THOMSON™
POWER SYSTEMS

QUICK START GUIDE
TS 870 ATS
100A – 800A (OPEN TRANSITION)

TSC 7320 Controller Firmware Version ≥ R0

DANGER

HAZARD OF ELECTRICAL SHOCK, EXPLOSION, OR ARC FLASH

- Read and understand this quick start guide before installing and operating the transfer switch
- The installer is responsible for compliance with National Electrical Code (NEC) or Canadian Electrical Code (CEC) requirements with respect to installation of this equipment.
- Many components of this equipment operate at line voltage. DO NOT TOUCH. Use only electrically isolated tools.
- Install and close all covers before applying power to this equipment.
- Do not open covers to equipment until ALL power sources are disconnected.
- This equipment must be installed and serviced only by qualified electrical personnel utilizing safe work practices and appropriate Personal Protective Equipment (PPE).

Failure to do so may cause personal injury or death

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A. Introduction

Thank you for purchasing a Thomson Power Systems product. This quick start guide applies to open transition TS 870 Industrial Transfer Switch 100A-800A models with TSC 7320 Controller. For other model types including Closed Transition, Dual Source, please contact Thomson Power Systems.

NOTE: Rev 0 of this Quick Start Guide applies to TSC 7320 with firmware revision **R0**.

This quick start guide contains all the information you typically need to install and set up a Thomson Power Systems TS 870 Transfer Switch.

To conserve our natural resources, the transfer switch does not include printed O&M manuals. O&M manuals containing complete information about operating the transfer switch is available at our Web site. Go to www.thomsonps.com and download applicable TS 870 and TSC 7320 O&M manuals.
NOTE: All information contained in this quick start guide is for reference only and is subject to change without notice.

B. Check Equipment Delivery

Upon delivery of the transfer switch, remove the product packaging and verify the product has not been damaged.

WARNING: Damaged Transfer Switch equipment: Do not install or operate the transfer switch if it appears damaged. **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

Check that the model number printed on the equipment label on the door of the transfer switch is the same as on the delivery note corresponding to the purchase order.

C. Check Line Voltage/Amperage

Verify the line voltage and amperage of the transfer switch product labeling matches the site requirements.
NOTE: All TS 870 transfer switches are equipped with *Multi-Voltage* field change feature capability. The TS 870 transfer switch can be configured for operation on different nominal voltage levels by way of TSC 7320 software configuration and control transformer tap change. Refer to Section O of this guide for detailed voltage change procedure.
NOTE: For applications utilizing single phase high-leg/red-leg delta systems, refer to detailed instructions provided in the TS 870 O&M manual for voltage phasing connections or damage may result.

WARNING: Do not install the transfer switch if either voltage or amperage does not match**. Failure to follow these instructions can result in death, serious injury, or equipment damage.**

D. Installation Requirements

Before installing the transfer switch, review the following requirements:

- **Installation Codes/Permits**: Suitable permits are required by local authorities having jurisdiction prior to installing standby generator sets and automatic transfer switches.
- **Installation Location**: The standard TS 870 transfer switch is designed for indoor wall mounting or outdoor wall mounting with NEMA 3R rating. The transfer switch must be installed in an environment where the temperature range is within +5° to +122° Fahrenheit (-15° to +50° Celsius) and humidity range not exceeding 5%-95% non-condensing.
- **Power Cabling**: All power cabling entering/exiting the enclosure must be installed in suitably sized conduit per NEC/CEC requirements. Ampacity, type and voltage rating of current carrying conductors must also comply with NEC/CEC requirements and local authorities having jurisdiction.
- **Control Wiring**: All control wiring for engine start, load shed, alarm and remote test must be installed in separate conduits from all power cabling and must utilize suitably sized conduits per NEC/CEC requirements. All control wiring shall be sized for minimum #18 AWG. Control wiring type and voltage rating must also comply with NEC/CEC requirements and local authorities having jurisdiction.

  NOTE: All field wiring/communication cabling that maybe field installed directly onto any ATS door mounted components must be suitably routed and protected across the door hinge to prevent possible mechanical damage upon door opening and/or door closing.
- **Generator Set Automatic Operation**: The TS 870 transfer switch operates in conjunction with any generator set with remote automatic starting capabilities utilizing a 2 wire, remote start control contact input. A dry contact is provided for remote generator starting control (contact closes to start generator and opens to stop generator).
- **Load Types:** The standard TS 870 is suitable for control of motors, electric discharge lamps, tungsten filament lamps, and electric heating equipment where the sum of motor full-load ampere ratings and the ampere ratings of other loads do not exceed the ampere rating of the switch and the tungsten load does not exceed 30 percent of the switch rating.
- **Upstream Overcurrent Protection:** Standard TS 870 transfer switch models do not contain any integral over current protection and require upstream over current protection devices for both Utility and Generator sources.
- **Application**: The TS 870 Transfer Switch is Listed by Underwriters Laboratories (UL) to Safety Standard UL 1008 for Transfer Switches for Emergency Standby applications. This product is intended for installation and operation on legally required standby applications for emergency power systems as defined by the National Electrical Code (NEC).
- **Withstand/Interrupting Current Ratings**: Refer to electrical ratings shown on Table #1 below for withstand current ratings on Standard TS 870 type transfer switches. Refer to electrical ratings shown Table #2 for interrupting ratings for Service Entrance type ATS or ATS's supplied with power switching devices with integral trip units.

WARNING: Do not install the transfer switch on systems with higher available short circuit current levels than listed in Table #1. **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

Table #1
Withstand Current Ratings

BASIC MODEL	MAX VOLTAGE (VOLTS)	RATED CURRENT (AMPS)	WITHSTAND CURRENT RATING (AMPS) (RMS) [1]		
			@240V	@480V	@600V
TS87xA-0100	600	100	65,000	25,000	18,000
TS87xA-0150	600	150	65,000	25,000	18,000
TS87xA-0200	240	200	65,000	N/A	N/A
TS87xA-0250[3]	600	250	65,000	65,000	35,000
TS87xA-0400	600	400	65,000	50,000	35,000
TS87xA-0600	600	600	65,000	50,000	35,000
TS87xA-0800	600	800	65,000	50,000	35,000

1. Standard ratings only are shown. Consult Thomson Power Systems for versions with higher withstand current ratings.
2. For other model types not shown, contact Thomson Power Systems for further information.
3. Withstand rating specified is for 250A, 3P. For 250A, the 4P rating are 65KA@240V, 35KA@480V and 22KA@600V

E. Service Entrance Rated ATS (US Market Only)

The following information pertains only to Automatic Transfer Switches supplied for the US Market with Service Entrance rated option or ATS models with integral overcurrent protection option.

- **Upstream Overcurrent Protection (Service Entrance Rated TS 870)**: Service Entrance rated TS 870 transfer switch models contain integral over current protection for the Utility source as standard. Service Entrance rated TS 870 transfer switches do not contain any integral over current protection for the generator source and requires upstream generator source over current protection. The Service Entrance rated TS 870 is rated for 80% maximum continuous loading of load types as described above.

WARNING: Do not install the transfer switch on systems with higher available short circuit current levels than listed in Table #2. **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

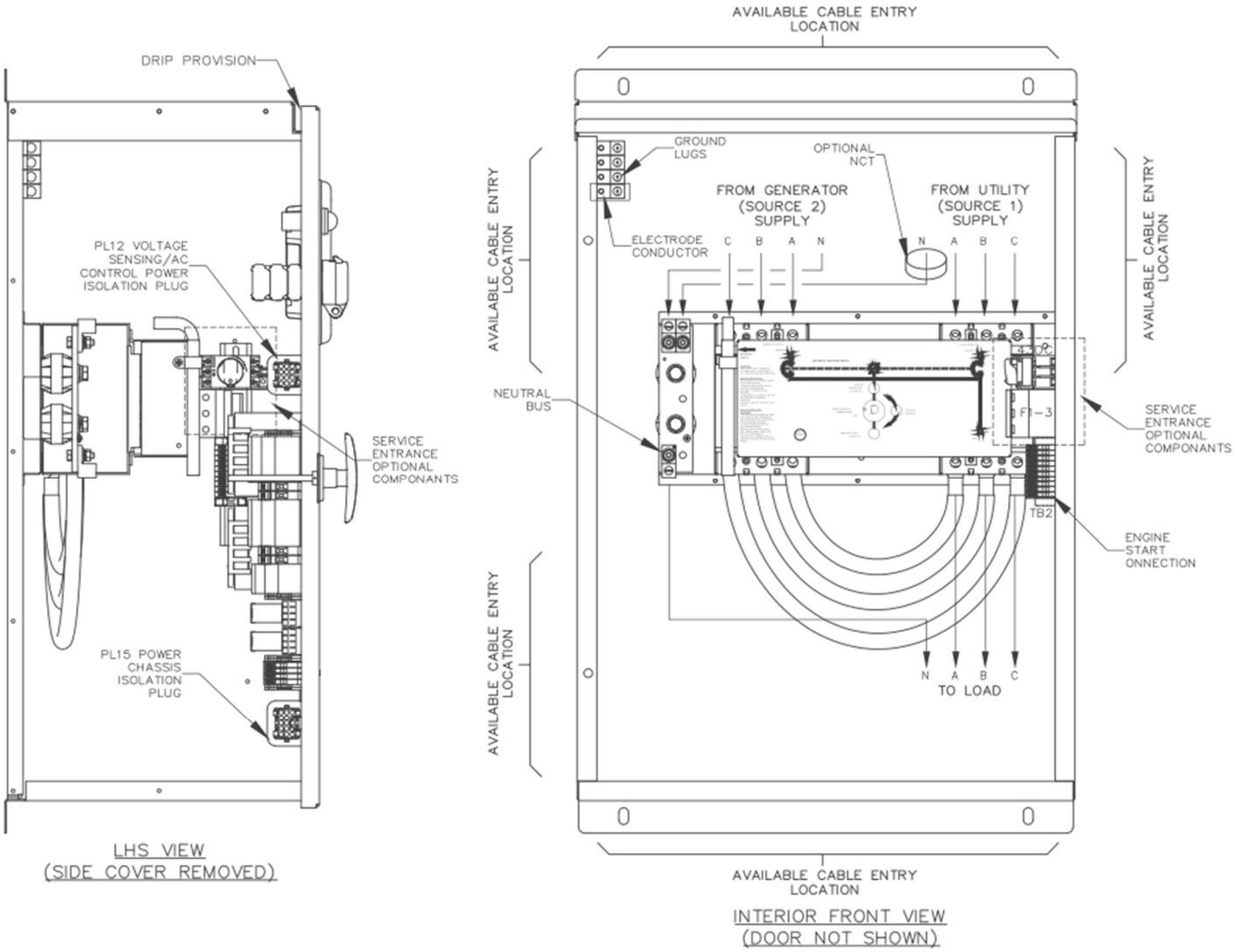
Table #2
Interrupting Current Ratings (for ATS with Internal Overcurrent Trip Units)

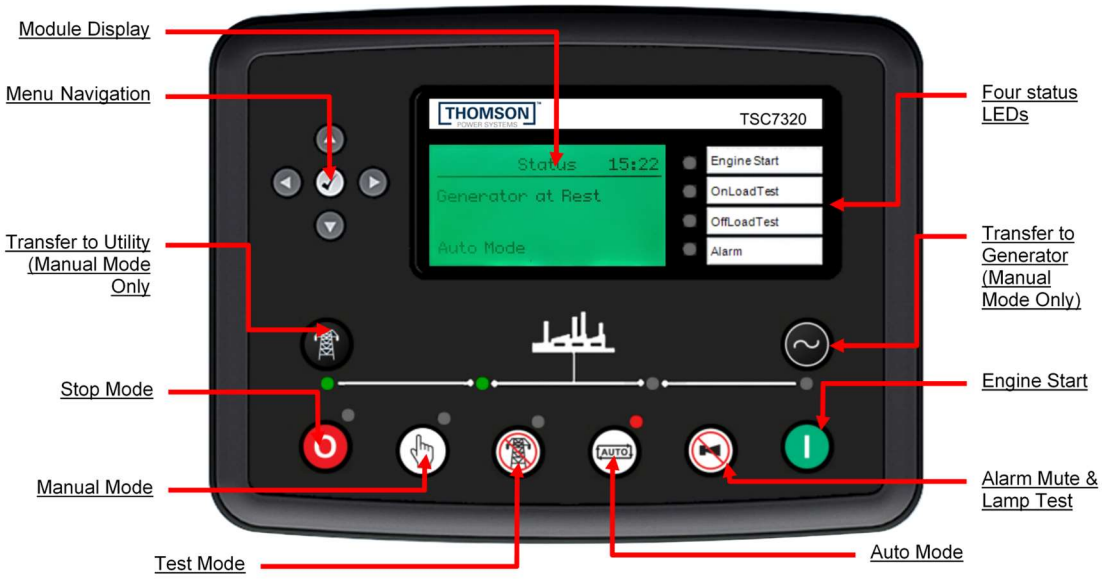
BASIC MODEL	MAX VOLTAGE (VOLTS)	RATED CURRENT (AMPS)	INTERRUPTING CURRENT RATING (AMPS) (RMS) [1]		
			No Upstream Overcurrent Protection Required		
			@240V	@480V	@600V
TS87xA-0100	600	100	65,000	25,000	14,000
TS87xA-0150	600	150	65,000	25,000	14,000
TS87xA-0200	240	200	65,000	N/A	N/A
TS87xA-0250	600	250	65,000	65,000	35,000
TS87xA-0400	600	400	65,000	50,000	25,000
TS87xA-0600	600	600	65,000	50,000	25,000
TS87xA-0800	600	800	65,000	50,000	25,000

1. Standard ratings only are shown. Contact Thomson Power Systems for versions with higher interrupting current ratings.
2. For other model types not shown, contact Thomson Power Systems for further information.

F. Typical Interior Component Layout Drawing

3 Pole Model, 100A—200A Shown





G. Power Conductor Installation

The transfer switch is provided with power cable lugs for line, load and neutral block as per sizes indicated in Table #3 below. All Power cables are to be installed and torqued on the lugs per values indicated on Table #3. Refer to ATS Physical Layout drawings as supplied with the ATS for Power Cable entry/exit locations on the enclosure.

WARNING: Failure to properly install and adequately tighten power cable connections can result in equipment malfunction and/or damage.

TABLE #3

BASIC MODEL	NUMBER OF POLES	DIMENSIONS INCHES (mm) [1]			SHIPPING WEIGHT	TERMINAL RATING [3]	
		HEIGHT	WIDTH	DEPTH	lbs (KG)	QTY PER PHASE	RANGE [4]
100A	2, 3, 4	31.1 (790)	22.3 (566)	14 (356)	143 (65)	1	#14 - 1/0
150A	2, 3, 4	31.1 (790)	22.3 (566)	14 (356)	143 (65)	1	#2 - 4/0
200A	2, 3, 4	31.1 (790)	22.3 (566)	14 (356)	143 (65)	1	#6 - 350 MCM
250A	2, 3, 4	35.1 (892)	27.3 (693)	14 (356)	172 (78)	1	#6 - 350 MCM
400A	2, 3	43.1 (1095)	34.3 (871)	13 (330)	227 (103)	2	2/0 - 500 MCM
400A	4	48.1 (1222)	37.8 (960)	14.5 (368)	256 (116)	2	2/0 - 500 MCM
600A	2, 3	46.1 (1171)	36.3 (922)	14.5 (368)	248 (113)	2	2/0 - 500 MCM
600A	4	48.1 (1222)	37.8 (960)	14.5 (368)	256 (116)	2	2/0 - 500 MCM
800A	2, 3	48.1 (1222)	37.8 (960)	14.5 (368)	309 (140.4)	3	2/0 - 500 MCM
800A	4	63.1 (1603)	40.8 (1036)	14.5 (368)	367 (167)	3	2/0 - 500 MCM

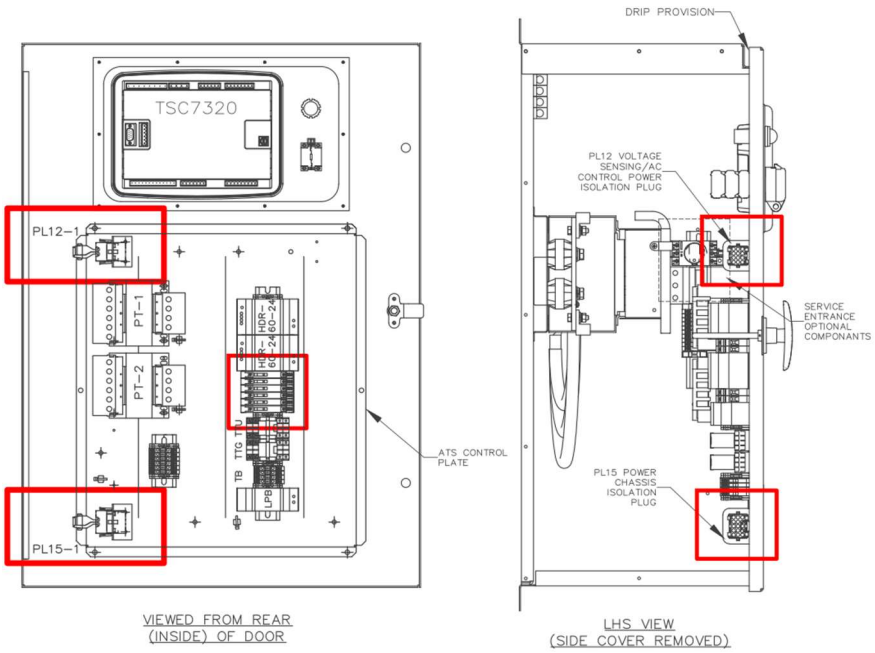
Optional NEMA 3R & 4X class enclosures available — consult Thomson Power Systems.

For ATS with Distribution Breaker Option contact factory for dimensions.

[1] Enclosure dimensions are for reference. (DO NOT USE FOR CONSTRUCTION)
[3] All cable connections suitable for copper or aluminum
[4] Optional terminal ratings are available in some models – Consult Thomson Power Systems

H. Power Conductor Insulation Resistance Testing

NOTE: Before insulation resistance testing is conducted, the Transfer Switch electronic Controller (TSC 7320) must be isolated from the power wiring by unplugging ATS wiring plugs PL12 & PL15 located on the inside of the ATS door. Next isolate the 24VDC section by opening all fuses on the Potential Transformer plate and disconnecting any 24VDC auxiliary power source connected to the B+ and B- terminals. Refer to drawing shown below. Failure to isolate the TSC 7320 controller for insulation resistance testing can result in equipment malfunction and/or damage.



Following power cable installation, and isolating the TSC 7320 controller, all power cables shall be appropriately insulation resistance tested to ensure no cross-phase connections or conduction to ground.

Once insulation resistance testing is complete, re-insert PL12 & PL15 isolation plugs, and close all the fuses on the Potential Transformer plate.

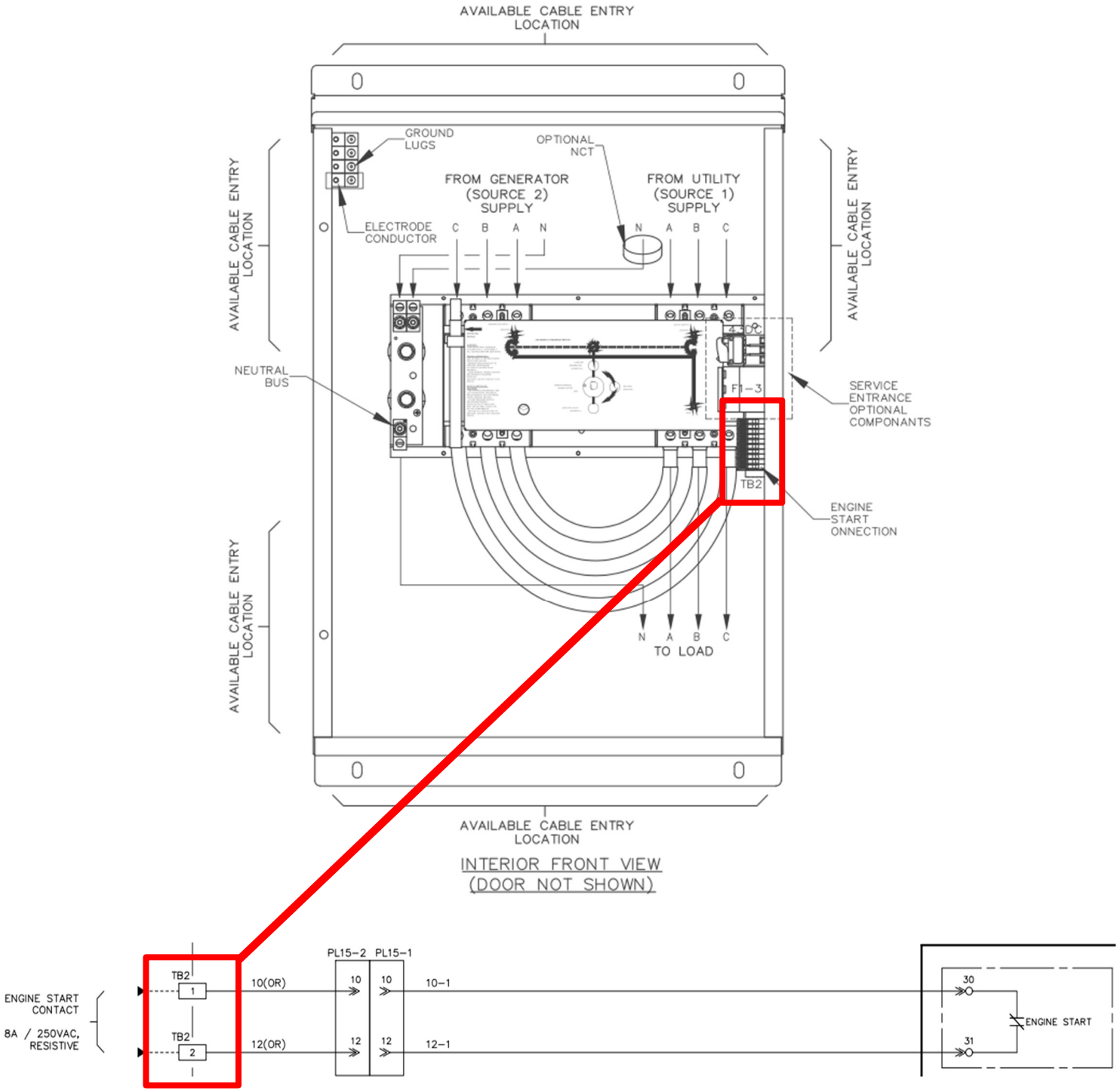
I. Engine Start Wiring Connections

The Engine start wiring connection is located on the inside of the ATS Enclosure on the right-hand side wall as highlighted on the drawing below.

The engine start circuit works in conjunction with any generator set with remote automatic starting capabilities utilizing a 2 wire, remote start control contact input. A dry contact is provided for remote generator starting control (contact closes to start generator and opens to stop generator). Connections are made to TB2 terminals **#1 & #2** per drawing shown below. Note: the contacts are rated for 8 amps @ 250VAC with a resistive load.

NOTE: if control power is de-energized to the TSC 7320 controller, the engine start contact will automatically close to start the generator set, following the engine start delay time setting.

WARNING: Do not apply a resistive load greater than 8A @ 250VAC across the engine start terminals #30 & #31 as this will cause damage to the TSC 7320 controller.

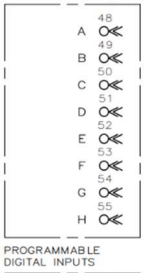


J. Remote Input Wiring Connections

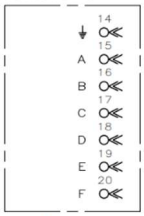
The TSC 7320 is provided from the factory with 14 programmable inputs with default settings per table shown below. 8 of the inputs are digital inputs, and the other 6 are analogue inputs that can also be programmed to be more digital inputs. Refer to the TSC 7320 Manual for further information on programming changes as required.

NOTE: All control wiring required for any remote input connection must be made directly to the door mounted TSC 7320 as per drawing below. All input wire cabling that may be installed must be suitably routed and protected across the door hinge to prevent possible mechanical damage upon door opening and/or door closing.

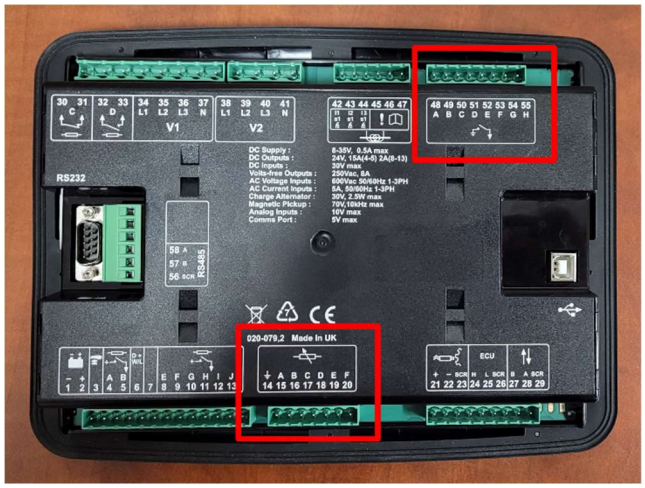
WARNING: Do not apply any voltage across the input terminal and DC common as this will cause damage to the TS 7320 controller. Connect only a dry (i.e. voltage-free) contact.



PROGRAMMABLE DIGITAL INPUTS



PROGRAMMABLE ANALOGUE INPUTS



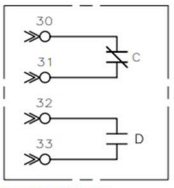
Inputs	Pin No.	Descriptions
DIGITAL INPUT A	48	GENERATOR BREAKER FEEDBACK
DIGITAL INPUT B	49	MAINS BREAKER FEEDBACK
DIGITAL INPUT C	50	NOT MAPPED
DIGITAL INPUT D	51	MANUAL OPERATION
DIGITAL INPUT E	52	OPEN TRANSITION WITH NEUTRAL DELAY
DIGITAL INPUT F	53	SERVICE DISCONNECT REQUEST
DIGITAL INPUT G	54	REMOTE OFF LOAD TEST
DIGITAL INPUT H	55	REMOTE ON LOAD TEST
GROUND	14	480V 3PH 4W CONFIGURATION
ANALOGUE INPUT A	15	120/240V 1PH 3W CONFIGURATION
ANALOGUE INPUT B	16	208V 3PH 4W CONFIGURATION
ANALOGUE INPUT C	17	240V 3PH 4W CONFIGURATION
ANALOGUE INPUT D	18	600V 3PH 4W CONFIGURATION
ANALOGUE INPUT E	19	110V 1PH 2W CONFIGURATION
ANALOGUE INPUT F	20	NOT MAPPED

K. Programmable Output Contacts

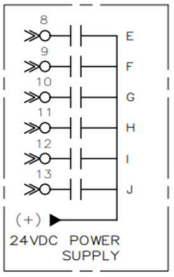
The TSC 7320 is provided from the factory with 8 programmable digital outputs and 2 programmable dry contact outputs with default settings per the table shown below. Refer to the TSC 7320 Manual for further information on programming changes as required. The Digital outputs are rated 2A @ 24VDC resistive. Dry output contacts are rated at 8 amps @ 250Vac resistive. One of the dry contacts are normally closed and the other contact is normally open.

NOTE: All control wiring required for any programmable output connections must be made directly to the door mounted TSC 7320 controller as per drawing below. All output wire cabling that may be installed must be suitably routed and protected across the door hinge to prevent possible mechanical damage upon door opening and/or door closing.

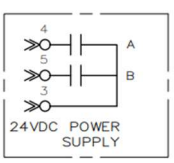
WARNING: Do not apply any voltage across the output contacts as this will cause damage to the TSC 7320 controller. Connect a load in series with applicable voltage/current as specified.



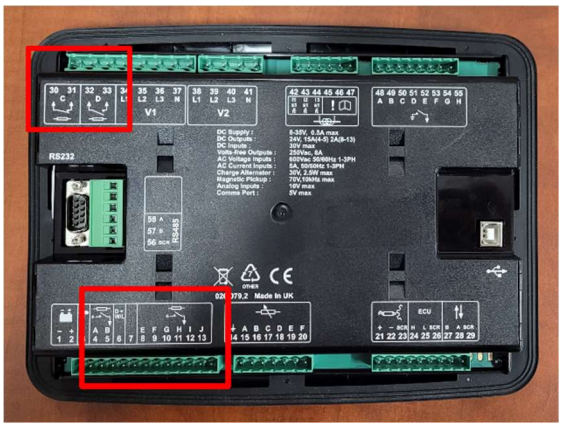
PROGRAMMABLE CONTACT OUTPUTS



PROGRAMMABLE DIGITAL OUTPUTS 2A RESISTIVE RATED



PROGRAMMABLE DIGITAL OUTPUTS 15A RESISTIVE RATED



Outputs	Pin No.	Rating (Resistive)	Descriptions
DC OUTPUT A	4	15A @ 24VDC	ATS ON SOURCE 1 (PWR FROM PIN 3)
DC OUTPUT B	5	15A @ 24VDC	ATS ON SOURCE 2 (PWR FROM PIN 3)
DC OUTPUT E	8	2A @ 24VDC	TRANFER TO GENERATOR
DC OUTPUT F	9	2A @ 24VDC	TRANFER TO UTILITY
DC OUTPUT G	10	2A @ 24VDC	TRANSFER TO NEUTRAL
DC OUTPUT H	11	2A @ 24VDC	CLOSED TRANSITION MODE
DC OUTPUT I	12	2A @ 24VDC	FAIL TO TRANSFER
DC OUTPUT J	13	2A @ 24VDC	ATS NOT IN AUTO MODE
RELAY OUTPUT C	30	8A @ 250VAC	ENGINE START CONTACTS
	31		
RELAY OUTPUT D	32	8A @ 250VAC	LOAD DISCONNECT CONTACTS
	33		

L. TSC 7320 Factory Default Programming

The TSC 7320 is factory programmed with default settings as shown as per the following table. NOTE: This table is applicable for firmware version R0. Refer to the TSC 7320 O&M Manual for programming instructions to change any default setting.

TSC 7320 FACTORY DEFAULT PROGRAMMING SETTINGS

Function	Description	Range	Factory Default Value	Percentage of nominal
PLC Instruments				
NeutralDelayStp	Neutral Delay Timer	0 - 86400 sec	3 sec	N/A
ElevatorPreTimer	Elevator Pre-park Timer	0 - 86400 sec	0 sec	N/A
ElevatorPostTimer	Elevator Post-park Timer	0 - 86400 sec	3 sec	N/A
Start Timers				
Mains Transient Delay	Engine Start Delay	0 - 30 sec	2 sec	N/A
Warming	Generator Warmup Timer	0 - 3600 sec	1 sec	N/A
Load / Stopping Timers				
Return Delay	Utility Return Timer	0 - 18000 sec	300 sec	N/A
Cooling	Generator Engine Cooldown	0 - 3600 sec	300 sec	N/A
Generator Options				
AC System	AC Electrical Configuration		3PH, 4W	N/A
Generator Voltage and Alarms[1]				
Under Voltage Alarm Trip	Under Voltage Alarm Threshold	50 - 409V PhN	234V PhN	84
Under Voltage Pre-Alarm Trip	Under Voltage Pre-Alarm Threshold	51 - 410V PhN	235V PhN	85
Nominal Voltage	Nominal Voltage	53 - 412V PhN	277V PhN	100
Over Voltage Alarm Trip	Over Voltage Alarm Threshold	55 - 414V PhN	319V PhN	115
Over Voltage Shutdown Trip	Over Voltage Shutdown Threshold	96 - 415V PhN	320V PhN	116
Generator Frequency and Alarms[1]				
Under Frequency Pre-Alarm Trip	Under Frequency Pre-Alarm Threshold	0.1 - 74.4 Hz	56.9 Hz	95
Nominal Frequency	Nominal Frequency	0.3 - 74.6 Hz	60.0 Hz	100
Mains Options				
AC System	AC Electrical Configuration		3PH, 4W	N/A
Mains Alarms[1]				
Under Voltage Alarm Trip	Under Voltage Alarm Threshold	50 - 412V PhN	234V PhN	84
Over Voltage Alarm Trip	Over Voltage Alarm Threshold	53 - 415V PhN	320V PhN	116
Under Frequency Trip	Under Frequency Alarm Threshold	0.0 - 74.7 Hz	56.9 Hz	95

[1] Alarm threshold values must cascade in value

Alternate Voltage configurations				
120/240 V Generator Voltage and Alarms[1] **(L1 - L2)**				
AC System	AC Electrical Configuration		1PH, 3W	
Under Voltage Alarm Trip	Under Voltage Alarm Threshold	50 - 409V PhN	101V PhN	84
Under Voltage Pre-Alarm Trip	Under Voltage Pre-Alarm Threshold	51 - 410V PhN	102V PhN	85
Nominal Voltage	Nominal Voltage	53 - 412V PhN	120V PhN	100
Over Voltage Alarm Trip	Over Voltage Alarm Threshold	55 - 414V PhN	138V PhN	115
Over Voltage Shutdown Trip	Over Voltage Shutdown Threshold	56 - 415V PhN	139V PhN	116
120/240V Mains Alarms[1]				
AC System	AC Electrical Configuration		1PH, 3W	
Under Voltage Alarm Trip	Under Voltage Alarm Threshold	50 - 412V PhN	101V PhN	84
Over Voltage Alarm Trip	Over Voltage Alarm Threshold	53 - 415V PhN	139V PhN	116
208V Generator Voltage and Alarms[1]				
AC System	AC Electrical Configuration		3PH, 4W	
Under Voltage Alarm Trip	Under Voltage Alarm Threshold	50 - 409V PhN	101V PhN	84
Under Voltage Pre-Alarm Trip	Under Voltage Pre-Alarm Threshold	51 - 410V PhN	102V PhN	85
Nominal Voltage	Nominal Voltage	53 - 412V PhN	120V PhN	100
Over Voltage Alarm Trip	Over Voltage Alarm Threshold	55 - 414V PhN	138V PhN	115
Over Voltage Shutdown Trip	Over Voltage Shutdown Threshold	56 - 415V PhN	139V PhN	116
208V Mains Alarms[1]				
AC System	AC Electrical Configuration		3PH, 4W	
Under Voltage Alarm Trip	Under Voltage Alarm Threshold	50 - 412V PhN	101V PhN	84
Over Voltage Alarm Trip	Over Voltage Alarm Threshold	53 - 415V PhN	139V PhN	116
240V Generator Voltage and Alarms[1]				
AC System	AC Electrical Configuration		3PH, 4W	
Under Voltage Alarm Trip	Under Voltage Alarm Threshold	50 - 409V PhN	117V PhN	84
Under Voltage Pre-Alarm Trip	Under Voltage Pre-Alarm Threshold	51 - 410V PhN	118V PhN	85
Nominal Voltage	Nominal Voltage	53 - 412V PhN	139V PhN	100
Over Voltage Alarm Trip	Over Voltage Alarm Threshold	55 - 414V PhN	160V PhN	115
Over Voltage Shutdown Trip	Over Voltage Shutdown Threshold	56 - 415V PhN	161V PhN	116
240V Mains Alarms[1]				
AC System	AC Electrical Configuration		3PH, 4W	
Under Voltage Alarm Trip	Under Voltage Alarm Threshold	50 - 412V PhN	117V PhN	84
Over Voltage Alarm Trip	Over Voltage Alarm Threshold	53 - 415V PhN	161V PhN	116

600V Generator Voltage and Alarms[1]				
AC System	AC Electrical Configuration		3PH, 4W	
Under Voltage Alarm Trip	Under Voltage Alarm Threshold	50 - 409V PhN	294V PhN	85
Under Voltage Pre-Alarm Trip	Under Voltage Pre-Alarm Threshold	51 - 410V PhN	295V PhN	85
Nominal Voltage	Nominal Voltage	53 - 412V PhN	347V PhN	100
Over Voltage Alarm Trip	Over Voltage Alarm Threshold	55 - 414V PhN	399VPhN	115
Over Voltage Shutdown Trip	Over Voltage Shutdown Threshold	56 - 415V PhN	400V PhN	115
600V Mains Alarms[1]				
AC System	AC Electrical Configuration		3PH, 4W	
Under Voltage Alarm Trip	Under Voltage Alarm Threshold	50 - 412V PhN	293V PhN	84
Over Voltage Alarm Trip	Over Voltage Alarm Threshold	53 - 415V PhN	401V PhN	116
110V Generator Voltage and Alarms[1]				
AC System	AC Electrical Configuration		1PH, 2W	
Under Voltage Alarm Trip	Under Voltage Alarm Threshold	50 - 409V PhN	92V PhN	84
Under Voltage Pre-Alarm Trip	Under Voltage Pre-Alarm Threshold	51 - 410V PhN	93V PhN	85
Nominal Voltage	Nominal Voltage	53 - 412V PhN	110V PhN	100
Over Voltage Alarm Trip	Over Voltage Alarm Threshold	55 - 414V PhN	127V PhN	115
Over Voltage Shutdown Trip	Over Voltage Shutdown Threshold	56 - 415V PhN	128V PhN	116
110V Mains Alarms[1]				
AC System	AC Electrical Configuration		1PH, 2W	
Under Voltage Alarm Trip	Under Voltage Alarm Threshold	50 - 412V PhN	92V PhN	84
Over Voltage Alarm Trip	Over Voltage Alarm Threshold	53 - 415V PhN	128V PhN	116

M. Transfer Switch Operation

a. TSC 7320 Display Password Security Description/Login (User Administration)

There are two different areas to change the controller settings, one of the requires entering a pin to change the settings, and the other are does not require a pin.

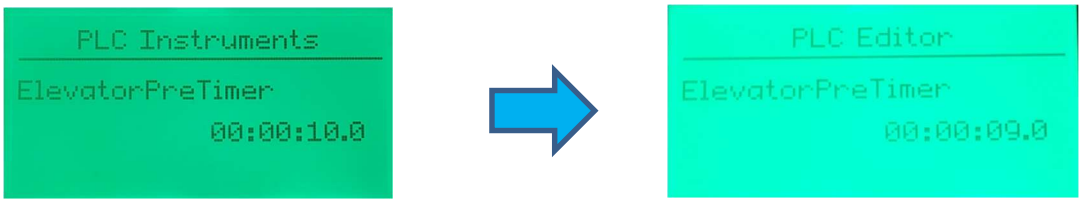
The following settings can be changed in the non-restricted area:

- Enable Elevator Timers - Elevator pre-timer - Elevator post-timer - Neutral delay timer



With the transfer switch energized, follow the procedure below to access the above settings:

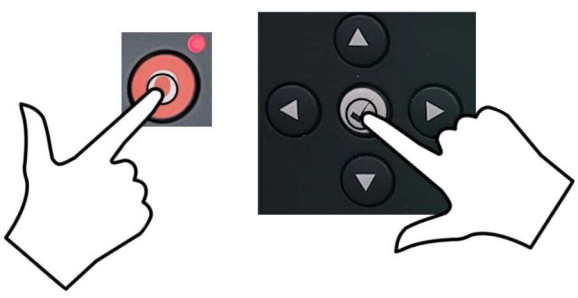
- Put the Transfer Switch into the “STOP” mode, by pressing the red button in the lower left corner of the controller.
- Use the left or right navigation keys to find the “PLC Instrumentation Page”
- Use the up or down navigation keys to find the setting to be adjusted
- Press and hold the center checkmark button until the header changes to “PLC Editor” (about 1 second)
- The timer on the screen will now begin to flash. Use the up or down navigation buttons to change the value of the timer
- When the desired value is set, press the center checkmark to save the timer and exit.
- If more settings need to be adjusted, repeat the above procedure.
- *Exiting the editor will automatically return the controller to auto mode.*



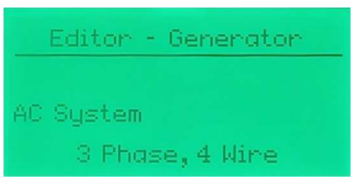
To prevent un-authorized access, all the other transfer switch settings can only be changed in the restricted area.

With the transfer switch energized, follow the procedure below to login to the TSC 7320 controller:

- Put the Transfer Switch into the “STOP” mode, by pressing the red button in the lower left corner of the controller.
- Press the stop button AND the center checkmark button (middle of navigation buttons) at the same time.
- The screen’s header will read “Editor” and the screen will ask for a 4-digit pin number.
- Use the navigation buttons to enter the default PIN “1 1 1 1”. The up and down buttons will change the value, and the left and right buttons will let the user cycle between the 4 digits.
- After the pin has been entered, press the center checkmark button to confirm and login to the restricted area.
- The left or right navigation keys can now be used to cycle between different groups of settings, and the up and down buttons can be used to cycle between the settings for that group
- Once the screen shows the desired setting, press the center checkmark button and the value will start to flash
- Use the up and down buttons to change the value, and the center checkmark button to confirm that value
- Find and change all settings as desired
- To exit the editor mode, hold the center checkmark button for 5 seconds while not editing any settings.





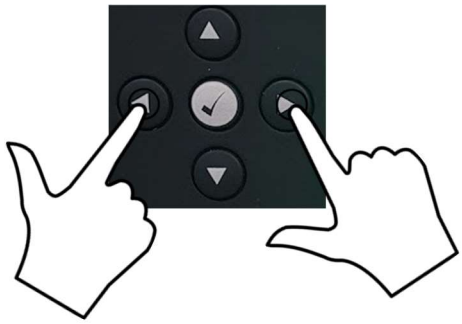


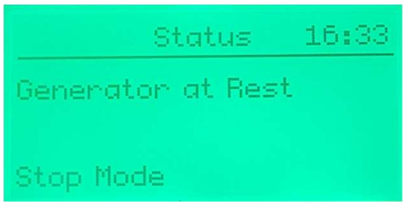
b. *Display Screen Navigation*

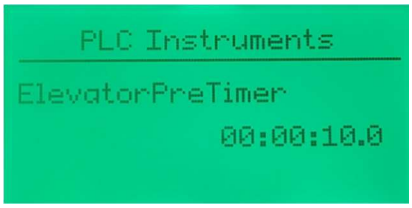
The TSC 7320 controller has pre-programmed display pages which are selected manually using the buttons on the front of the controller, by pushing the left and right navigation buttons.

The display pages are organized into the following order and can be continuously cycled through left or right:

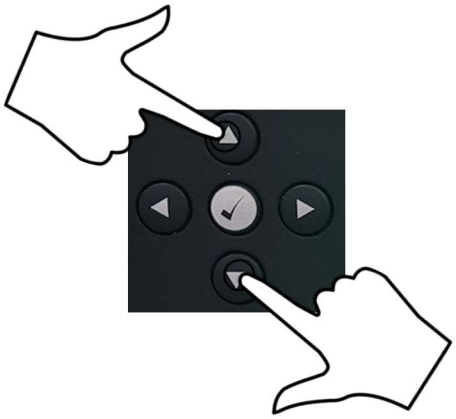
← Status – Engine – Generator – Mains – Alarms – Event Log – Communications – Schedule – PLC Instruments – About →







More information can be found by using the up and down buttons for a given display page (voltage and transfer switch state, etc.).







c. Operation Modes

Mode	Description	ATS Mechanism Control Outputs	Engine Start Output
AUTO 	ATS automatically transfers to Generator (Source 2) during a Utility (Source 1) failure and automatically returns power to utility once restored	Outputs automatically operate ATS mechanism per automatic sequence of operation	Output contact closes to start engine during a utility (source 1) failure and opens to stop engine once utility power has transferred back to the load.
STOP MODE 	ATS will immediately start transferring to utility and stay there. The ATS will not automatically operate during a utility power failure	Outputs momentarily energize to move ATS mechanism to the Utility position. If the mechanism is moved away from Utility, the controller will automatically move it back to Utility.	Output is disabled - engine will not start during a utility power failure[1] Engine will stop if it was previously running
TEST MODE 	ATS will not automatically operate during a utility power failure, and The ATS will transfer to utility if there is a gen power failure. ATS cannot be operated manually as the controller will keep the breaker on utility.	Outputs momentarily energize to move ATS mechanism to the Utility position. If the mechanism is moved away from Utility, the controller will automatically move it back to Utility.	Output is enabled but engine will not start during a utility power failure[1]. Engine will continue to run unless there is a fault.
MANUAL 	ATS will not automatically operate during a utility power failure, and The ATS will transfer to utility if there is a gen power failure. ATS cannot be operated manually as the controller will keep the breaker on utility.	Outputs momentarily energize to move ATS mechanism to the Utility position. If the mechanism is moved away from Utility, the controller will automatically move it back to Utility.	Output is enabled but engine will not start during a utility power failure[1]. Engine will continue to run unless there is a fault.
SERVICE DISCONNECT ***(Service Entrance Only- US Market ATS)***	ATS transfers to neutral position to disconnect power to the load. ATS will not automatically operate during a utility power failure. Note: When the Service Disconnect signal is removed, the transfer switch will immediately return to the utility, and the controller will remain in STOP mode. When required, put the controller back in Auto mode.	Outputs momentarily energize to move ATS mechanism to the neutral position.	Output is disabled - engine will not start during a utility power failure[1]. Engine will stop if it was previously running
ON LOAD TEST	When ONLOAD TEST mode is initiated, a utility power failure condition will be simulated which will cause engine to start and ATS will transfer to generator supply. When TEST mode is terminated, ATS will transfer back to utility supply and engine will stop	Outputs automatically operate ATS mechanism per automatic sequence of operation	Output contact closes to start engine during the ONLOAD TEST mode. Output automatically opens when test mode is terminated and ATS is back on utility power
EXERCISE ON LOAD TEST	When ONLOAD TEST mode is initiated, a utility power failure condition will be simulated which will cause engine to start and ATS will transfer to generator supply. When TEST mode is terminated, ATS will transfer back to utility supply and engine will stop	Outputs automatically operate ATS mechanism per automatic sequence of operation	Output contact closes to start engine during the ONLOAD TEST mode. Output automatically opens when test mode is terminated and ATS is back on utility power
MANUAL OFF LOAD TEST	When OFF LOAD TEST mode is manually initiated, engine will start and run, but the ATS will not transfer to the generator. When OFF LOAD TEST mode is terminated, engine will stop	Outputs do not change state **even if** utility or generator supply fails	Output automatically closes to start engine during the OFF LOAD test mode. Output automatically opens when test mode is terminated
EXERCISE OFF LOAD TEST	When OFF LOAD TEST mode is initiated, engine will start and run, but the ATS will not transfer to the generator. When OFF LOAD TEST mode is terminated, engine will stop	Outputs do not change state unless utility or generator supply fails in Off Load test mode	Output automatically closes to start engine during the OFF LOAD test mode. Output automatically opens when test mode is terminated
EXERCISE SCHEDULE	When an EXERCISE SCHEDULE occurs, the ATS will perform an exercise test on the pre-selected calendar date and time. The Generator will operate on load or off load as selected and will continue to run for the Exercise duration period as selected. If a re-occurring Exercise mode is selected, ATS will repeat an exercise test based on the calendar dates and times as selected.	Outputs operate ATS mechanism per automatic sequence of operation if programmed for ON LOAD TEST operation.	Output contact closes to start engine during the EXERCISE test mode. Output automatically opens when exercise mode is terminated

[1] The TSC 7320 requires continuous control power (i.e. utility/gen power on, or 24VDC aux power on) to keep the automatic engine start output disabled. If control power is de-energized, the engine start output will close after approximately 1 minute, once its power reservoir de-energizes. This in turn will cause a repeating engine start/stop event every 3-4 minutes. To prevent engine start/stop cycling condition upon loss of control power, the local engine control panel should be selected for the OFF operating mode.

d. Automatic Sequence of Operation

NOTE: Time delays indicated below are factory default settings only. Refer to TSC 7320 manual for alternate time delay settings available on the TSC 7320 Controller	
UTILITY POWER FAIL	When voltage drops on any phase of the utility supply below 85% of rated voltage, a generator start sequence will be initiated
GEN START	The generator will start following expiry of the 2 second Gen Start timer
GEN WARMUP	A generator warmup period will be initiated once the generator starts running, and will not transfer until the timer expires, or a fault occurs
TRANSFER TO GEN	The load will transfer to the generator supply following expiry of the 2 second Gen Warmup timer
UTILITY POWER RETURN	When utility power is restored to above 90% rated voltage on all phases, a utility return timer sequence will be initiated
TRANSFER AWAY FROM GENERATOR	The load will transfer away from the generator supply following expiry of the 300 second utility return timer
TRANSFER TO UTILITY	Once the load transfers off of the generator supply, the load will re-transfer back onto the utility supply following expiry of the 3 second neutral delay timer
GEN COOLDOWN	The generator will automatically stop following expiry of the 300 second cooldown timer.

e. TSC 7320 Controller ON LOAD TEST & OFF LOAD TEST Operation Instructions

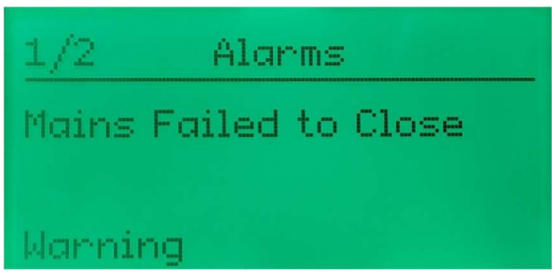
ON LOAD TEST 	To initiate an ATS On Load Test, press the test button on the TSC 7320 controller to enter test mode. Next, press the gen start button (green), and the controller will start the generator and once it reaches the nominal voltage and frequency, the switch will be transferred to the generator and take over the load. To stop the on-load test and return to normal, press the auto button, and the controller will start a utility return delay timer, and transfer back to the utility when the timer expires. The generator will continue to run until the cooling expires, and then it will turn off the generator. **Note :** Pushing the red stop button will initiate a return to Utility request followed by an engine stop. If the utility is available, the ATS will transfer to utility and stop the engine ignoring any countdown timers. If the Utility is not available, the controller will turn off the generator, and generate a Mains Fail to Close Alarm.
OFF LOAD TEST 	To initiate an ATS off load test, press the manual button on the TSC 7320 controller to enter manual mode. Next, press the gen start button (green), and the controller will start the generator, but the switch will NOT transfer to generator, even if the source is healthy. To stop the off-load test and return to normal, press the STOP button, and the controller will turn off the generator. If the Auto mode button is pushed, the controller will start a countdown timer and then turn off the generator.

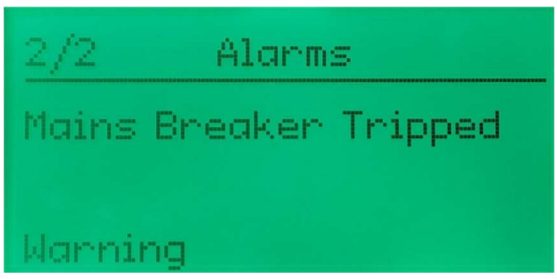
f. TSC 7320 Controller Alarms

If any faults occur during the ATS operation the controller will turn on the “Alarm” LED beside the screen, the controller’s buzzer will start beeping, and it will display the fault on the green LCD screen. If there is more than one fault, the up and down arrow keys can be used to cycle between the different alarms. The alarms can also be silenced, or cleared by following the options below:

1.The alarms can be silenced by pushing the alarm button. This will stop the beeping from the controller but will NOT clear the alarm. Note; when the alarm button is pushed all twelve on screen LEDs will light up, this is expected.

2. The alarms can be cleared by pushing and holding the alarm button  for 5 seconds. The controller will reset all alarms and function as intended again.





g. ATS Manual Operation Instructions

The transfer switch may be operated manually for maintenance or emergency operation conditions provided both Utility and Generator supplies are de-energized prior to manual operation.

DANGER HAZARD OF ELECTRICAL SHOCK, EXPLOSION, OR ARC FLASH

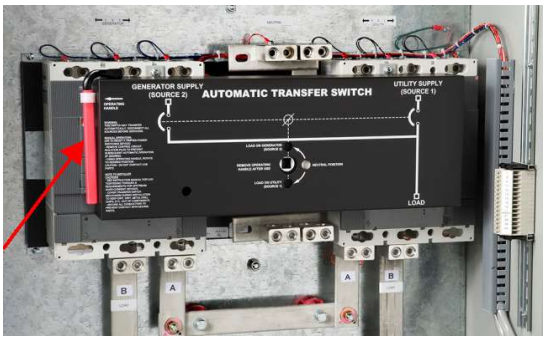
1. This equipment must be serviced only by qualified electrical personnel utilizing safe work practices and appropriate Personal Protective Equipment (PPE).
2. Many components of this equipment operate at line voltage. DO NOT TOUCH. Use only electrically isolated tools.
3. Install and close all covers before applying power to this equipment
4. Do not open covers to equipment until ALL power sources are disconnected

Failure to do so may cause personal injury or death

Once both Utility and Generator supplies are de-energized the following procedure can be used to operate the Transfer Switch manually.

5. Disconnect the ATS Power Chassis & Voltage Sensing Isolation Plugs (PL12 & PL15) to prevent automatic operation.
6. Open ATS enclosure door and locate Manual Operation Handle provided with the transfer switch (see photo below)

Manual Operation Handle



7. Insert manual handle into the center hole of the transfer switch mechanism.
8. To manually operate mechanism, rotate handle to the desired position as labeled on the ATS mechanism cover. Do not over-torque handle once position has been attained.
9. Once ATS is manually operated to desired position, re-close ATS enclosure door, then re-energize supply sources to re-energize the load.

N. Equipment Energization Procedure

a. Pre-Energization Checks

1. Verify the generator and utility supply voltages match the model of the ATS ordered. If a different voltage is required, refer to procedure in Section O of this guide for voltage change programming procedure.
2. Confirm power cable size is correct for the lugs supplied in the transfer switch (line, load, and neutral) and are properly torqued.
3. Confirm transfer switch has been adequately grounded per NEC/CEC requirements.
4. Confirm power cables have been insulation resistance tested to ensure no cross-phase connections or conduction to ground.
5. Check to ensure there is no mechanical damage.
6. Check to ensure no packaging materials or tools are left inside the transfer switch enclosure.
7. Verify control wiring connected to terminal blocks are properly installed (i.e. no frayed ends, screws are tight, no damage, etc.).
8. Ensure ATS Power Chassis & Voltage Sensing Isolation Plugs (PL12-1 & PL15-1) are inserted and all TSC 7320 Controller plugs are inserted prior to operation.
9. Visually verify the transfer switch mechanism is closed in the utility position as indicated on the mechanism cover.
10. Verify correct control wire interconnects have been installed to the generator set auto start/stop controls.

    NOTE: The ATS Engine Start contact CLOSES to start the engine and OPENS to stop the engine.
11. Ensure the inside of the transfer switch enclosure is clean from all dust, and other foreign materials.
12. Close the transfer switch enclosure door and tighten all door screws.
13. Visually verify on the transfer switch enclosure that there are no gaps, holes, or potential for water ingress.

b. Equipment Energization

DANGER - HAZARD OF ELECTRICAL SHOCK, EXPLOSION, OR ARC FLASH
This equipment must be serviced only by qualified electrical personnel utilizing safe work practices and appropriate Personal Protective Equipment (PPE). Many components of this equipment operate at line voltage. DO NOT TOUCH. Use only electrically isolated tools. **Failure to do so may cause personal injury or death.**

1. Confirm Utility, Generator and loads can be energized in a safe manner.
2. Energize utility supply and wait approximately 20 seconds for the TSC 7320 controller to successfully perform an initial "boot-up" process. The Thomson Power Systems Logo will be displayed during the booting process.

   NOTE: under normal operation, TSC 7320 controller will not re-boot due to use of an external control power reservoir circuit. The Low Power Buffer (LPB) maintains DC control power during Utility power failures, allowing the controller to start the gen and transfer to it without rebooting.
3. Confirm utility voltage on the TSC 7320 DISPLAY Home page is matching the rating of the ATS. If the voltage is not matching, refer to Section O, *TS 870 System Voltage Change Procedure*, of the quick start guide to modify the controller settings. If the voltage is matching, the ATS will automatically transfer to the Utility source.
4. To perform any changes to the TSC 7320 controller settings, refer to Section M(a) of this document for details.
5. Set the TSC 7320 Internal time clock – With the TSC 7320 powered on, Enter the restricted area of the settings, and find the page with the "Display" heading. If the date and time is not listed, the up or down navigation button may need to be pressed to show the setting
   a. Press the center checkmark button and one section will start to flash. Use the up or down navigation keys to change the value of the flashing setting, and the left and right keys to change which part of the setting is going to be changed





   b. Change all parts of the time and date to match the desired values and press the center checkmark when finished. Hold the center checkmark to exit the editor mode.



6. Verify the status of the following indicator lights on the TSC 7320 front panel:
   a. Utility Source Green LED is "ON" when the voltage is healthy and available
   b. Load on Utility Green LED is "ON" when the load is connected to the utility
7. Run the generator manually and confirm generator voltage on the TSC 7320 display, the voltage is displayed on the "Generator" page. Verify the measured voltage is correct and matches the rating of the ATS.
8. With generator still running, confirm generator phasing matches that of the Utility supply by viewing the "Generator" page, and using the up or down navigation buttons to find the "Gen Phase Sequence" page. If phase rotation does not match, de-energize ATS and re-confirm supply rotation and power wiring is correct.

   NOTE
   On 3 Phase Systems, the TSC 7320 ATS controller has Phase Rotation miss-match protection. For the ATS to successfully transfer between sources, both the Utility and Generator Source Phase rotation must be matched. Phase rotation on both sources can be either positive rotation (i.e. A-B-C) or negative rotation (C-B-A) via programming selection on the TSC 7320.
9. Verify the TSC 7320 front panel Generator Source green LED is "ON":
10. Manually stop generator and place the generator controls in the "AUTOMATIC" position.
11. To confirm automatic starting and load transferring of the generator, perform an On-Load test as described in section M(e). Press the "Test mode" button, and then press the green "Start" button. The generator will start and transfer on load per Automatic Sequence. The following lights on the TSC 7320 front panel should be on: Engine Start, Gen Source LED and Load on Gen LED.

12. To stop the generator and transfer load back to the utility supply, press the “Auto” button to return to auto mode. The load will re-transfer back to the utility power as per Automatic Sequence.
13. Perform a utility power outage test by opening the upstream utility feeder breaker to the ATS. The TSC 7320 front panel Utility available LED will turn off; the generator set will start after the 2-second engine start delay has expired and the generator will start and transfer on load as per Automatic Sequence.
14. Return Utility supply voltage to the ATS by re-closing the upstream utility breaker. The load should re-transfer back to the utility supply as per Automatic Sequence.

O. *TS 870 System Voltage Change Procedure*

The system voltage change procedure is a 2 step process 1) ATS Potential Transformer Tap Change and 2) TSC 7320 Software Programming. Details of each step are as follows:

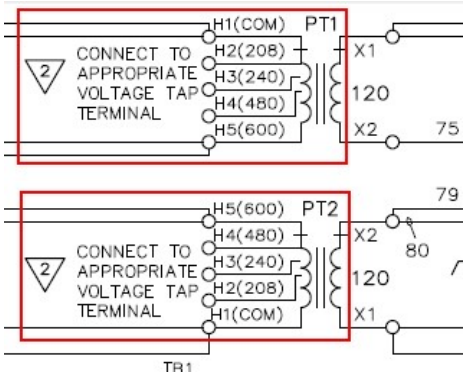
1) ATS Potential Transformer Tap Change

DANGER

HAZARD OF ELECTRICAL SHOCK, EXPLOSION, OR ARC FLASH

- This equipment must be serviced only by qualified electrical personnel utilizing safe work practices and appropriate Personal Protective Equipment (PPE).
- Many components of this equipment operate at line voltage. DO NOT TOUCH. Use only electrically isolated tools.
- Install and close all covers before applying power to this equipment
- Do not open covers to equipment until ALL power sources are disconnected

1. Ensure all power sources are de-energized and are safely Locked-out from service prior to opening the transfer switch enclosure door.
2. Disconnect AC Sensing and ATS Power Chassis Circuit Isolation Plugs PL12 & PL15.
3. Change voltage transformer primary taps settings as follows to match new system voltage on <u>all</u> multi-tap potential transformers (PTs). (Refer to wiring schematic diagram below).



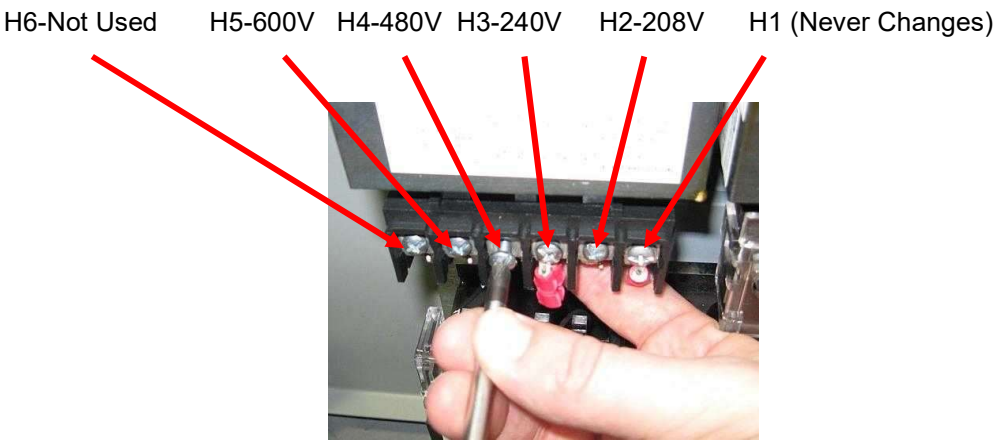
4. Carefully remove the potential transformer high voltage side covers by prying up on the edge of the cover with a ¼” Flat Head Blade screwdriver and lifting off.





<u>NOTE:</u> You can also use your finger to pry up on the edge of the PT cover.

5. Remove the screw on the PT Tap which is the correct voltage selected for the application (i.e. H2-208V, H3-240V, H4-480V or H5-600V)



CAUTION: Brace PT terminal block with your hand when loosening or tightening ANY screws.

6. Remove the screw and red ring terminal connected to the incorrect (existing) PT voltage terminal. Install the screw and red ring terminal to the new selected PT Tap Terminal based on required voltage and tighten while supporting the terminal block. Make sure the ring terminal is not misaligned or the PT cover will not fit back on.





7. Install the extra screw back onto the old PT location and tighten.





CAUTION: Confirm that PT screws are correctly tightened, and do not put strain on the PT Tap wires.

8. Replace the PT cover. PT covers should 'snap' in place, confirm they are installed correctly by gently "twisting" the PT cover. DO NOT use excessive force.

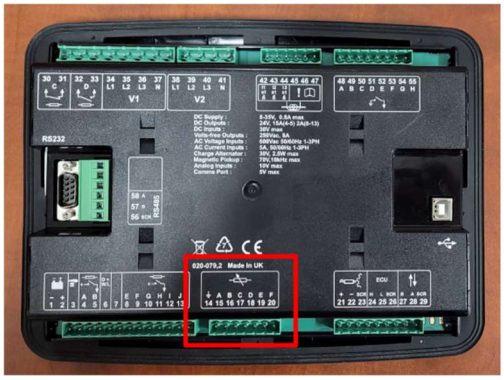
9. Repeat the steps 1 to 8 for all Potential Transformers.

2) TSC 7320 Voltage Change Procedure

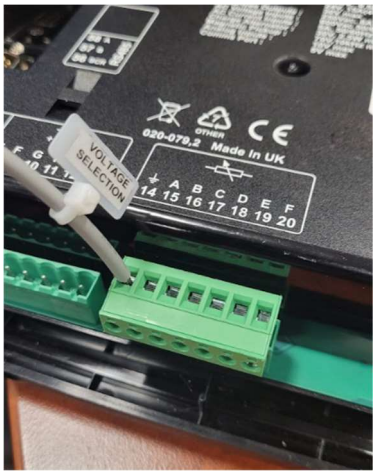
To change system voltage on the TSC 7320 controller, the transfer switch can be energized or de-energized to change the system voltage. If the transfer switch is energized, please ensure the mechanism is in the utility position, and place the controller in “Stop” mode by pushing the red button in the lower left corner. It is recommended to de-energize the transfer switch to mitigate any hazardous conditions. Always proceed with caution and follow the steps below to change the voltage.

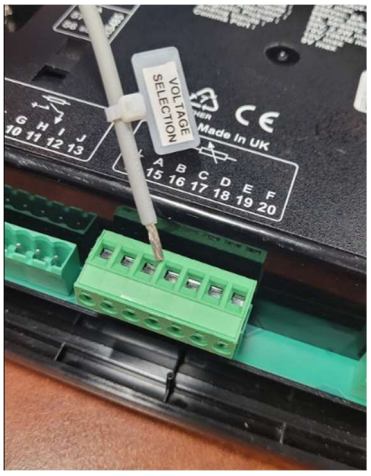
NOTE: All system voltage changes are ONLY done via connecting a designated wire to a different terminal on the TSC 7320 controller. All alarm values are ONLY changed via software programming.

a. Locating the PIN: First find PINs 14 to 20 on the backside of the TSC 7320 controller. There will be a wire connected to PIN 14, and that wire will have a label specifying it is the voltage selection wire.



b. Removing the wire: Using a small flat head screwdriver, loosen the terminal screw for PIN 14, and remove the voltage selection wire out of PIN 14.

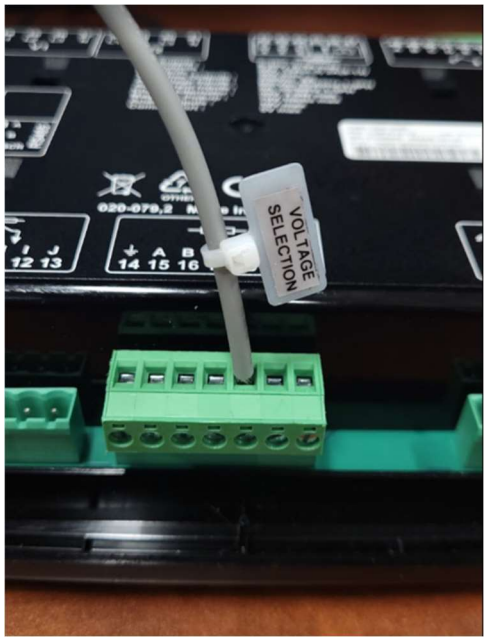




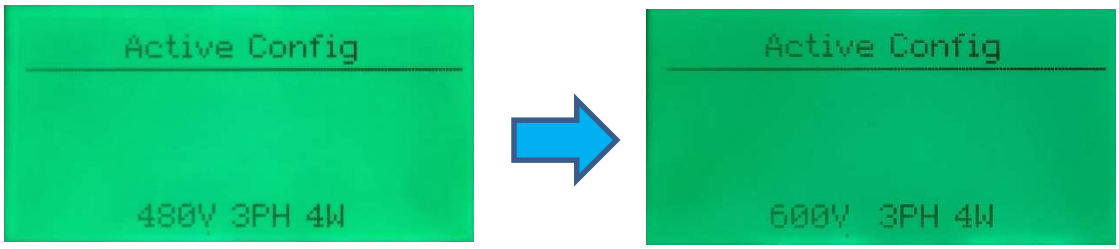
c. Choosing voltage configuration: There are 5 separate inputs that dictate the different configurations, and they are listed in the table below. Select one of the options below based on the ATS requirements.

Inputs	Pin No.	Descriptions
GROUND	14	480V 3PH 4W CONFIGURATION
ANALOGUE INPUT A	15	120/240V 1PH 3W CONFIGURATION
ANALOGUE INPUT B	16	208V 3PH 4W CONFIGURATION
ANALOGUE INPUT C	17	240V 3PH 4W CONFIGURATION
ANALOGUE INPUT D	18	600V 3PH 4W CONFIGURATION
ANALOGUE INPUT E	19	110V 1PH 2W CONFIGURATION

d. Inserting the wire: Insert the voltage selection wire into the desired terminal and tighten the screw on the terminal. The terminals are rated for 4.5in-lbs of torque, do NOT over tighten the terminal screw. The photo below shows the 600V 3PH 4W configuration.



e. Checking config: If the panel is not energized, turn on the power and energize the transfer switch. After the controller boots-up, use the left or right navigation keys to find the “Mains” page, and use the up and down navigation keys to find the “Active Config” page. If the controller is properly registering the changed input, the screen should display the desired configuration, and NOT the default 480V configuration. In this case, the 600V configuration has been selected.



f. Complete: The voltage change procedure is now complete. If the voltage settings need to be adjusted from their default values, please refer to Section M(a) of this document for further details on entering the restricted area of the settings, and how to change values.

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PM173 REV0 23/02/10

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