



# STMT Medium Voltage Multi-Tap Surge Protective Device Installation, Voltage Selection & Operation Instructions 1000V - 4160V



Shown with optional Monitoring package

**Read and Understand these Instructions**

**Warning:  
Hazardous & Potentially Deadly  
Energy Levels Present**

- Risk of Explosion
- Risk of Electrical Shock
- Risk of Fire



### **RECOMMENDED APPLICATION:**

This Surge Protective Device (SPD) is intended for oil production operations that increment system voltage upward over time to increase throughput.

For example, a pump rig might start production at 1000V, convert to 2500V later, and then convert to 4160V later. Traditionally, each voltage change requires a new SPD. This unit can accommodate different service voltages through multiple sets of leads. This SPD is not intended to protect different system voltages simultaneously. It is intended for one voltage at a time.

This unit includes multiple sets of leads, which correspond to different service voltages. As service voltage changes, leads must be changed accordingly. Failure to install and service this SPD correctly will result in hazardous energy levels.

## **CONDITIONS OF USE IMPORTANT INFORMATION - WARNING**

This Surge Protective Device (SPD) is available for use by those who understand and accept its benefits and risks. APT is unaware of a UL safety standard for medium voltage surge suppressors. It is assumed that users have appropriate system monitoring and controls to prevent unintended effects.

This SPD is designed to control high-energy transient overvoltages having short time durations. In the event of sustained overvoltages caused by electrical distribution system anomalies, this unit will fail short-circuited. The unit will attempt to flow its available fault current. This may result in the clearing of upstream overcurrent protection and/or severe non-passive SPD failure. It is important to note that SPD failures are symptoms of system level overvoltage problems. SPDs do not fail randomly or for no apparent reason. Be aware that ungrounded distribution systems are intended to 'float' and 'move' with respect to ground. A failed SPD may escalate the initial distribution system anomaly, resulting in equipment shutdown, single-phasing, loss of production, etc. This unit should be positioned or shielded in a manner such that rupture failure does not represent a hazard to personnel or property.

This SPD is supplied without internal overcurrent protection. The SPD can be installed at any location in the distribution system. The user/installer is responsible for providing and coordinating fusing or overcurrent protection. Ferraz Shawmut, Bussman, etc., offer full lines of field installable overcurrent protection.

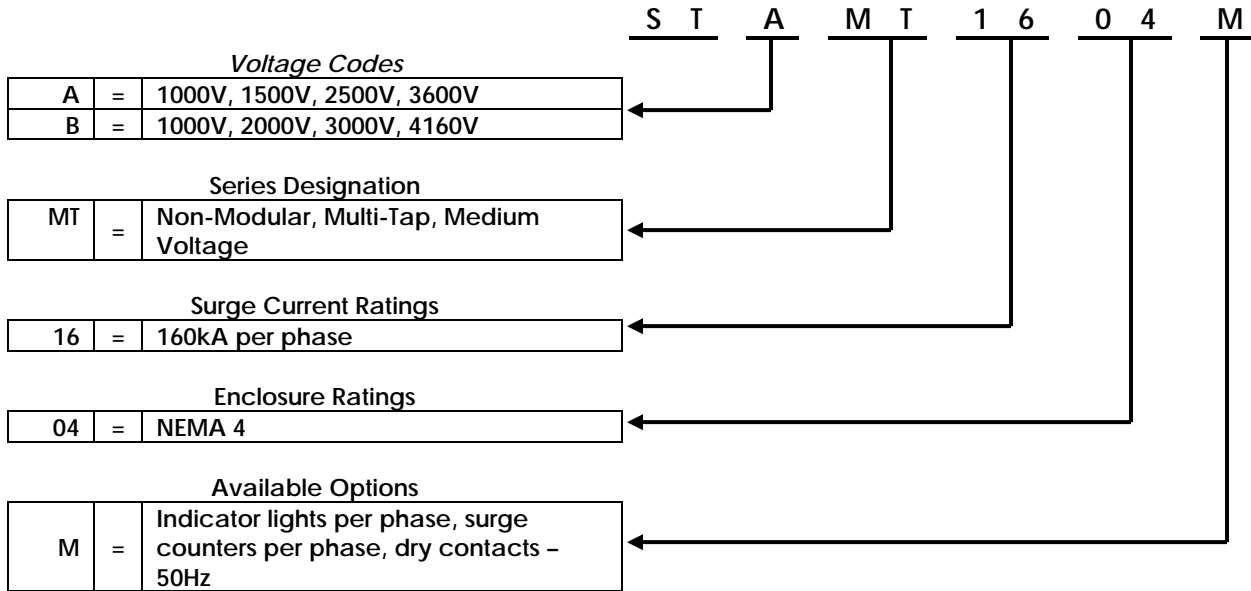
We recommend that any installed overcurrent protection be rated lower than the immediate upstream overcurrent protection. This ensures that a failed SPD will not effect upstream portions of the distribution system. Note that too conservative of overcurrent protection may result in premature or nuisance clearing, which may be difficult to detect.

Some users of medium voltage suppressors have reported excellent success from installing units in a secure location without overcurrent protection. In the event of unit failure, hazards are minimized, upstream overcurrent protection clears the affected load(s) including the SPD(s), power monitoring detects undesirable power quality (i.e., single-phasing, etc.) and shuts down appropriate loads.

APT recommends that medium voltage SPD(s) not be installed unless this information is understood and acceptable to the end-user.

**Decoding Model Numbers:**

Example Part Number: STAMT1604M5 = Voltage range of 1000V, 1500V, 2500V, 3600V; 160kA per phase; NEMA 4 Enclosure, Optional Monitoring Package Included



**Environmental Specifications:**

- Relative Humidity Range: 0-100% Non-condensing
- Operating Frequency: 50, 60Hz
- Operating Temperature: -40°F to +160°F (-40°C to +70°C)
- NEMA 4 (IP66) Heavy Gauge Steel Enclosure Standard
- Standard Size: 31cm x 31cm x 15.5cm (12" x 12" x 6")
- With monitoring package: 41cm x 35.5cm x 15.5cm (16" x 14" x 6")
- Weight: 38.6 kg (85 lbs) to 49.9kg (110lbs)



WARNING

VERIFY THAT ALL POWER CIRCUITS ARE DE-ENERGIZED BEFORE MAKING CONNECTIONS

All electrical connections should be performed by a qualified (licensed) electrician or technician. All wiring must comply with the National Electrical Code (NEC) and applicable local codes.



## Pictorial Overview:

Optional Monitoring Package – includes SuperBright LEDs and Surge Counters

This end 'up'

SPD UNIT



Color code legend for wire conductors

Mounting Feet

2.5" Hub

Conductors

- 1 – Green Ground
- 3 – Black 3600V/4160V
- 3 – White 2500V/3000V
- 3 – Red 1500V/2000V
- 3 – Yellow 1000V

Unused Conductors to be terminated in Termination Block

Connected Conductors Connect to Electrical System

**Conductors must be selected and terminated correctly. Mistakes will be catastrophic and lethal.**

Nylon Bolts for each conductor into Termination Block

Termination Block – secures unused conductors

SurgTec

A division of Advanced Protection Technologies

14550 58<sup>th</sup> St. North, Clearwater, FL 33760 Tel: (727) 535-6339, Fax: (727) 539-8955, Email: [info@surgtec.com](mailto:info@surgtec.com)

[www.surgtec.com](http://www.surgtec.com)

## Installation:

NOTE: There are no user serviceable parts inside main SPD enclosure. Opening door does not gain access to serviceable components (Optional Monitoring Package door provides service access to Monitoring Display board)

- 1.) Read all Instructions, Understand and Accept Conditions of Use (see inside front cover)
- 2.) All electrical connections must be performed by qualified electrician or technician
- 3.) Verify system voltages, Hz and compare to model number. Ensure that the proper SPD unit is being installed.
- 4.) Verify that all power circuits are deenergized and locked out
- 5.) Verify that overcurrent protection rated 200A or lower exists in the distribution system to protect the SPD
- 6.) Identify suitable location for SPD:
  - Need connected leads as short and straight as possible
  - Need to mount on surface capable of supporting 110lbs (50kg)
  - Do not cut pre-installed conductors until after installation is thought through
  - Identify nearby and suitable, dry, protected, non hazardous location for Termination Block. Unused conductors will be energized during normal operation and need to be terminated in Termination Block. Make sure Termination Block is close enough - when original Conductors are trimmed down, and electrical system voltage is changed later, those shortened conductors need to go into the Termination Block. Make sure the Termination Block is close enough. It is OK to loop or coil conductor connecting to Termination Block. (Do not loop or coil conductors connected to power system!)
- 7.) Mount SPD, install overcurrent protection and conduit as appropriate. SPD is intended for mounting such that conduit hub is on bottom. When equipped with Optional Monitoring Package, SPD MUST be installed such that vent hood is on top and vent holes are on bottom.
- 8.) Identify and Confirm system voltage. See "Selecting the Correct Voltage Tap Wires" on the next page. Identify appropriate phase conductors on SPD. Conductors are color coded and labeled for each phase.

### STAMT:

- 3 – Black for 3600V
- 3 – White for 2500V
- 3 – Red for 1500V
- 3 – Yellow for 1000V
- 1 – Green Ground

### STBMT:

- 3 – Black for 4160V
- 3 – White for 3000V
- 3 – Red for 2000V
- 3 – Yellow for 1000V
- 1 – Green Ground



- 9.) Connect SPD's three #6 phase conductors to phases A, B & C (phase sensitive)
- 10.) Connect SPD's #6 ground conductor to system ground
- 11.) Terminate unused conductors in Termination Block
  - Unused Conductors will be energized – unsure proper connection in safe location
  - Loosen bolts in Termination Block and Insert unused conductor
  - Ensure that unused conductors are properly insulated and unable to arc to other conductors
  - Tighten bolts into unused conductors to secure – torque to 10 ft-lb
- 12.) Verify system is clear of deficiencies. Maintain distance as precaution against misapplication.
- 13.) Energize unit.
- 14.) Wait two (2) minutes. Visually inspect termination block for signs of arcing. If equipped with Optional Monitoring, verify LED operation, surge counter operation and dry contacts have changed state.

## Selecting the Correct Voltage Tap Wires:

Selecting the correct Voltage Tap Wires is essential for proper operation. See table below for STAMT and STBMT models (note differences of third character; A or B).

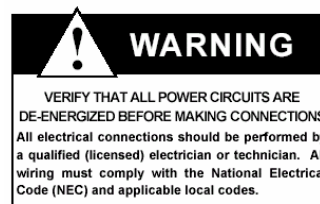
Determine system's Nominal L-L voltage. Select appropriate Color Code for Voltage Tap Wires. As double-check, confirm that actual measured L-L voltage is within allowable range.

If you have any questions on which Voltage Tap Wires to choose, contact SurgTec Tech Support at (727) 535-6339. Incorrect installation can result in failure and hazardous situation. If in doubt – call!

- Maximum Continuous Operating Voltage (MCOV) must be at least 10% higher than actual measured L-L voltages. If MCOV is equal or less than actual L-L voltages, the SPD will conduct current, immediately overheat internally and fail.
- Selecting Voltage Tap Wires intended for higher voltage than actual voltage will reduce protection. Likewise, selecting incorrect Tap Wires are likely to damage the Optional Monitoring Package or cause malfunction.

If you have any questions on which Voltage Tap Wires to choose, contact SurgTec Tech Support at (727) 535-6339.

STAMT			
Nominal Voltage (L-L)	Conductor Color Code	MCOV	Allowable System Voltage (L-L)
3600V	Black	4460V	2755V to 3950V
2500V	White	3060V	1676V to 2754V
1500V	Red	1860V	1081V to 1675V
1000V	Yellow	1200V	900V to 1080V
STBMT			
Nominal Voltage (L-L)	Conductor Color Code	MCOV	Allowable System Voltage (L-L)
4160V	Black	5000V	3241V to 4500V
3000V	White	3600V	2161V to 3240V
2000V	Red	2400V	1081V to 2160V
1000V	Yellow	1200V	900V to 1080V



## *Changing Tap Wires:*

NOTE: There are no user serviceable parts inside main SPD enclosure. Opening door does not gain access to serviceable components (Optional Monitoring package door provides service access to Monitoring Display board)

- 1.) Review all Instructions, Understand and Accept Conditions of Use (see inside front cover)
- 2.) All electrical connections must be performed by qualified electrician or technician
- 3.) Verify that all power circuits are deenergized and locked out
- 4.) Verify that overcurrent protection rated 200A or lower exists in the distribution system to protect the SPD
- 5.) Identify and Confirm new system voltage. Identify appropriate phase conductors on SPD. Conductors are color coded and labeled for each phase

### STAMT:

- 3 – Black for 3600V
- 3 – White for 2500V
- 3 – Red for 1500V
- 3 – Yellow for 1000V
- 1 – Green Ground

### STBMT:

- 3 – Black for 4160V
- 3 – White for 3000V
- 3 – Red for 2000V
- 3 – Yellow for 1000V
- 1 – Green Ground

- 6.) Connect appropriate three #6 phase conductors to phases A, B & C (phase sensitive)
- 7.) Make sure SPD's #6 ground conductor stays connected to system ground
- 8.) Terminate unused conductors in Termination Block
  - Unused Conductors will be energized – unsure safe location
  - Loosen bolts in Termination Block and Insert unused conductor
  - Ensure that unused conductors are properly insulated and unable to arc to other conductors
  - Tighten bolts into unused conductors to secure – torque to 10 ft-lb
- 9.) Verify system is clear of deficiencies. Maintain distance as precaution against misapplication.
- 10.) Energize unit.
- 11.) Wait two (2) minutes. Visually inspect termination block for signs of arcing. If equipped with Optional Monitoring, verify LED operation, surge counter operation and dry contacts have changed state.

## *Operational Status: Standard STMT without Optional Monitoring Package:*

The standard STMT SPD does not have operational indicators. One may assume that it is 100% functional when energized. Treat the SPD as suspect whenever an upstream overcurrent protection operates.

## Operational Status: Enhanced STMT with Optional Monitoring Package:

**Indicator Lights:** Each phase has a bright cluster of green LEDs. When lit, the suppression circuit for that phase is on-line and working properly.

An extinguished indicator light indicates:

- Failed SPD
- Loss of phase or grounded phase

Either situation requires immediate action by appropriate service personnel



If all three phase indicators are extinguished the unit may be improperly installed, deenergized or needs replacement.

**Surge Counters:** Each phase has its own surge counter for statistical recording purposes. The surge counter provides a means to totalize the number of transient voltage surges encountered since the counter was last reset.

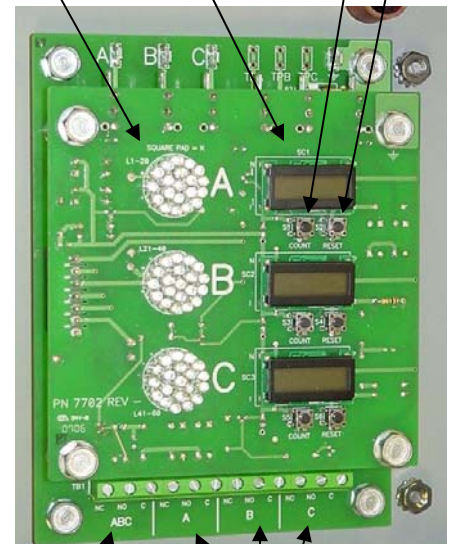
Under the front cover, each phase has its own "Reset" and "Test Count" buttons. Pressing "Test Count" increments the counter by one (1). Pressing "Reset" resets the counter to zero (0).

**Dry Contacts:** The entire SPD, plus each phase has its own set of Form C Normally Open (NO) and Normally Closed (NC) dry contacts. The terminal block is inside the cover of the monitoring option enclosure. These relay contacts can be used for remote indication of the SPD's operating status. Typical Normally Open configuration will use the NO and Common terminals. Typical Normally Closed configuration will use the NC and Common terminals.

Remote monitoring of each phase's dry contact will also provide indication of a Phase to Ground fault. For example, if one phase faults, that line's voltage drops to zero and the dry contact will change state. This can be remotely configured as ground fault indication.

The Dry Contacts are designed for low voltage control signals only. Maximum switching current is 0.5Amp and maximum switching voltage is 120VAC. The Diagnostic Board is field replaceable if de-energized and capacitance is bled off unit. Please call for assistance.

Super Bright LED Cluster  
Surge Counter LCD Display  
Surge Counter Test Count Reset



Complete SPD Dry Contact  
Per Phase Dry Contacts

Phase	Output Terminals	Description
ABC	NC (normally closed)	Use either the NO or NC terminal and the Common to monitor the operating status of all 3 Phases simultaneously
	NO (normally open)	
	Common	
A	NC (normally closed)	Use either the NO or NC terminal and the Common to monitor the operating status of Phase A only
	NO (normally open)	
	Common	
B	NC (normally closed)	Use either the NO or NC terminal and the Common to monitor the operating status of Phase B only
	NO (normally open)	
	Common	
C	NC (normally closed)	Use either the NO or NC terminal and the Common to monitor the operating status of Phase C only
	NO (normally open)	
	Common	

## *Problems & Failures:*

- SPDs are purposely put in harm's way to protect load
- SPDs will protect load or Die Trying
- SPDs will protect until failure
- SPDs rarely fail from surges
- Failed SPD is usually caused by system related Sustained Overvoltage – there is usually a problem in the system – check it!
- SPD does not draw current unless it is actively suppressing an overvoltage. Therefore, it does not normally generate heat. In the event of overtemperature, paint discoloration, deformed enclosure, deformed conductors or other abnormal condition, maintain safe distance and deenergize SPD immediately.

## *Open Nearby Overcurrent Protection:*

This is usually a signal of problems on the system, such as equipment fault, etc. Under certain conditions, it is possible that an equipment failure can skew system voltages far enough that the SPD will attempt to control any overvoltages. Due to relatively sustained conditions, this may fail the SPD. This may not be obvious. Be aware that SPD's rarely fail from surges; they almost always fail from system level overvoltage problems. When the equipment is serviced and reenergized, the SPD may fail. We recommend that the SPD be tested in conjunction with any other equipment failure as follows:

## *Troubleshooting:*

Safely deenergize unit and isolate from other all equipment. Use a DC ohmmeter or continuity meter to measure the impedance of each phase's suppression elements. The following combinations exist: A-B, B-C, C-A, A-G, B-G and C-G. The ohmmeter should show Megaohm to Infinite impedance for every mode of protection. (AC ohmmeters may load down the circuit and provide false indication of low impedance.) Any short circuits clearly indicate an internal fault - *do not reuse SPD - replace it.*

If you have or suspect problems, call SurgTec Tech Support at (727) 535-6339.

