



TSB 850

BYPASS ISOLATION SWITCHES

INSTALLATION, OPERATING & SERVICE MANUAL



PM051 Rev 7 02/05/28

INDEX

1. PRODUCT REVISION HISTORY 1

2. CAUTION 1

3. NOTE TO INSTALLER..... 2

 3.1. TRANSFER SWITCHES WITH MULTI-TAP VOLTAGE CAPABILITY..... 2

4. GENERAL DESCRIPTION..... 3

 4.1. SINGLE SIDED BYPASS MODEL TSBU 850 (Utility), TSBG 850 (Generator) 3

 4.2. DOUBLE SIDED BYPASS (MODEL TSBD 850)..... 3

 4.3. PRODUCT MODEL CODE..... 4

5. GENERAL NOTES ON SERVICING..... 5

6. GENERAL THEORY OF OPERATION 5

 6.1. SINGLE SIDED BYPASS (MODEL TSBU (Utility), TSBG (Generator))..... 6

 6.2. DOUBLE SIDED BYPASS (MODEL TSBD)..... 6

 6.2.1. Utility Bypass..... 7

 6.2.2. Generator Bypass..... 7

7. RECOMMENDED MAINTENANCE 8

8. DEFECTIVE COMPONENTS 8

9. REQUIREMENTS FOR UPSTREAM CIRCUIT PROTECTIVE DEVICES 9

10. CABLE TERMINAL INFORMATION AND RECOMMENDED TIGHTNESS..... 10

11. NOTES..... 10

1. PRODUCT REVISION HISTORY

The following information provides an historical summary of changes made to this product since the original release.

Rev 7 02/05/22	New TSB 850 models introduced (MS3-100,MS3-150, MS5-250, TS6-400, TS6-600 & TS6-800)
Rev 6 01/10/17	Withstand rating change for 100A & 150A.
Rev 5 01/07/20	New TSB 850-TS7-1000/1200 model introduced; ground fault test requirements; performance tests.
Rev 4 00/12/01	New TSB 850-TCK-600 model introduced; cable terminal information; DSS option Lev-3 information available in PM043.
Rev 3 00/03/01	Warnings added with reference to multi-tap controller capability features and system voltage.
Rev 2 00/01/21	Added 200A model information c/w drawings.
Rev 1 97/08/01	Minor text changes
Rev 0 97/07/10	Original release.

Contact Thomson Technology Inc., to obtain applicable instruction manuals. Soft copy of most current version is available at www.thomsontechnology.com.

NOTE: All information contained in this manual is for reference only and is subject to change without notice.

2. CAUTION

Before opening the transfer switch or bypass isolation enclosure to perform any service task or to manually transfer the mechanism, it is imperative to isolate the transfer switch from any possible source of power. Failure to do so may result in serious personal injury or death due to electrical shock.

3. NOTE TO INSTALLER

To ensure satisfactory installation of this equipment be sure to observe "Recommended Connection Tightness" and "Requirements for Upstream Circuit Protective Devices" located in this manual.

All mechanical and electrical connections must be checked for tightness prior to placing this equipment in service to ensure proper operation and to validate applicable warranty coverage.

3.1. TRANSFER SWITCHES WITH MULTI-TAP VOLTAGE CAPABILITY

If the transfer switch has programmable multi-tap voltage capability (refer to engineered drawings), confirm the transfer switch has been configured for the system voltage prior to installation.

Warning

Failure to confirm and match transfer switch voltage with the system voltage could cause serious equipment damage.

The voltage selections and connections are shown on the electrical schematics attached to each transfer switch. The factory default settings will be indicated on the calibration label attached on the inside of the enclosure door (supplied loose on open style models). A blank label is included to record the applicable settings if the configuration is changed from the factory default settings.

To change the transfer switch configuration the following must be accomplished:

- Change voltage taps of PT's to system voltage (refer to schematics)
- Change TSC 800 programming (refer to sections 6.2.2, 6.2.4, 6.2.5, 6.3, and 6.4 of the TSC 800 instruction manual). The following settings may require reprogramming (depending on options purchased):
 - System voltage
 - System frequency
 - System phase
 - Utility undervoltage pickup (typically 90% of system voltage)
 - Utility undervoltage dropout (typically 80% of system voltage)
 - Utility overvoltage pickup (typically 110% of system voltage)
 - Utility overvoltage dropout (typically 105% of system voltage)
 - Utility underfrequency (typically 95% of system frequency)

- Utility overfrequency (typically 105% of system frequency)
- Generator undervoltage pickup (typically 90% of system voltage)
- Generator undervoltage dropout (typically 80% of system voltage)
- Generator overvoltage pickup (typically 110% of system voltage)
- Generator overvoltage dropout (typically 105% of system voltage)
- Generator underfrequency (typically 95% of system frequency)
- Generator overfrequency (typically 105% of system frequency)

Record any changed setting on the TSC 800 Programming Data Sheets for future reference.

Complete the blank calibration label and attach to the inside of the transfer switch enclosure door.

4. GENERAL DESCRIPTION

Bypass isolation switches are used in conjunction with automatic load transfer switches. They enable an operator to bypass a source to the load and isolate the transfer switch for maintenance or testing.

The mechanism utilizes molded case switching devices and a positive mechanical interlock to prevent two sources from being connected at the same time and true isolation of the transfer switch.

Thomson Technology Inc. offers two types of isolation-bypass switches.

4.1. SINGLE SIDED BYPASS MODEL TSBU 850 (Utility), TSBG 850 (Generator)

This device may be either a utility or generator side bypass. The bypass consists of a source isolate breaker (either utility or generator), a load isolate breaker and a source bypass breaker (either utility or generator). This device provides an interrupted bypass to the selected source. The alternate source must be isolated upstream to provide complete isolation of the transfer switch.

4.2. DOUBLE SIDED BYPASS (MODEL TSBD 850)

This device allows bypass to either source and complete isolation of the transfer switch. The bypass consists of two source isolate breakers, two source bypass breakers (both utility and generator sides) and a load isolate breaker. This switch provides for either an interrupted or uninterrupted bypass to either source. A test circuit allows for transfer switch operation in the bypassed mode.

4.3. PRODUCT MODEL CODE

The type of TSB 850 series bypass isolation transfer switch supplied is identified by way of a product code which appears on the equipment rating plate (MODEL) on the door of the bypass switch, and on the engineered drawings. The model code structure and definitions are as follows:

TSB D 85 3 – T S6 800 A 600
1 2 3 4 5 6 7 8

- 1) Basic Model Type (TSB 850 Series)
- 2) Indicates Source(s) Bypassed
 U=Utility
 G=Generator
 D=Double – i.e. both sources
- 3) Number of Power Switching Unit Poles (2, 3 or 4)
- 4) Mechanism Style (M or T)
 M = 100 amp through 250 amp, single toggle mechanism
 T = 400 amp through 1200 amp, dual toggle mechanism
- 5) Power Switching Unit Type

Amperage	Power Switching Unit Model Type
100	S3
150	S3
250	S5
400	S6
600	S6
800	S6
1000	S7
1200	S7
1600*	S7

*Non UL/CSA rated

- 6) Amperage - 100, 150, 250, 400, 600, 800, 1000, 1200, 1600
- 7) Integral Overcurrent Protection Option: (A or B)
 A = NONE (no overcurrent protection)
 B = With integral overcurrent protection (Utility and/or generator sources as identified) on the equipment rating plate and engineered drawings

- 8) System Voltage - 208, 240, 480, 600 (the maximum system voltage will be specified-operating voltage may be same or lower on multi-tap featured units)

5. GENERAL NOTES ON SERVICING

When performing any service work on the bypass isolation switch, it is imperative that the following be observed:

- a) To maintain mechanical integrity, ensure that:
- Mechanical interlocking is correct and movement is free; proper sequence of breaker opening/closing must be maintained.
 - All fasteners are adequately tightened.
- b) To maintain electrical integrity, ensure that:
- All electrical connections are clean and adequately tightened.
 - All insulating devices are in place and in good condition.
 - No moisture or other contamination is present.

Service work should be undertaken only by qualified personnel. Failure to correctly maintain a bypass isolation switch may represent a hazard to life and equipment. Full operational testing must be done prior to placing a switch in service subsequent to any maintenance or repair. Any service work involving electrical components requires high potential testing to ensure that required insulation levels have been maintained.

6. GENERAL THEORY OF OPERATION

(Refer to the operating description for the model and type of equipment installed).

NOTE:

- a) In this manual, the breakers are designated as follows:

UI-Utility isolate: This breaker isolates the utility supply input from the transfer switch.

GI-Generator isolate: This breaker isolates the generator supply input from the transfer switch.

LI-Load isolate: This breaker isolates the load from the transfer switch.

UB-Utility bypass: This breaker connects the utility supply directly to the load.

GB-Generator bypass: This breaker connects the generator supply directly to the load.

- b) Normal position is defined as when neither source is bypassed and the load is being supplied from either source through the transfer switch.

6.1. SINGLE SIDED BYPASS (MODEL TSBU (Utility), TSBG (Generator))

NOTE: Transfer switch is not completely isolated unless isolate breakers and alternate supply breakers are open.

The sequence of operation for a utility side bypass is as follows:

- Normal position: Utility isolate (UI) and Load isolate (LI) closed; Utility bypass (UB) open.
- Before bypassing, turn engine control switch to OFF if startup is not desired and/or isolate generator circuit breaker to ensure complete transfer switch isolation.
- To bypass and isolate transfer switch: Open Utility isolate (UI) and Load isolate (LI).
- Move sidebar interlock to allow closure of Utility bypass (UB).
- Close UB.
- The load is now connected directly to the utility supply and the transfer switch is isolated from the utility supply. Isolation of the transfer switch from the generator supply must be done upstream.
- To return to normal position, reverse the above steps.

The sequence of operation for a generator side bypass is as follows:

- Normal position: Generator isolate (GI) and Load isolate (LI) closed; Generator bypass (GB) open.
- Before bypassing, the generator should be running and connected to the Load through the transfer switch (to ensure complete transfer switch isolation) and/or open utility supply feeder breaker.
- To bypass and isolate transfer switch: Open Generator isolate (GI) and Load isolate (LI).
- Move sidebar interlock to allow closure of Generator bypass (GB).
- Close GB.
- The load is now connected directly to the generator supply and the transfer switch is isolated from the generator supply. Isolation of the utility supply must be done upstream.
- To return to normal position, reverse the above steps.

6.2. DOUBLE SIDED BYPASS (MODEL TSBG)

The sequence of operation for uninterrupted bypass is as follows:

6.2.1. Utility Bypass

- Normal position: Utility isolate (UI), Generator isolate (GI) and Load isolate (LI) are closed; Utility bypass (UB) and Generator bypass (GB) are open.
- Before bypassing, turn engine control switch to OFF if startup is not desired.
- To bypass and isolate transfer switch: Open Generator isolate (GI).
- Move sidebar interlock to allow closure of Utility bypass (UB).
- Close UB. The utility source is now parallel connected to the load through the transfer switch and UB.
- Open Utility isolate (UI).
- Open Load isolate (LI). The transfer switch is now isolated from both sources and the load.
- If the lockable sidebar is used, move sidebar to isolate position and lock to prevent accidental energization of the transfer switch.
- To return to normal position, reverse the above steps.

6.2.2. Generator Bypass

NOTE: The generator should be running and connected to the load through the transfer switch.

- Normal position: Utility isolate (UI), Generator isolate (GI) and Load isolate (LI) are closed. Utility bypass (UB) and Generator bypass (GB) are open.
- To bypass and isolate transfer switch: Open Utility isolate (UI).
- Move sidebar interlock to allow closure of Generator bypass (GB).
- Close GB. The generator source is now parallel connected to the load through the transfer switch and GB.
- Open Generator isolate (GI).
- Open Load isolate (LI). The transfer switch is now isolated from both sources and the load.
- If the lockable sidebar is used, move sidebar to isolate position and lock to prevent accidental energization of the transfer switch.

CAUTION: In either mode, the transfer switch is not isolated unless all three isolation breakers (UI, LI, GI) are open.

The previous sequences are for uninterrupted bypass. An interrupted bypass can be accomplished by opening all isolation breakers prior to closing the selected bypass breaker.

Note:

The transfer switch may be tested in the bypassed mode by connecting the transfer to the test plug. This allows for energization of the control circuits **only** for transfer switch function or maintenance testing. **The neutral delay control feature of the transfer switch (if supplied) will not be functional while using the test plug.**

7. RECOMMENDED MAINTENANCE

- 7.1. *Do not perform dielectric tests on the equipment with any control components in the circuit.*
- 7.2. *Periodically inspect all terminals (load, line) for tightness. Re-torque all bolts, nuts and other hardware.*
- 7.3. *Bypass isolation switches should be in clean, dry and indoor location. If signs of moisture are present, attempt to remove. If cleaning is unsuitable, replace the corroded parts. Should dust or debris gather on the switch, brush, vacuum or wipe clean. **DO NOT** blow dirt into breakers or terminals.*
- 7.4. *Check for ease and correctness of interlock movement.*

8. DEFECTIVE COMPONENTS

Return defective components to Thomson Technology Inc. for repair. Be sure to advise model and serial number of the unit.

9. REQUIREMENTS FOR UPSTREAM CIRCUIT PROTECTIVE DEVICES

Basic Model	Max. Voltage	Rated Current (AMPS)	AMPS (RMS) ¹				
			With Upstream Circuit Breaker Protection			With Upstream Fuse Protection	
			@240V	@480V	@600V	@ Up to 600V	Fuse Type
TSB 850 – MS3-100	600	100	65,000	25,000	18,000	100,000	T, J
TSB 850 - MS3-150	600	150	65,000	25,000	18,000	100,000	T, J
TSB 850 – MS5-250	600	250	65,000	35,000	25,000	100,000	T, J
TSB 850 – TS6-400	600	400	65,000	50,000	35,000	100,000	T, J
TSB 850 – TS6-600	600	600	65,000	50,000	35,000	100,000	T, J
TSB 850 – TS6-800	600	800	65,000	50,000	35,000	100,000	Consult Factory
TSB 850 – TS7-1000	600	1000	65,000	50,000	42,000	100,000	Consult Factory
TSB 850 – TS7-1200	600	1200	65,000	50,000	42,000	100,000	Consult Factory

1. Standard ratings only are shown. Consult TTI for versions with higher withstand current ratings.
2. For other model types not shown, contact TTI for further information.

Fuse ratings shown are maximum allowable to permit use of the transfer switch in application with available fault current not exceeding that shown. Consideration must be given to fuse sizing when fuses also provide overload protection.

Please refer to the factory for further information on upstream protection requirements, if required.

10. CABLE TERMINAL INFORMATION AND RECOMMENDED TIGHTNESS

BYPASS TRANSFER SWITCH RATING (AMPS)	TRANSFER SWITCH MECHANISM TYPE	TERMINAL RATING		CONNECTION TIGHTNESS (In-lbs)	
		QTY PER PHASE	RANGE	TERMINAL MOUNTING SCREW	CABLE CLAMP
100/150	MS3	1	#2-4/0	120	120
250	MS5	1	#6- 350MCM	150	275
400 ¹	TS6	3	2/0- 500MCM	72	275
600 ¹	TS6	3	2/0- 500MCM	72	275
800 ¹	TS6	3	2/0- 500MCM	110	375
1000/1200 ¹	TS7	4	4/0- 500MCM	375	375

1. Optional terminal ratings are available in some models – Consult TTI.
2. For other model types not shown, contact TTI for further information.

11. NOTES