customisable Current, Voltage and Power Load Protection

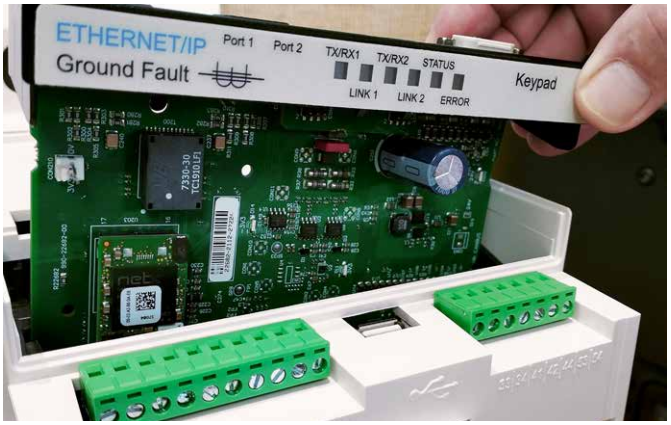
TMS11 incorporates an exhaustive list of in-built protection levels including current imbalance, undercurrent, overcurrent, under-voltage, over-voltage, under-power, over-power, excess start time, restart delay, starts per hour, and more.

Real-time Management Software

Connect, monitor, control, program and manage up to 254 soft starters in real time using the TMS11 soft starter management software. Individual starter settings can also downloaded and saved via the built-in USB port.

Integrated Design with Built-in Bypass for Motors up to 700kW

With the built-in bypass and space allocated for optional cards, the TMS11 does not require major external components making it easy to fit into your existing cabinet and integrate with your control system.



TMS11 Soft Starter Applications

New generation TMS11 Soft Starters can be installed and customised to suit any application. They have been used in the most demanding industries including mining, steel, cement, sugar, petrochemical and manufacturing.

Pumping Applications

With the controlled application of torque, TMS11 provides a regulated flow of liquids during start thus minimising the stresses associated with Direct On Line Starting (DOL). This has a significant effect on the pump impellers, piping infrastructure and control valves that may be in circuit.

TMS11 also has a “Smart Card ” option for pumping application that provides dedicated inputs for pressure, depth, temperature and flow sensor for added protection. The smart card can automatically start, stop or trip the soft starter based on user-selected levels for high or low pressure, depth, temperature or flow.

In addition, TMS11 also offers an “Adaptive Control” which has been specifically designed to minimise the damaging effects of fluid hammer. It also includes an undercurrent protection feature that stops a pump from running dry, preventing pump wear and tear and prolonging the life of the equipment.

Pumping Application

Compressor Applications

TMS11 soft starters eliminate current transients during start and in most industrial facilities this is extremely desirable as it reduces the potential for voltage drop, minimises the impact on other electrical components and the supply network.

In applications such as industrial air / gas compression, refrigeration and air-conditioning they protect the drive train by limiting the application of torque thus reducing wear and tear on the couplings, mechanical infrastructure and the compressor itself.

As compressors often run at constant speed, incorporating soft start technology is by far a more economical solution than variable frequency drives.

TMS11 takes up less space than variable frequency drives, does not require additional ventilation and provides full motor and load protection making it an ideal solution for starting.

Compressor Applications

TMS11 Soft Starter Applications

Fan Applications

Centrifugal Fans, under traditional starting methods, are greatly affected by torque transients.

These transient add mechanical stress on fan housings, fan couplings as well as the motor and fan bearings. These additional forces ultimately increases the requirement for maintenance, possibility of unscheduled stoppages and the associated cost to run the operation.

In some instances, fans are driven by one or more drive belts. During a direct on line start, these belts have a tendency to slip as the starting torque from a motor is too high and the belts are not able to transfer these forces.

Once again, these type of problems add to the maintenance costs and also result in production losses.

The TMS11 Soft Starter applies gradual torque to a motor for smooth start and thereby avoid sudden jolts.

The TMS11 starter has the ability to adjust the sart settings to accommodate any starting condition, both unloaded (closed damper) and fully loaded starts (open damper). Plus there is an option to manage deceleration in a controlled manner thereby gently slowing the load to a smooth stop.

Conveyor Applications

Starting method of a conveyor is extremely important as it is the key to productivity and process security.

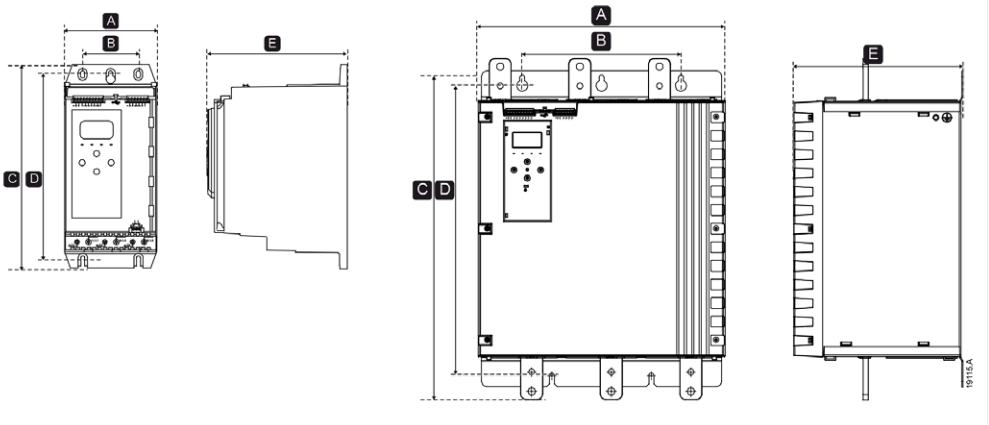
When speed control in not required, the TMS11 soft starter can reduce the risk of belt stretch and other mechanical damage by controlling the delivery of motor torque as the conveyor accelerates to full speed.

Benefits of the TMS11 Soft Starter in belt conveyor applications:

- Reduction of torque transients ensure a smooth start.
- Material on belt remains stable during Start & Stop
- Reduces belt stretch and costly replacements.
- Reduces maintenance costs.
- Protects the motor and load through advanced monitoring and protection.
- Able to apply a soft stop and reverse

Compared to traditional starting methods, TMS11 Soft Starter will not only improve the starting performance of your conveyor, but also provide process and production security through advanced motor protection and lower maintenance costs which adds to the bottom line.

Technical Specifications and Dimensions

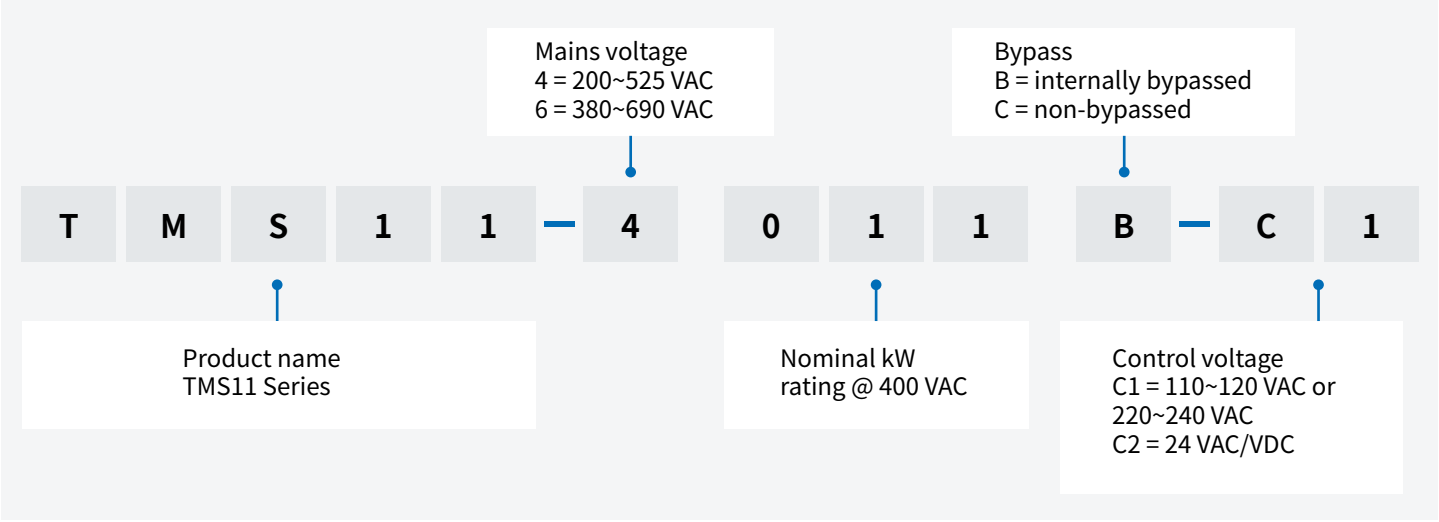


Frame	TMS11-4… TMS11-6…	Weight kg	Width mm		Height mm		Depth mm
			A	B	C	D	E
1	011B	4.8	152	92	336	307	233
	018B						
	022B	4.9					
	030B						
	037B						
	045B	5.5					
	055B						
	075B						
2	090B	12.7	216	180	495	450	245
	110B						
	132B						
	150B						
	185B	15.5			523		
	200B						
	220B						
	315B	19					
	355B						
3	500B	51	447	287	618	525	310
	560B						
	630B	62					
	710B	63					
	750B	65					
	400C	47	447	287	618	525	310
	450C						
	560C	58					
	630C	59					
	710C	61					

Technical Specifications

General	**Type**	AC semiconductor motor controller
	Configuration	3 phase, fully controlled
	Motor connection	In-line or inside delta
	Bypass	TMS11-xxxxB… – integrated internally (AC-53b)
		TMS11-xxxxC… – external (optional) (AC53a & AC-53b)
Supply	**Mains Voltage (L1, L2, L3)**	
	TMS11-4xxx…	200 VAC ~ 525 VAC (± 10%)
	TMS11-6xxx…	380 VAC ~ 690 VAC (± 10%)
	Control Voltage (A1, A2, A3)	
	TMS11-xxxxX-C1 (A1, A2)	110 VAC ~ 120 VAC (+10%/-15%), 600 mA
	TMS11-xxxxX-C1 (A2, A3)	220 VAC ~ 240 VAC (+10%/-15%), 600 mA
	TMS11-xxxxX-C2 (A1, A3)	24 VAC/VDC (± 20%), 2.8 A
	Mains Frequency	45 Hz to 65 Hz
	Rated insulation voltage to earth	690 VAC
	Rated impulse withstand voltage	6 kV
	Form designation	Bypassed or continuous, semiconductor motor starter form 1
Short circuit capability	**Coordination with semiconductor fuses**	Type 2
	Coordination with HRC fuses	Type 1
EMC	**EMC Immunity**	IEC 60947-4-2
	EMC Emissions	IEC 60947-4-2 Class B
Inputs	**Input rating**	Active 24 VDC, 8 mA approx.
	Motor thermistor (B4, B5)	Trip >3.6kΩ, reset <1.6kΩ
Outputs	**Relay outputs**	10 A @ 250 VAC resistive, 5 A @ 250 VAC, AC15 pf 0.3
	Main contactor (33, 34)	Normally open
	Bypass contactor (03, 04)	Normally open
	Relay output A (41, 42, 43)	Changeover
	Relay output B (53, 54)	Normally open
	Analog output (21, 22)	
	Maximum load	600Ω (12 VDC @ 20 mA)
	Accuracy	± 5%
Environmental	**Operating temperature**	-10 °C ~ 60 °C, above 40 °C with derating
	Operating altitude	0 - 1000 m, above 1000 m with derating
	Storage temperature	-25 °C ~ +60 °C
	Humidity	5% to 95% Relative Humidity
	Pollution degree	Pollution Degree 3
	Vibration	IEC 60068-2-6
	Ingress protection	
	TMS11-4011B ~ TMS11-4075B	IP20
	TMS11-4090B ~ TMS11-4355B	IP00
	TMS11-4400C ~ TMS11-4710C	IP00
Heat dissipation	**During start / run (non- bypassed)**	4.5 watts per ampere
	During run	
	TMS11-x011B ~ TMS11-x022B	≤ 35 watts approx.
	TMS11-x030B ~ TMS11-x075B	≤ 50 watts approx..
	TMS11-x090B ~ TMS11-x150B	≤ 120 watts approx.
	TMS11-x185B ~ TMS11-x355B	≤ 140 watts approx.
	TMS11-x500B ~ TMS11-x750B	≤ 180 watts approx.
Certification	**CE**	EN 60947-4-2
	RCM	N1971

Product code contents



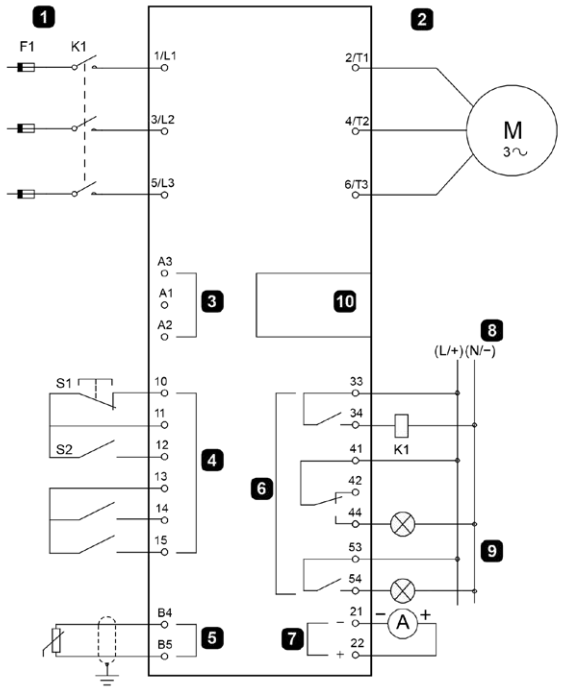
Product Specifications

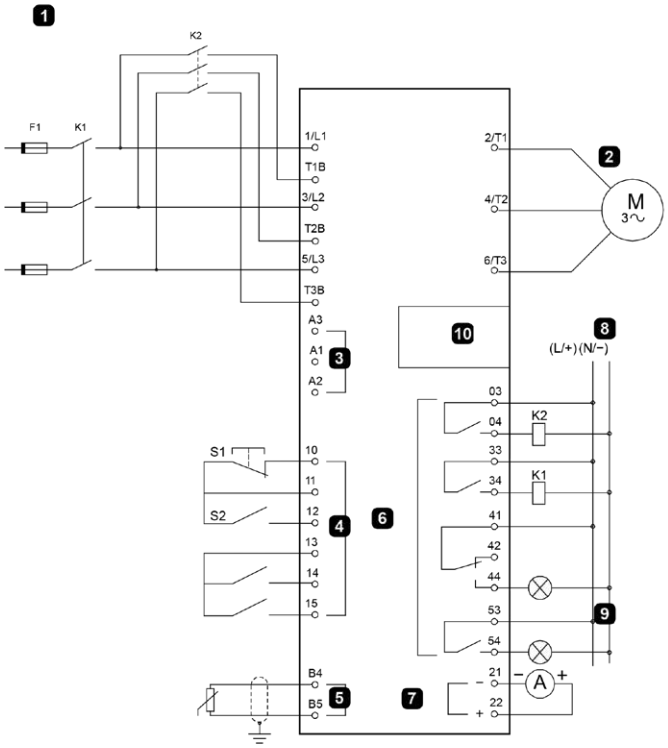
Item		Specification							
Type		TMS11							
Frame Size		Frame 1							
Type		TMS11-…							
Form	400 V Class	4011B	4018B	4022B	4030B	4037B	4045B	4055B	4075B
	690 V Class	6011B	6018B	6022B	6030B	6037B	6045B	6055B	6075B
Current Rating	Current Limit / start time	10 starts / hour, < 40°C, < 1000 m ASL			6 starts / hour, < 40°C, < 1000 m ASL				
	300 % 10 s	24	42	52	64	69	105	115	135
	350 % 15 s	20	34	41	62	69	86	107	129
	400 % 10 s	19	34	39	60	69	84	104	126
	400 % 20 s	16	27	34	50	62	68	86	103
Power Supply	Voltage	200 – 525 V							
	Frequency	50 Hz to 60 Hz (±5 Hz)							
	Fault level	65 kA using recommended HRC fuses							
Control Power Supply	…-C1	110~120 VAC (+10%/-15%), 600 mA OR 220~240 VAC (+10%/-15%), 600 mA							
	…-C2	24 VAC/VDC (± 20%), 2.8 A							
EMC	Immunity	IEC 60947-4-2 (EU Directive 2014/35/EU)							
	Emissions	IEC 60947-4-2 Class B							
Ingress Protection		IP20							
Cooling Method		Natural convection, air cooled							
Temperature		-10°C~60°C, above 40°C with derating							
Relative Humidity		5%~95% non condensing							

Item		Specification								
Type		TMS11-…								
Frame Size		Frame 2								
Form	**400 V Class**	4090B	4110B	4132B	4150B	4185B	4200B	4220B	4315B	4355B
	690 V Class	6090B	6110B	6132B	6150B	6185B	6200B	6220B	6315B	6355B
Current Rating	Current Limit / start time	10 starts / hour, < 40°C, < 1000 m ASL			6 starts / hour, < 40°C, < 1000 m ASL					
	300 % 10 s	184	200	229	250	352	397	410	550	580
	350 % 15 s	143	170	194	244	285	322	410	526	578
	400 % 10 s	139	165	187	230	277	311	410	505	554
	400 % 20 s	115	138	157	200	234	262	379	427	469
Power Supply	Voltage	400 V Class: 200 - 525 VAC / 690 V Class: 380 - 690 VAC								
	Frequency	50 Hz to 60 Hz (±5 Hz)								
	Fault level	65 kA using recommended HRC fuses								
Control Power Supply	…-C1	110~120 VAC (+10%/-15%), 600 mA OR 220~240 VAC (+10%/-15%), 600 mA								
	…-C2	24 VAC/VDC (± 20%), 2.8 A								
EMC	Immunity	IEC 60947-4-2 (EU Directive 2014/35/EU)								
	Emissions	IEC 60947-4-2 Class B								
Ingress Protection		IP00 (IP20 with Finger Guard TM-FGK-S2)								
Cooling Method		Natural convection air cooled								
Temperature		-10°C~60°C, above 40°C with derating								
Relative Humidity		5%~95% non condensing								

Item		Specification								
Type		TMS11-…								
Frame Size		Frame 3								
Form	**400 V Class**	4500B	4560B	4630B	4710B	4750B	4400C*	4450C*	4560C*	4630C*	4710C*
	690 V Class	6500B	6560B	6630B	6710B	6750B	6400C*	6450C*	6560C*	6630C*	6710C*
Current Rating	Current limit/start time	6 starts / hour, < 40°C, < 1000 m ASL									
	300 % 10 s	835	940	1070	1230	1250	835	940	1210	1430	1620
	350 % 15 s	654	736	950	1154	1250	732	822	1067	1307	1620
	400 % 10 s	630	708	905	1090	1250	716	803	1033	1252	1616
	400 % 20 s	535	603	785	959	1155	593	667	874	1076	1309
Power Supply	Voltage	400 V Class: 200 – 525 VAC / 690 V Class: 380 - 690 VAC									
	Frequency	50 Hz to 60 Hz (±5 Hz)									
	Fault level	65 kA using recommended HRC fuses									
Power Supply	…-C1	110~120 VAC (+10%/-15%), 600 mA OR 220~240 VAC (+10%/-15%), 600 mA									
	…-C2	24 VAC/VDC (± 20%), 2.8 A									
EMC	Immunity	IEC 60947-4-2 (EU Directive 2014/35/EU)									
	Emissions	IEC 60947-4-2 Class B									
Ingress Protection		IP00									
Cooling Method		Forced air cooled									
Temperature		-10°C~60°C, above 40°C with derating									
Relative Humidity		5%~95% non condensing									
*Note		* TMS11-xxxxC Models are not internally bypassed and are rated for continuous operation									

Standard Connection Diagrams





Internally bypassed Installation	Externally bypassed Installation

1	Three-phase supply	Three-phase supply
2	Motor	Motor
3	Control voltage (soft starter)	Control voltage (soft starter)
4	Digital inputs	Digital inputs
5	Motor thermistor input	Motor thermistor input
6	Relay outputs	Relay outputs
7	Analog output	Analog output
8	Control voltage (external equipment)	Control voltage (external equipment)
9	Pilot lamps	Pilot lamps
10	Communications / Smart card expansion port	Communications / Smart card expansion port
K1	Main contactor	Main contactor
K2		Bypass contactor (external)
F1	Fuses or circuit breaker	Fuses or circuit breaker
B4, B5	Motor thermistor input	Motor thermistor input
03, 04		Bypass contactor output
10, 11 (S1)	Reset	Reset
11, 12 (S2)	Start/Stop	Start/Stop
13, 14	Programmable input A (default = Input Trip (N/O))	Programmable input A (default = Input Trip (N/O))
13, 15	Programmable input B (default = Input Trip (N/O))	Programmable input B (default = Input Trip (N/O))
21, 22	Analog output	Analog output
33, 34	Main contactor output	Main contactor output
41, 42, 44	Relay output A (default = Run)	Relay output A (default = Run)
53, 54	Relay output B (default = Run)	Relay output B (default = Run)

Main Contactor K1

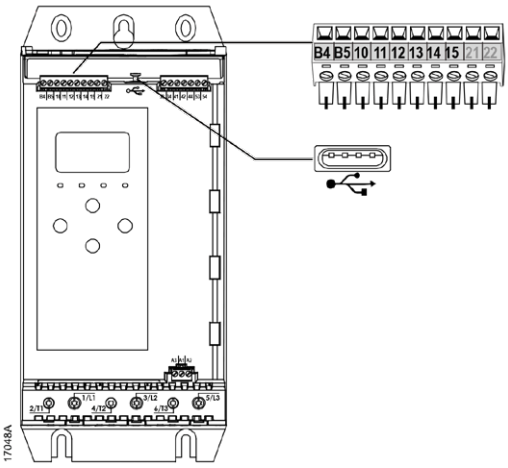
- The soft starter should be installed with an AC3 rated main contactor (or with a shunt trip circuit breaker). The main contactor must be controlled by the main contactor output (33, 34) of TMS11 Starter.
- Control voltage must be supplied from the input side of the contactor or from a separated power circuit.

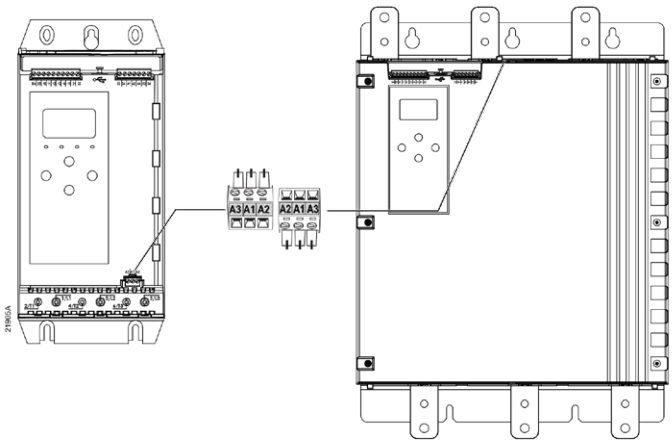
Bypass Contactor K2

- For externally bypassed installation use an AC1 rated external bypass contactor (AC3 rated for DOL starting option). The bypass contactor must be controlled by the bypass contactor output (03, 04) of TMS11 Starter.

Fuses F1

- Fuses may be installed to provide Type 1 or Type 2 coordination. Please refer to the TMS11 User Manual for selection and details.



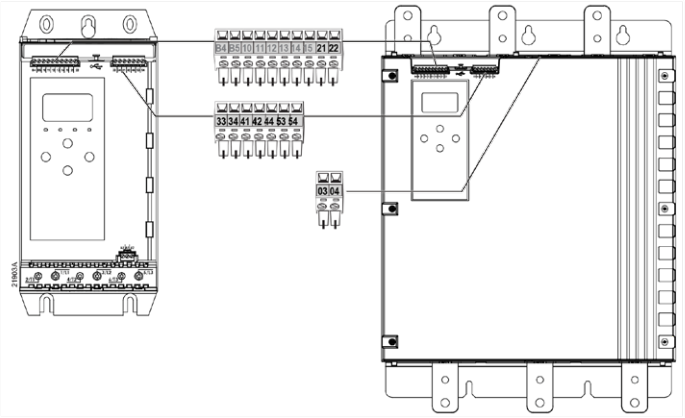


Control Input Terminals

B4, B5	Motor thermistor input
10, 11	Reset input
11, 12	Start/stop input
13, 14	Programmable input A (default = Input Trip (N/O))
13, 15	Programmable input B (default = Input Trip (N/O))
⇢	USB port (2.0 type A)

Control Voltage Terminals

A1, A2	xxxX-C1 (110~120 VAC)
A2, A3	xxxX-C1 (220~240 VAC)
A1, A2	xxxX-C2 (24 VAC/VDC)

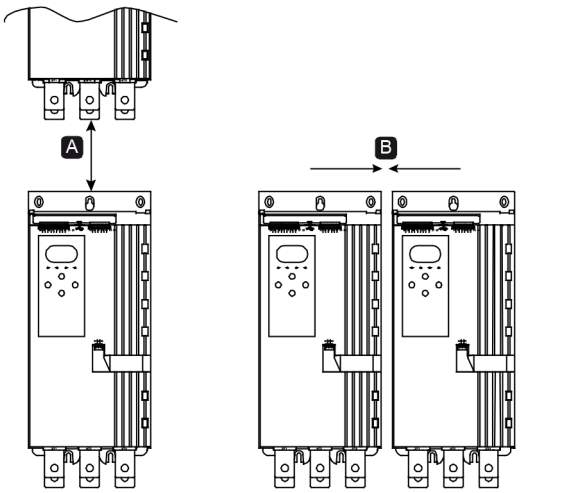


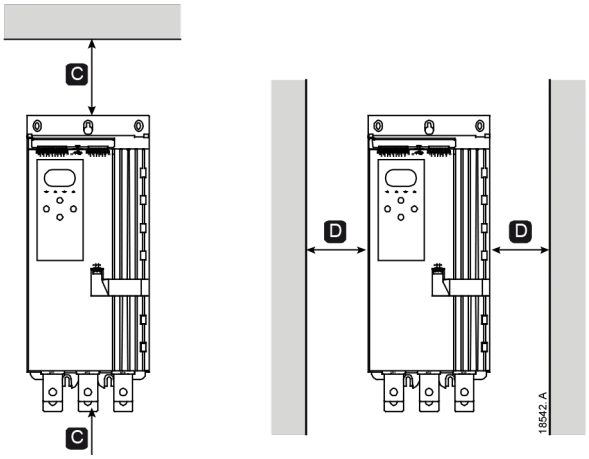
Control Output Terminals

21, 22	Analog output
33, 34	Main contactor output
41, 42, 44	Relay output A (default = Run)
53, 54	Relay output B (default = Run)
03, 04	Bypass contactor output

Typical Installation

Physical Installation

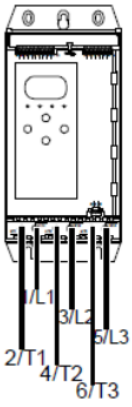


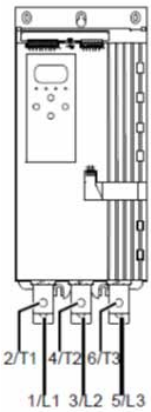


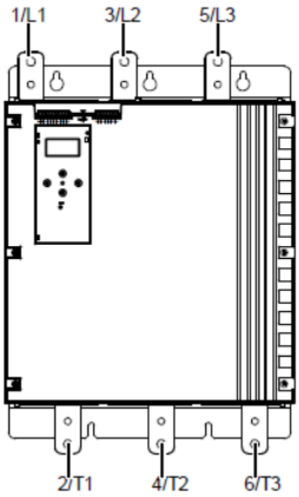
Between starters	
A	**B**
> 100mm (3.9 inch)	> 10mm (0.4 inch)

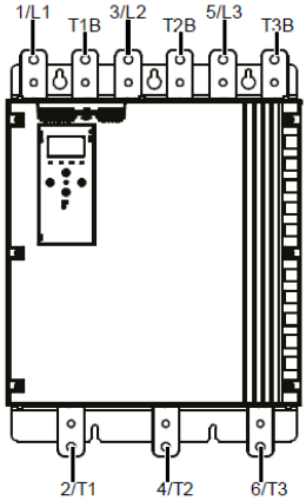
Solid surfaces	
C	**D**
> 100mm (3.9 inch)	> 10mm (0.4 inch)

Power Terminations





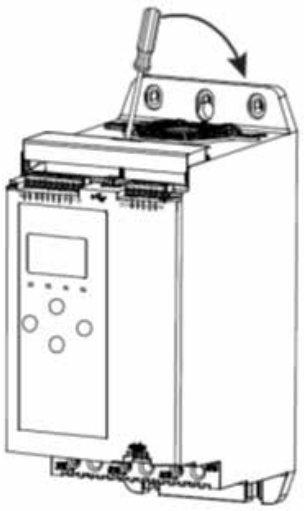
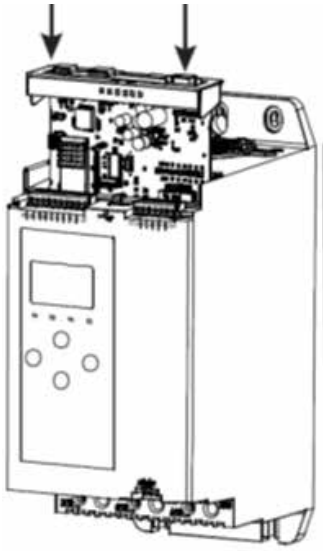




011B~075B	090B~355B	500B~750B	400C~710C
Power input 1/L1, 3/L2, 5/L3 - unit bottom Power output 2/T1, 4/T2, 6/T3 - unit bottom		Power input 1/L1, 3/L2, 5/L3 - unit top Power output 2/T1, 4/T2, 6/T3 - unit bottom	Power input 1/L1, 3/L2, 5/L3 - unit top Power output 2/T1, 4/T2, 6/T3 - unit bottom Bypass connection T1B, T2B, T3B - unit top

Optional Accessories

Expansion Cards : Expansion cards enhance the capability of TMS11 soft Starters. Each soft starter can accommodate one expansion card for users requiring additional inputs and outputs or advanced functionality.

Expansion card	Installation	Connections
TMS11 Smart Card - Pump application	**1** 	• 4 x Digital inputs (Normally open) • C13-C14, C23-C24, C33-C34, C43-C44 • RTD/PT100 input • R1, R2, R3 • 3 x 4-20 mA inputs • B13-B14, B23-B24, B33-B34 • DB9 connector for optional remote keypad
TMS11 Ethernet/IP Card **TM-EIM-03**		• 2 x RJ45 ethernet ports, supporting line, star, ring and loop network topologies • 2 pin connector for ground fault CT • DB9 connector for optional remote keypad
TMS11 Modbus TCP Card **TM-MTM-03**		• 2 x RJ45 ethernet ports, supporting line, star, ring and loop network topologies • 2 pin connector for ground fault CT • DB9 connector for optional remote keypad
TMS11 Profinet Card **TM-PNM-03**		• 2 x RJ45 ethernet ports, supporting line, star, ring and loop network topologies • 2 pin connector for ground fault CT • DB9 connector for optional remote keypad
TMS11 Modbus RTU Card **TM-MBM-02**	**2** 	• 5 pin Modbus network connection • 2 pin connector for ground fault CT • DB9 connector for optional remote keypad
TMS11 Devicenet Card **TM-DNM-02**		• 5-way connector plug • DB9 connector for optional remote keypad
TMS11 Profibus Card **TM-PBM-02**		• DB9 connector to Profibus network • DB9 connector for optional remote keypad
TMS11 Remote Keypad Card **TM-RCP-02**		• DB9 connector for optional remote keypad
TMS11 Remote Key Pad **(Max. 3m away from the starter)** **TM-RCP-03**		• Dedicated connection port in all expansion cards

Ground Fault Protection: Ground fault protection is available with the Modbus TCP, Ethernet/IP and Profinet expansion cards. An externally mounted Current Transformer is required (not supplied).

Finger Guard Kit: Optional finger guards are available to achieve IP20 ratings for models in frame 2 and 3.
TMS11 IP20 Guard kit S2
TM-FGK-S2

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