

SSW7000 - MEDIUM VOLTAGE SOFT-STARTER

Latest technology for smooth
start and motor protection



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Medium Voltage Soft-Starter SSW7000

Summary

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Latest technology for smooth start and motor protection

The SSW7000 uses **latest technology** to provide start/stop control and protection for three-phase induction and synchronous medium voltage motors. Developed to ensure **excellent performance**, it prevents mechanical shocks from the load, protects the motor against related burnouts or current surges in the power supply and thus, offers prepackaged and engineered solutions for various applications including Marine & Mining.

The SSW7000 reduces the voltage applied to the motor at start. As a consequence, motor current and torque are reduced for a smooth start. The motor voltage control is performed with the firing angle control of the thyristors in antiparallel connection.



Integrated bypass



Fibre-optic firing



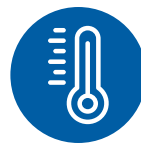
Complete isolation between MV and LV compartments



User friendly configuration and operation



Motor protection built-in in the standard cabinet



Heavy duty design at 50 °C ambient temperature (above 40 °C with current derating)



Upstream Circuit breakers are not required because there is own line contactor / circuit breaker



Applications



**Water
& Waste**

Pumps, Fans and Exhausters



**Sugar
& Ethanol**

Pumps, Fans and Exhausters



Metals

Pumps, Fans and Exhausters



**Cement
& Mining**

Pumps, Fans, Exhausters, Conveyors and Mills



**Pulp
& Paper**

Pumps, Fans and Exhausters

Advantages in Using WEG Soft-Starter



Mechanical Benefits

- Reduced mechanical stress on drive-train (gear, bearing wear and failures, belt wear, pump impeller wear, minimizes valve and pipe repair costs)
- Prolong motor life
- Provides smooth (step-less) ramping of motor speed

Electrical Benefits

- Better power quality
- Reduced stress on transformers, power line and motor rotor/stator
- Reduced voltage drop
- No need of oversized generators
- Prolong motor life
- Complete isolation between MV and LV compartments
- Optical fiber firing
- Fewer distribution problems



Cost Benefits

- MV solid state Soft-Starters may cost less than other reduced voltage starting methods and less than a DOL + Protection Relay
- Lower operating costs as SSW7000 helps to reduce energy consumption, for example with the reduction of inrush currents
- Providing smoother and step-less acceleration reduces load shocking to the drive train and machinery which means less investment in maintenance
- Faster pay-back when compared to other starting methods
- Extends the life time of the complete drive system, reduces maintenance time and costs
- Better price/performance ratio

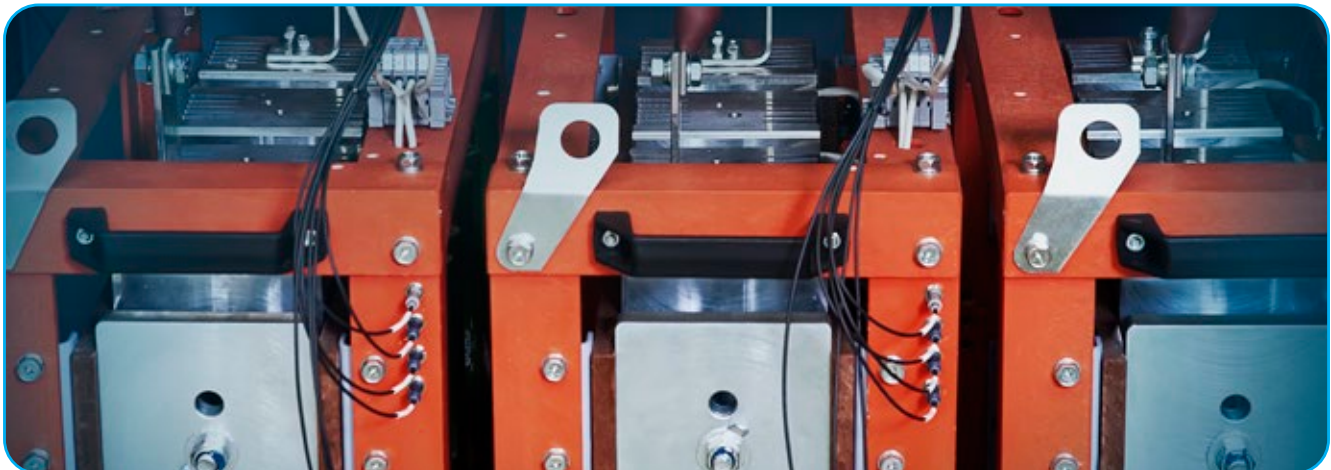
Process Benefits

- Productivity and uptime can be greatly increased by reducing costs associated with maintenance, downtime and parts replacement.
- Prolong system life
- Provides smooth (step-less) ramping of motor speed
- Gradually stop a load (e.g. avoid water hammer in pipe lines)
- Prevents pressure surges from pumps and piping systems
- Prevents jerk and surge-free motion of conveyor belts

Main Characteristics

- Motor Voltage: 2.3 kV to 13.8 kV
- Torque control - FTC - Flexible Torque Control, technology developed by WEG which uses the vector control and control of direct torque concepts, based on technologies developed for the vector frequency inverters CFW. The FTC is flexible to select the desired torque control according to the type of load applied to the motor (constant loads, quadratic loads, or loads with lower or higher starting torque), providing a smooth start with a linear speed ramp along the entire starting process
- Accessories can be easily and quickly installed by using the Plug & Play concept
- Protection degree: IP41 or IP54/NEMA 12
- Operating interface (HMI) with graphic LCD
- Real-time clock
- Medium voltage fuses or Relay + Circuit Breaker
- Power and control insulated by fiber optics
- Main and Bypass Vacuum Contactors or Vacuum Circuit Breakers able to perform DOL start
- Flash memory module (accessory)
- SoftPLC function
- Licence-free software SuperDrive and WLP
- USB connection to PC
- Motor thermal protection - Pt-100 - 8 channels
- 5 start modes
- Network communication boards (accessories):
 - DeviceNet, Profibus-DP, Ethernet, Modbus TCP/IP and Modbus, RS232 or RS485
- Oriented Startup function presents minimum programming sequence to commence the operation
- Active Protection offers complete motor protection in DOL mode and eliminated the need of extra protection relays
- Ground Fault Protection – Standard
- Easy installation and suitable for retrofits
- 310,000 hours MTBF
- No need of back access

Heavy Duty Design



- The heatsinks are sized for real heavy duty overload cycle
- The power stacks are developed in independent modules with or without wheels, making installation and maintenance easy or compacting the panel size

Standard Protections

ANSI/IEEE C37.2	Function/protection feature
19	Reduced voltage starting and bypass
27	Undervoltage protection
37	Undercurrent protection
46	Phase-balance current protection
47	Phase sequence
48	Incomplete sequence
50	Instantaneous overcurrent trip
51	Overcurrent trip
55	Power factor check
59	Overvoltage
81	Frequency check
86	Lockout relay - electronic
50N/51G	Ground fault detection instantaneous and fault-current
49 & 38	Winding temperature and bearing temperature

Main Characteristics

Human Machine Interface - HMI

Navigation is similar to the logic used in cell phones, with the option of sequential access to the parameters or through the groups (Menu) by means of the function access keys on the display (soft keys).

Easy to Read Display

SSW7000 has an easy to read display, offering extensive feedback and real-time information. You can configure your own display to show the most relevant data for your application.

Remote Mount Display

SSW7000 display can be mounted on panel door reducing the need of separate meters and status indicators or mounted remotely on customer's console.

Languages

English, Portuguese, Spanish, others under request.

Event Log

SSW7000 HMI interface provides a fault history saving last 10 faults with date and time, motor current, power supply voltage in the fault and operating status.



Plug & Play Philosophy

The installation of the accessories is based on the Plug & Play philosophy, that is, they are automatically configured when connected to the SSW7000, ensuring a faster and easier process.



Human Machine Interface - HMI (standard)

Slot 5 - Flash memory module (optional)

Slot 1 and 2 - Temperature sensor module Pt-100

Slot 3 - Communication (optional)

Slot 4 - Communication (optional)

Superdrive G2

License-free software (available at WEG website) for total control and monitoring of WEG SSW7000.

- Parameter upload and download
- Soft-Starter operation
- Soft-Starter monitoring
- On-line and off-line programming



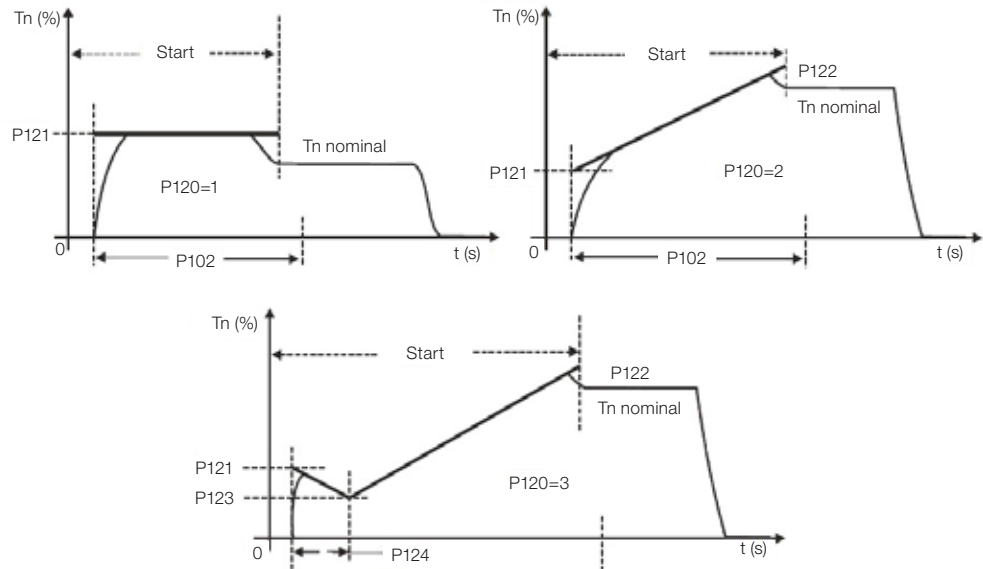
Starting and Stopping Modes

WEG SSW7000 is Supplied With the Possibility to Adjust Starting Curve to the Load Curve With Several Options

Torque Control

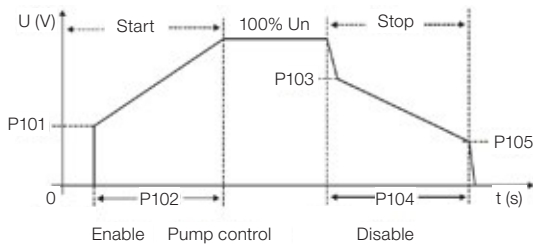
It allows choosing which torque profile the SSW will follow during the motor starting. WEG SSW7000 has three torque profiles available, which makes possible to start any type of load, constant or 1 point linear or 2 points and quadratic or 3 points:

- 1: Constant torque
- 2: Linear torque
- 3: Quadratic torque



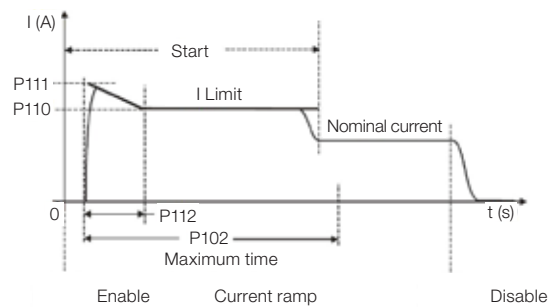
Pump Control

It limits the starting torque and the stopping speed for a smooth management in water pumps. Reduce the Water Hammer, pressure overshoots inside the hydraulic pipelines which could damage them. Set voltage is applied using voltage and current feedback measurement. Special algorithm aims to minimize pressure overshoots within piping to prevent material wear.



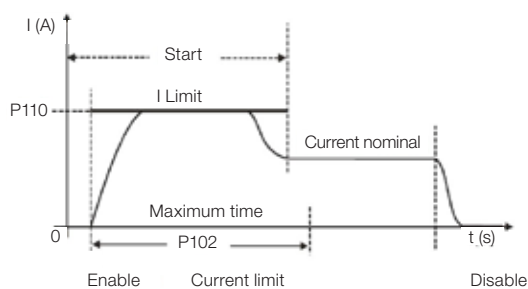
Current Ramp

Useful for application with Variable Torque. It can be used in weak power supplies to limit the current.



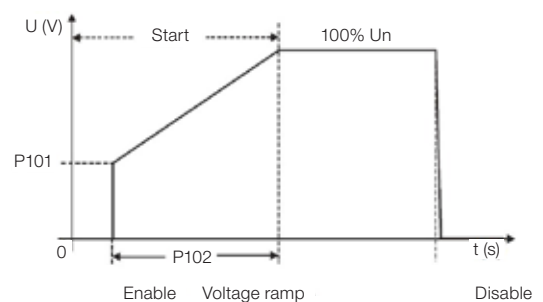
Current Limit

Soft-Starter will control the set current limit. When current drops below this limit the Soft-Starter will end the ramp and close the bypass.



Voltage Ramp

Used for starting loads with low starting torque and quadratic torque.



Customized Solutions

Ideal to costumize the solutions following the requirements



Unique main input power supply with bus bar interconnection + PFC columns in the back

WEG can provide engineered solutions under request.

- Reversing motor starter (clockwise and counter-clockwise)
- Redundant protection via relay
- Medium voltage capacitors - PFC
- IP56 outdoor
- Output grounding switch
- Soft-Starter for brush/brushless synchronous motors
- Over 600 A under request
- Internal connection feeder bar
- Withdrawable circuit breaker/contactors
- HMI Touch (on Chinese, French, Russian, and other)

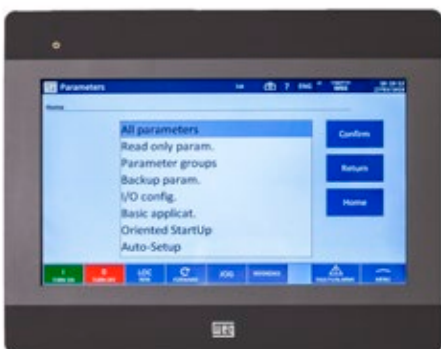


Withdrawable Circuit Breakers

Note: for engineered solutions, please get in contact with the factory or WEG sales representative.



Soft Starter SS7000C with PFC column



HMI Touch

Testing Facilities

Every equipment manufactured is tested in our labs. This guarantees the performance and save time during commissioning and start-up.

The tests of WEG MV Soft Starters will be conducted in accordance with the following standards: NBR IEC 62271-200, IEC 62271-1, IEC 60060-1, CISPR 11, IEC 61000-4-4, IEC 61000-4-18, NBR IEC 60529, UL 347 and UL 347B.

- Routine tests: visual inspection, insulation, dielectric voltage-withstand, light load, checking of auxiliary devices and checking the control equipment properties.
- Type tests: checking protective devices, paint plan, temperature rise, phase loss, phase reversal, enclosure ground integrity and measurement of the resistance of the contactor.
- Special tests: rated continuous load and ground fault test.

Routine tests, type tests and special tests can be performed in the same manufacturing plant. Please consult WEG for further information.



WEG Laboratories – Load tests in our facilities

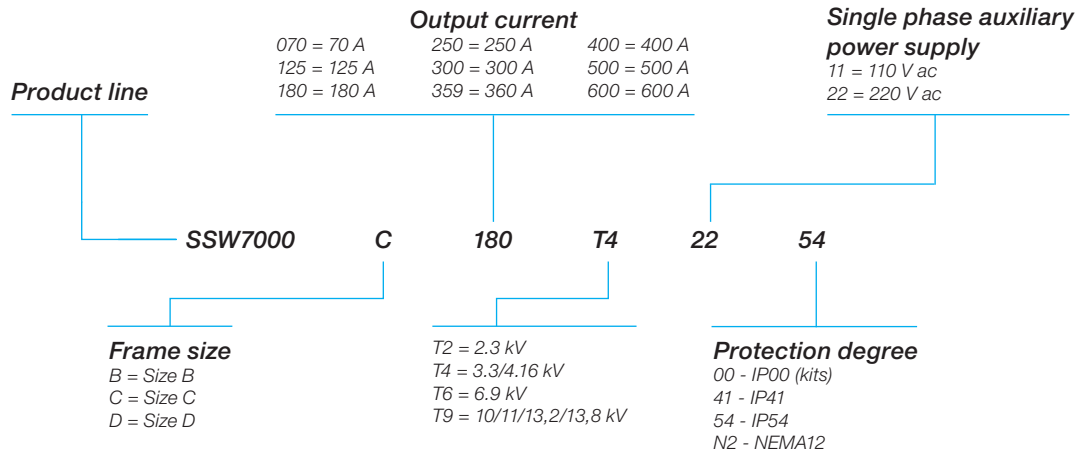


Combined test (MV Incoming Switchgear + Phase-shifting Transformer + MV VSD + MV Motor).

Sizing the Appropriate Soft-Starter

- Type of application (pump, compressor, conveyor, etc.)
- Motor rated power (HP or kW)
- Motor nominal current (A)
- Motor nominal voltage (V)
- Motor synchronous speed (rpm)
- Curve current x speed
- Curve motor torque x speed
- Curve load torque x speed
- Rotor and load inertia $J=GD^2/4$ (Kgm²)
- Number of starts per hour and time between them
- Ambient temperature
- Altitude above sea level

Product Code



Accessories

Reference	Description	Slot
Control accessories to install in slots 1, 2 and 3		
IOE-04	Module for 8 temperature sensors Pt-100	1 and 2
RS 485-01	RS 485 serial communication module (Modbus)	3
RS 232-01	RS 232C serial communication module (Modbus)	
RS 232-02	RS 232C serial communication module with switch to program the microcontroller Flash memory	
Anybus-CA accessories to install in slots 4		
PROFDP-05	Profibus-DP interface module	4
DEVICENET-05	DeviceNet interface module	
ETHERNET/IP-05	Ethernet/IP interface module	
RS232-05	RS 232 interface module (passive) (Modbus)	
RS485-05	RS 485 interface module (passive) (Modbus)	
Flash memory module to install in slot 5 - included in standard models		
MMF-01	Flash memory module	5
Other accessories		
HMI-01	Man Machine Interface - MMI (sold separately)	-
RHMIF-01	Frame kit for MMI (protection rate IP56)	
TC FT	Ground fault CT	

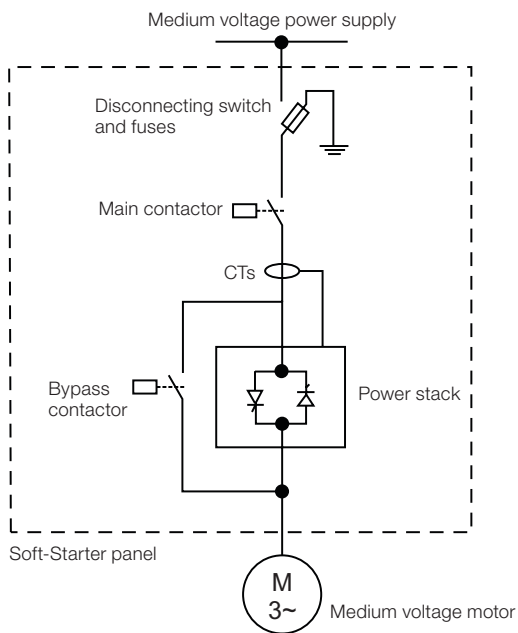
Models

Up to 6,9 kV

Power supply	Product	Rated current (A)	Frame	Motor maximum power	
				HP	kW
2,300 V ac	SSW7000C 070 T2 XX 54	70	C	315	235
	SSW7000C 125 T2 XX 54	125		560	420
	SSW7000C 250 T2 XX 54	250		1,125	840
	SSW7000C 359 T2 XX 54	360		1,620	1,200
	SSW7000 B 500 T2 XX 54	500	B	2,250	1,680
	SSW7000 B 600 T2 XX 54	600		2,700	2,020
3,300 V ac	SSW7000C 070 T4 XX 54	70	C	450	340
	SSW7000C 125 T4 XX 54	125		800	600
	SSW7000C 250 T4 XX 54	250		1,675	1,250
	SSW7000C 359 T4 XX 54	360		2,320	1,730
	SSW7000 B 500 T4 XX 54	500	B	3,230	2,410
	SSW7000 B 600 T4 XX 54	600		3,875	2,890
4,160 V ac	SSW7000C 070 T4 XX 54	70	C	570	425
	SSW7000C 125 T4 XX 54	125		1,020	760
	SSW7000C 250 T4 XX 54	250		2,040	1,520
	SSW7000C 359 T4 XX 54	360		2,930	2,180
	SSW7000 B 500 T4 XX 54	500	B	4,075	3,040
	SSW7000 B 600 T4 XX 54	600		4,890	3,650
6,900 V ac	SSW7000C 070 T6 XX 54	70	C	945	705
	SSW7000C 125 T6 XX 54	125		1,685	1,260
	SSW7000C 250 T6 XX 54	250		3,380	2,520
	SSW7000C 359 T6 XX 54	360		4,870	3,630
	SSW7000 B 500 T6 XX 54	500	B	6,770	5,050
	SSW7000 B 600 T6 XX 54	600		8,110	6,050

Notes: 1) Motor power is for 4P motor with 0.87 P.F. and 97% efficiency at full load.
 2) The ratings apply at 40 °C ambient temperature and 1,000 meter above sea level.

Block Diagram



Dimension



Frame	Width mm (in)	Height mm (in)	Depth mm (in)	Weight kg (lb)
C	915 (36)	2,400 (95)	851 (33.5)	670 (1,470)
B	1,200 (47)	2,400 (95)	1,000 (40)	970 (2,140)

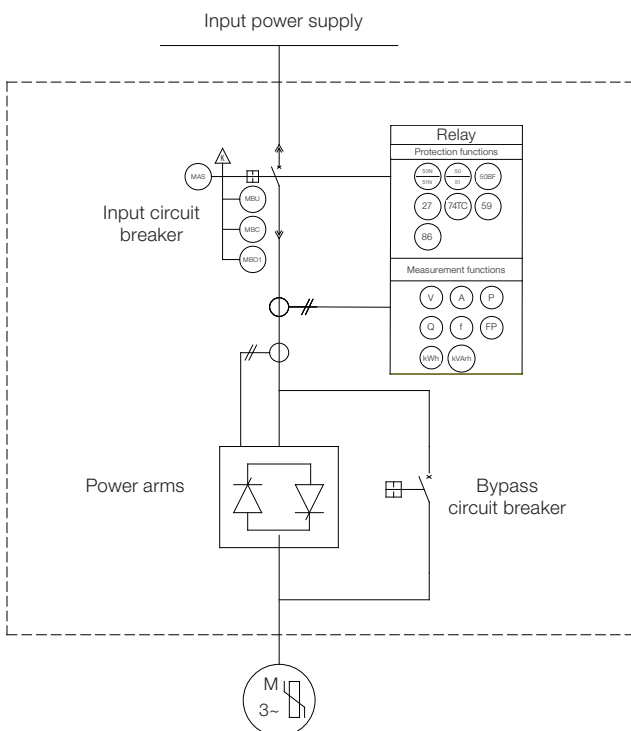
Models

Up to 13,8 kV

Power supply	Product	Rated current (A)	Frame	Motor maximum power	
				HP	kW
10,000 V ac	SSW7000 D 070 T9 XX 41	70	D	1,370	1,025
	SSW7000 D 180 T9 XX 41	180		3,550	2,650
	SSW7000 D 300 T9 XX 41	300		5,900	4,400
	SSW7000 D 400 T9 XX 41	400		7,850	5,860
	SSW7000 D 500 T9 XX 41	500		9,800	7,315
	SSW7000 D 600 T9 XX 41	600		11,800	8,800
11,000 V ac	SSW7000 D 070 T9 XX 41	70	D	1,500	1,120
	SSW7000 D 180 T9 XX 41	180		3,900	2,910
	SSW7000 D 300 T9 XX 41	300		6,490	4,850
	SSW7000 D 400 T9 XX 41	400		8,640	6,450
	SSW7000 D 500 T9 XX 41	500		10,780	8,050
	SSW7000 D 600 T9 XX 41	600		13,000	9,700
13,200 V ac	SSW7000 D 070 T9 XX 41	70	D	1,810	1,350
	SSW7000 D 180 T9 XX 41	180		4,690	3,500
	SSW7000 D 300 T9 XX 41	300		7,790	5,815
	SSW7000 D 400 T9 XX 41	400		10,370	7,740
	SSW7000 D 500 T9 XX 41	500		13,000	9,700
	SSW7000 D 600 T9 XX 41	600		15,600	11,650
13,800 V ac	SSW7000 D 070 T9 XX 41	70	D	1,890	1,410
	SSW7000 D 180 T9 XX 41	180		4,900	3,660
	SSW7000 D 300 T9 XX 41	300		8,150	6,080
	SSW7000 D 400 T9 XX 41	400		10,850	8,100
	SSW7000 D 500 T9 XX 41	500		13,550	10,120
	SSW7000 D 600 T9 XX 41	600		16,300	12,200

Notes: 1) Motor power is for 4P motor with 0.87 P.F. and 97% efficiency at full load.
 2) The ratings apply at 40 °C ambient temperature and 1,000 meter above sea level.

Block Diagram



Dimension



Frame	Width mm (in)	Height mm (in)	Depth mm (in)	Weight kg (lb)
D	2,100 (83)	2,300 (91)	1,300 (52)	2,800 (6,200)

General Technical Characteristics

		Frame: C and B	Frame: D
Power supply	Power voltage (RV1 L1, S/3L2, T/5L3)	Models: 2,300 V ac: (-60% to +10%) or (920 to 2,530 V ac) 4,160 V ac: (-60% to +10%) or (1,664 to 4,576 V ac) 6,900 V ac: (-60% to +10%) or (2,760 to 7,590 V ac)	Models: 10,000 V ac: (-60% to +10%) or (4,000 to 11,000 V ac) 11,000 V ac: (-60% to +10%) or (4,400 to 12,100 V ac) 13,200 V ac: (-60% to +10%) or (5,280 to 14,520 V ac) 13,800 V ac: (-60% to +10%) or (5,520 to 15,810 V ac)
	Frequency	(50 to 60 Hz): (±10%) or (45 to 66 Hz)	
Capacity	Number of starts	5 starts in 2 hours (one start every 30 minutes), others under request	
	Starting current	400% for 20s (Frame C) 450% for 30s (Frame B)	450% for 30s
Thyristors	Medium voltage SCRs per power stack	2,300 V ac: 2 thyristors per power stack 4,160 V ac: 2 matched pairs of thyristors 6,900 V ac: 2 matched triplets of thyristors	2 matched sextets of thyristors
	Peak reverse voltage on the power stack	2,300 V ac: 6.5 kV 4,160 V ac: 13 kV 6,900 V ac: 19.5 kV	39 kV
Protection degree	IP54 / NEMA 12 or IP41	IP54 / NEMA 12	IP41
Protections	Protection by hardware	dv/dt filter Active overvoltage protection on the thyristors	
Control supply	Control voltage	Bivolt 110~230 V ac 110 V ac: (-15% to 10%) or (93.5 to 121 V ac) 230 V ac: (-15% to 10%) or (195.6 to 253 V ac)	
	Frequency	(50 to 60 Hz): (±10%) or (45 to 66 Hz)	
	Consumption	1,800 mA (400W) Peak: 9.5 A (during the closing of the vacuum contactors / vacuum circuit breakers)	
Control	Method	Voltage Ramp Current Limitation Pump Control Torque Control Current Ramp DOL	
Inputs	Digital	6 insulated digital inputs, 24 V dc, programmable functions	
	Analog	2 differential inputs insulated by differential amplifier; AI1 resolution: 12 bits, AI2 resolution: 11 bits + signal, (0 to 10) V, (0 to 20) mA or (4 to 20) mA, impedance: 400 kΩ for (0 to 10 V), 500 Ω for (0 to 20 mA) or (4 to 20 mA), programmable functions	
Outputs	Digital	3 NO/NC contact relays, 240 V ac, 6 A, programmable functions	
	Analog	2 insulated outputs, (0 to 10 V) RL ±10 kΩ (maximum load), 0 to 20 mA or 4 to 20 mA RL<500 Ω, 11 bit resolution, programmable functions	
Man machine interface	Standard	9 keys: Turn/Stop, Increase, Decrease, Rotation Direction, Jog, Local/Remote, right soft key and left soft key. Graphic LCD. It enables access to/change of all parameters	
Safety	Main protections	Under and overcurrent and current unbalance Under and overvoltage and voltage unbalance Under and overtorque and active overpower phase loss Reverse phase sequence overtemperature in the power racks Motor overload Motor overtemperature (optional) External defect Ground fault by voltage or current Fault in the power racks Fault in the power contactors Faults in the control boards Communication faults of MMI and between controls Faults in the communication networks Programming errors For further details and more protections implemented, refer to the programming manual	
PC connection for programming	USB connector	USB standard rev. 2.0 (basic speed) USB plug type B "device" Interconnecting cable: standard host/device shielded USB cable	
Environmental conditions	Temperature	-10 to 40 °C, with current derating of 2%/1 °C	
	Altitude	Up to 1,000 m above sea level. For higher altitudes, contact our sales force	
	Humidity	Air relative humidity of 5% to 90% non-condensing	
Standards	NBR IEC 62271-200	High voltage controlgear and switchgear - Part 200: High voltage controlgear and switchgear in metal enclosure for voltages over 1 kV up to and including 52 kV	
	IEC 62271-1	High-voltage switchgear and controlgear - Part 1: Common specifications	
	IEC 60060-1	High-voltage test techniques. Part 1: General definitions and test requirements	
	CISPR 11	Industrial, scientific and medical (ISM) radio-frequency equipment - electromagnetic disturbance characteristics limits and methods of measurement	
	IEC 61000-4-4	Electromagnetic compatibility (EMC) - Part 4: Testing and measurement techniques - Section 4: electrical fast transient/burst immunity test. Basic EMB publication	
	IEC 61000-4-18	Electromagnetic compatibility (EMC) - Part 4-18: Testing and measurement techniques - damped oscillatory wave immunity test	
	NBR IEC 60529	Protection rates for electric equipment enclosures (ip code)	
	UL 347	Medium voltage ac contactors, controllers and control centers	Not applied
	UL 347B	Medium voltage motor controllers	Not applied



Global presence is essential, as much as understanding your needs.

Global Presence

With more than 30.000 employees worldwide, WEG is one of the largest electric motors, electronic equipments and systems manufacturers. We are constantly expanding our portfolio of products and services with expertise and market knowledge. We create integrated and customized solutions ranging from innovative products to complete after-sales service.

WEG's know-how guarantees our **medium voltage Soft-Starter SSW7000** is the right choice for your application and business, assuring safety, efficiency and reliability.



Availability is to have a global support network



Partnership is to create solutions that suit your needs



Competitive edge is to unite technology and innovation



Know More



High performance and reliable products to improve your production process.

MV Switchgears

Medium and Low Voltage Converters



Medium and Low Voltage Electric Motors

Excellence is to provide a whole solution in industrial automation that improves our customers productivity.

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