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0 08/08/14 2.1 09/01/21 Original software release for TSC 80e Software updated to incorporate Configurable PT Ratio for 3 phase, 3 wire applications Operating & Service Manual Version Rev 0 09/01/19 Original release of dedicated Manual for TSC 80e Contact Thomson Technology, to obtain applicable instruction manuals. Soft copy of most current version is available at [www.thomsontechnology.com](http://www.thomsontechnology.com). PM091 Rev 0 09/01/21 1 Thomson Technology TSC 80e TRANSFER SWITCH CONTROLLER 1.2. GENERAL INFORMATION NOTE: Installations should be done in accordance with all applicable electrical regulation codes as required. The following information is provided for general information only pertaining to TSC 80e Transfer Switch Controllers installed in a Thomson Technology Automatic Transfer Switch as applied in a typical site installation. For specific site installation information, consult Thomson Technology as required.  
**CAUTION** contents subject to damage by STATIC ELECTRICITY This equipment contains static-sensitive parts. Please observe the following anti-static precautions at all times when handling this equipment. precautions may cause equipment failure and/or damage. · Discharge body static charge before handling the equipment (contact a grounded surface and maintain contact while handling the equipment, a grounded wrist strap can/should also be utilized).  
Do not touch any components on the printed circuit board with your hands or any other conductive equipment.  
· Do not place the equipment on or near materials such as Styrofoam, plastic and vinyl. Place the equipment on grounded surfaces and only use an anti-static bag for transporting the equipment. Failure to observe these 1.3. NOTES TO TRANSFER SWITCH INSTALLER 1.  
3.1. SYSTEM VOLTAGE If the transfer switch has programmable/multi-tap system voltage capability (refer to electrical schematic), confirm the transfer switch has been configured for the correct PM091 Rev 0 09/01/21 2 Thomson Technology TSC 80e TRANSFER SWITCH CONTROLLER system voltage. If the transfer switch requires reconfiguring, the TSC80e controller will require re-programming as well. WARNING Failure to confirm and match transfer switch voltage with the system voltage could cause serious equipment damage. 1.3.2. SYSTEM PHASING - HIGH LEG DELTA SYSTEMS When the transfer switch is connected to a 3-phase 4-wire delta systems, the "High" leg (Phase B, colored Orange), must be connected to Phase B of the Utility and/or Generator supply. This will ensure the ATS control power, which is internally connected between Phase A and Neutral is maintained at 120VAC.  
  
Refer to figure below for further details. WARNING Failure to match correct system phasing will result in serious damage to the TSC 80e controller. Autom atic Transfer Switch (Utility Supply) PH A (UA) PH B (UB) PH C (UC) Neural (N) B (Orange) (High Leg) 240V 208V 240V A (R ed) 120V 120V C (Yellow) N (W hite) PM091 Rev 0 09/01/21 3 Thomson Technology TSC 80e TRANSFER SWITCH CONTROLLER CAUTION!!! All installation and/or service work performed must be done by qualified personnel only. Failure to do so may cause personal injury or death. 1.3.3. REMOTE START CONTACT FIELD WIRING As a minimum, the remote engine start control field wiring shall conform to the local regulatory authority on electrical installations. Field wiring of a remote start contact from a transfer switch to a control panel should conform to the following guidelines to avoid possible controller malfunction and/or damage. 1.  
3.3.1. Minimum #14 AWG (2.5mm<sup>2</sup>) wire size shall be used for distances up to 1 100ft (30m) ).  
For distances exceeding 100 ft. (30m) consult Thomson Technology. 1.3.3.  
2. Remote start contact wires should be run in a separate conduit. 1.3.3.3. Avoid wiring near AC power cables to prevent pick-up of induced voltages. 1.3.3.  
4. An interposing relay may be required if field-wiring distance is excessively long (i.e. greater than 100 feet (30m)) and/or if a remote contact has a resistance of greater than 5.0 ohms. 1.3.3.5. The remote start contact provided is voltage free (i.e. dry contact). Refer to the "TSC 80e Typical Connection Diagram" on page 52 for terminal interface and contact voltage/current ratings or page 13 for specifications on output contact ratings. Applying voltage or current in excess of the ratings will damage the controller and is not cover by Thomson

*Technology's limited warranty. 1.*

*3.4. DIELECTRIC TESTING Do not perform any high voltage dielectric testing on the transfer switch with the TSC80e controller connected into the circuit, as serious damage will occur to the controller. All AC control fuses and control circuit isolation plugs connected to the TSC80e must be removed if high voltage dielectric testing is performed on the transfer switch. PM091 Rev 0 09/01/21 4 Thomson Technology TSC 80e TRANSFER SWITCH CONTROLLER 2. DESCRIPTION The TSC 80e controller utilizes microprocessor-based design technology, which provides high accuracy for all voltage sensing and timing functions.*



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The TSC 80e is factory configured to control all the operational functions and display features of the automatic transfer switch. The TSC 80e controller consists of two parts; a Lexan faceplate, which is mounted externally on the transfer switch door, and a printed circuit board (PCB), which is mounted inside the transfer switch on the enclosure door. The TSC 80e PCB contains a built-in LCD display that is visible from the front panel faceplate. The Lexan faceplate contains operation/data-acquisition/programming pushbuttons and indication LEDs. 2.1. LEXAN FACEPLATE The TSC 80e Controller Lexan faceplate is shown as in FIGURE 1. The Lexan pushbuttons and LED lights are connected to the main PCB via plug-in ribbon cable. The main features of the Lexan faceplate are described as follows with reference to FIGURE 1.

Utility Supply Available LED light Load on Utility supply LED light Load on Generator supply LED light Generator Supply Available LED light ATS Load Bus Energized LED light Utility Power Fail Test Mode Pushbutton (Program value DECREMENT/DOWN Pushbutton) & LED light Auto Generator Exercise Mode Pushbutton (Program value INCREMENT/UP Pushbutton) & LED light LCD Display Screen Viewing Window Programming Escape/Data Log review Pushbutton Programming Enter Pushbutton PM091 Rev 0 09/01/21 5 Thomson Technology TSC 80e TRANSFER SWITCH CONTROLLER FIGURE 1 - TSC 80e Controller Lexan Faceplate · ESC pushbutton. The ESC function is used to "ESCAPE" or exit the last field or programming menu. The program menu is a drill down format; by pressing the ESC button the program steps back one layer at a time until it escapes/exits the program menu. The ESC function can also be used to view the controllers Data Logs that are stored. · DOWN pushbutton. The DOWN function is used to change or decrement values while in the programming mode and is used to scroll down through the status menus or programming sub menus to the next item. PM091 Rev 0 09/01/21 6 Thomson Technology TSC 80e TRANSFER SWITCH CONTROLLER · UP pushbutton. The UP function is used to change or increment a programming value while in the programming mode and is used to scroll up through the status menus or programming sub menus to the previous item. · ENTER pushbutton. The ENTER function is used to access the Program menus and "enters" and accept new programming or operating mode changes after a new value has been selected. 2.2. PRINTED CIRCUIT BOARD 38 PROG 2 37 PROG 3 PROG 1 44 TB7 ENG STOP TB6 29 TRANSFORMER BT1 TRANSFORMER REAL TIME CLOCK BATTERY XFER UTIL SYS OK XFER GEN LD ON GEN (PROG 4) LD ON UTIL (PROG 5) 11 TB2-5 10 1 2 3 4 5 6 7 8 9 TB1 FIGURE 2 The printed circuit board (PCB) is shown in FIGURE 2. The PCB contains the following user interface items: PM091 Rev 0 09/01/21 7 Thomson Technology 1 28 TSC 80e TRANSFER SWITCH CONTROLLER 2.2.

1. TERMINAL BLOCKS Terminal blocks are located on the PCB as follows: TB1 High voltage sensing terminal block (120-600VAC). WARNING Voltage sensing circuits are capable of lethal voltages while energized. Standard safety procedures should be followed and be performed by qualified personnel only. Failure to do so may cause personnel injury and/or death.

TB2-TB6 Transfer control terminal block for 120VAC control power and input/output circuits. TB7 Low voltage control inputs (5VDC internally powered, switched to terminal 38). 2.2.2. DIAGNOSTIC LED'S The TSC 80e controller provides diagnostic LED lights, which are mounted on the printed circuit board as per FIGURE 2. Their functions are described as follows: SYS OK LED flashes on and off at irregular intervals, which indicates the microprocessor is functioning normally. XFER TO UTILITY LED illuminates whenever the TSC 80e is initiating a signal to transfer to the Utility supply. (UP transfer contact as noted on the electrical schematic is closed) XFER TO GEN LED illuminates whenever the TSC 80e is initiating a signal to transfer to the Generator supply. (GP transfer contact as noted on the electrical schematic is closed) ENG STOP LED illuminates whenever the TSC 80e is initiating an ENGINE STOP (remote start contact is open).

PROG 1 LED illuminates whenever the Programmable output Relay #1 is turned on (relay on the circuit board is energized). PROG 2 LED illuminates whenever the Programmable output Relay #2 is turned on (relay on the circuit board is energized). PROG 3 LED illuminates whenever the Programmable output Relay #3 is turned on (relay on the circuit board is energized). PM091 Rev 0 09/01/21 8 Thomson Technology TSC 80e TRANSFER SWITCH CONTROLLER LD ON GEN (PROG 4) LED illuminates whenever the Prlity Power Available (UPA), Generator Power Available (GPA), ATS Not in Auto, ATS in Auto, Transfer to Gen, Transfer to utility, Switch failure, and limit switch failure. PM091 Rev 0 09/01/21 10 Thomson Technology TSC 80e TRANSFER SWITCH CONTROLLER 2.4. APPLICATION INFORMATION 2.4.1. AC VOLTAGE SENSING INPUT The TSC 80e can accept direct AC voltage sensing inputs on the generator and utility supplies from 120-600VAC (nominal).

Note: Direct input voltage sensing can only be used when the system utilizes a 3 phase, 4 wire distribution system which has the neutral conductor solidly grounded. For 3 phase, 3 wire systems (i.e. no neutral) or high voltage systems, potential transformers must be used. Refer to FIGURE 3 for voltage sensing connections.

PM091 Rev 0 09/01/21 11 Thomson Technology TSC 80e TRANSFER SWITCH CONTROLLER 3Ø, 4W 208/380/480/600VAC DIRECT SENSING SINGLE PHASE, 3W 120/240VAC DIRECT SENSING TSC 80e A B C N TSC 80e GRD L1 L2 N GRD 1 2 3 NO CONNECTION 1 2 3 25 26 24 120 GRD 1 10 25 26 24 GRD GRD VOLTAGE INPUTS 600VAC L-L, 347VAC L-N 480VAC L-L, 277VAC L-N 380VAC L-L, 220VAC L-N 208VAC L-L, 120VAC L-N 1 PT REQUIRED FOR TRANSFER SWITCH MECHANISM POWER (MUST BE SIZED TO SUIT POWER REQUIREMENTS). VOLTAGE INPUTS 240VAC L-L, 120VAC L-N NOTE: UTILITY VOLTAGE SENSING SHOWN ONLY. NOTE: UTILITY VOLTAGE SENSING AND CONTROL POWER SHOWN ONLY. 3Ø, 4W 120/240V HIGH LEG DELTA DIRECT CONNECTION 3Ø, 3W DELTA PT's TSC 80e A B C N TSC 80e A B C GRD 1 2 3 25 26 24 GRD 120V 2 1 2 3 25 26 24 120 GRD 120 120 GRD 1 GRD A N SECONDARY PT VOLTAGE 120VAC L-L [NO NEUTRAL] NOTE: ØB IS GROUNDED B C 1 2 PT REQUIRED FOR TRANSFER SWITCH MECHANISM POWER (MUST BE SIZED TO SUIT POWER REQUIREMENTS). TSC80e CONTROLLER MUST BE PROGRAMMED FOR CORRECT PT RATIO AND SECONDARY PT VOLTAGE IN SOFTWARE NOTE: FOR HIGH LEG DELTA SYSTEMS PHASING OF CUSTOMER SUPPLY MUST BE CONNECTED AS SHOWN ABOVE. FAILURE TO COMPLY WILL RESULT IN DAMAGE TO CONTROLLER. NOTE: UTILITY VOLTAGE SENSING AND CONTROL POWER SHOWN ONLY. NOTE: UTILITY VOLTAGE SENSING SHOWN ONLY.



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FIGURE 3 PM091 Rev 0 09/01/21 12 Thomson Technology TSC 80e TRANSFER SWITCH CONTROLLER 2.4.2. AC CONTROL POWER INPUT The TSC 80e is factory supplied for 120VAC (nominal) control power input voltage. Independent AC control power is required from both utility and generator supplies. AC control power is utilized for internal TSC 80e control circuits and external control device loads. The TSC 80e requires approximately 6 VA power for internal control circuits.

The maximum external load is limited by output contact ratings (i.e. 10A resistive, 120VAC). Total AC control power requirements for each supply must be determined by adding both internal and external load requirements. 2.4.3. OUTPUTS The TSC 80e provides the following types of output circuits: Engine Start Contact Transfer to Utility Output Transfer to Generator Output Isolated Form B contact (10A, 120VAC Resistive) 120VAC, 10A (Resistive) powered output contact 120VAC, 10A (Resistive) powered output contact The TSC 80e provides the following additional output circuits: Programmable Output Contact #1 Programmable Output Contact #2 Programmable Output Contact #3 Programmable Output Contact #4 Programmable Output Contact #5 Isolated Form C contact (10A, 120VAC/250VAC Resistive) Interposing relays are required between the TSC 80e outputs and the end device if loads exceed the output current rating. PM091 Rev 0 09/01/21 13 Thomson Technology TSC 80e TRANSFER SWITCH CONTROLLER 3. OPERATING INSTRUCTIONS To operate the TSC 80e controller and associated transfer switch using the front faceplate pushbuttons, refer to the following detailed operating instruction sub-section descriptions.

### 3.1. AUTOMATIC SEQUENCE OF OPERATION 3.1.1.

**NORMAL OPERATION** Under normal operating conditions, the transfer switch operates automatically during a failure and restoration of utility power and does not require operator intervention. When utility supply voltage drops below a preset nominal value (70 - 95% of rated adjustable) on any one phase, an engine start delay will be initiated and the transfer to utility supply signal will be removed (i.e. contact opening). Following expiry of the engine start delay period (0 - 60 sec.

adjustable) an engine start signal will be given (contact closure, relay drops out to initiate start sequence). Once the engine starts, the transfer switch controller will monitor the generators voltage and frequency levels. When the generator voltage and frequency rises above preset values (70 - 95% nominal adjustable) the Engine Warm-up timer will be initiated. After the Engine Warm-up timer expires (0-60 sec. Adjustable), the transfer to generator supply signal (contact closure) will be given to the transfer switch mechanism. The load will then transfer from the utility supply to the generator supply via motor driven mechanism (Neutral Delay is bypassed on utility failure detection). The generator will continue to supply the load until the utility supply has returned and the retransfer sequence is completed as follows: When the utility supply voltage is restored to above the present values (70 - 95% of rated adjustable) on all phases, a transfer return delay circuit will be initiated. Following expiry of the utility transfer return timer (0 - 30 min. adjustable), the transfer to generator supply signal will be removed (contact opening), then the transfer to utility supply signal (contact closure) will be given to the transfer switch mechanism. The load will then be transferred from the generator supply back to the utility supply.

During the utility re-transfer sequence a neutral positioning delay circuit will cause the transfer mechanism to pause in the "neutral position (i.e. with both transfer power switching devices open) for the duration of the neutral delay timer (0-30 seconds adjustable) setting. Once the neutral delay expires, the re-transfer sequence will be completed. PM091 Rev 0 09/01/21 14 Thomson Technology TSC 80e TRANSFER SWITCH CONTROLLER An engine cooldown timer circuit will be initiated once the load is transferred from the generator supply. Following expiry of the cooldown delay period (0 - 30 min. adjustable) the engine start signal will be removed (contact opening) to initiate stopping of the generator set. 3.1.2.

**ABNORMAL OPERATION 3.1.2.1. TEST CONDITION** A test pushbutton on the transfer switch shall signal a simulated utility power fail signal to the transfer switch controller.

The transfer switch shall operate as per a normal utility power fail condition. of power are available). The transfer switch shall remain on generator supply until the test mode is terminated. It will then retransfer back to the utility supply following expiry of the transfer return timer and then continue to operate the generator set for its cooldown period then stop. 3.

**1.2.2. GENERATOR FAILURE ON LOAD** Should the generator set fail while on load, the transfer switch shall retransfer the load back to the utility supply if within nominal limits. The utility return and neutral delay timers will be bypassed in this condition. NOTE This operating condition shall apply to a normal utility failure as well as any test condition. 3.1.2.3.

**TRANSFER SWITCH FAIL ALARM LOGIC** The TSC 80e controller contains logic to detect a transfer mechanism failure. Should a failure be detected, a forced transfer to the alternate supply will be initiated. Detailed logic operation is as follows: NOTE Disabling of the "TRANSFER SWITCH FAIL" feature is possible by selecting the "Disconnected" position on "Service Entrance Models" or by a closure between terminals 38 & 42 on the TSC 80e. In these situations the TSC 80e controller will not verify that the transfer mechanism has operated correctly to provide power to the load bus. The neutral delay circuit logic will be active during transfer to and from the generator supply (i.e. when both sources PM091 Rev 0 09/01/21 15 Thomson Technology TSC 80e TRANSFER SWITCH CONTROLLER 3.1.2.4.

**TRANSFER FAIL DETECTION-NORMAL STEADY STATE CONDITION (NON-TRANSFERRING)** i. Limit Switch Failure (i.e. open contact) - Transfer Fail Alarm is initiated (Load on Source Flashing LED) after a 9-second delay, and then a forced transfer to the alternate source is initiated, if valid and available. Retransfer back to the original source will not occur until the Transfer Fail alarm condition is reset.

Refer to item 3.3 for Transfer Fail Fault Reset details. ii. Loss of Load Voltage (<80VAC) (i.e. Power switching device Tripped or Failed to Close/Conduct Condition) - Transfer Fail Alarm is initiated (Load Source Flashing LED) after a 5-second delay, then a forced transfer to the alternate source is initiated, if valid and available. Re-transfer back to the original source will not occur until the Transfer Fail alarm condition is reset.



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Refer to item 3.3 for Transfer Fail Fault Reset details. iii. Limit Switch Failure & Loss of Load Voltage <80VAC - Transfer Fail Alarm is initiated (Load Source Flashing LED) after an 11-second delay, then a forced transfer to the alternate source is initiated, if valid and available. Retransfer back to the original source will not occur until the Transfer Fail alarm condition is reset. Refer to item 3.3 for Transfer Fail Fault Reset details. 3.

1.2.5. TRANSFER FAIL DETECTION - TRANSFERRING CONDITION Transfer Source to Neutral "NEUTRAL POSITION TIME" (10 seconds adjustable) starts timing as soon as a transfer to the alternate source is initiated. During this period the ATS motor is energized and moves the mechanism from the original source to neutral. The power to the motor will be de-energized when either the "NEUTRAL POSITION TIME" times out or the load voltage drops below 80VAC on all phases (whichever occurs first). Once the ATS motor is de-energized, the Neutral Delay timer starts timing (all other timers are halted while neutral delay timer is running). Once the Neutral Delay timer expires the motor is re-energized to continue the transfer (see below). Note: Normally the load voltage will typically drop below the 80VAC setpoint within 1 second when the source power-switching device opens and therefore the "NEUTRAL POSITION TIME" never times out. The default setting of this timer (10 seconds) is intentionally set long so that it will not pre-maturely stop the ATS mechanism.

PM091 Rev 0 09/01/21 16 Thomson Technology TSC 80e TRANSFER SWITCH CONTROLLER Transfer Neutral to Source "Find Neutral/Source Timer" starts timing as soon as the Neutral Delay timer times out. During this period the motor is energized and moves the mechanism from the neutral to the alternate source. The power to the ATS motor will be de-energized when either the mechanism's limit switch activates (i.e. external logic to the TSC 80e) or the "Find Neutral/Source Timer" times out (whichever occurs first).

Note: During the above 2 sequences the "Transfer Fail Alarm" logic is inhibited. Once the 2 sequences have been completed, the "Transfer Fail Alarm" logic will be re-enabled and will only be triggered if conditions as described in item A (Normal Steady State Condition) are sensed (limit switch and/or loss of load voltage). For example, if the ATS mechanism fails to move (i.e. due to broken rod, motor failure or manual release plunger not re-engaged), the total time before a transfer fail will be initiated is 31 seconds (i.

e. Find Neutral/Source Timer" (10 sec) + Find Neutral/Source Timer" (10 sec) + Limit Switch Failure & Loss of Load Voltage <80VAC (11 sec) = 31 seconds Total). 3.1.2.6. SERVICE ENTRANCE ATS For Service Entrance Rated transfer switch applications, the transfer switch control logic will include external wiring from the TSC 80e to signal the transfer switch mechanism to move to the "Service Disconnected" position. In this mode the TSC 80e transfer control outputs and Transfer Fail feature is disabled. 3.2.

TEST MODES 3.2.1. UTILITY POWER FAIL SIMULATION (LOAD TEST) To simulate a utility power failure condition, press and hold the "UTILITY POWER FAIL SIMULATE" pushbutton on the Lexan faceplate until the LED light above the pushbutton changes state, approximately 5 seconds. Once the mode is initiated, the engine start will be activated, when the engine accelerates to nominal voltage and frequency levels, the load will automatically transfer to the generator supply. To terminate the Utility Power Fail Test Mode, the Test pushbutton must be held until the LED light above the pushbutton changes state, approximately 5 seconds. When the pushbutton is released the LED light will go out and, the load will re-transfer back to the utility supply following expiry of the Utility Return delay timer. PM091 Rev 0 09/01/21 17 Thomson Technology TSC 80e TRANSFER SWITCH CONTROLLER NOTE The load will automatically re-transfer to the utility supply should the generator fail while on load and the utility supply is within applicable limits. 3.2.

2. AUTOMATIC PLANT EXERCISE TEST The TSC 80e controller provides both pre-programmed and user programmable automatic plant exercise programs. Refer to SECTION 4.6.3 for further details on the programmable "Automatic Exercise".

The generator set will be exercised either "on or off" load dependent upon the controller software program setting (refer to SECTION 4.6.5.11). To initiate an automatic plant exercise mode cycle, press and hold the AUTO GEN EXERCISE TEST pushbutton on the Lexan faceplate until the LED light above the pushbutton changes state, approximately 5 seconds.

Once the mode is initiated, the engine will immediately start and transfer on load (i.e. if configured for On Load Test, "factory default is off load test") once nominal voltage and frequency levels have been obtained. The engine will remain operating on load until the plant exercise time delay period of 30 minutes expires, then the load will re-transfer back to the utility supply. The system will then be automatically re-tested at the programmed "Automatic Exercise" Start/Stop/Day/Time. NOTES 1. The load will automatically re-transfer to the utility supply should the generator fail while in the test mode. 2. To bypass the exercise run period, press and hold the Exercise pushbutton on for 5 seconds until the LED remains on. The Generator Exercise LED light will operate as follows: LED ON - Exercise Timer is initiated, the programmable 7-14-21-28 day timer is active and the generator is in the off state.

LED FLASHING - Exercise Timer is initiated, the programmable minute run timer is active and the generator is running on loads. LED OFF - Exercise Timer is not initiated and the programmable timer is not active. To terminate the Auto Generator Exercise Mode, the Exercise pushbutton must be held on for approximately 5 seconds until the LED light above the PM091 Rev 0 09/01/21 18 Thomson Technology TSC 80e TRANSFER SWITCH CONTROLLER pushbutton starts flashing. When the pushbutton is released, the LED light will go out and the system will return to normal operation. NOTE To enable the Auto Exercise mode without initiating an immediate exercise test, operator must first place the gen set engine control to off, then press the Exercise button once to initiate the test feature, then press it a second time to cancel the immediate test. The gen set engine control can then be returned back to the Automatic position, no starting of the gen set or transferring of the facility loads should occur. 3.2.3. FOUR FUNCTION REMOTE TEST (FTS4 OPTION) The function of the Four Position Test Switch Input is to allow operators to select various operating scenarios for test or maintenance purposes, in addition to the use of the faceplate mounted pushbuttons.

NOTE: When an external FTS4 switch is used, the TSC 80e operation as selected from the faceplate pushbuttons will be overridden.



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**OFF:** Disables the engine start output from the transfer switch. If the primary source is available, and within normal limits, the TSC 80e will initiate a transfer to the primary source. The transfer switch will not automatically transfer to the secondary (alternate) source should the primary source fail. **AUTO:** All automatic functions are enabled.

**ENGINE START:** (No load test) An engine start signal will be initiated and will remain on until the FTS4 is placed in another position. The engine will start if the engine's auto start controller is in the "Auto" mode. If the primary source fails in this mode, and the secondary source is within parameters, the TSC 80e will initiate a transfer to the secondary source. When the Engine Start input is removed, the generator will continue to run if it has not operated for a time equal to or greater than the minimum run time (i.e.

based on the Engine Cooldown Timer setting). PM091 Rev 0 09/01/21 19 Thomson Technology TSC 80e **TRANSFER SWITCH CONTROLLER TEST:** (Full load test) A primary source failure is simulated and an engine start signal will be initiated. When the secondary source is within normal limits, the TSC 80e will initiate a transfer to the secondary source. The system will remain in this state until the FTS4 is placed in another position or the secondary supply fails.

Upon a secondary supply failure, if the primary supply is available, the TSC 80e will initiate a transfer to the primary supply. The Engine Cooldown time sequence will be initiated when the test mode is terminated. 3.2.4. **REMOTE TEST** To activate a remote load test, a remotely controlled contact is to be closed between terminal #38 and terminal #44.

When the contact closes, an engine start will be activated, once the engine accelerates to nominal voltage & frequency levels and the Warm Up Timer expires, the load will be automatically transfer to the generator supply. When the remote contact is opened, the load will re-transfer back to the utility supply following expiry of the Utility Return delay timer. The Engine Cooldown time sequence will be initiated when the test mode is terminated. **NOTE** The load will automatically re-transfer to the utility supply should the generator fail while on load. 3.3. **TRANSFER FAIL FAULT RESET** To reset a Transfer Fail condition, simultaneously press and hold both the Up & Down arrow pushbuttons on the Lexan faceplate for approximately 5 seconds, the LEDs above the buttons will commence oscillating after 5 seconds indicating the reset has been achieved. A flashing LED above the associate source contact on the face of the TSC 80e Lexan annunciates a Transfer Fail alarm condition. This event will cause the TSC 80e to force a transfer of the facility loads to the alternate source, after the fault is reset; the load will automatically retransfer back to the preferred/selected source if within normal limits (a slight delay is typical before re-transfer commences). PM091 Rev 0 09/01/21 20 Thomson Technology TSC 80e **TRANSFER SWITCH CONTROLLER** 3.

4. **LAMP TEST** To initiate a Lamp Test, simultaneously press both the Up & Down arrow pushbuttons on TSC 80e Lexan faceplate. The Lexan LEDs will flash confirming their operation. **NOTE** The Lamp Test Function will also clear a Transfer Failure or allow select active timers to be bypassed if held longer than 5 seconds. 3.

5. **TIMER BYPASS** To bypass an active timing sequence (e.g. utility return timer, warm-up timer, cooldown timer), simultaneously press both the Up & Down arrow pushbuttons on Lexan faceplate (i.e.

**UTILITY POWER FAIL SIMULATE & GENERATOR EXERCISE MODE**) for approximately 5 seconds, the LEDs above the buttons will commence oscillating after 5 seconds indicating the bypass has been achieved. PM091 Rev 0 09/01/21 21 Thomson Technology TSC 80e **TRANSFER SWITCH CONTROLLER** 3.6. **TSC 80e LCD DISPLAY OPERATION** The TSC 80e incorporates a Liquid Crystal Display (LCD) that is visible on the front faceplate.

The LCD has pre-programmed displayed messages which are automatically displayed in an auto-Scrolling mode or they may be selected manually by pressing the UP or DOWN pushbuttons in succession until the desired menu is displayed. The display menu types and order in which they are programmed are as follows: 3.6.1. **LCD DISPLAY SCREENS** The following seventeen (17) Display Screens are provided: **SOFTWARE VERSION SYSTEM TIME CLOCK GENERATOR VOLTAGE/FREQUENCY UTILITY VOLTAGE/FREQUENCY SYSTEM CONFIGURATION GENERATOR UNDER VOLTAGE SETPOINT GENERATOR UNDER FREQ. SETPOINT GEN SET START DELAY COUNTER/SETPOINT GEN SET WARMUP DELAY COUNTER/SETPOINT GEN SET COOLDOWN DELAY COUNTER/SETPOINT NEUTRAL DELAY COUNTER/SETPOINT UTILITY UNDER VOLTAGE SETTING UTILITY RETURN COUNTER/SETPOINT AUTO EXERCISE MODE STATUS GENERATOR MODE STATUS UTILITY FAULT STATUS GENERATOR FAULT STATUS** PM091 Rev 0 09/01/21 22 Thomson Technology TSC 80e **TRANSFER SWITCH CONTROLLER** 3.

6.1.1. **SOFTWARE VERSION** The LCD screen displays the current version number of TSC 80e software installed in the controller. 3.6.1.2. **SYSTEM TIME CLOCK** The LCD screen displays the current date and time, based on what has been programmed to the TSC 80e controller. 3.

6.1.3. **GENERATOR VOLTAGE/FREQUENCY** The LCD screen displays the current generator voltage (3 phase or single phase, line to line or line to neutral voltages) and frequency. 3.

6.1.4. **UTILITY VOLTAGE/FREQUENCY** The LCD screen displays the current utility voltage (3 phase or single phase, line to line or line to neutral voltages) and frequency. 3.

6.1.5. **SYSTEM CONFIGURATION** The LCD screen displays the current system configuration setup in the TSC 80e program software: **VOLTAGE** (120, 128, 208, 220, 230, 240, 380, 400, 440, 460, 480, 575, 600V). Note: voltage setting is dependent on type of voltage sensing used on the ATS (i.e. with or without potential transformers). Refer to section 5.4.5.

**FREQUENCY** (50, 60Hz) **PHASES** (single or 3 phase) 3.6.1.6. **GENERATOR UNDER VOLTAGE SETPOINT** The LCD screen displays the programmed generator under voltage sensor setpoint value and the associated dropout % in the TSC 80e controller (percentage is based on nominal voltage level selected in System Configuration). 3.6.1.7. **GENERATOR UNDER FREQUENCY SETPOINT** The LCD screen displays the programmed generator under frequency sensor setpoint value and the associated dropout % in the TSC 80e controller (percentage is based on nominal frequency level selected in System Configuration).

PM091 Rev 0 09/01/21 23 Thomson Technology TSC 80e **TRANSFER SWITCH CONTROLLER** 3.6.1.8. **ENGINE START DELAY SETTING** The LCD screen displays the Engine Start Delay Timer, displayed are: active timer value and programmed time delay setpoint in the TSC 80e controller.

3.6.1.9. **ENGINE WARMUP DELAY SETTING** The LCD screen displays the Engine Warm-up Delay Timer, displayed are: active timer value and programmed time delay setpoint in the TSC 80e controller.

3.6.1.10. **ENGINE COOLDOWN DELAY SETTING** The LCD screen displays the Engine Cooldown Delay Timer, displayed are: active timer value and programmed time delay setpoint in the TSC 80e controller.



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3.6.1.11. NEUTRAL DELAY SETTING The LCD screen displays the Neutral Delay Timer, displayed are: active timer remaining value and programmed time delay setpoint in the TSC 80e controller.

3.6.1.12. UTILITY UNDER VOLTAGE SETTING The LCD screen displays the programmed Utility Voltage under voltage sensor setpoint value and the associated dropout % in the TSC 80e controller (percentage is based on nominal voltage level selected in System Configuration). 3.6.1.13. UTILITY RETURN DELAY SETTING The LCD screen displays the Utility Return Timer, displayed are: active timer value and programmed time delay setpoint in the TSC 80e controller.

3.6.1.14. AUTO EXERCISE MODE STATUS The LCD screen displays if the Auto Exercise mode is currently enabled or disabled.

When it is enabled, the remaining time to test is displayed. @@@@No Password is required for the VIEW ONLY MODE. @@Press the ENTER key. 2. @@3.

@@4. @@5. @@To exit the programming sub-menus, press the ESC key. To exit back to the normal display mode, press the ESC key again. 4.1.2. USER READ / WRITE MODE User password can view and modify all programming parameters except submenu items "Clear System Statistics", "Clear Data Log", "Set Voltage Calibrations" & "System Options". User password can also modify the User password number. The Factory default number for the User read/write mode is one (01).

4.1.3. MASTER READ / WRITE MODE Master password can view and modify all programming parameters except items in the "System Options" sub-menu. Master password can also modify the User password number. Consult THOMSON TECHNOLOGY factory for master password number if required. PM091 Rev 0 09/01/21 27 Thomson Technology TSC 80e TRANSFER SWITCH CONTROLLER 4.1.4. PASSWORD ENTRY PROCEDURE To enter the programming mode, follow the procedure as shown: 1.

Press the ENTER key to obtain the Password Main Menu. The "PASSWORD ENTRY & RESETS" prompt will appear). 2. Press the ENTER key a second time to obtain the Password Sub Menus. The "USER PASSWORD" prompt will appear).

If the USER password is to be entered, proceed to step #4. 3. Press the DOWN arrow key to select USER or MASTER password sub-menu 4. Once the USER or MASTER sub-menu is selected, press the ENTER key again to allow password number entry (an asterisk (\*) should appear to signal data entry is possible). 5.

Use the UP arrow key to adjust the right-hand digit, and if required use the DOWN arrow key to adjust the left-hand digit. Once the desired number is displayed, press ENTER key to accept the value. NOTES - The USER password can be modified only when the MASTER Password is used and the "SET PASSWORD" prompt is displayed. - The MASTER Password cannot be changed. If programming menu is exited the password must be re-entered. 4.2. SOFTWARE PROGRAMMING PROCEDURE Once the correct password is entered and access is provided to the Programming menus, the following procedure is required to locate and view/change a specific program value. 1. Press the DOWN or UP keys to scroll through the programming menus.

2. Once the selected program menu is displayed, press the ENTER key to view the submenus available. 3. @@4. Once the selected program sub-menu item is displayed, press the ENTER key to change the sub-menu item to a different value. An asterisk (\*) must appear to signal data entry is possible. PM091 Rev 0 09/01/21 28 Thomson Technology TSC 80e TRANSFER SWITCH CONTROLLER Note: If an asterisk (\*) symbol does not stay displayed when attempting to make a program change, an incorrect level of password has been entered which will prevent changing the value. 5. Press the DOWN or UP keys to change numeric values or selection of programming functions available. Once the desired value is selected, press the ENTER key to accept the change.

The asterisk will disappear. To exit the programming sub-menus, press the ESC key. To exit back to the normal display mode, press the ESC key again.

PM091 Rev 0 09/01/21 29 Thomson Technology TSC 80e TRANSFER SWITCH CONTROLLER 4.3.

PROGRAMMING DISPLAY MAIN MENU SCREENS The following illustrates the available programming menus, which are available, and the order in which they are displayed in software: PASSWORD ENTRY & RESET SYSTEM DATE & TIME AUTO EXERCISE TIMER SYSTEM OPTIONS SYSTEM CONFIG VOLTAGE CALIBRATION UTILITY SETPOINTS GENERATOR SETPOINTS SYSTEM TIMING DELAYS PROGRAMMABLE OUTPUTS SYSTEM STATISTICS DATA LOGS PM091 Rev 0 09/01/21 30 Thomson Technology TSC 80e TRANSFER SWITCH CONTROLLER 4.4. QUICK GUIDE VOLTAGE CHANGE PROGRAMMING PROCEDURE PM091 Rev 0 09/01/21 31 Thomson Technology TSC 80e TRANSFER SWITCH CONTROLLER 4.5. QUICK GUIDE PROGRAMMABLE OUTPUTS PROGRAMMING PROCEDURE PM091 Rev 0 09/01/21 32 Thomson Technology TSC 80e TRANSFER SWITCH CONTROLLER 4.

6. PROGRAMMING DISPLAY SUB-MENU DESCRIPTIONS The following Programming DISPLAY SUB-MENU Screens are provided in software: 4.6.1. PASSWORD ENTRY & RESET The following sub-menus are located within this section: 4.6.1.1. User Password Entry User Password description and operation is described in Section 4.1 Passwords 4.

6.1.2. Master Password Entry Master Password description and operation is described in Section 4.1 Passwords 4.6.1.3. Set Password This sub-menu item is used to change the User Password value stored in the controller. Refer to Section 4.

2 for programming change procedure. NOTE: A Master Password is required to change this parameter 4.6.1.4.

Clear System Stats This sub-menu item is used to clear all items in the data logs. NOTE: A Master Password is required to change this parameter 4.6.1.5. Clear Data Log This sub-menu item is used to clear or reset the TSC 80e's system status contents back to zero. This clear instruction will change the following system status item registers: · Load on Utility PM091 Rev 0 09/01/21 33 Thomson Technology TSC 80e TRANSFER SWITCH CONTROLLER · · · Gen Test Start Load on Gen Gen Test Stop NOTE: A Master Password is required to change this parameter 4.6.2. SYSTEM DATE & TIME This sub-menu item is used to set the controllers real time clock. This clock is utilized for operation of the programmable plant exercise function and data logging time/date stamping. The controllers clock's time & date setting has a battery back-up feature, which will maintain the clocks setting during normal utility power interruptions. The battery back-up feature has a reserve capacity to allow the clock time to be saved for up to 100 hours following loss of control power to the controller. The time clock also has a daylight saving feature as described in Section #4.6.

5.12 The following sub-menus are located within this section: 4.6.2.1. Year 4.6.2.2. Month 4.

6.2.3. Date 4.6.

2.4. Hours 4.6.2.

5. Minutes 4.6.2.6. Seconds Refer to Section 4.2 for programming change procedure. 4.6.3.

AUTO EXERCISE TIMER The TSC 80e controller has a built-in programmable exercise timer, which allows up to a 4 week (28 day), exercise time period.



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The timer is fully programmable for, day of week, time of day, duration of the test and type of test mode (i.e. On or Off Load). The exercise timer utilizes the TSC 80e's internal real-time-clock clock for referencing all timing functions. The time clock has a 500-hour power reserve feature to retain correct time settings during short duration utility power failures. NOTE: During any On Load 34 PM091 Rev 0 09/01/21 Thomson Technology TSC 80e TRANSFER SWITCH CONTROLLER exercise test mode, the transfer switch will automatically re-transfer back to the utility supply if the generator set fails. Refer to Section 4.2 for programming change procedure. The following sub-menus are located within this section: 4.

6.3.1. Start Week Select the week number (e.g.

1-4) that the generator set is to be started to begin its exercise period. NOTE: Week Number is programmable only if the System Time Clock Rollover period is set longer than 7 days. 4.6.3.

2. Start Day Select the day of the week (e.g. Monday, Tuesday, etc.) that the generator set is to be started to begin its exercise period. 4.6.3.3. Start Hour Select the hour of the day (e.

g. 0-23 hour) that the generator set is to be started to begin its exercise period. 4.6.3.4. Start Min Select the minute of the day (e.g. 0-59 minutes) that the generator set is to be started to begin its exercise period. 4.

6.3.5. Run Time Hours Select the number of hours (e.g.

0-23 hour) that the generator set is to be operated during its exercise period. 4.6.3.6.

Run Time Min Select the number of minutes (e.g. 0-60 minutes) that the generator set is to be operated during its exercise period. 4.6.3.7. Rollover Days Select the number of days (7, 14, 21, 28) in which the system time clock will rollover for desired operation of the exercise timer. (Example - If a weekly test PM091

Rev 0 09/01/21 35 Thomson Technology TSC 80e TRANSFER SWITCH CONTROLLER schedule is required at the same time; a 7-day period may be selected, this will have the test repeat each week at the same time and interval. If the generator set is to be exercised once a month, a 28-day system rollover should be selected.

) The week and day of week can be selected from any one of the 4 weeks in the list, the test will then repeat at this selected time and interval. NOTE: The Plant Exercise Load or No Load operation setting is located in System Config sub-menu. Refer to Section #4.6.5.11 for programming information 4.6.4. SYSTEM OPTIONS 4.6.

4.1. Version Factory enabled for operation based on the TSC 80e controller. NOTE: This sub-menu item cannot be accessed with user or Master Password. 4.6.5. SYSTEM CONFIG 4.6.5.

1. System Voltage Twelve system voltage setpoints can be programmed in software for the TSC 80e controller (i.e. 120, 128, 208, 220, 230, 240, 380, 400, 440, 460, 480, 575, 600V). The system voltages are typical system Phase-to-Phase nominal voltages. NOTES 1. For 3 phase 3 wire or high voltage applications utilizing potential transformers with 120V or 128V nominal secondary voltage, the controller must be programmed with 120V or 128V setting. Terminal #43 input is ignored in this application with the TSC 80e. PM091 Rev 0 09/01/21 36 Thomson Technology TSC 80e TRANSFER SWITCH CONTROLLER 3. For nominal system voltages that are not provided by specific software values, refer to Section 4.

6.5.2 When a system voltage is selected, the TSC 80e's utility and generator under voltage setpoint percentage setting will be automatically programmed to correspond to the sensing input voltage (e.g. with a 600V system voltage selected, and a 80% under voltage software setting, the under voltage sensor will be activated below 540VAC). PM091 Rev 0 09/01/21 37 Thomson Technology TSC 80e TRANSFER SWITCH CONTROLLER 4.6.5.2. TSC 80e UNDER VOLTAGE SETPOINTS WITH NON-STANDARD SYSTEM VOLTAGES When the Transfer Switch & TSC 80e transfer controller is applied to nonstandard system voltages, the TSC 80e under voltage software setting percentages will not correspond to the correct voltage drop out setting.

To obtain the correct drop-out voltages using non-standard system voltages, the TSC 80e software under voltage setpoints need to have an offset percentage adjustment with the corresponding voltage software settings. For non-standard system voltages, the following formula can be used: A) Desired Drop-out Voltage = Drop-out % x System Voltage B) TSC 80e UNDER VOLTAGE Setting = (Desired Drop-out voltage x 100) TSC 80e System Voltage Setting Example: for 200V system, 85% of 200V = .85 x 200V = 170V TSC 80e software Setting = (170 x 100) TSC 80e Software Setting = 82% NOTE The TSC 80e System Voltage Setting in Software must be set to be equal to the nominal system voltage level or the next highest setting available (e.g. 200V system voltage must use 208V jumper setting).

4.6.5.3. PT Ratio The TSC 80e controller can be programmed in software to display correct Utility or Generator system line voltage when external Potential Transformers are utilized on the voltage sensing inputs.

Potential Transformers are typically applied when 3 phase 3 wire system voltage are only available. This menu has a programmable range of PT ratios from 1.0 to 25.0. Example: for use with 480:120 potential transformers, program ratio of 4.0. To offset minor output voltage variances of potential transformers used, PT ratio can be programmed slightly higher or lower using the "tenths" digit. TSC 80e controllers utilizing direct connected voltage sensing (i.e. without PTs) are to be programmed as setting "1".

0". PM091 Rev 0 09/01/21 38 Thomson Technology TSC 80e TRANSFER SWITCH CONTROLLER NOTE The PT Ratio setting affects the displayed Utility & Generator voltages when the SYSTEM VOLTAGE is set for 120V or 128V. The PT ratio setting has no affect with any other system voltage settings.

4.6.5.4. System Frequency The TSC 80e controller can be programmed in software for 2 system frequencies 50Hz or 60Hz. When a system frequency is programmed, the TSC 80e's generator frequency setpoint percentage setting will be automatically programmed to correspond to the sensing input frequency (e.g.

with a 60Hz system frequency, and a 90% under frequency potentiometer setting, the under frequency sensor will be activated below 54.0 Hz). 4.6.5.

5. System Phases The TSC 80e controller can be programmed in software for two types system Phases, single phase or 3 phase. Phase C voltage sensing input is ignored in the single-phase mode. 4.6.

5.6. 3 Wire Delta This is a status menu only to indicate if the controller is currently configured for 3 wire operation. The status will indicate "YES" when the SYSTEM VOLTAGE Setting is programmed to = 120V or 128V which enables the 3 Wire Delta system operation. 4.6.5.7. LDC Transfer The TSC 80e controller can be programmed in software to perform a Load Disconnect signal operation prior to and following a load transfer. To enable the LDC signal, program as YES.

Refer to sections 5.4.9.7 & 5.4.9.8 for programming the LDC time delay functions and section 5.

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4.10 for assigning the desired type of output contact signal. NOTE 1.

The LDC Transfer default setting is YES PM091 Rev 0 09/01/21 39 Thomson Technology TSC 80e TRANSFER SWITCH CONTROLLER 4.6.5.8. Secure Mode  
The TSC 80e controller can be programmed in software to inhibit the test pushbuttons on the Lexan faceplate, for security purposes.

To inhibit the test pushbuttons, program as YES. NOTE 1. The Secure mode factory default setting is NO 4.6.5.

9. Auto Test This is a status menu only to indicate if the controller is currently set to Automatically test the generator set as initiated by the front faceplate AUTO EXERCISE pushbutton. This menu item is not programmable. 4.6.5.10. Dual Event Test The TSC 80e controller can be programmed in software to select a Dual event test (i.e. The first programmed Plant exercise event will perform a Load test, then the second programmed Plant exercise event will perform, a no-load test will be performed).

To select a Dual Event Test, program as YES. 4.6.5.11. Xfr on Load Test The TSC 80e controller can be programmed in software to select the desired Plant Exercise testing mode (i.e. load test with transfer or no-load test) for the programmable exercise function or for a remotely initiated Test mode. select a Xfer on Load test, program as YES. NOTES 1.

The No-Load Test mode is the factory default setting. 2. Should utility power fail during a no-load test operation, the load will automatically transfer to the generator and will retransfer back when utility power is restored to within normal conditions. The engine will continue to run until the 30 minute exercise time delay period expires. To PM091 Rev 0 09/01/21 40 Thomson Technology TSC 80e TRANSFER SWITCH CONTROLLER 4.

6.5.12. DST Auto Adjust The TSC 80e controller can be programmed in software to enable or disable the real time clocks Daylight Savings Time (DST) feature. To enable the DST feature, program as YES.

During the year, the TSC 80e's time clock will then automatically adjust time based on the occurrences DST changes in North America. NOTE The DST feature is programmed based on North American DST changes effective year 2008 forward 4.6.6. VOLTAGE CALIBRATION The TSC 80e software program provides voltage-sensing calibration for the utility and generator sensors. All voltage-sensing circuits are factory calibrated to specific voltage levels prior to shipment of the transfer switch and should not require further adjustment in the field. Should field calibration of any voltage-sensing circuitry be required, the following procedure may be used. DANGER!!!! Arc Flash and Shock Hazard. Will cause severe injury or death. Do not open 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 NOTE: A Master Password is required to change any voltage calibration item Note: to calibrate the TSC 80e controller, a two-step procedure is required Zero and Span PM091 Rev 0 09/01/21 41 Thomson Technology TSC 80e TRANSFER SWITCH CONTROLLER 4.6.6.1. ZERO CALIBRATION-GENERATOR 4.6.6.1.1. Energize the utility supply to power up the controller and deenergize the generator supply.

NOTE: The phases being calibrated for zero must have a true zero reference to ground to allow proper calibration therefore the TSC 80e sensing inputs for the generator must be temporarily grounded to provide this true zero reference. 4.6.6.1.

2. To gain access to the Voltage Calibration menu, follow the Programming instructions for User Password & Submenu per sections 5.1 & 5.2. Once the Voltage Calibration sub-menu is accessed, press the ENTER key.

Scroll to the display the GEN Phase A ZERO. To calibrate the Gen phase A ZERO press the ENTER key again. 4.6.6.1.3. Use the UP or DOWN arrow pushbuttons to adjust the correction factor number while observing the displayed voltage level. Adjust the correction factor number to obtain 0VAC on the display. 4.

6.6.1.4. With zero voltage displayed, press the ENTER pushbutton to accept the correction factor number. 4.6.6.1.5.

To zero calibrate the other generator phases, press the ENTER pushbutton to select the desired phase, then press ENTER again to adjust its correction factor and repeat the procedures as outlined above. 4.6.6.2.

ZERO CALIBRATION-UTILITY 4.6.6.2.1.

Energize the generator supply to power up the controller and de-energize the utility supply. NOTE: The phases being calibrated for zero must have a true zero reference to ground to allow proper calibration therefore the TSC 80e sensing inputs for the utility must be temporarily grounded to provide this true zero reference. PM091 Rev 0 09/01/21 42 Thomson Technology TSC 80e TRANSFER SWITCH CONTROLLER 4.6.6.2.2. To calibrate the Utility ZERO values, repeat procedure 5.4.6.

1.2 to 5.4.6.2.5 except selecting the Utility sub-menus. 4.6.6.3.

SPAN CALIBRATION-GENERATOR 4.6.6.3.1.

For Span calibration, connect an external calibrated AC voltmeter of adequate voltage range and accuracy to the TSC 80e controller generator sensing terminals (phase to neutral) associated with the voltage phases to be calibrated 4.6.6.3.2.

Energize the generator supply voltage to the controller at a nominal level. The utility supply may be de-energized. 4.6.6.3.3. To gain access to the Voltage Calibration menu, follow the Programming instructions for User Password & Submenu per sections 5.1 & 5.2.

Once the Voltage Calibration sub-menu is accessed, press the ENTER key. Scroll to the display the GEN Phase A SPAN. To calibrate the Gen phase A SPAN press the ENTER key again. 4.6.6.3.4. Use the UP or DOWN arrow pushbuttons to adjust the correction factor number while observing the displayed voltage level. Adjust the correction factor number to obtain the same LN voltage as measured with the external calibrated AC voltmeter on the display.

4.6.6.3.5.

With the correct L-N voltage displayed, press the ENTER pushbutton to accept the correction factor number. 4.6.6.3.

6. To Span calibrate the other generator phases, press the ENTER pushbutton to select the desired phase, then press ENTER again to adjust its correction factor and repeat the procedures as outlined above. PM091 Rev 0 09/01/21 43 Thomson Technology TSC 80e TRANSFER SWITCH CONTROLLER 4.6.6.4. SPAN CALIBRATION-UTILITY 4.6.6.4.

1. For Span calibration, connect an external calibrated AC voltmeter of adequate voltage range and accuracy to the TSC 80e controller utility sensing terminals (phase to neutral) associated with the voltage phases to be calibrated 4.6.6.4.2. Energize the utility supply voltage to the controller at nominal level. The generator supply may be de-energized. 4.6.

6.4.3. To calibrate the Utility Span values, repeat procedure 5.4.

6.3.2 to 5.4.6.

3.6 except selecting the Utility sub-menus. 4.6.7. UTILITY VOLTAGE SETPOINTS The TSC 80e controller provides 3-phase under voltage sensing on the utility supply. Each sensor is individually programmable for pickup and dropout voltage setpoints (i.



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e. adjustable hysteresis). To program the voltage sensing features, refer to the following descriptions: 4.

6.7.1. Utility Under Voltage Drop Out Set to the desired utility under voltage setpoint at which the internal voltage sensor drops out (i.e. the sensor de-energizes to an abnormal state when any one of the utility phase voltages is below the setpoint). The setting is entered based on a phase-to-phase voltage percentage within a range of 70% to 95% of nominal system voltage. NOTE: The difference between the pickup and dropout setting is considered the dead band or hysteresis value. 4.6.

7.2. Utility Under Voltage Pick Up Set to the desired utility under voltage setpoint at which the internal voltage sensor picks up (i.e. the sensor energizes to a normal state when all phases of the utility phase voltages are above the setpoint).

The setting is entered based on a phase-to-phase voltage percentage within a range of 75% to 100% of nominal system voltage. NOTE: The difference between the pickup and dropout setting is considered the dead band or hysteresis value. PM091 Rev 0 09/01/21 44 Thomson Technology TSC 80e TRANSFER SWITCH CONTROLLER 4.6.8.

GENERATOR VOLTAGE & FREQUENCY SETPOINTS The TSC 80e controller provides 3-phase under voltage sensing and under frequency sensing on the Generator supply. Each sensor is individually programmable for pickup and dropout voltage setpoints (i.e. adjustable hysteresis). To program the voltage and frequency sensing features, refer to the following descriptions: 4.6.8.1. Generator Under Voltage Drop Out Set to the desired generator under voltage setpoint at which the internal voltage sensor drops out (i.e.

the sensor de-energizes to an abnormal state when any one of the generator phase voltages is below the setpoint). The setting is entered based on a phase-to-phase voltage percentage within a range of 70% to 95% of nominal system voltage. NOTE: The difference between the pickup and dropout setting is considered the dead band or hysteresis value. 4.6.8.2. Generator Under Voltage Pick Up Set to the desired generator under voltage setpoint at which the

internal voltage sensor picks up (i.e. the sensor energizes to a normal state when all phases of the generator phase voltages are above the setpoint). The setting is entered based on a phase-to-phase voltage percentage within a range of 75% to 100% of nominal system voltage. NOTE: The difference between the pickup and dropout setting is considered the dead band or hysteresis value. 4.6.8.

3. Generator Under Frequency Drop Out Set to the desired generator under frequency setpoint at which the internal frequency sensor drops out (i.e. the sensor de-energizes to an abnormal state when the generator frequency is below the setpoint). The setting is entered in a percentage value within a range of 70-90%.

4.6.8.4. Generator Under Frequency Pick Up Set to the desired generator under frequency setpoint at which the internal frequency sensor drops out (i.e. the sensor de-energizes to an abnormal state when the generator frequency is below the setpoint). The setting is entered in a percentage value within a range of 70-90%. 4.6.

9. SYSTEM TIMING DELAYS The TSC 80e provides control and timing delay logic specific to the operation of the utility and generator, these are: PM091 Rev 0 09/01/21 45 Thomson Technology TSC 80e TRANSFER SWITCH CONTROLLER 4.6.9.1. Utility Return Delay The utility return delay period will be initiated once the utility supply has returned within limits following a utility power failure condition. Select desired utility return delay time in minutes. The range of settings is 0.0 to 30.0 minutes.

If no delay is required, set this time delay to zero. NOTE: The utility return delay will be bypassed should the generator fail during the time delay period. 4.6.9.

2. Generator Start Delay The generator (i.e. engine) start signal will be initiated following expiry of the start delay timer. Select desired generator start delay time in seconds.

The range of setting is 0 to 60 seconds. If no delay is required, set this time delay to zero. NOTE: The output relay is normally energized when the utility power is within limits and de-energizes to start the generator. 4.6.9.3. Generator Speed & Warm Up Delay A transfer to the generator supply will be initiated when the voltage and speed (i.e., frequency) are within limits and upon expiry of the warm-up delay timer.

Select desired generator warm-up delay time in seconds. The range of settings is 0 to 60 seconds. If no delay is required, set this time delay to zero.

4.6.9.4. Generator Cool Down Delay The generator (i.e. engine) cooldown period will be initiated once the load has transferred from the generator supply. The engine start signal will be maintained until expiry of the cooldown delay timer. Select desired generator cooldown delay time in minutes. The range of settings is 0.0 to 30.0 minutes.

If no delay is required, set this time delay to zero. 4.6.9.5.

Neutral Delay The neutral delay time period will be initiated once both of the supply powerswitching devices are open during a transfer sequence. Select desired neutral delay time in seconds. The range of settings is 0 to 60 seconds. If no delay is required, set this time delay to zero. NOTE: The neutral delay may be bypassed should the operating power fail for longer than the timer setting. 4.6.9.6. Neutral Position Time The TSC 80e transfer control logic includes an adjustable time delay feature to compensate for the maximum time that a transfer switch mechanism takes to operate when load-sensing voltage is used to detect the neutral position.

This PM091 Rev 0 09/01/21 46 Thomson Technology TSC 80e TRANSFER SWITCH CONTROLLER time delay is set to a time value, which is greater than the typical time that the transfer mechanism typically takes to operate from one supply position to the neutral position. When the TSC 80e controller is supplied from the factory with a Thomson Technology transfer mechanism the Neutral Position Delay will be factory set for correct operation. 4.6.9.7. Pre-Transfer Delay The pre-transfer delay period will be initiated upon an impending transfer in either direction from a powered-to-powered source. The pre-transfer output relay will momentarily energize (as per the pre-transfer time setting) prior to a load transfer and will stay energized until the post-transfer delay time commences. Select desired pre-delay time in seconds. The range of settings is 0 to 60 seconds.

If no delay is required, set this time delay to zero. 4.6.9.8.

Post-Transfer Delay The post-transfer delay period will be initiated on expiry of the pre-transfer delay (overlapping) in either direction. The post-transfer output relays will energize (as per the post-transfer time setting) after the load transfer and will stay energized until the post-transfer delay time period expires. Select desired post-delay time in seconds. The range of settings is 0 to 60 seconds. If no delay is required, set this time delay to zero.

4.6.10. PROGRAMMABLE OUTPUTS The TSC 80e transfer controller provides programmable output relay functions.



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