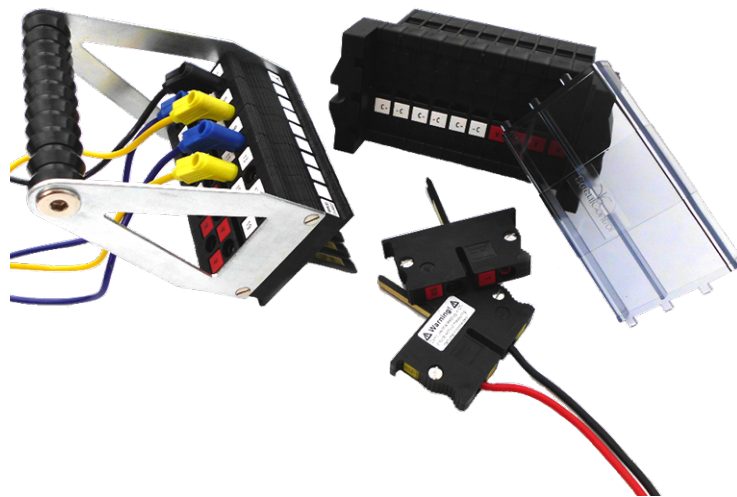


# FTS / FTP Test Blocks & Plugs

## Reference Handbook

fts-reference-en v.154



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# 1 Introduction

## The FTS / FTP Test Block & Plug

The FTS is a test block for interfacing substation devices (protection relays, fault recorders, revenue meters, ...) to the voltage and current transformers and to other equipment on the system side of a power grid.

The FTP is a test plug keyed to a particular configuration of FTS Test Blocks. Once inserted into the corresponding Test Block, the FTP Plug isolates the substation devices from the system side equipment while at the same time allowing connection of test equipment for secondary injection tests.

## Key Features

- Finger-safe Test Block and Test Plug increase safety during testing.
- Test Plugs are keyed to the corresponding Test Blocks and help eliminate of the most common human errors during testing.
- Construction of Test Plugs prevents contact between test set and current and voltage transformers during insertion / removal and allows test during operation.
- Built-in time-sequencing of disconnection / reconnection operations prevents spurious breaker operation.
- Extremely low internal resistance ( $< 2 \text{ m}\Omega$ ) helps reduce heat inside cabinets and panels.
- Available in 8, 10, 12, 14, 16, 18 or 20 pole configurations.
- Test plug handle is functionally and ergonomically designed and enables an easy plug and plug out process.

## Applicable Models

Information in this document applies to all FTS Test Blocks and FTP Test Plugs manufactured after May 2011.

## Unpacking

Unpack the product carefully and make sure that all pertinent parts like dust covers and screws are put aside so they will not be lost.

## 1. INTRODUCTION

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Check the contents against the packing list. If any of the contents listed are missing, please contact **SECUCONTROL** immediately (see contact information at the rear cover of this manual).

Examine the product for any shipping damage. If the product is damaged, notify the shipping company without delay. Only the consignee (the person or company receiving the unit) can file a claim against the carrier for shipping damage.

### Part Number and Manufacturing Date Location

Part number and manufacturing date are stated on a label on the right side of the Test Block or Test Plug.

### Safety Symbols

The following symbols are located on different parts of the equipment and in this manual:



Paragraphs marked with this symbol contain information which, if not properly followed, may cause damage to the equipment and/or installation.



Paragraphs marked with this symbol contain information which, if not properly followed, may cause personal injury or even death.

---

### General Safety Instructions

Installation and operation of the products described in this manual is only to be performed by personnel that has been trained or is knowledgeable in substation protection, automation and control.

This instruction manual is an integral part of the scope of delivery and provides basic instructions for installation and operation of the equipment here described. Shall additional information be needed, please contact **SECUCONTROL** at any of the addresses provided on the rear cover of this document.



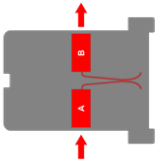
Do not disassemble the Test Block. Correct alignment of internal parts is critical in order to provide insulation and arch-avoidance.



The warranty will be void if the Test Block is disassembled (or otherwise handled inappropriately). SecuControl does not assume responsibility for any damages arising out of mishandling of our products, including test blocks that have been disassembled by parties other than SecuControl.

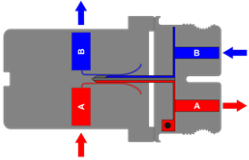
# 2 Principle of Operation

## Closed Circuit



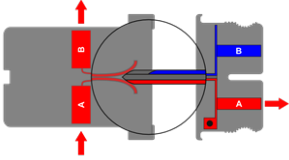
In the resting state the FTS test block's contacts are closed, signals from the system side (side A) are connected by flat springs to the panel devices (side B).

## Open Circuit, Signal Injection



To open the test block's contacts, the FTP Test Plug is inserted into the FTS Test Block. In this situation, the devices in the panel (side B) are isolated from the system side (side A). Signals can be injected using the banana jacks on the front side of the FTP Test Plug.

## Current Transformers



The FTP Test Plugs automatically short-circuits the secondaries of current transformers. The short-circuiting happens before the contacts are open ("make-before-break").

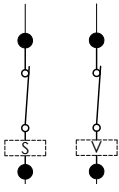
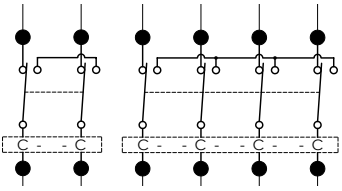




# 3 Application

## Schematic Symbols

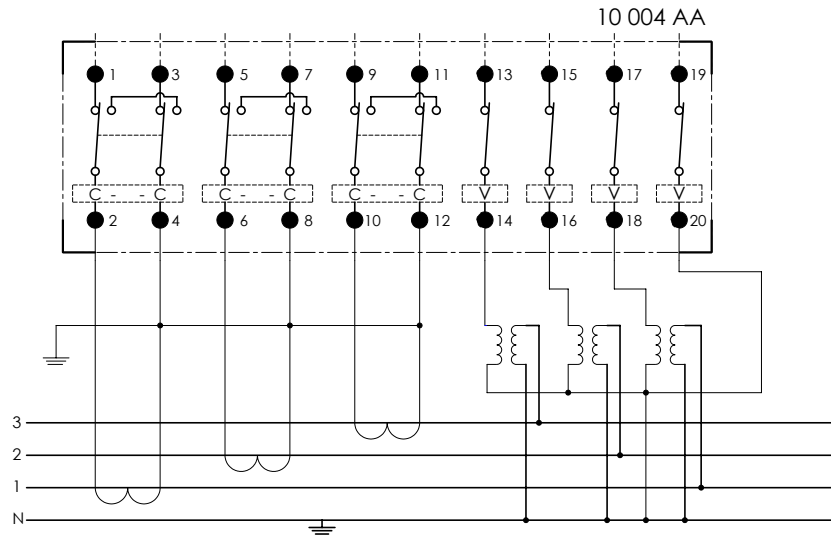
Following symbols are suggested in order to represent the FTS Test Block in schematic diagrams.

Symbol	Description
	Signal, Voltage (single pole)
	Current (2-pole, 4-pole)

3. APPLICATION

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**Typical Connection Schematic**

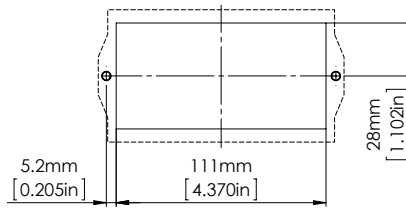


# 4 Installation

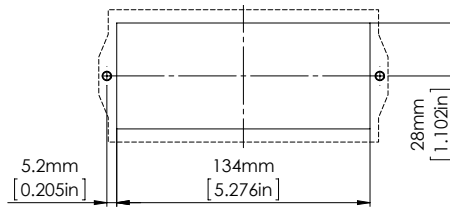
## Panel Cutouts, Drilling Plans and Mounting

Use the provided M5x30 screws to fix the FTS Test Block onto the panel. The screws should be tightened using a 4 mm hex drive.

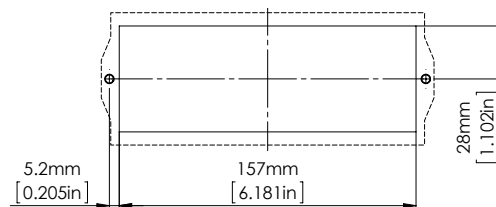
### 8-pole Models



### 10-pole Models



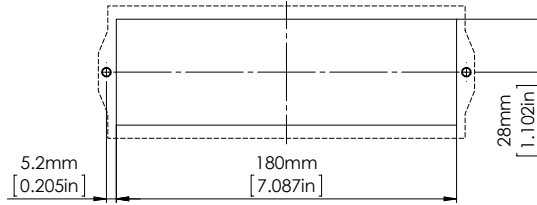
### 12-pole Models



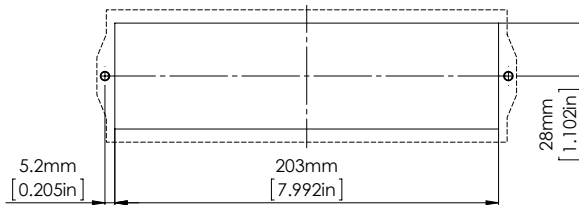
## 4. INSTALLATION

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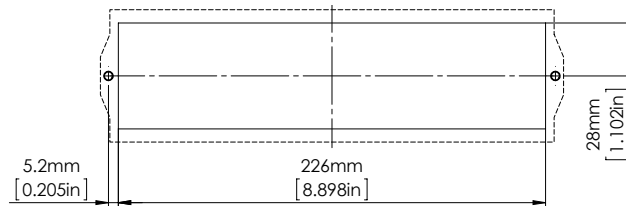
### 14-pole Models



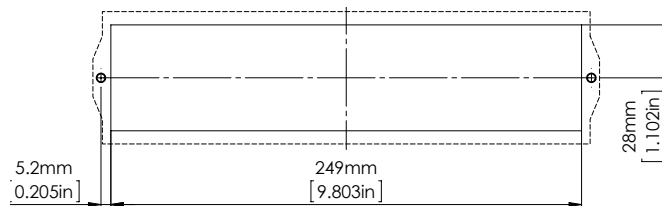
### 16-pole Models



### 18-pole Models



### 20-pole Models



### Wiring

Electrical connection terminals are located on the top and bottom of the FTS Test Block. The connection terminals combine a screw in the center with a pressure plate, accepting ring cable lugs, stripped wire or other crimp connectors.



Recommended wire gauge is from 1.5 mm<sup>2</sup> (AWG 16) to 4 mm<sup>2</sup> (AWG 12).

CTs should be wired to the terminals provided for this purpose (in 2- or 4-pole combinations) to ensure automatic short circuiting upon insertion of FTP test plugs or individual test probes into the FTS Test Block. The terminals designated for the connection of the CTs can be typically identified by the 

C-	-C
----	----

 or 

C-	-C-	-C-	-C
----	-----	-----	----

 labeling<sup>1</sup>.

The panel equipments (protection relays, meters, fault recorders, etc) should be connected to the device side terminals indicated by the odd-numbers (1, 3, 5, 7, ...), or by the “b” suffix (1b, 2b, 3b, ...), depending on model.

The protection equipments (current and voltage transformers, breaker, etc) should be connected to the system side terminals indicated by the even-numbers (2, 4, 6, 8, ...), or by the “a” suffix (1a, 2a, 3a, ...), depending on model.



<sup>1</sup>Custom labeling may show other symbols or use other colors.



## 5 Operation

Handling of the FTP Test Plugs or Test Probes should be done using only the handle and/or insulated plastic parts, since the fingers may be connected to live equipment either via the test block or test equipment.

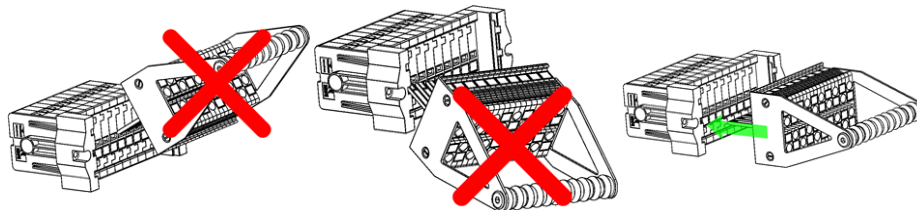
Store the FTP Test Plugs and Test Probes carefully in order to avoid damage to the metallic test fingers. **SECUCONTROL** recommends using one of the cases listed under “Accessories” on page 23.



1. Remove the dust cover by sliding the cover up and then out.
2. Connect cables from the test set onto the corresponding FTP Test Plug or Test Probe.

There is no need to externally short-circuit the current transformers, since the FTP Test Plugs and Test Probes have internal shorting bars which will automatically short circuit the corresponding circuits before opening them.

3. Carefully align the FTP Test Plug or Test Probe with the corresponding positions on the FTS Test Block.



4. Insert the FTP Test Plug or Test Probe in one smooth movement into the FTP Test Block.
5. Once you are ready to resume normal operation, remove the FTP Test Plug or Test Probe in a single, continuous movement.
6. Reattach the dust cover.





## 6 Technical Specifications

### Electrical

Current Withstand	30 A continuously 500 A for 1 second
Maximum voltage	600 V
Contact resistance	$\leq 2 \text{ m}\Omega$
Dielectric Withstand	3.0 kV RMS for 1 minute between adjacent contact pairs and between any contact pair and other metal parts 2.0 kV RMS for 1 minute between open contacts when test plug is inserted
Voltage Impulse	3 positive and 3 negative impulses of 5 kV peak, 1.2/50 $\mu\text{s}$ , 0.5 J between adjacent contact pairs and between all contact pairs and other metal parts
Temperature Range	-25 to +70 °C (-13 to +158 °F), storage -25 to +55 °C (-13 to +131 °F), operation
UL94 Flammability Class	V-0
Enclosure Protection	IP20 without cover IP50 with dust cover attached

FTS / FTP Test Blocks and Plugs are classified as electromagnetically benign and are therefore excluded from the scope of the European Community EMC Directive 2004/108/EC.

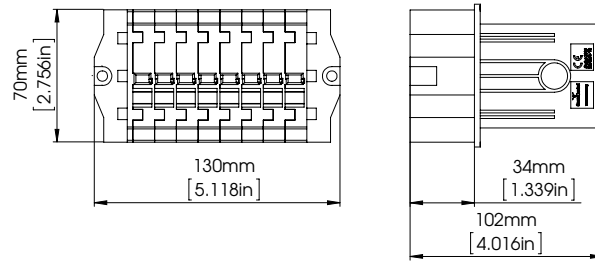
FTS / FTP Test Blocks and Plugs meet or exceed all requirements from ANSI / IEEE C37.90-2005.

### Mechanical

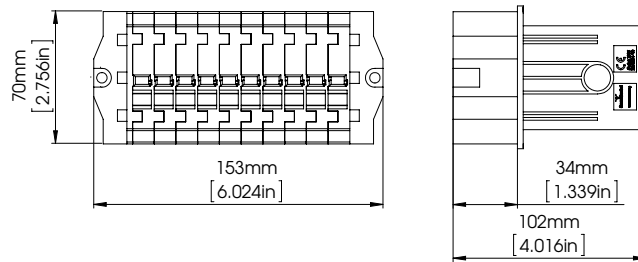
# of poles	8	10	12	14	16	18	20
FTS Weight (kg)	0.94	1.13	1.31	1.50	1.68	1.86	2.05
(lbs)	2.07	2.49	2.89	3.31	3.70	4.10	4.52

## Dimensional Drawings FTS

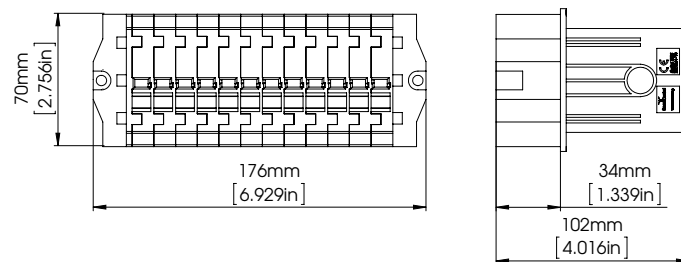
### 8-pole Models



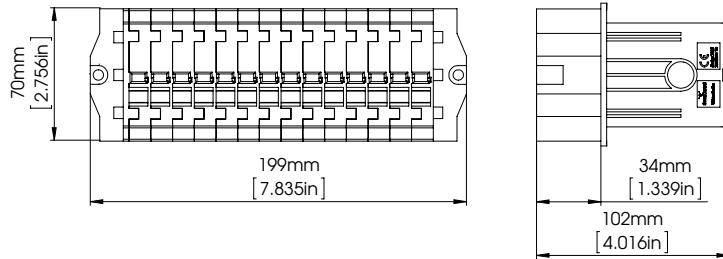
### 10-pole Models



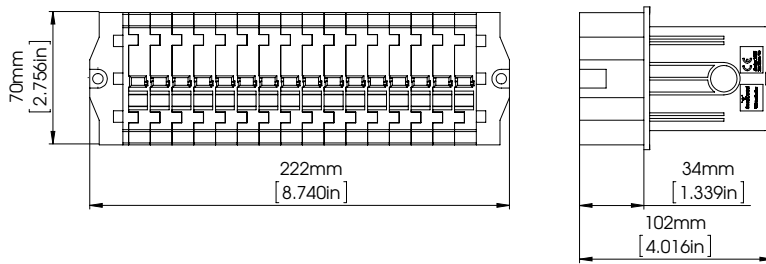
### 12-pole Models



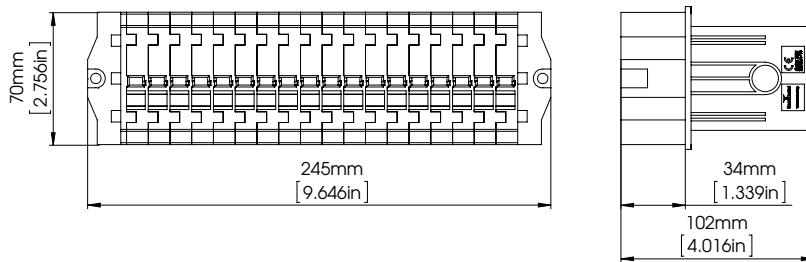
### 14-pole Models



### 16-pole Models



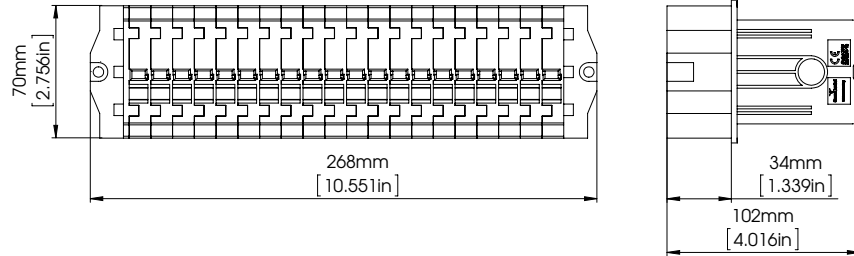
### 18-pole Models



## 6. TECHNICAL SPECIFICATIONS

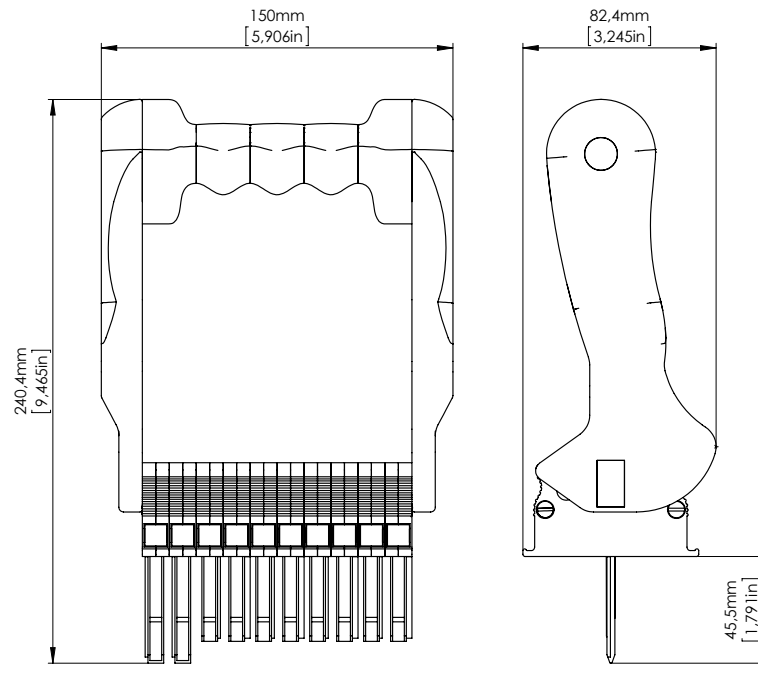
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### 20-pole Models



## Dimensional Drawings FTP

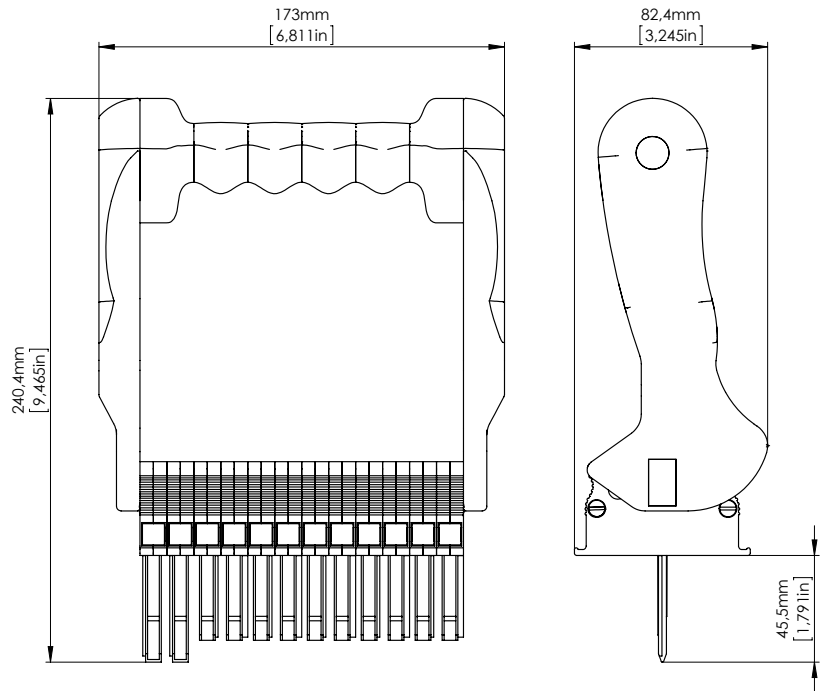
### 10-pole Models



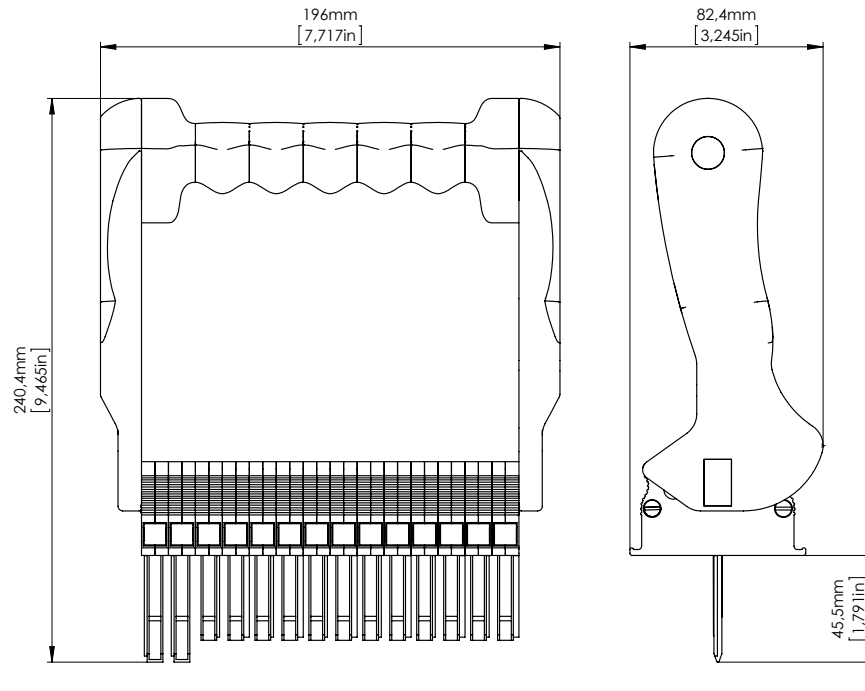
## 6. TECHNICAL SPECIFICATIONS

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### 12-pole Models



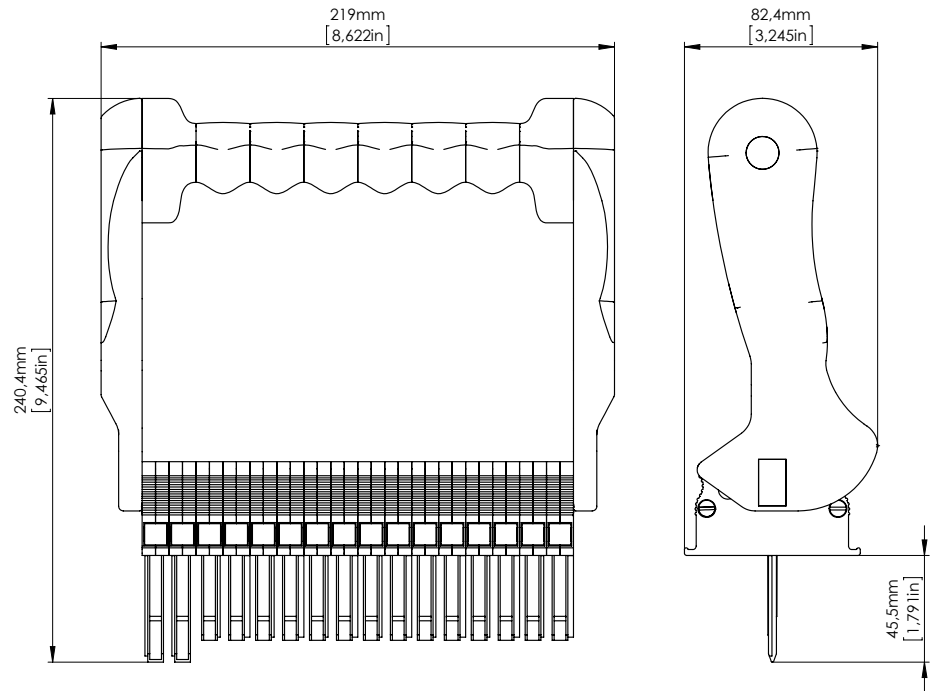
14-pole Models



## 6. TECHNICAL SPECIFICATIONS

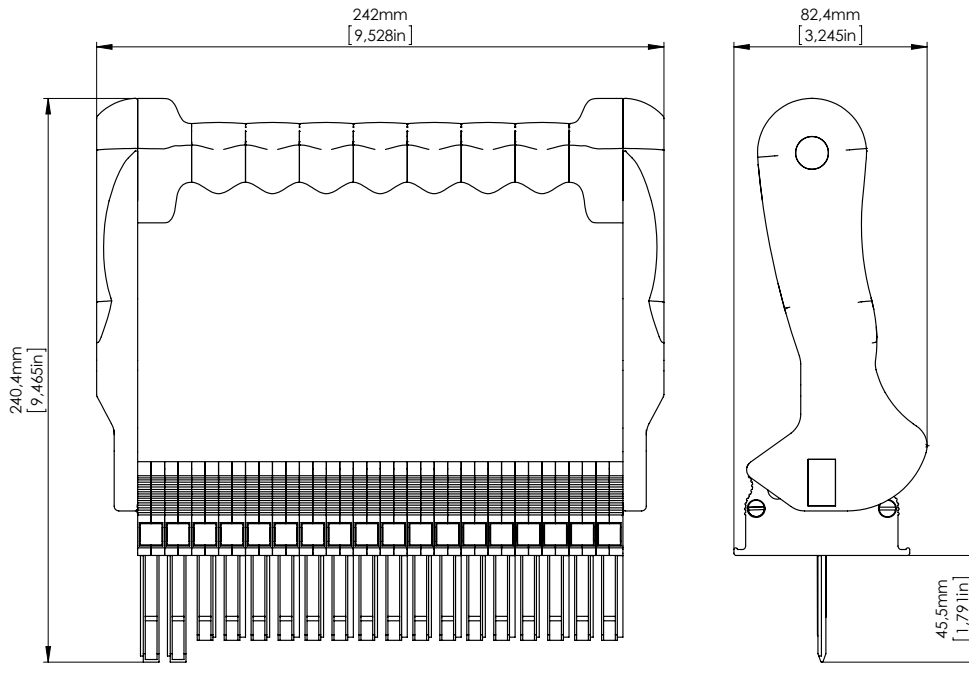
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### 16-pole Models





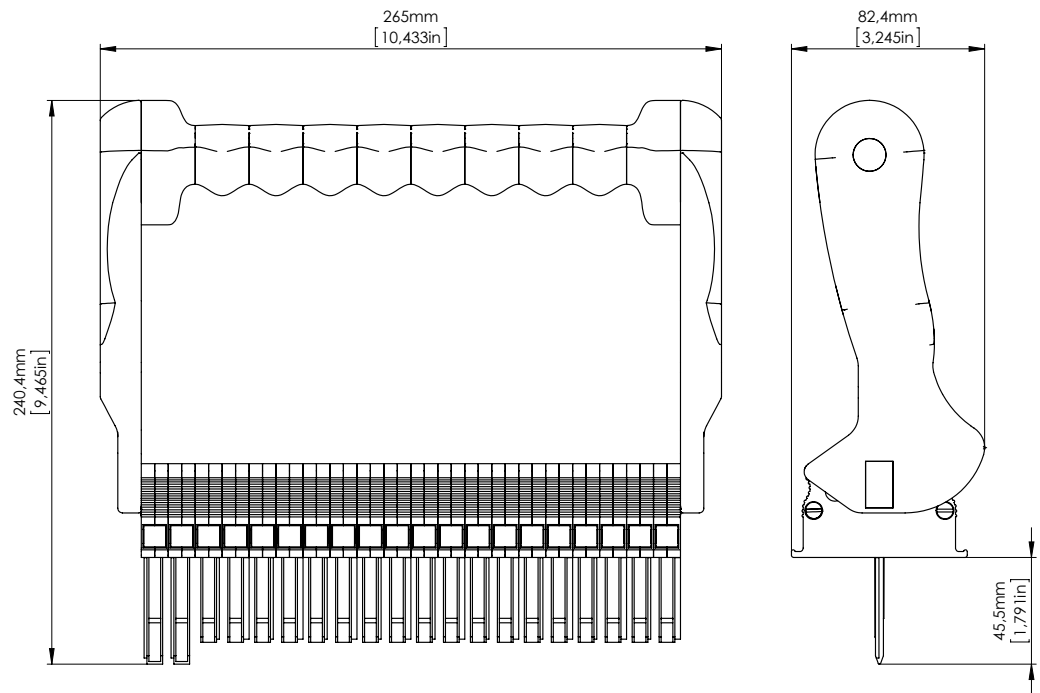
18-pole Models



## 6. TECHNICAL SPECIFICATIONS

---

### 20-pole Models



## 7 Accessories

### Cases for FTP Test Plugs

Rugged case for FTP Test Plugs with handle or Test Probes.

Description	Order Code
Case for FTP Test Plug	CFTP1
Case for FTP Test Probes	CFTP2



### Individual Test Probes

This probes will fit all FTS Test Blocks, regardless of configuration. Keying in the probes prevents insertion into wrong circuits (i.e., 2-pole current probes can only be inserted into a 2-pole current part of a FTS block).

Current probes include internal shorting bridge.

Description	Order Code
Single pole probe (voltages, signals and trips)	FTPA01TVSAA
2-pole probe (single current and return)	FTPA020C2AA
4-pole probe (three currents, common return)	FTPA040C4AA

### Universal Test Probes Set

Set of individual test probes in a rugged case. Two configurations are available:

#### “Small” Set

- 3 × 2-pole current probes (for single currents and return)
- 1 × 4-pole current probes (for three currents and common return)
- 6 × single pole probes (for voltages, trips and signals)

### “Large” Set

- 6 × 2-pole current probes (for single currents and return)
- 2 × 4-pole current probes (for three currents and common return)
- 12 × single pole probes (for voltages, trips and signals)

Description	Order Code
Universal Test Probe Set “Small”	UFTP1
Universal Test Probe Set “Large”	UFTP2



### Current Measurement Probe

This special test probe allows for the connection of a current measurement device or a shunt. The AWG 13 (2.5 mm<sup>2</sup>) connection cable has a length of 118 inches (3 meters). The test probe is available with c-hook terminals or banana plugs.

The current measurement probe is a special tool that is built for current measurement purposes. It does NOT automatically short-circuit current transformer circuits upon insertion into the FTS test block. Instead, current circuits are opened and redirected via the attached wires once the probe is entered into the test block. The probe must always be correctly connected to a measurement instrument or a shunt before insertion into the FTS test block, to prevent the creation of an open current transformer circuit. The current measurement probe should be used by properly trained personnel only.



Description	Order Code
C-hook connection	UTPC1
Banana plug connection	UTPC2



### FTS 19” Rack Plates

**SECUCONTROL** offers metal plates for installation of FTS test blocks in 19” racks that come painted in various colors and with various cutouts for FTS test blocks, in standard heights of 2U or 3U. Please contact **SECUCONTROL** if you require drawings or special customizations. The picture below shows an ANSI-grey #61 rack plate with three cutouts for 10-pole FTS test blocks.



- height** Rack plates are available in 2U and 3U
- config.** A: standard 19" rack plates, 2mm thick with standard cutouts  
 B-Z: reserved for special configurations
- cutout** e.g. 14xx16  $\zeta$  cutout for one 14-pole (left) and one 16-pole (right) FTS test block  
 e.g. 14xxxx  $\zeta$  cutout for one 14-pole (left) FTS test block  
 e.g. xxx18  $\zeta$  cutout for one 18-pole (right) FTS test block  
 e.g. 100810  $\zeta$  cutout for one 10-pole (right), one 8-pole (middle) and one 10-pole (right) FTS test block  
 max. modules per rack plate = 30
- color** These two digits define rack plate colors. Available options can be found in the table below:

Color	Description
AG	ANSI-grey #61
PG	pebble grey RAL 7032
LG	light grey RAL 7035
BK	black

For all configurations with 3 cutouts and 30 modules (e.g. 3 x 10-pole cutouts), **SECUCONTROL** recommends special FTS fitting screws (M5x22). These screws should be mounted on the far left and the far right side of the rack plate, to prevent the tip of the screws from touching the mounting frame. Two special screws are included with every FTS rack plate with 3 cutouts\30 modules. Please use the order codes below for reordering.



**Special FTS Fitting Screws**

Fitting set to fix the FTS Test Block in the rack plate cutout with 3 cutouts and 30 modules. The screw set contains two M5x22 hexagon socket head cap screws (4 mm)

Description	Order Code
Special fitting set M5	SCPFT



### Covers for 19" FTS Rack Plate Cutouts

Built to cover existing cutouts in rack plates for FTS test blocks, these metal covers are offered for different FTS cutout sizes.

<b>Description</b>	<b>Order Code ANSI-grey #61</b>	<b>Order Code light grey</b>	<b>Order Code pebble grey</b>	<b>Order Code black</b>
8 -pole cover	FTBC08AG	FTBC08LG	FTBC08PG	FTBC08BK
10-pole cover	FTBC10AG	FTBC08LG	FTBC08PG	FTBC08BK
12-pole cover	FTBC12AG	FTBC08LG	FTBC08PG	FTBC08BK
14-pole cover	FTBC14AG	FTBC08LG	FTBC08PG	FTBC08BK
16-pole cover	FTBC16AG	FTBC08LG	FTBC08PG	FTBC08BK
18-pole cover	FTBC18AG	FTBC08LG	FTBC08PG	FTBC08BK
20-pole cover	FTBC20AG	FTBC08LG	FTBC08PG	FTBC08BK



## 8 Spare Parts

### Dust Covers

# of poles	Order Code
8	FTDC08
10	FTDC10
12	FTDC12
14	FTDC14
16	FTDC16
18	FTDC18
20	FTDC20



### Fitting Set

Fitting set to fix the FTL Test Block in the panel cutout. The screw set contains two M5x30 hexagon socket head cap screws (4 mm) and two M5 nuts.

Description	Order Code
Fitting set M5	SCSFT







## 9 Ordering Information

### Part Numbers for FTS Test Block

F T S A     
poles config labeling

### Part Numbers for FTP Test Plug

F T P P     
poles config labeling

### Available Configurations

A list of available Configurations can be found in the download section of our website.

Should your application require a configuration that is not listed below, please contact **SECUCONTROL** at any of the addresses listed on the rear cover of this manual, or use the configurator on our homepage.





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