

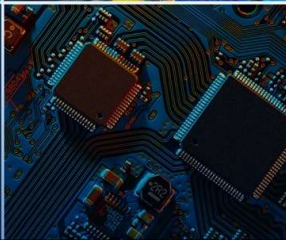
WEG SSW7000 Medium Voltage Soft Starter



Driving efficiency and sustainability



Class: SSW701
Version: 01.2025



Automation Training

WEG Medium Voltage Solutions



Overview

- Variable Speed Drives and Soft Starters from 1,000V to 13,800V.
- Available US Inventory and Assembly.
- Two Variable Speed Drive topologies, range of cooling / installation configurations.

MVW01		MVW3000	SSW7000	
MVW01-G3 Up to 6.9 kV 46,000 HP	MVW01-W Water Cooled Up to 6.9 kV 50,000 HP	MVW3000 Up to 13.8 kV 30,000 HP	SSW7000C Up to 6.9 kV 8,000 HP	SSW7000 Up to 13.8 kV 20,000 HP
				

WEG has a comprehensive range of Medium Voltage Solutions. This includes Variable Speed Drives and Soft Starters, spanning from 1,000V to 13,800V. Some of our solutions are assembled and readily available in the US, ensuring quick and efficient deployment to meet your needs.

Our Variable Speed Drive topologies are designed to cater to diverse cooling and installation configurations. The MVW01 supports up to 6.9 kV and delivering a robust 50,000 Horsepower.

For higher voltage applications, the MVW3000 series supports up to 13.8 kV and provides a substantial 30,000 HP.

In the realm of Soft Starters, the SSW7000 series stands out with two models: the SSW7000C, supporting up to 6.9 kV and delivering 8,000 HP, and the SSW7000, supporting up to 13.8 kV and offering a powerful 20,000 HP. In this presentation, we will discuss the WEG Medium Voltage soft Starter option in detail.

Soft Starter Definition



- A motor soft starter is a device used with AC electrical motors to temporarily reduce the motor torque during starting. Soft starters work by reducing the voltage and / or current during starting while the frequency remains constant
- Also known as Reduced Voltage Soft Starter (RVSS), Solid State Starter, Variable Voltage Fixed Frequency starter (VVFF)

Advantages:

- + Reduces voltage sag in the supply network during starting due to reduced starting current
- + Reduces mechanical stresses on the motor and driven equipment
- + Reduces electrodynamic stresses in cabling and upstream switchgear

Disadvantages:

- Motor torque is reduced during starting
- Soft Starters cannot be used on all applications
 - Constant torque applications requiring fully loaded starting
 - High inertial loads like large fans
- Not able to vary motor speed

A motor soft starter is a device used with AC electrical motors to temporarily reduce the motor torque during starting. This is achieved by reducing the voltage and/or current during the starting phase while maintaining a constant frequency. You might also hear these devices referred to as Reduced Voltage Soft Starters (RVSS), Solid State Starters, or Variable Voltage Fixed Frequency starters (VVFF).

Using soft starters offers several advantages. They help reduce voltage sag in the supply network during starting due to the reduced starting current. Additionally, they minimize mechanical stresses on the motor and driven equipment, as well as reduce electrodynamic stresses in cabling and upstream switchgear.

However, it's important to note that there are some limitations. The motor torque is reduced during starting, which can be a drawback in certain applications. Soft starters are not suitable for all applications, particularly those requiring constant torque applications with fully loaded starting or high inertial loads, such as large fans. Moreover, soft starters do not have the capability to vary motor speed.

Frames and Ratings



Frame C:

- 2.3kV – 4.16kV
- 125A, 180A, 250A, 360A
- NEMA 12 & NEMA 3R



Frame B:

- 2.3kV – 6.9kV
- 500A & 600A
- NEMA 12



Frame D:

- 10.0kV – 13.8kV
- 70A – 600A
- IP41

Assembled in the US

There are three different frames available for the SSW7000.

First, we have Frame C, which operates within a voltage range of 2.3kV to 4.16kV. This frame supports current ratings of 125 Amp, 180 amp, 250 Amp, and 360 Amp, and is available in both NEMA 12 and NEMA 3R enclosures.

Next, we have Frame B, designed for a higher voltage range of 2.3kV to 6.9kV. This frame supports current ratings of 500A and 600A, with a NEMA 12 enclosure.

Finally, Frame D, which operates at an even higher voltage range of 10.0kV to 13.8kV. This frame supports current ratings from 70A to 600A and comes with an IP41 enclosure.

SSW7000C Features



Assembled & stocked in Duluth, GA

- 2300VAC and 4160VAC
- NEMA 12 and NEMA 3R enclosures
- UL 347 listed
- Direct replacement for most competitors
- Emergency direct-on-line start capability
- Active motor protections in bypass and DOL operation
- Fused control power transformer included
- Ground fault protection is a standard feature
- Service entrance rated
- Built-in soft PLC function (license-free software)
- 5 starting modes available
- Oriented Startup-Up (guided setup sequence)



The SSW7000C assembled and stocked in Duluth, GA and operates at both 2300VAC and 4160VAC, making it versatile for various applications. It is available in NEMA 12 and NEMA 3R enclosures, ensuring it meets different environmental requirements. The SSW7000C is UL 347 listed, guaranteeing compliance with stringent safety standards.

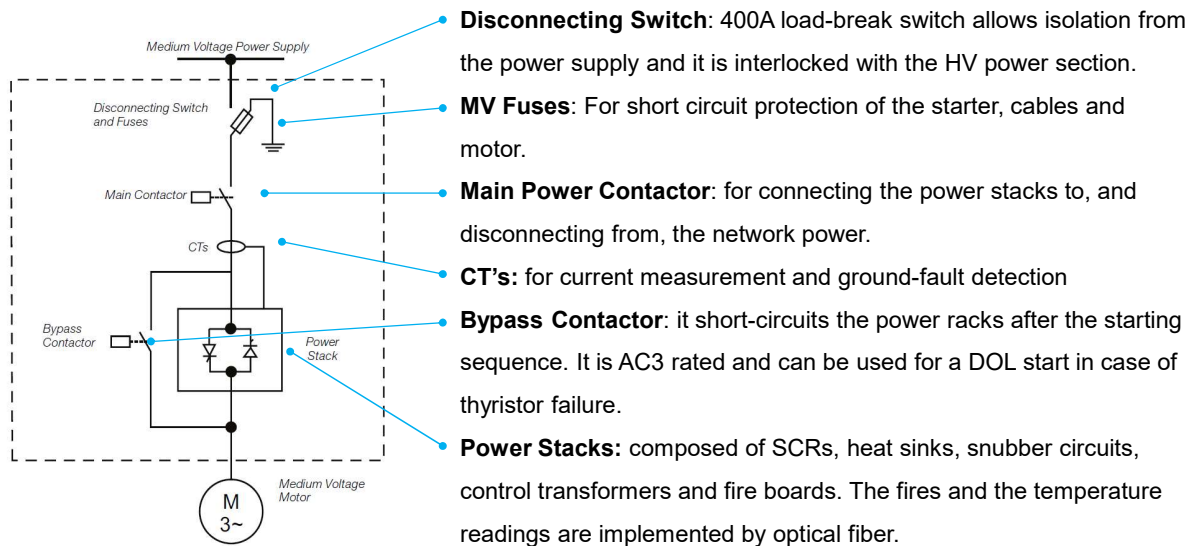
This product is designed to be a direct replacement for most competitors, offering the convenience of emergency direct-on-line start capability. It includes active motor protections in both bypass and DOL operation, providing enhanced safety and performance. A fused control power transformer is included, and ground fault protection is a standard feature, ensuring comprehensive protection.

The SSW7000C is service entrance rated and comes with a built-in soft PLC function, complete with license-free software. It offers five starting modes and an oriented startup guided setup sequence, making it user-friendly and efficient.

SSW7000C Features



Main Components



Let's review the key components of the SSW7000C and their function.

Starting with the Disconnecting Switch, this 400A load-break switch allows for isolation from the power supply and is interlocked with the high voltage power section. This ensures safety and ease of maintenance by disconnecting the power when necessary.

Next, we have the MV Fuses, which are crucial for short circuit protection of the starter, cables, and motor. These fuses prevent damage to the system in the event of a fault.

The Main Power Contactor plays a vital role in connecting and disconnecting the power stacks from the network power, controlling the flow of electricity within the system.

Current Transformers, or CTs, are used for current measurement and ground-fault detection. These components are essential for monitoring the system's performance and ensuring its safety.

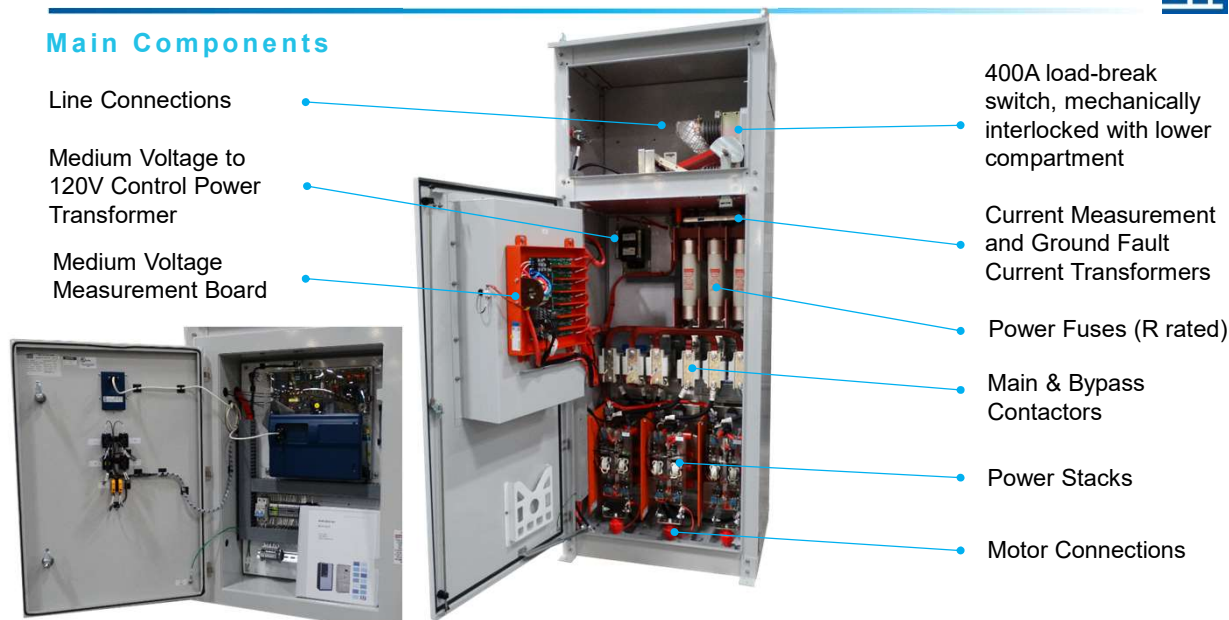
The Bypass Contactor short-circuits the power racks after the starting sequence. It is AC3 rated and can be used for a direct-on-line start in case of thyristor failure, providing an additional layer of reliability and functionality.

Finally, the Power Stacks are composed of SCRs, heat sinks, snubber circuits, control transformers, and fire boards. The fires and temperature readings are implemented by optical fiber. These stacks are the heart of the soft starter, managing the power conversion and ensuring efficient operation.

SSW7000 Features



Main Components



Starting at the top, we have the line connections, which are crucial for integrating the SSW7000 into your existing electrical infrastructure. Adjacent to this, the 400A load-break switch, mechanically interlocked with the lower compartment, provides a secure and reliable means of disconnecting the load, ensuring safety during maintenance.

Moving down, the medium voltage to 120V control power transformer ensures that the equipment can step down voltage for control circuits. Next, we have the medium voltage measurement board, an essential component for monitoring and managing the voltage levels within the system.

The current measurement and ground fault current transformers are vital for monitoring current flow and detecting any ground faults, thereby protecting the system from potential damage. Power fuses, are included to safeguard the equipment by breaking the circuit in case of an overload.

The main and bypass contactors are integral for controlling the flow of electricity. Below these, the power stacks are responsible for handling the high power levels, ensuring efficient performance.

Finally, at the bottom, we have the motor connections, which facilitate the integration of motors into the system.

SSW7000 Dimensions and Protection Features



Dimensions

same for NEMA 12 & NEMA 3R



Protections

ANSI/IEEE C37.2	Function/Protection Feature	Standard	Option
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	☐	☐

The SSW7000, is 92.5 inches tall, 36.0 inches wide, and 30.0 inches deep; this robust machine is engineered for optimal performance and efficiency.

You'll find a table on the right side outlining the SSW7000's comprehensive protection features, categorized under the ANSI/IEEE C37.2 standard.

These features include reduced voltage starting and bypass, Undervoltage protection, undercurrent protection, phase-balance current protection, phase sequence, incomplete sequence, instantaneous overcurrent trip, overcurrent trip, power factor check, overvoltage, frequency check, lockout relay-electronic, ground fault detection instantaneous and fault-current, and winding temperature and bearing temperature.

MV Soft Starters: Sales Tips



Great places to supply WEG Medium Voltage Motor Control

- Every Motor is Started by Something
 - Include WEG MV Soft Starters or Drives with every MV Motor Quote
- Facilities with antiquated motor control (wye-delta, auto transformer, direct on-line (DOL) starters)
- Customers dealing with voltage drop issues or peak demand utility costs
- Instances of motor failure / equipment damage due to the use of DOL starters
- Replacement of existing Soft Starters

Selling Soft Starters is the same whether Medium Voltage or Low Voltage

Consideration	LV	MV
Current / Power & Voltage	✓	✓
Application	✓	✓
Environment / Enclosure	✓	✓
Features / Accessories	✓	✓

Important note: Motor rated current must be at least 20% of the starter rated current

EXAMPLE:

Starter Model:	SSW7000C250T411N2
Rated motor power:	1,000HP
Rated continuous current:	up to 250A
Minimum motor current:	50A (250 * 0.2)
Equivalent motor power:	450HP

Every motor needs a reliable starting mechanism, and WEG MV Soft Starters or Drives are the perfect solution. When quoting for MV Motors, always include a soft starter or drive to ensure optimal performance.

Facilities with outdated motor control systems, such as wye-delta, auto transformer, and direct on-line starters, are prime candidates for an upgrade. Customers experiencing voltage drop issues, high peak demand utility costs, motor failures, or equipment damage due to DOL starters will benefit greatly from our products. Additionally, those looking to replace existing soft starters will find our offerings ideal.

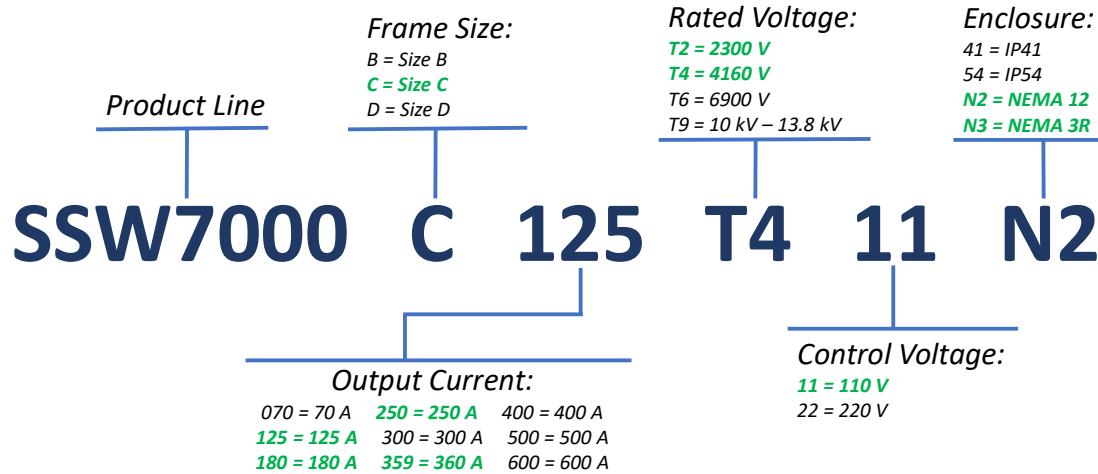
Selling soft starters is consistent across both Medium Voltage and Low Voltage applications. Considerations such as Full Load Current, Application, Voltage, and Environment. You will also want to know any Features or Accessories they need for there setup.

Remember, the motor rated current must be at least 20% of the starter rated current.

Catalog Number Definition



Specific to US Built Product



The catalog number definition SW7000 is shown here. The catalog number is broken down into six distinct parts: Product Line, Frame Size, Output Current, Rated Voltage, Control Voltage, and Enclosure.

SSW7000C Catalog Numbers in Stock



Power Supply	Model	Rated Current	Motor Power	
			HP	kW
NEMA 12				
2300V, 3PH, 60Hz	SSW7000C125T211N2	125A	550	410
	SSW7000C180T211N2	180A	750	560
	SSW7000C250T211N2	250A	1,100	800
	SSW7000C360T211N2	360A	1,500	1,100
4160V, 3PH, 60Hz	SSW7000C125T411N2	125A	1,000	750
	SSW7000C180T411N2	180A	1,500	1,100
	SSW7000C250T411N2	250A	2,000	1,500
	SSW7000C360T411N2	360A	3,000	2,250
NEMA 3R				
2300V, 3PH, 60Hz	SSW7000C125T211N3	125A	550	410
	SSW7000C180T211N3	180A	750	560
	SSW7000C250T211N3	250A	1,100	800
	SSW7000C360T211N3	360A	1,500	1,100
4160V, 3PH, 60Hz	SSW7000C125T411N3	125A	1,000	750
	SSW7000C180T411N3	180A	1,500	1,100
	SSW7000C250T411N3	250A	2,000	1,500
	SSW7000C360T411N3	360A	3,000	2,250



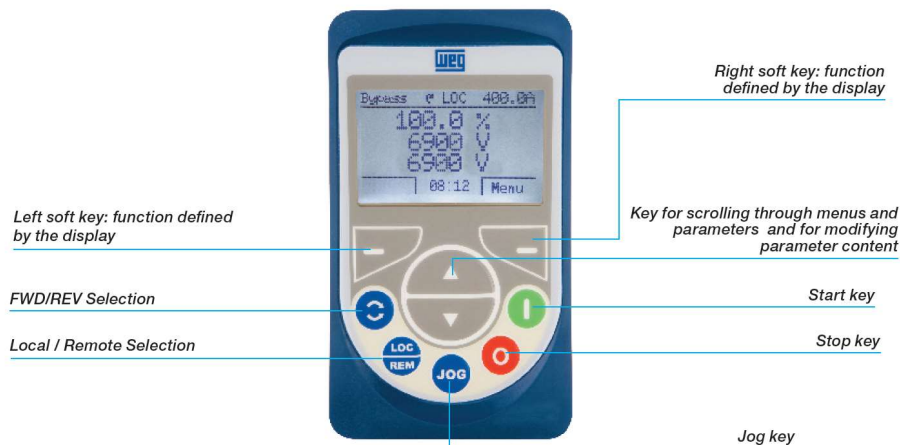
WEG maintains a diverse inventory of SSW7000 models in both NEMA 12 and NEMA 3R enclosures, ensuring our customers experience minimal downtime during urgent situations.

SSW7000C Features



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).



The SSW7000C Human Machine Interface employs a navigation logic similar to that used in cell phones, ensuring a seamless and intuitive experience. The display features function access keys, also known as soft keys, which allow for sequential access to parameters or groups.

The left soft key's function is dynamically defined by the display, providing flexibility based on the current screen. Similarly, the right soft key adapts to the display's needs, enhancing user interaction. Centrally located for ease of use, the key for scrolling through menus and parameters also allows for modifying parameter content. The FWD/REV selection key enables users to toggle between forward and reverse operations, while the Local/Remote selection key facilitates switching between local and remote control modes. The start key initiates operations, and the stop key halts them. Additionally, the jog key offers precise control.

The display screen presents various parameters such as voltage and current, delivering real-time data to the user.

SSW7000C Features



Plug and play philosophy

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



The SSW7000C was designed with a plug-and-play philosophy. This innovative system ensures that accessories are automatically configured upon connection, streamlining the installation process and saving valuable time.

The Human Machine Interface (HMI), included as a standard feature. Slot 2 is dedicated to the Temperature Sensor Module PT100, an accessory that enhances the system's precision by providing accurate temperature readings.

Slots 3 and 4 are reserved for communication accessories, offering versatile connectivity options to suit various applications. Slot 5 houses the flash memory module.

SSW7000C Options and 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)	

The SSW7000C has various options and accessories available designed to enhance your operational capabilities.

The first section lists control accessories that can be installed in slots 1, 2, and 3. These include the module for 8 temperature sensors, the RS 485 serial communication module, the RS 232 serial communication module, and the RS 232 serial communication module with a switch to program the microcontroller Flash memory.

The second section details Anybus-CA accessories for slot 4, featuring the Profibus-DP interface module, the DeviceNet interface module, the Ethernet/IP interface module, the RS 232 interface module, and the RS 485 interface module.

This table also shows the flash memory module and the HMI accessories.

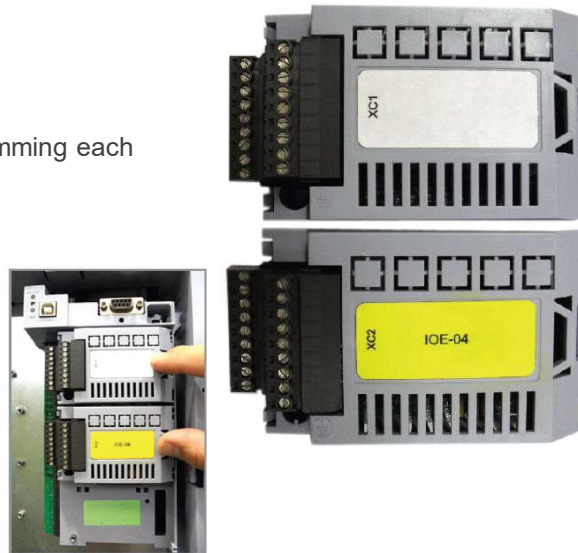
SSW7000C Options and Accessories



RTD Module (IOE-04)

- Allows for monitoring of up to 8x PT100s
- Programmable ALARM & TRIP temperatures
- Dedicated parameters for reading and programming each channel independently

P0063	Ch1 Motor Temperature	-20 to 260 °C
P0064	Ch2 Motor Temperature	-20 to 260 °C
P0065	Ch3 Motor Temperature	-20 to 260 °C
P0066	Ch4 Motor Temperature	-20 to 260 °C
P0067	Ch5 Motor Temperature	-20 to 260 °C
P0068	Ch6 Motor Temperature	-20 to 260 °C
P0069	Ch7 Motor Temperature	-20 to 260 °C
P0070	Ch8 Motor Temperature	-20 to 260 °C



The SSW7000C RTD Module is designed to monitor up to eight PT100 sensors, providing precise temperature readings for various channels. Programmable ALARM and TRIP temperatures ensure safety and efficiency when monitoring motor temperatures. Each channel can be read and programmed independently, offering flexibility and control.



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Thank you for watching the overview of the SSW7000. Please complete the test before moving on to the next lesson.