

PRODUCT BROCHURE

# Fisher Pierce® Series capacitor controllers









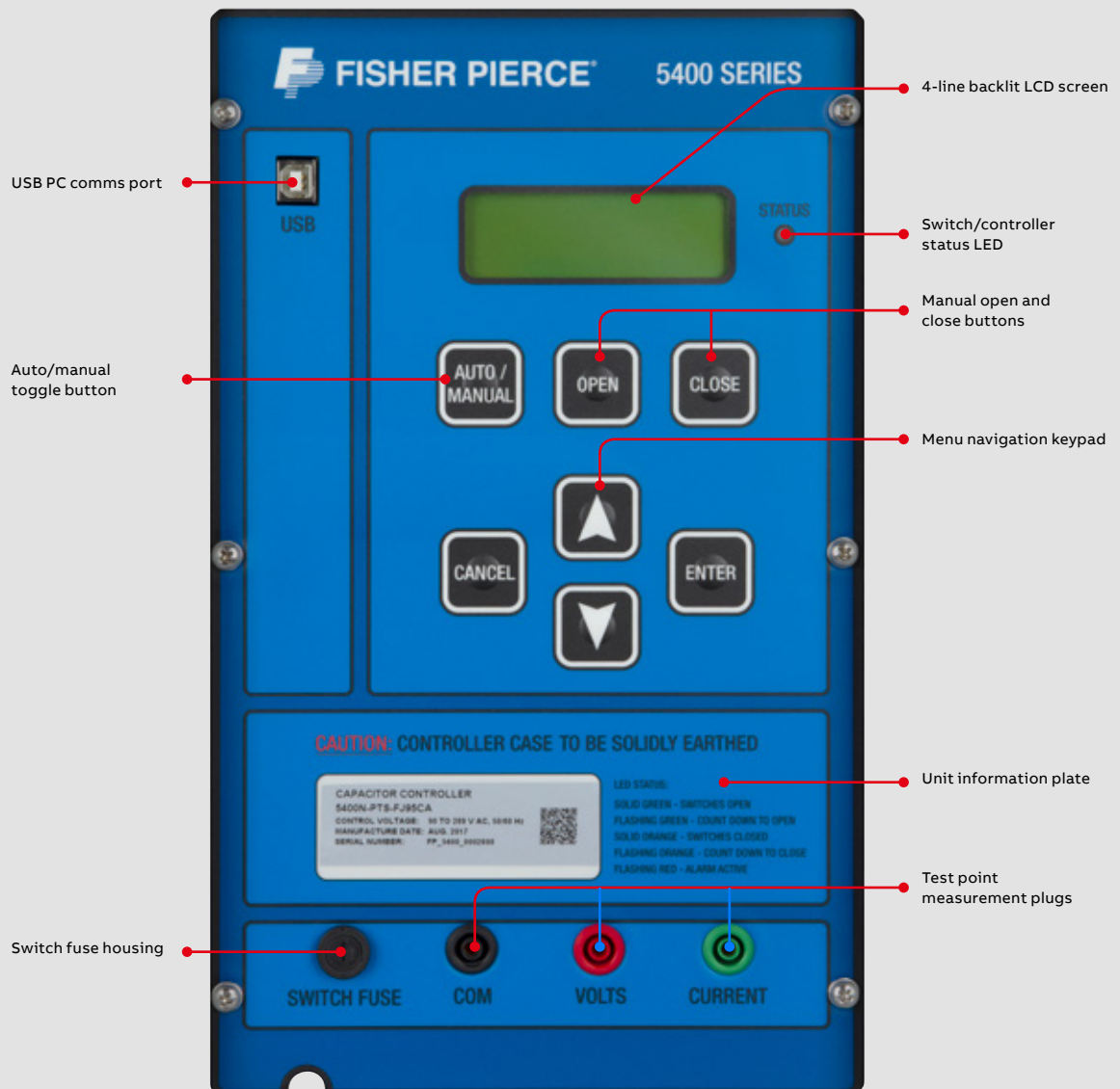
# Introduction

The Fisher Pierce series capacitor controllers are the next generation in smart controllers designed to provide a low cost, reliable method of switching pole-mounted capacitors. The capacitor controller range comes in two basic configurations — the 5400 and the 5500.

The 5400 is a stand-alone controller that switches capacitor banks automatically based on network conditions. The 5500 has the same standard features as the 5400 but with the addition of communication modules for remote control.

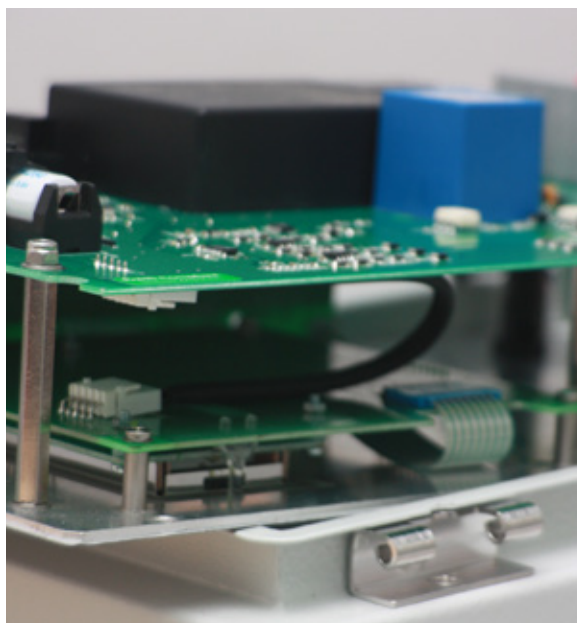
Both are designed for easy setup, configuration and monitoring through either the large front panel LCD screen and keypad, or by using the supplied PC software.

The controllers include a range of control modes, including remote, automatic and manual control, designed to offer customers true value through smarter management of their electrical systems and reliable integration with Smart Grid systems.



# Benefits and features

Benefits	Features
Reliable	<ul style="list-style-type: none"> <li>– Fast onboard microprocessor for accurate sampling, measurement and decision making</li> <li>– Flash upgradeable software allows new features to be deployed in the field</li> <li>– Advanced automatic switching</li> <li>– External temperature sensor</li> <li>– Real-time battery-backed clock (approximately 10-year life in unpowered state)</li> <li>– ISO-9001 manufacturing environment</li> </ul>
Flexible	<ul style="list-style-type: none"> <li>– Universal power supply (90 V AC to 264 V AC)</li> <li>– Frequency auto detection (47 Hz to 63 Hz real-time frequency measurement)</li> <li>– Flexible mounting options</li> <li>– Wide range of switch types supported (e.g. motor-driven, solenoid-driven or electrically held switch types)</li> <li>– Optional available features:               <ul style="list-style-type: none"> <li>- Fisher Pierce CapLink™ short range Wi-Fi communications</li> <li>- Neutral current measurement via sensor input</li> <li>- Capacitor bank switch status feedback monitoring</li> </ul> </li> </ul>
Durable	<ul style="list-style-type: none"> <li>– Wide environmental operating conditions (-40 °F to 158 °F)</li> <li>– NEMA 4R (IP65) rated enclosure</li> <li>– Electrical protection via 450 V varistors and transient voltage suppressors to provide fast spike and ESD protection (1500 V 8/20 <math>\mu</math>s impulse protection)</li> </ul>
Easy to use	<ul style="list-style-type: none"> <li>– Includes a logical, structured menu system and user-friendly navigation interface including 4-line LCD screen</li> <li>– Fully user-programmable via unit faceplate or PC software for maximum flexibility in operation</li> <li>– Microsoft Windows® compatible software package supplied for external configuration and data retrieval process</li> <li>– USB2.0 PC interface</li> </ul>
Data integrity	<ul style="list-style-type: none"> <li>– Real-time monitoring of network parameters</li> <li>– Flash stored programmed settings</li> <li>– Data logging captures 10,000 events at set time periods into non-volatile memory</li> </ul>



# Features

—  
01 Example of monitor  
tab on 5500 controller  
utility software

## Modes of operation

The Fisher Pierce series controllers can be used either as manually controlled devices or automatically controlled devices that switch the capacitors on/off based on a wide range of standard control modes.

The 5400 and 5500 series controllers have all the same standard features except the 5500 has the addition of communication modules for remote control and monitoring.

The following automatic control modes are available as standard on all controllers:

- Schedule (time)
- Voltage
- Temperature
- Var\*
- Current\*

\*requires a current sensor to be installed

Allowing great flexibility, any combination of three of the above control modes can be used in conjunction, with the hierarchy of control being selected by the user. The threshold values and time-outs for each control parameter are fully programmable by the user, either through the unit faceplate or the supplied PC utility software.

Where schedule switching is required, the Fisher Pierce series controllers support both a single schedule as well as different schedules for summer and winter. Separate schedules for weekdays (work days) and weekends (non-work days) are supported along with the ability to select which days are work and non-work days. Holidays and daylight saving time are also supported.

## Data logging

The Fisher Pierce series controllers have internal storage for 10,000+ data log entries. The data log is useful for troubleshooting and load profiling. A data log entry is made upon all controller events such as switch open or close, threshold values being exceeded or alarms triggered. Data log entries can also be programmed to be recorded at predetermined time intervals from 30 seconds to every hour.

The data log is stored in non-volatile flash memory, with the oldest log entries being overwritten cyclically when storage is full.

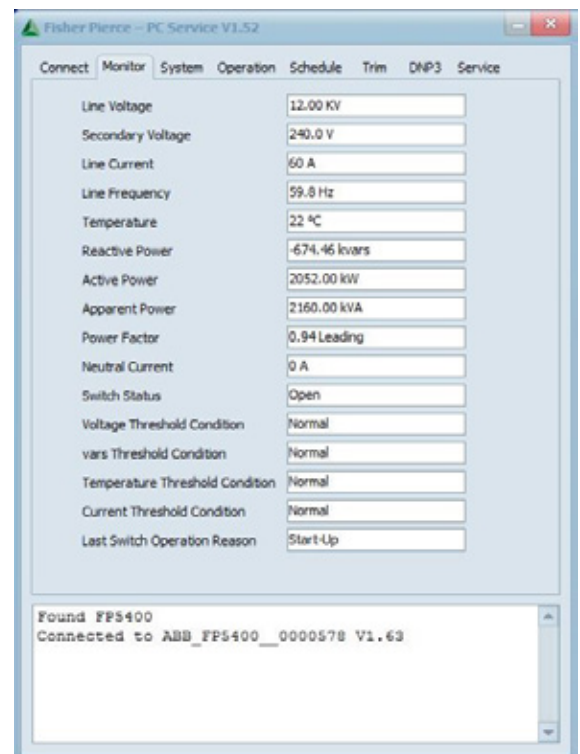
Log data is downloaded as a .CSV file, allowing the user to control, analyze and transport the information in programs such as Microsoft Excel™.

## PC utility software

The Fisher Pierce series controllers use a standard USB connection to communicate directly with a PC or laptop, while also supporting communication via Fisher Pierce CapLink. The software provides an intuitive, user-friendly interface, which allows rapid programming and deployment of Fisher Pierce series controller units. Configuration files can be created and saved for future unit download, further reducing the time taken to deploy multiple units.

The software is designed so that no file extraction is required for it to run, allowing the software to be stored and operated on a portable device. This allows greater flexibility for operating in the field.

Real-time status and measured values are updated every second and are displayed on the monitor tab.





# Communication

With the increasing requirement for smart grids and the need for flexible switching options, the Fisher Pierce series controllers come fully equipped for modern communication.

## DNP3.0

For remote control and monitoring, the Fisher Pierce series 5500 controller utilizes the DNP3.0 protocol. For full flexibility, this includes polled and unsolicited responses, support for up to class 3 polling, and DNP3.0 time synchronization. Using analog output points, the auto switch mode programmable parameters can also be remotely configured.

For transmitting remote data, the Fisher Pierce series 5500 controller supports both RS232 and Ethernet (TCP or UDP) communication ports. This allows a wide range of modem/radio devices to be used, while also allowing the 5500 to interface with existing communications infrastructure.

In case there is a problem with the communication system (i.e. master station is down, communication tower failure), the 5500 has a configurable time-out period that returns the unit to local automatic mode until the communication link has been restored.

The controller also allows remote monitoring and recording while the unit is in local automatic control mode.



## Fisher Pierce CapLink

Given that the majority of capacitor controllers are mounted in an elevated position in the field, a physical connection between the controller and a laptop can be an undesirable proposition.

Optional on the 5400 and 5500, Fisher Pierce CapLink allows the user the full connection functionality of the standard USB connection over a secure short-range wireless link up to 150 feet. This allows field technicians to communicate with the Fisher Pierce series controllers from the ground or service vehicle, resulting in much safer operation of the controller regardless of weather conditions.



# Pairing the Fisher Pierce Controllers

## with other Fisher Pierce and Joslyn Hi-Voltage™ products



### Fisher Pierce Series 1301 PowerFlex® high-accuracy line-post current sensors

Offer a unique combination of safety, installation without service interruption, space savings and low installed cost.

- Easy installation — simply fasten conductor to sensor with any nonferrous material conductor tie
- No line cutting or dead-ending required, no service interruption or loss of revenue
- Rugged, long-life, no-maintenance design withstands continuous high current, transients and switching surges



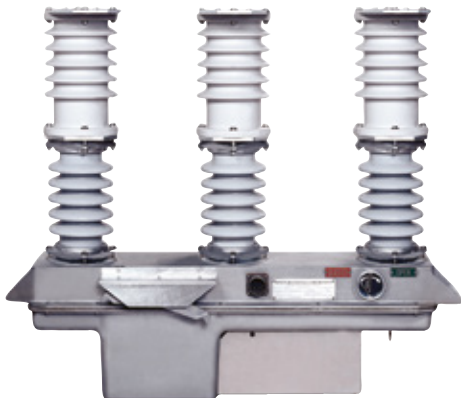
Three-phase

Single-phase

### Joslyn Hi-Voltage VerSaVac® capacitor switches

Solenoid operating mechanism offers one of the longest service lives of any distribution capacitor switch — 50,000 maintenance-free operations.

- Synchronized operation from a fast, repeatable solenoid operating mechanism ensures all phases will operate within ¼ cycle — unlike slow motor-operated devices — reducing recovery voltage when the bank is switched off, which, in turn, reduces electrical stress on capacitor bank insulation and system infrastructure
- Vacuum interruption and solid dielectric Joslyte insulation — no oil, no gas, no maintenance
- Long-life solenoid operating mechanism yields 50,000 maintenance-free operations (25,000 open and 25,000 close)
- Models support grounded and ungrounded systems in a variety of applications, 15–38 kV, single or three phase
- Available with zero voltage close (ZVC) logic option to eliminate excessive over-voltage conditions due to capacitor bank switching
- Compatible with existing oil switch or vacuum switch installations



### Joslyn Hi-Voltage Varmaster VBM switching systems

For substation capacitor and reactor switching.

- Vacuum interruption and solid dielectric Joslyte insulation — no oil, no gas, no maintenance
- Depending on operating mechanism and control voltage selection, offers up to 100,000 maintenance-free operations
- 15 kV–69 kV system range, substation or pole-mounted installations
- Compact and lightweight, no special foundations or support required
- Completely sealed construction provides safe interruption with no external arcing in normal operation and quiet yet high-speed switching
- Available with zero voltage close (ZVC) logic option

# Technical data

Control system	
Micro-processor-based system for balanced three-phase networks	
Field-upgradeable firmware capability through USB interface allows future upgrades and features to be deployed in field	
Supply voltage	
90 V AC to 264 V AC universal power supply	
Consumption	
10 VA max. (no modem); 130 VA max. (with modem*)	
Connection type for measuring circuit and power supply	
Phase-phase or phase-neutral; user-selectable VT ratios	
External current sensor converting 0–600 A to 0–10 V AC (optional for power-based measurements)	
Frequency range	
47 Hz to 63 Hz — Real-time frequency measurement monitors actual system frequency and calculates kVAR, PF, KVA, kW, etc, based on actual system conditions	
Electrical isolation/protection	
450 V varistor protection	
Transient voltage suppressors providing fast spike and ESD protection (1500 V 8/20 µs impulse protection)	
Electrically protected auxiliary digital inputs	
Fuse protection	
Unit protection:	2 A Fast blow (M205) internal
Switch protection:	10 A SLOW-BLO® (M205)
Operating environment	
Operating temperature:	-40 °F to 158 °F (-40 °C to 70 °C) (ambient)
Unit display operating temperature:	-4 °F to 158 °F (-20 °C to 70 °C)
Humidity range:	5% to 95% (non-condensing)
Measurement sensor performance	
Voltage:	± 375.8 V peak (264 Vrms) range 0.2 V AC resolution ± 1% accuracy
Current:	0 to 600 A range 0.5 A resolution ± 1% accuracy + sensor accuracy
Phase angle:	-179° to 180° range 1° resolution ± 0.1% accuracy
Temperature:	-40 °F to 158 °F range (-40 °C to 70 °C) 1 °F (1 °C) resolution ± 1% non-linearity

Output contacts	
Switch contacts:	2 x 20 A volt free contacts 1 open, 1 close
Continuous current (max):	20 A
Inrush current (max):	100 A
Contact closure period:	User selectable, 100 ms to 10 s as well as constant closed for electrically held switch operation
Settings	
90 V AC to 264 V AC universal power supply	
Control modes:	
Remote (control or monitor only) Automatic (local) Manual (local)	
Automatic control modes:	
Schedule (time) Voltage Schedule with temperature override Temperature VAR* Current*	
Switch on schedule:	
Single or seasonal Work day and non-work day schedules with full customization	
Switch on temperature range:	
-40 °F to 122 °F (-40 °C to 50 °C)	
Switch on voltage range:	
105 V to 130 V or 210 V to 260 V	
Switch on VAR range:	
-10 MVAR to +10 MVAR	
Open/close time delay:	
5 s to 10 min Separate open and close times	
Maximum operations:	
1 to 30 daily operations	
Logging periods:	
30 s to 60 min	



# Technical data

## Enclosure

Lockable, NEMA 4R (IP65), powder-coated, stainless steel enclosure

## Mounting

Pole-mounting brackets provided as standard; optional wall and meter socket mounts are also available

## Memory/calendar

**Time clock:** Battery-backed RTC

**Calendar:** 20 years preset  
30 user-settable annual holidays  
Daylight savings operation and auto season adjust  
Fully user-selectable weekdays and weekends

## Non-volatile flash data logging memory:

10,000+ record logs

**Backup battery:** 3.6 V lithium cell — 10-year life (unpowered state)

## Communications

Unit configuration and data log transfer via USB  
Optional Fisher Pierce Smart Link radio allows local interrogation without touching unit (up to 164' range)

RS232 and Ethernet interfaces allow monitoring over remote networks using a wide range of modem devices; DNP3.0 communication protocol enabled\*\*

## Quality

Printed circuit board in accordance to IPC-D-2221  
Unit in accordance applicable electrical standards  
CE mark (C-tick), RoHS component compliant  
Manufactured in an ISO9001 and ISO14001 environment

\* Requires a current sensor to be installed

\*\* Available only on the series 5500



# Series 5400 ordering information

The following diagram shows how to construct a catalog number for the 5400 series capacitor controller.



Indicates field that must be filled in to complete order.

**Note:** Availability of selected configuration will be verified at quotation time.

**54**   **N** - **P** **T** **S** -  **9** **5**  **A**

**Standard model**

**54** Series 5400 AutoCap® programmable capacitor controller in compact enclosure

**Line current input**

**1** Fisher Pierce 1301 line post sensor (60 A/V 60 Hz and 72 A/V 50 Hz) or Lindsey sensor (100 A/V)

Catalog no.	kV range
1301-17-XX*	15kV L-L
1301-47-XX*	25kV L-L
1301-27-XX*	35kV L-L

XX = cable length

**0** None

**CT/VT neutral sensing**

**1** Fisher Pierce AT929 sensor with 6-ft. lead AT929-400-06\*

**3** VT (not supplied)

**0** None

**Optical communication port**

**N** None

**Counter/display**

**P** Programmable display

**Memory**

**S** Standard 128 k

**Temperature sensor**

**T** Supplied

**Fisher Pierce CapLink**  
**X** = None  
**C** = CapLink  
**S** = Short CapLink antenna

**CapLink programming Cable FPCAPLINK-USB\***

**A** Factory code

**Voltage/frequency**

**5** 90–264 VAC, 47–63 Hz

**Enclosure type**

**9** Powder-coated stainless steel

**Four-jaw meter socket mounting and wiring**

	1	2	3	4	5	6	Current inputs	External ground
FJ	L	N/GND**	TR	CL	–	–	None	No
GJ	L	N/COM	TR	CL	–	–	None	Yes

**Six-jaw meter socket mounting and wiring**

	1	2	3	4	5	6	Current inputs	External ground
SJ	CSL	N/GND**	L	TR	CSH	CL	Line only	No
TJ	CSL	N	L	TR	CSH	CL	Line only	Yes
SM	L	N/GND**	CSL	CSH	TR	CL	Line only	No
TM	L	N	CSL	CSH	TR	CL	Line only	Yes
SL	L	N/GND**	NSL	NSH	TR	CL	Neutral only	No
TL	L	N	NSL	NSH	TR	CL	Neutral only	Yes
SK	L	N/GND/COM**	NSH	CSH	TR	CL	Line + neutral	No
TK	L	N/COM	NSH	CSH	TR	CL	Line + neutral	Yes

**Bracket mounting with plug-in cable \*\*\***

	Mounting location	Ext. gnd lug	Current inputs
BJ	Pole	Wire connection - 7-pin connector	Yes
WJ	Wall		None, line, neutral, or line + neutral

**View looking into socket**

1 ☐ ☐ 2  
3 ☐ ☐ 4

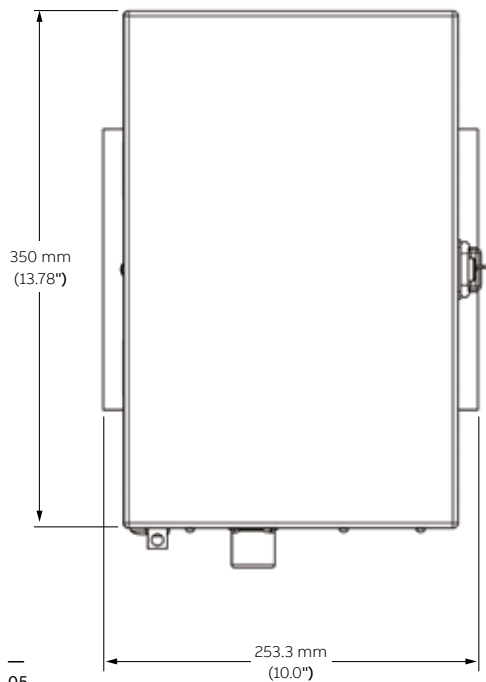
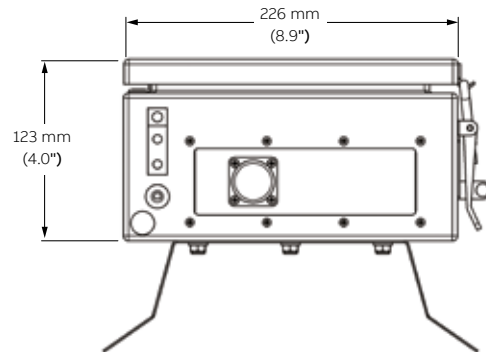
Socket for CT shorting switch available for SJ and TJ wiring

1 ☐ ☐ 2  
3 ☐ ☐ 4  
5 ☐ ☐ 6

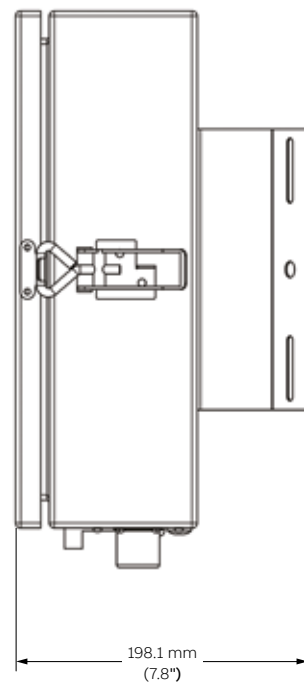
**Footnote:** \* Sold separately \*\* GND must be connected at socket \*\*\* Cable sold separately

# Series 5400 dimensions and installation

— 05 Dimensional drawings for 5400 controller  
— 06 Installation and preferred sensor location

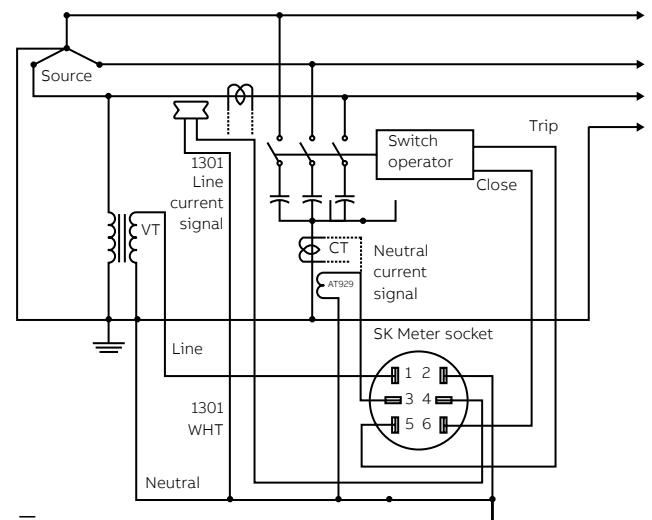


05



## Installation and preferred sensor location

1. 4W-grounded WYE circuit shown.
2. Refer to ordering information for wiring of other socket codes.
3. Refer to instruction manual for complete installation information.



06

Specifications are subject to change.



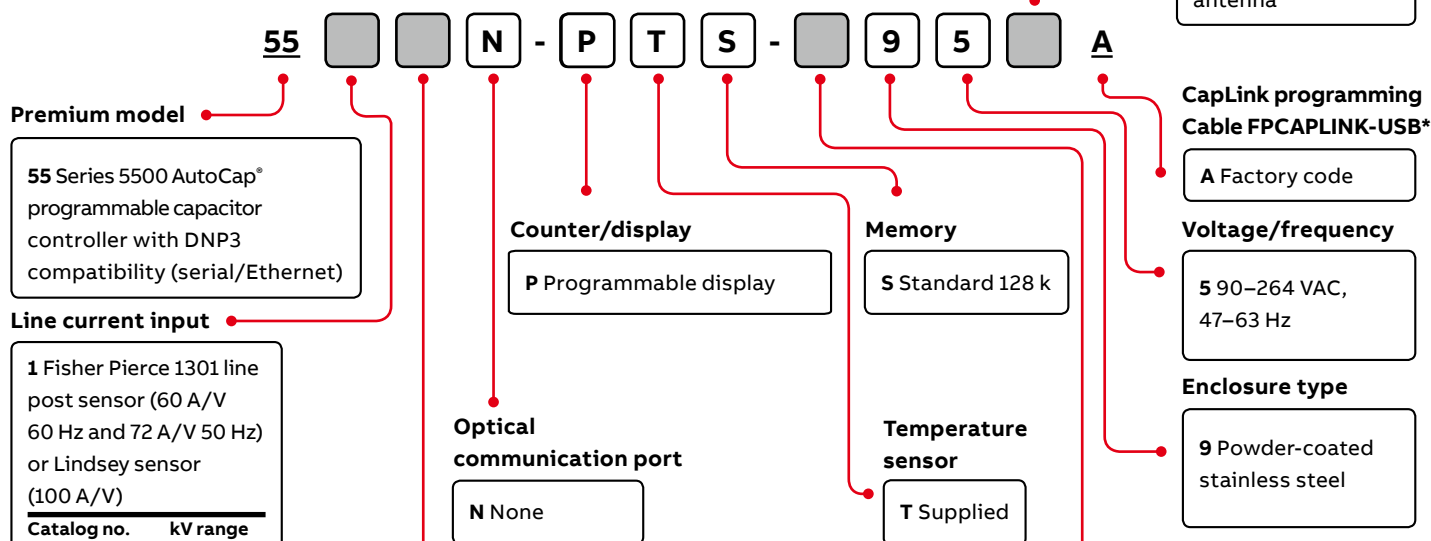
# Series 5500 ordering information

The following diagram shows how to construct a catalog number for the 5500 series capacitor controller.



Indicates field that must be filled in to complete order.

**Note:** Availability of selected configuration will be verified at quotation time.

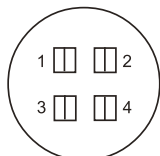


## CT/VT neutral sensing

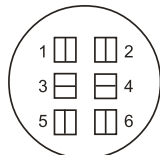
1 Fisher Pierce AT929 sensor with 6-ft. lead AT929-400-06\*

3 VT (not supplied)

0 None



View looking into socket



Socket for CT shorting switch available for SJ and TJ wiring

## Four-jaw meter socket mounting and wiring

	1	2	3	4	5	6	Current inputs	External ground
FJ	L	N/GND**	TR	CL	–	–	None	No
GJ	L	N/COM	TR	CL	–	–	None	Yes

## Six-jaw meter socket mounting and wiring

	1	2	3	4	5	6	Current inputs	External ground
SJ	CSL	N/GND**	L	TR	CSH	CL	Line only	No
TJ	CSL	N	L	TR	CSH	CL	Line only	Yes
SM	L	N/GND**	CSL	CSH	TR	CL	Line only	No
TM	L	N	CSL	CSH	TR	CL	Line only	Yes
SL	L	N/GND**	NSL	NSH	TR	CL	Neutral only	No
TL	L	N	NSL	NSH	TR	CL	Neutral only	Yes
SK	L	N/GND/COM**	NSH	CSH	TR	CL	Line + neutral	No
TK	L	N/COM	NSH	CSH	TR	CL	Line + neutral	Yes

## Bracket mounting with plug-in cable \*\*\*

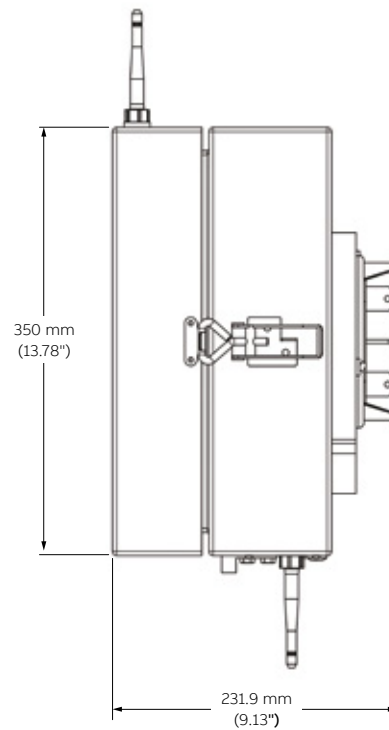
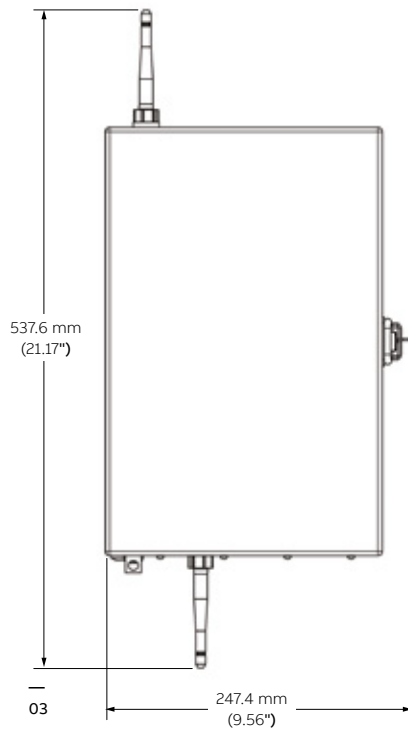
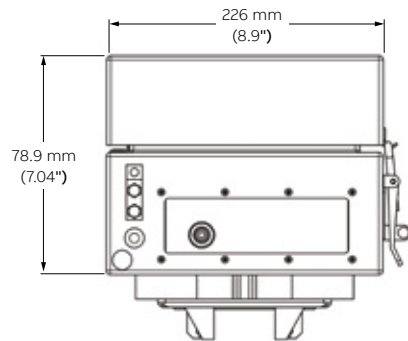
	Mounting location	Ext. gnd lug	Current inputs
BJ	Pole	Wire connection - 7-pin connector	Yes
WJ	Wall		None, line, neutral, or line + neutral

\* Sold separately \*\* GND must be connected at socket \*\*\* Cable sold separately

# Series 5500 dimensions and installation

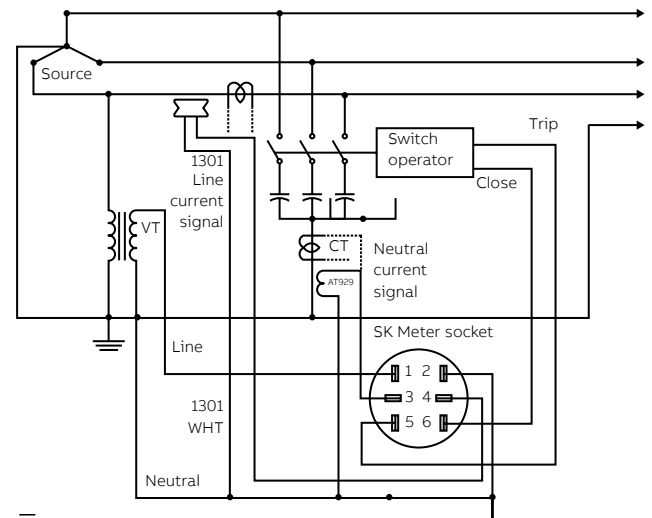
03 Dimensional drawings for 5500 controller

04 Installation and preferred sensor location



## Installation and preferred sensor location

1. 4W-grounded WYE circuit shown.
2. Refer to ordering information for wiring of other socket codes.
3. Refer to instruction manual for complete installation information.







## Notes



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