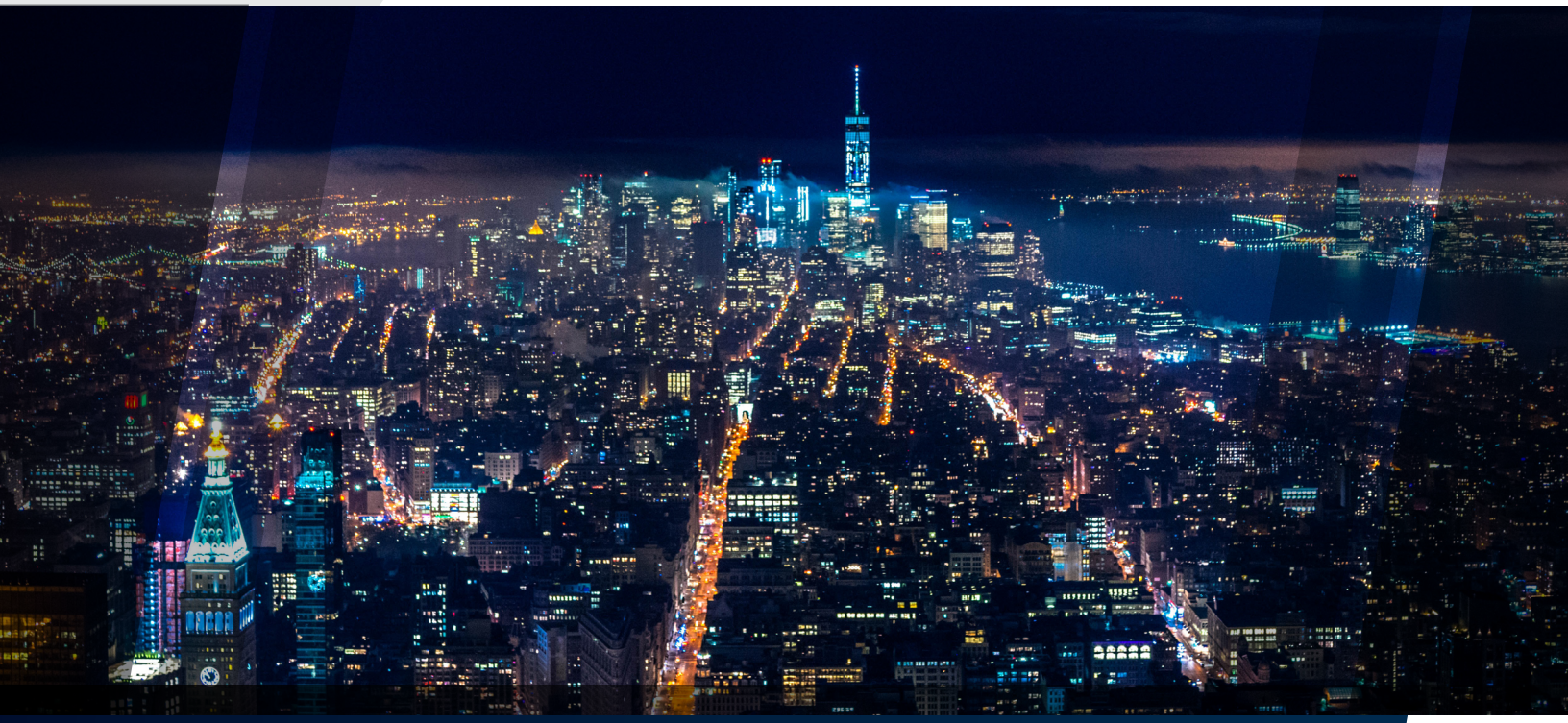
THOMSON™
POWER SYSTEMS



SERIES TS 870 • 100 - 1200 AMP AUTOMATIC TRANSFER SWITCH

COMMERCIAL, INDUSTRIAL

RegalRexnord™

TS 870 AUTOMATIC TRANSFER SWITCHES OFFER:

ENCLOSED CONTACT POWER SWITCHING UNITS

- Fully enclosed silver alloy contacts provide high withstand rating & 100% continuous current rating
- 3 cycle short circuit current withstand
- 10 cycle 6X overload current rating
- Completely isolated utility and generator side power switching units
- Power switching units can incorporate over current protection, allowing cost savings in upstream devices
- Switching manually will prevent damage while in service

RELIABLE MOTOR-OPERATED TRANSFER MECHANISM

- Heavy duty brushless gearmotor and operating mechanism provide mechanical interlocking (for open transition ATS) and longer product life
- Stored Energy: Motor Operators for fast CTTS
- Safe manual operation permits operation under adverse conditions

SUPERIOR SERVICEABILITY

- All mechanical and control devices are visible and front accessible
- All control wires and power busses are front accessible
- Plug-in TSC 7320 Transfer Switch Controller

CONTROL FEATURES

- TSC 7320 Advanced ATS Controller with 2.3" back-lit LCD display and programmable inputs/outputs
- Isolation plug permits disconnecting control circuits from all power sources

PRODUCT DATA

- Models from 100 - 1200A continuous current
- Available 2, 3 or 4 pole
- All models 50/60Hz rated
- Voltage range 120 - 600VAC
- 3 phase, 3 or 4 wire systems
- Open Transition or Closed Transition ATS
- 1000 - 1200A offer fast Open Transition transfer, with phase monitoring

SEISMIC CERTIFICATION:

TS 870 ATS is certified for installation and operation per the following requirements:

- IBC 2012 – Section 13, Occupancy Category IV
- ASCE7 - 05 Region 3 (minimum SS=200%)

SAFETY STANDARDS

- UL™* 1008 Automatic Transfer Switches for use in Emergency Systems
- CSA™* C22.2 No. 178 Automatic Transfer Switches
- NFPA™* 110 Standard for Emergency and Standby Power Systems

WARRANTY

- 2 year limited warranty included

TS 870 Automatic Transfer Switches employ two mechanically interlocked power switching units with an Advanced ATS Controller to automatically start a generator and transfer system load to a generator supply in the event of a utility supply failure. System load is then automatically re-transferred back to the utility supply following restoration of the utility power source to within normal operating limits. All load transfer sequences are "Open Transition"(i.e., break-before-make) with adjustable neutral position delay to ensure adequate voltage delay for preventing out of phase transfers .

TS 870 Automatic Transfer Switches are certified to UL 1008 & CSA 178 Standards for use in Emergency Power Systems applications.

All TS 870 Transfer Switch models have been 3 cycle withstand current tested in accordance with UL 1008 & CSA 178. Additionally, they can withstand 6 times overload for 10 cycles. The standard TS 870 Automatic Transfer Switch is rated for 100% system load. The TS 870 design allows for optional use of integral over current trip elements within the power switching units. All TS 870 Automatic Transfer Switches use a TSC 7320 Advanced ATS Controller which provides all necessary control functions for fully automatic operation. The controller is equipped with 2.3"back-lit LCD display which provides operating status and controls. All parameters and configurations are entered without opening the front door.

* See last page for attribution.

WITHSTAND CURRENT RATINGS (3 CYCLE MODELS)

MODEL	Type	MAX VOLTAGE	WITHSTAND CURRENT RATING AMPS (RMS)[1]		
			@240V	@480V	@600V
TS 87xA-0100	100A	600	65,000	25,000	18,000
TS 87xA-0150	150A	600	65,000	25,000	18,000
TS 87xA-0200	200A	240	65,000	N/A	N/A
TS 87xA-0250	250A[2]	600	65,000	65,000	35,000
TS 87xA-0400	400A	600	65,000	50,000	35,000
TS 87xA-0600	600A	600	65,000	50,000	35,000
TS 87xA-0800	800A	600	65,000	50,000	35,000
TS 87xA-1000	1000A	600	150,000	100,000	65,000
TS 87xA-1200	1200A	600	150,000	100,000	65,000

[1] Note: For power switching devices equipped with optional over current trip units, standard interrupting ratings are identical to withstand ratings shown at 240V and 480V. For interrupting ratings at 600V, contact Thomson Technology Power Systems.

[2] Note: Withstand rating specified is for 250A, 3P. For 250A, 4P, the withstand ratings are 65KA@240V, 35KA@480V and 22KA@600V.

ENCLOSURE DIMENSIONS/CABLE TERMINALS (ATS ONLY) (NEMA®* 1, ASA #61 GRAY)

AMPERAGE	# OF POLES	DIMENSIONS[1]			SHIPPING WEIGHT lbs (kg)	TERMINAL RATING[2]	
		HEIGHT INCHES (mm)	WIDTH INCHES (mm)	DEPTH[3] INCHES (mm)		QTY (PER PHASE)	RANGE
100A	2, 3, 4	31.1 (790)	22.3" (566)	14" (356)	143 lbs (65)	1	#14 - 1/0
150A	2, 3, 4	31.1" (790)	22.3" (566)	14" (356)	143 lbs (65)	1	#2 - 4/0
200A	2, 3, 4	31.1" (790)	22.3" (566)	14" (356)	143 lbs (65)	1	#6 - 350 mcm
250A	2, 3, 4	35.1" (892)	27.3" (693)	14" (356)	172 lbs (78)	1	#6 - 350 mcm
400A	2, 3	43.1" (1095)	34.3" (873)	13" (330)	227 lbs (103)	2	2/0 - 500 mcm
400A	4	48.1" (1222)	37.8" (960)	14.5" (368)	256 lbs (116)	2	2/0 - 500 mcm
600A	2, 3	46.1" (1171)	36.3" (922)	14.5" (368)	248 lbs (113)	2	2/0 - 500 mcm
600A	4	48.1" (1222)	37.8" (960)	14.5" (368)	256 lbs (116)	2	2/0 - 500 mcm
800A	2, 3	48.1" (1222)	37.8" (960)	14.5" (368)	309 lbs (140)	3	2/0 - 500 mcm
800A	4	63.1" (1603)	40.8" (1036)	14.5" (368)	367 lbs (167)	3	2/0 - 500 mcm
400A - 800A CTTS	2, 3, 4	64" (1626)	30" (762)	13" (330)	400 lbs (181)	3	2/0 - 500 mcm
1000A/1200A (ALL)	2, 3, 4	70" (1780)	34.3" (871)	14" (356)	550 lbs (249)	4	4/0 - 500 mcm

[1] Enclosure dimensions are for reference. (NOT FOR CONSTRUCTION).

[3] All cable connections suitable for copper or aluminum.

[4] Optional terminal ratings are available in some models - Consult Thomson Technology Power Systems.

Optional NEMA 3R & 4X class enclosures available - Consult Thomson Technology Power Systems.

For ATS with Distribution Breaker Option - Contact factory for dimensions.

* See last page for attribution.

STANDARD FEATURES

TSC 7320 ADVANCED ATS CONTROLLER

- 2.3" back-lit LCD display for monitoring 3 Phase Utility/ Generator voltage, system frequency, operation status and alarms
- Five key menu navigation
- Front panel editing with PIN protection
- Load on Utility & Load on Generator indication
- Utility & Generator Source available indication
- 3 Phase Voltage sensing on Utility & Generator Sources
- Generator AC frequency sensing
- Utility under voltage control setpoint 50 - 95%[1]
- Generator under voltage control setpoint 50 - 95%[1]
- Generator under frequency control setpoint 70 - 90%[1]
- Engine warmup timer 0-60 min.[1]
- Utility return timer 0-60 min.[1]
- Engine start (Mains Transient) timer 0-30 sec.[1]
- Engine cooldown timer 0-60 min.[1]
- Neutral position delay timer 0-300 sec.[1]
- Load Disconnect Contact (LDC) for pre/post transfer control to signal external building systems such as elevators during transfer operations
- Up to 16 different date and time scheduler for On-load or Off-load Generator Exercising
- Real-time clock provides accurate event logging
- Data logging
- Ten outputs total. Two user programmable outputs are rated at 2A, 24VDC resistive, and two user programmable output rated 15A, 24VDC resistive. Remaining contacts are for ATS functionality. The user programmable outputs can be changed to 20 different functions including: Load on Utility, Load on Gen, Load Disconnect Contact (LDC), Fail to Transfer (FTT), Utility Power Available (UPA), Generator Power Available (GPA), Utility Power Fail, ATS Not in Auto, and ATS in Auto.
- The Transfer Switch is pre-programmed with the following outputs enabled:
  - Load on Utility (UX) (15A)
  - Load on Gen (GX) (15A)
  - Load Disconnect Contact (LDC) (8A)
  - Fail to Transfer (FTT) (2A)
  - ATS Not in Auto (NIA) (2A)

1 Settings are adjustable
2 Power Metering requires Current Transformer Option Kit.

- Local and Remote utility power fail simulation test
- Engine start contact (8A, 120/240VAC resistive max.)
- Automatic force transfer to alternate supply should load voltage become de-energized
- 24VDC control power
- Remote Load Test/Peak Shave Input
- Solid Neutral on 4 Wire Systems
- Configuring System Voltage Type (3 wire delta or 4 wire Wye capable without additional sensing transformers)
- ATS Generator Bus Power Metering Capability (Amp, Volt, Freq, kW, kVA, PF)[2]
- Under/Over Frequency Protection - Utility and Generator Sources
- 3 Phase Over Voltage Protection - Utility and Generator Sources
- Phase Sequence and Phase Rotation Protection between Utility and Generator Sources
- Voltage Phase Loss/Unbalance Protection
- Fourteen Programmable Inputs Total (Quantity 5 User Programmable Inputs)
- Optional Remote Input module DSE2130 (Quantity 8) Digital inputs
- Optional Remote Output module DSE2157 (Quantity 8) relay contacts
- RS485 Modbus®* Remote Communication Port (Modbus Serial RTU)
- Optional Ethernet Modbus TCP/IP® Remote Communication Module DSE855 (Modbus TCP/IP)
- Optional Remote Annuciator
- Support up to Three Remote Display Unit
- Serviceable Plug-in connectors

* See last page for attribution.

TS 870 ORDERING INFORMATION

When placing an order, specify the following 21 digit ATS MODEL CODE as per the features and applications described below.

TS 873A0250A1CY6DKKAA

1	2		4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
T	S		8	7																

1-3. SERIES
- TS - TRANSFER SWITCH

4 & 5. MODEL
- 87 - 870 SWITCH

6. POLES
- 2 – 2 POLE
- 3 - 3 POLE
- 4 – 4 POLE

7. CONFIGURATION TYPE
- A – ATS
- E - DOUBLE BYPASS - 4 BRKR[9]
- X - SPECIAL

8 - 11. AMPERAGE
- 0100
- 0150
- 0200[5]
- 0250
- 0400
- 0600
- 0800
- 1000
- 1200

12. APPLICATION
- A - STANDARD
- B - SERVICE ENTRANCE
- C - DUAL UTILITY CONTROL
- D - DUAL STANDBY GEN (Slave ATS)
- H - DUAL PRIME GEN CONTROL
- X – SPECIAL

13. OPERATION TYPE
- 1 - OPEN TRANSITION
- 2 - MANUAL ELEC. OP.
- 3 - CLOSED TRANSITION (MOMENTARY)[7]
- X – SPECIAL

14. SAFETY STANDARD
- A - UL™ 1008 (Service Entrance)
- B - CSA™ C22.2 NO 178
- C - UL 1008 / CSA 178
- X - NOT APPLICABLE

15. VOLTAGE

1Ø 3 WIRE
- D - 120/240

3Ø 4 WIRE (GROUNDED NEUTRAL)
- E - 120/208[1]
- F - 127/220
- G - 120/240[1] (DELTA)
- H - 220/380[2]
- S - 230/400[2]
- J - 240/416
- K - 254/440
- M - 277/480[1]
- N - 347/600[1]
- Y - MULTI-VOLTAGE (STOCK SWITCHES Only)[1] *Customer Configurable*

3Ø 3 WIRE
- P - 208
- Q - 220
- R - 240
- U - 416
- V - 480
- W - 600
- X - SPECIAL

16. CONTROLLER
- 5 - TSC 900 c/w GHC GRAPHIC DISPLAY
- 6 - TSC 7320 c/w LCD DISPLAY
- 7 - NONE (MANUAL)

17. ENCLOSURE TYPE
- A - NEMA1, ASA #61 GRAY
- B - NEMA2, ASA #61 GRAY
- C - NEMA12, ASA #61 GRAY
- D - NEMA3R SD, ASA #61 GRAY
- E - NEMA3R DD, ASA #61 GRAY
- F - NEMA3RX / 4X DD (304 STAINLESS STEEL)[3]
- G - NONE (OPEN STYLE)
- L - NEMA3RX / 4X DD (316 STAINLESS STEEL)[3]
- X - SPECIAL

18. UTILITY SWITCHING DEVICE
- D - MOLDED CASE SWITCH DRAWOUT[9] (400 - 1200A)
- E - MOLDED CASE SWITCH DRAWOUT[9] C/W ELECTRONIC TRIP (400 - 1200A)
- F - MOLDED CASE SWITCH DRAWOUT[9] C/W ELECTRONIC TRIP & GF (400 - 1200A)
- K - MOLDED CASE SWITCH (100 - 1200A)
- M - MOLDED CASE SWITCH C/W THER-MAG TRIP (100 - 200A)
- N - MOLDED CASE SWITCH C/W ELECTRONIC TRIP (250 - 1200A)
- P - MOLDED CASE SWITCH C/W ELECTRONIC & GF TRIP (250 - 1200A)

19. GENERATOR SWITCHING DEVICE
- D - MOLDED CASE SWITCH DRAWOUT[9] (400 - 1200A)
- E - MOLDED CASE SWITCH DRAWOUT[9] C/W ELECTRONIC TRIP (400 - 1200A)
- F - MOLDED CASE SWITCH DRAWOUT[9] C/W ELECTRONIC TRIP & GF (400 - 1200A)
- K - MOLDED CASE SWITCH (100 - 1200A)
- M - MOLDED CASE SWITCH C/W THER-MAG TRIP (100 - 200A)
- N - MOLDED CASE SWITCH C/W ELECTRONIC TRIP (250 - 1200A)
- P - MOLDED CASE SWITCH C/W ELECTRONIC & GF TRIP (250 - 1200A)

20. POWER CONNECTIONS
- A - STANDARD
- B - ATS CONNECTION PLATE 100-400A
- C - ATS CONNECTION PLATE 600-800A
- D - ATS CONNECTION PLATE 1000-1200A
- E - ATS CONNECTION PLATE 100-400A FOR U&G
- F - ATS CONNECTION PLATE 600-800A FOR U&G
- G - ATS CONNECTION PLATE 1000-1200A FOR U&G
- X - SPECIAL

21. ATS CONNECTION CONFIGURATION[3]
- A - STANDARD
- B - ALTERNATE B (400-1200A)
- C - ALTERNATE C (400-1200A)
- D - ALTERNATE D (400-1200A)

NOTES:

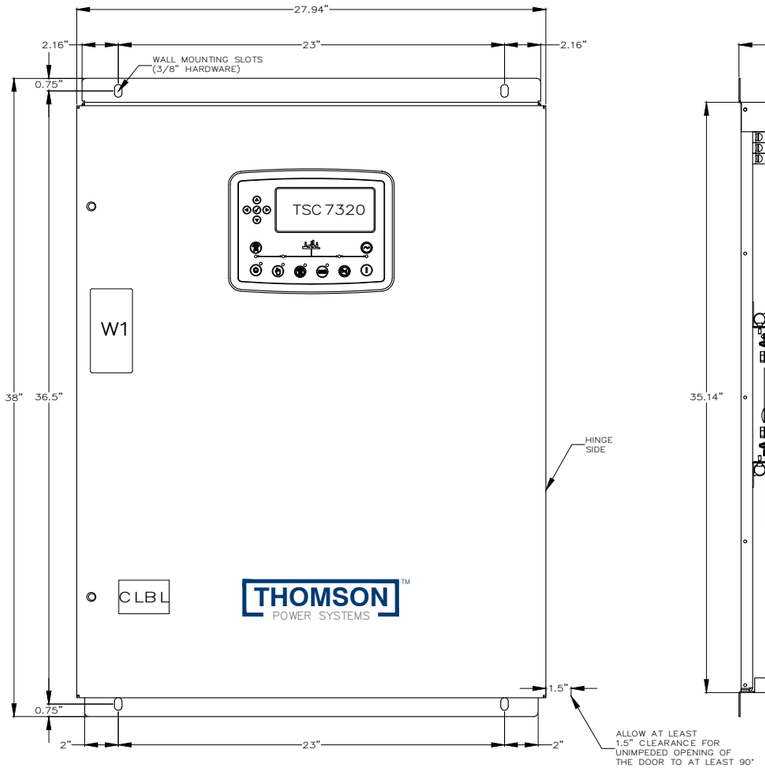
1 MULTI-VOLTAGE CAPABLE
2 FOR 50 Hz APPLICATION
3 FOR BYPASS SWITCH APPLICATIONS REFER TO FACTORY
5 240V MAX
7 CLOSED TRANSITION OPTION 400A - 1200A ONLY
9 DOUBLE BYPASS OPTION 400A -1200A ONLY

OPTIONAL FEATURES (Specify separately from ATS MODEL CODE when ordering)

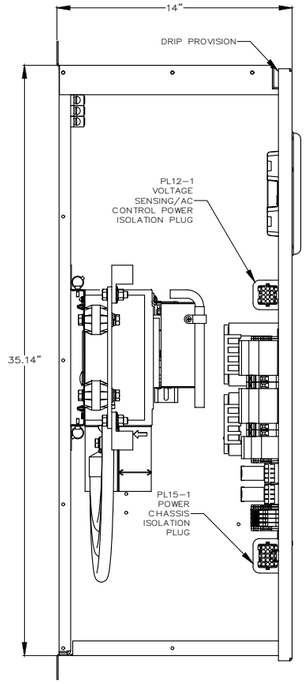
CODE	DESCRIPTION
AUXILIARIES:	
AUX-BG	Generator Bypass Auxiliary Contact
AUX-BU	Utility Bypass Auxiliary Contact
KOTS-DSE	Key Operated Test Switch - Auto/Off/Engine Start/Test - includes the DSE2130 module
RO2157	Programmable Relay Output Expansion Module - Includes QTY 8, 2A Resistive 30VDC rated relays - 4 NO and 4 Form C Contacts
PPR-10-DSE	Programmable Power Relay Includes 10A Form C Contact Wired to Terminal Block (Up to Qty 3)
TS-STG	24Vdc or 120VAC Shunt Trip Generator Switch (external power source required)
TS-STU	24Vdc or 120VAC Shunt Trip Utility Switch(external power source required)
COMMUNICATION:	
EMB-TCP/IP-DSE-MOXA	Ethernet Modbus®* Remote Communication (Modbus TCP)
RA7320 (DSE2548)	Remote annunciator with eight configurable LEDs. Works up to 0.6 miles from the TSC7320. Up to 10 modules can be daisy-chain (Refer to the DSE2548 Datasheet)
RD7320 (DSE2520)	Remote Display. Up to three display modules can be connected to TSC7320 (Refer to the DSE2510-20 Datasheet)
ENCLOSURE:	
LCK	Enclosure Lockable Door (Single point T-Handle lock)
TS-H1	Enclosure Strip Heater c/w Thermostat (120VAC external power source required)
TS-H2	Enclosure Strip Heater c/w Thermostat (internally powered from ATS load)
FUNCTION:	
MTS	Manually Initiated Electrically Operated Transfer Switch c/w Source Selector Switch, Position Indicating Lights, Source Available Lights
TCP	Transfer Switch Connection Plate for Generator Supply (Portable Generator Docking Supply)
TS-SS	Internal Multi-Voltage Selector Switch (208V/240V/480V)
LSC	Load Shed, 5 Stage - Requires CTK Option
METERING:	
LPM-DSE	Transfer Switch Load Power Metering CT Kit (Amp, Volt, Freq, kW, kVA, PF) **Requires CT Kit
CTKxxxx-DSE	Current Transformer Kit (xxxx - Specify CT Size 0100, 0150, 0250, 0400, 0600, 0800, 1200) - Requires CT Kit
MUP	Multifunction Utility Protective Relay – Basler®* BE1-11i (Protection Functions 27, 32, 47, 50/51, 67, 81O/U NOTE: May be required by local utility for Momentary CT applications. Consult factory for other makes and models
POWER:	
SPD	Surge Protection Device
OTHER:	
3YR	Additional 12 Month Warranty **
5YR	Additional 48 Month Warranty **

* See last page for attribution.

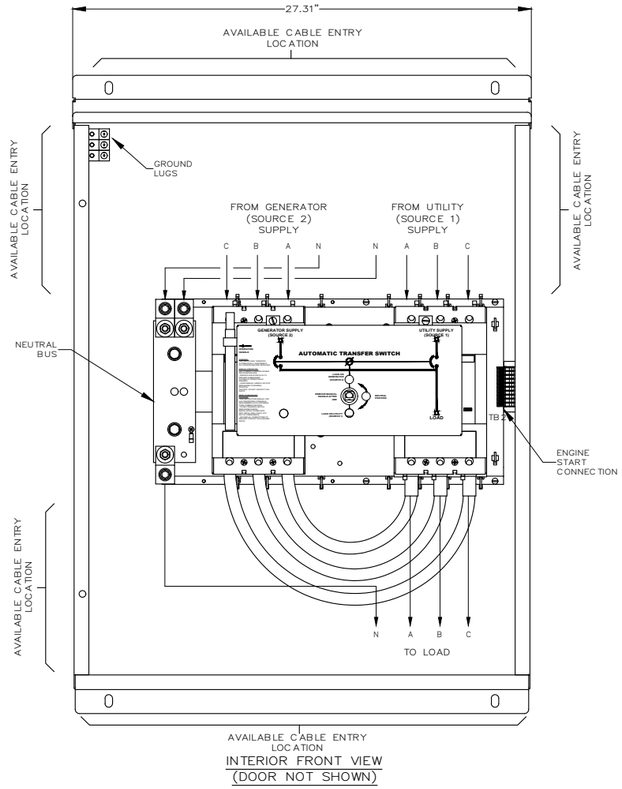
** Refer to Thomson Technology Power Systems Warranty for additional details



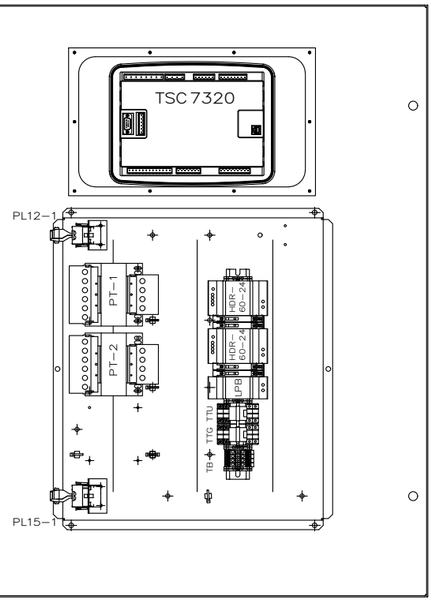
FRONT VIEW



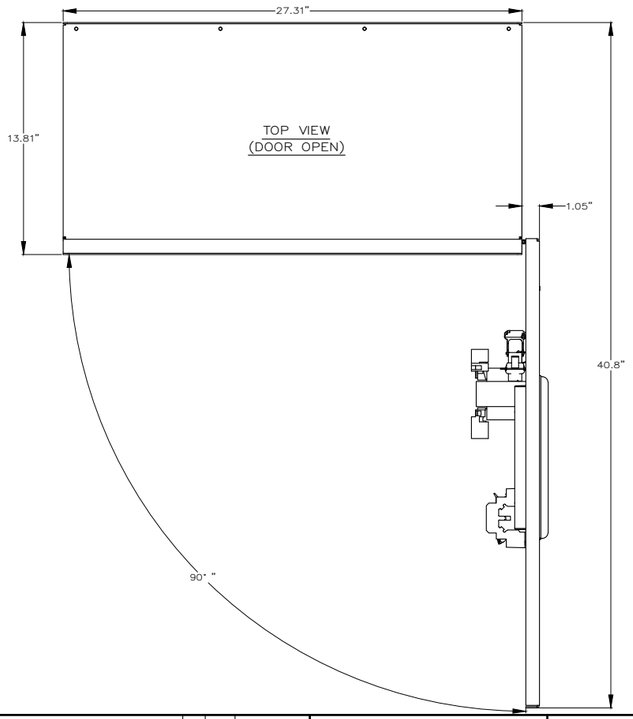
LHS VIEW
(SIDE COVER REMOVED)



INTERIOR FRONT VIEW
(DOOR NOT SHOWN)



VIEWED FROM REAR
(INSIDE) OF DOOR



BASIC MODEL TS87xA	STANDARD ATS: CLOSING AND WITHSTAND RATING AVAILABLE AMPS (RMS) CLOSING & WITHSTAND RATINGS SHOWN ARE ONLY FOR ATS UTILITY AND/OR GENERATOR POWER SWITCHING DEVICE(S) THAT ARE NOT FACTORY SUPPLIED WITH INTEGRAL OVERCURRENT PROTECTION. PLEASE REFER TO PRODUCT INSTRUCTION MANUAL FOR FURTHER INFORMATION ON UPSTREAM PROTECTION REQUIREMENT.				
	MAX. VOLTAGE	RATED CURRENT (A)	@240V	@480V	@600V
TS 87xA–250	600	250	65,000	65,000	35,000

CONNECTION DATA		
250A ATS	UTILITY (SRC1)	1C, #6–350MCM Cu/Al PER PHASE
	GENERATOR (SRC2)	1C, #6–350MCM Cu/Al PER PHASE
	LOAD	1C, #6–350MCM Cu/Al PER PHASE
	NEUTRAL	1C, #6–350MCM Cu/Al PER SOURCE
	GROUND	3C, #14–2/0 Cu/Al

GENERAL NOTES	
1	POWER SWITCHING DEVICES ARE MECHANICALLY INTERLOCKED SO THAT ONLY ONE DEVICE IS CLOSED AT A TIME
2	NEMA 12 / NEMA 3R SD ENCLOSURE C/W GASKETING
3	FOR 1 PHASE, 3 WIRE SOLID NEUTRAL APPLICATION, CONNECT PHASE TO 'A' & 'B'. OMIT 'C'
4	FOR 1 PHASE, 3 WIRE SWITCHED NEUTRAL APPLICATION, CONNECT PHASE TO 'A' & 'B'. CONNECT NEUTRAL TO 'C'
5	REFER COVER PAGE / SELECTED OPTION LIST FOR PROJECT SPECIFIC DETAILS

2.5" x 5"

W1

DANGER
PELIGRO

Arc Flash and Shock Hazard
Will cause severe injury or death. More than one live circuit - see diagram. Disconnect all sources of supply before servicing. This equipment must be installed and serviced only by qualified electrical personnel utilizing safe work practices and appropriate Personal Protective Equipment (PPE). Failure to comply may result in injury or death! Refer to NFPA 70E for minimum PPE requirements.

Risque d'Arc Electrique et d'Electrocution
Peut causer des blessures graves oul la mort. Plus d'un circuit sous tension - voir schema. Couper toutes les sources d'alimentation avant de faire l'entretien et les réparations. Ce matériel doit être installé et entretenu uniquement par un électricien qualifié. Ce dernier doit connaitre les pratiques de travail sécuritaires et porter l'équipment de protection individuelle approprié. Le non respect mai entrainer des blessures ou la mort! Reportez-vous à NFPA 70E pour le manuel des exigences minimales PPE.

Riesgo de Arco y Choque Eléctrico
Se causarán lesiones graves o muerte. Más de un circuito energizado - ver diagrama. Desconectar todas las fuentes de suministro antes de hacer mantenimiento. Este equipo solo se debe instalar y mantener por personal calificado, usando medidas de seguridad y equipo de protección personal adecuados. No seguir estas recomendaciones puede causar lesiones o muerte! Consultar la NFPA 70E para los requisitos mínimos del equipo de protección personal (PPE)

QTY = 1

FOR REVIEW ONLY

DRAWINGS AND OR OTHER TECHNICAL INFORMATION SUPPLIED BY THOMSON POWER SYSTEMS AS A PART OF A SALE OF EQUIPMENT ARE FOR THE PURCHASER'S USE SOLELY IN CONJUNCTION WITH THAT EQUIPMENT, UNLESS SPECIFICALLY AGREED TO OTHERWISE AS A PART OF THE TERMS OF SALE.

☐ APPROVED FOR CONSTRUCTION
☐ MASTER COPY ☐ REFERENCE COPY ____ OF ____
☐ MULTIPLE UNIT WORK ORDER
☐ RELEASED FOR INFORMATION
AUTH. BY: _____ DATE: _____

CROSS REFERENCE LEGEND
50C–C–1
GRID COORDINATE
SHEET No.

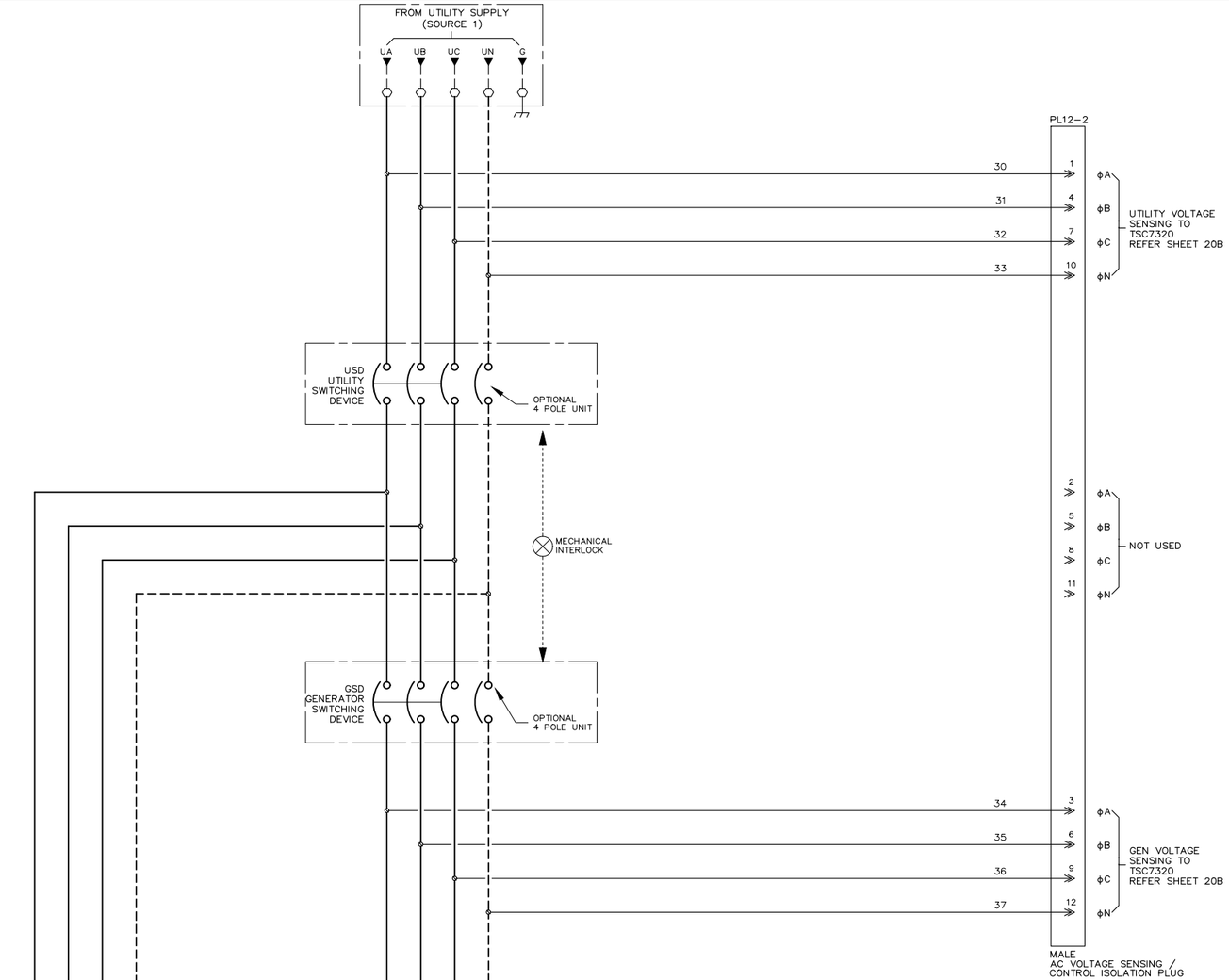
DRAWING No.	REFERENCE DRAWINGS

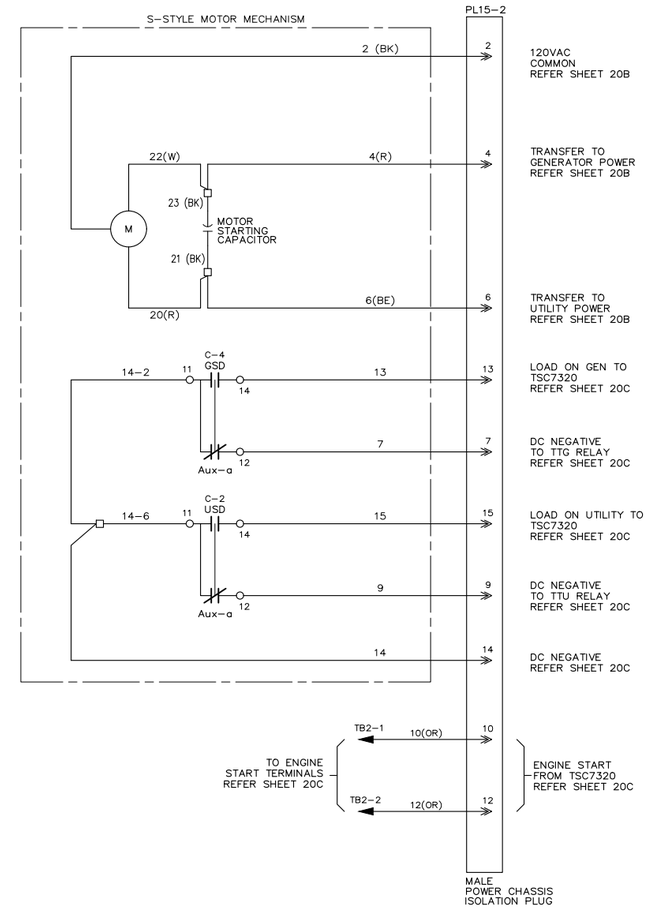
No.	REVISIONS	BY	AUTH	DATE

THOMSON POWER SYSTEMS

AUTOMATIC TRANSFER SWITCH
MODEL TS 870
PHYSICAL LAYOUT & INSTALLATION DETAILS
250A, 2P/3P, NEMA 1/2/12/3R SD, MCS ATS, STD

CUSTOMER	THOMSON POWER SYSTEMS			
CUSTOMER ORDER No.	C–XXXXXX	WORK ORDER No.	W–XXXXXX	
DRAWN BY	AUTH BY	DATE	REV	
NS	OG	22–11–22	0	
DRAWING/FILE No.	MCS870M312	SHEET	10A	

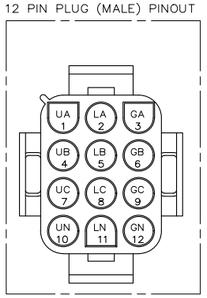




GENERAL NOTES	
1	FOR 1 PHASE, 3 WIRE SOLID NEUTRAL APPLICATION, CONNECT PHASE TO 'A' & 'B'. OMIT 'C'
2	FOR 1 PHASE, 3 WIRE SWITCHED NEUTRAL APPLICATION, CONNECT PHASE TO 'A' & 'B'. CONNECT NEUTRAL TO 'C'
3	COLOR CODE: ALL WIRING IS GREY UNLESS NOTED. SAFETY GROUND WIRES ARE GREEN
4	WIRE TYPE: ALL WIRING SHALL BE 18AWG UNLESS NOTED.
5	WIRE NUMBERS TO MATCH TERMINAL NUMBERS, UNLESS NOTED
6	REFER COVER PAGE / SELECTED OPTION LIST FOR PROJECT SPECIFIC DETAILS

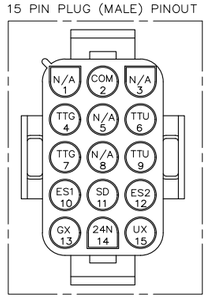
COLOR KEY	
BK	BLACK
BE	BLUE
BN	BROWN
GN	GREEN
GY	GREY
OR	ORANGE
PE	PURPLE
R	RED
W	WHITE
Y	YELLOW
V	VIOLET

12 PIN PLUG (MALE) PINOUT



12 PIN KEY		
1	UA	UTILITY PHASE A
2	LA	LOAD PHASE A
3	GA	GEN PHASE A
4	UB	UTILITY PHASE B
5	LB	LOAD PHASE B
6	GB	GEN PHASE B
7	UC	UTILITY PHASE C
8	LC	LOAD PHASE C
9	GC	GEN PHASE C
10	UN	UTILITY NEUTRAL
11	LN	LOAD NEUTRAL
12	GN	GEN NEUTRAL

15 PIN PLUG (MALE) PINOUT



15 PIN KEY		
1	N/A	NOT USED
2	COM	UTILITY-GEN COMMON
3	N/A	NOT USED
4	TTG	TRANSFER TO GEN POWER
5	N/A	NOT USED
6	TTU	TRANSFER TO UTILITY POWER
7	TTG	DC NEGATIVE TO TTG RELAY
8	N/A	NOT USED
9	TTU	DC NEGATIVE TO TTU RELAY
10	ES1	ENGINE START 1 PIN 1
11	SD	SERVICE DISCONNECT
12	ES2	ENGINE START 1 PIN 2
13	GX	GEN BREAKER FEEDBACK
14	24N	DC NEGATIVE
15	UX	UTILITY BREAKER FEEDBACK

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50C – C – 1
GRID COORDINATE
SHEET No.

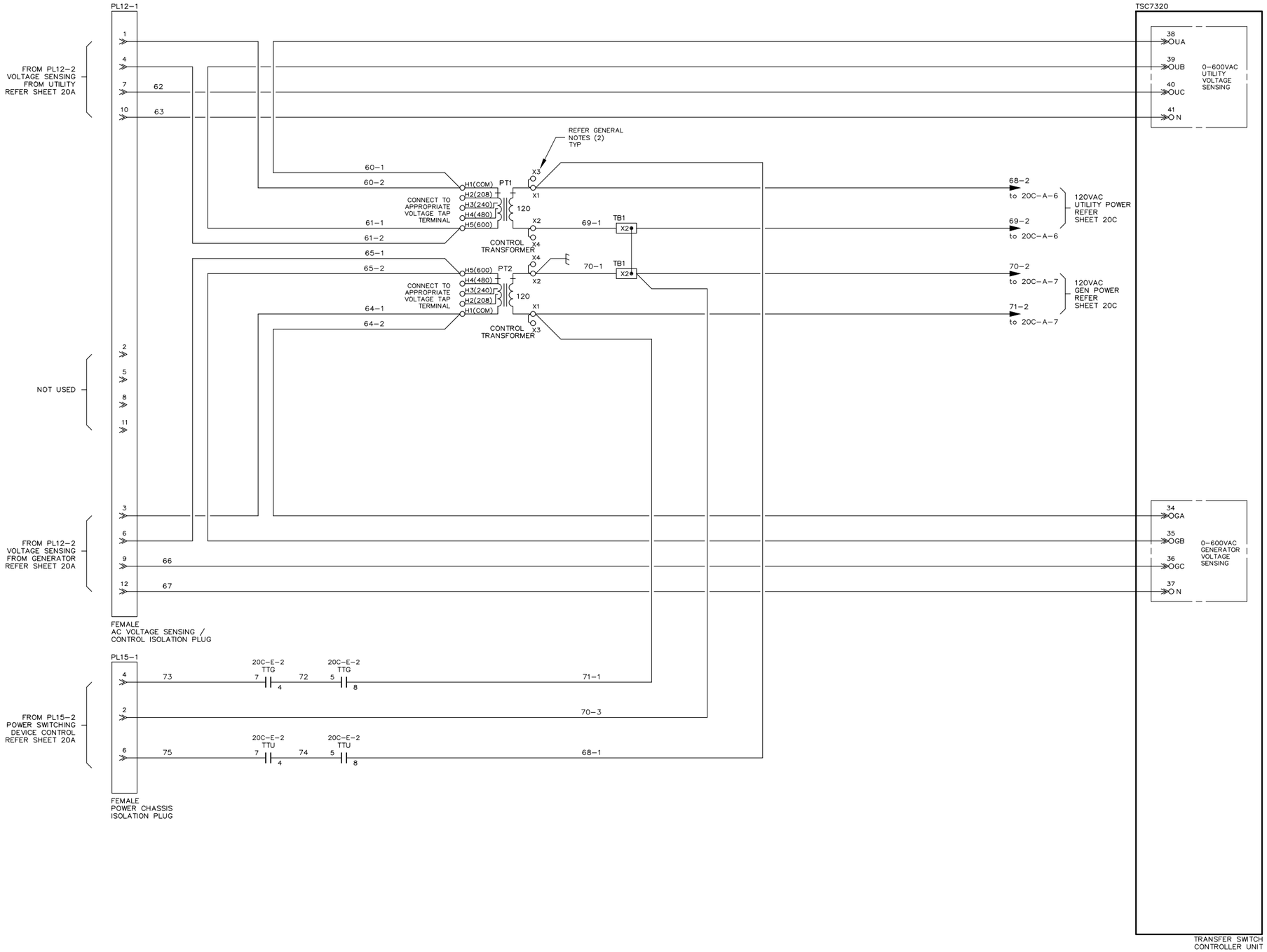
DRAWING No.	REFERENCE DRAWINGS

No.	REVISIONS	BY	AUTH	DATE
6	UX & GX RELAY CIRCUIT UPDATES	SN	OG	23-03-17
5	15 PIN PLUG (MALE) PINOUT UPDATED	SK	OG	23-03-15
4	UPDATED WIRE NUMBERS	SK	OG	23-01-30
3	UPDATED 24VDC NEGATIVE WIRE NUMBERS & UX, GX RELAYS	SK	OG	23-01-25
2	ADDED RELAYS FOR LOAD ON GEN AND LOAD ON UTILITY	SK	OG	23-01-11

THOMSON™ POWER SYSTEMS

AUTOMATIC TRANSFER SWITCH
MODEL TS 870
MCS ATS AC SCHEMATIC, STD
100 – 800A

CUSTOMER	THOMSON POWER SYSTEMS
CUSTOMER ORDER No.	C-XXXXXX
WORK ORDER No.	W-XXXXXX
DRAWN BY	SK
AUTH BY	OG
DATE	22-11-22
REV	6
DRAWING/FILE No.	MCS870E500
SHEET	20A



VOLTAGE
(X DENOTES HIGH POLARITY MARKER)

PT TAP	208	240	380	400	416	480	600
H1	X	X			X	X	X
H2	X			X	X		
H3		X					
H4					X	X	
H5			X	X			X

GENERAL NOTES	
1	CONTROL TRANSFORMER IS RATED FOR 100VA FOR MCS ATS & 200VA FOR ATS MECHANISM USING TRIP & CLOSE COILS
2	100VA CONTROL TRANSFORMER DOES NOT INCLUDE A 2ND 120VAC SECONDARY WIRING (X3/X4)
3	COLOR CODE: ALL WIRING IS GREY UNLESS NOTED. SAFETY GROUND WIRES ARE GREEN
4	WIRE TYPE: ALL WIRING SHALL BE 18AWG UNLESS NOTED.
5	WIRE NUMBERS TO MATCH TERMINAL NUMBERS, UNLESS NOTED
6	REFER COVER PAGE / SELECTED OPTION LIST FOR PROJECT SPECIFIC DETAILS

COLOR KEY	
BK	BLACK
BE	BLUE
BN	BROWN
GN	GREEN
GY	GREY
OR	ORANGE
PE	PURPLE
R	RED
W	WHITE
Y	YELLOW
V	VIOLET

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CROSS REFERENCE LEGEND
50C - C - 1
GRID COORDINATE
SHEET No.

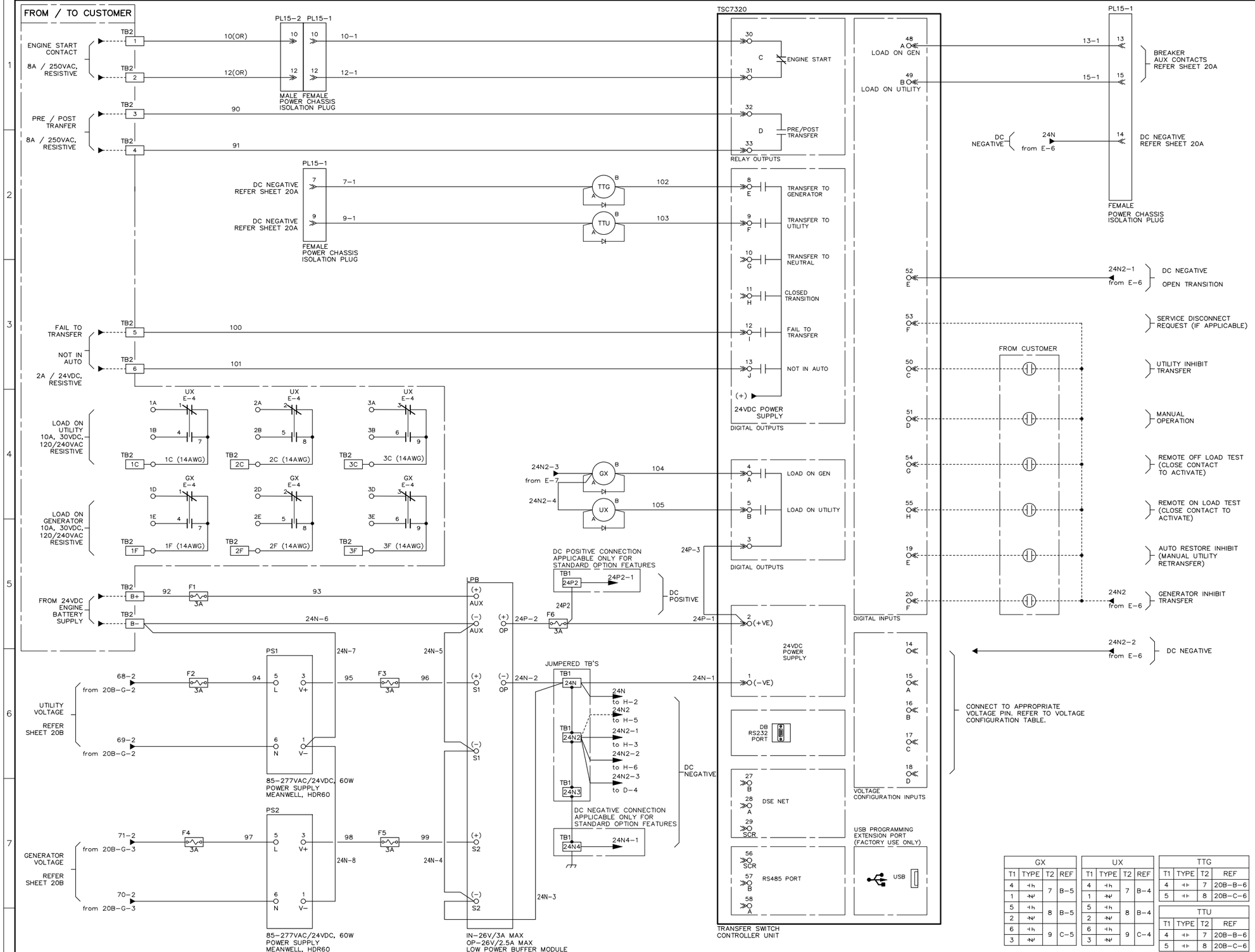
DRAWING No.	REFERENCE DRAWINGS

No.	REVISIONS	BY	AUTH	DATE
2	ADDED RELAYS FOR LOAD ON GEN AND LOAD ON UTILITY	SK	OG	23-01-11
1	UPDATED DRAWINGS AS PER PROTO TYPE MODIFICATIONS	SK	OG	22-12-08

THOMSON™ POWER SYSTEMS

AUTOMATIC TRANSFER SWITCH
TSC7320 TRANSFER SWITCH CONTROLLER
ATS AC CONTROL SCHEMATIC, STD
100 -800A

CUSTOMER THOMSON POWER SYSTEMS
CUSTOMER ORDER No. C-XXXXXX
WORK ORDER No. W-XXXXXX
DRAWN BY SK
AUTH BY OG
DATE 22-11-22
REV 2
DRAWING/FILE No. TSC700E100
SHEET 20B



TSC7320 FACTORY DEFAULT SETTINGS

NOTE : REFER TO OPTION DRAWINGS FOR APPLICABLE CHANGES TO FACTORY DEFAULT SETTINGS

PARAMETER	DEFAULT	RANGE
GENERATOR (SOURCE 2) WARM UP DELAY	2 SEC	0–3600 SEC
GENERATOR (SOURCE 2) COOL DOWN DELAY	300 SEC	0–3600 SEC
UTILITY (SOURCE 1) RETURN DELAY	300 SEC	0–3600 SEC
TRANSFER NEUTRAL DELAY	3 SEC	0–300 SEC
EXERCISE TIMER	PROG.	PROG.
GENERATOR (SOURCE 2) UNDER VOLTAGE DELAY	3 SEC	0–60 SEC
GENERATOR (SOURCE 2) UNDER FREQUENCY DELAY	5 SEC	0–60 SEC
UTILITY (SOURCE 1) TRANSIENT DELAY	2 SEC	0–30 SEC

ALL SETTINGS ARE FIELD ADJUSTABLE UNLESS NOTED. REFER TO THE TSC7320 MANUAL FOR A COMPLETE LISTING OF ALL TSC7320 SETTINGS.

VOLTAGE CONFIGURATION

I–#	INPUT FUNCTION	VOLTAGE CONFIGURATION
I–14	DEFAULT	480V, 3PH 4W
I–15	INPUT A	120/240V, 1PH 3W
I–16	INPUT B	208V, 3PH 4W
I–17	INPUT C	240V, 3PH 4W
I–18	INPUT D	600V, 3PH 4W

FOR 3PH 3W OR CUSTOM VOLTAGE APPLICATIONS, PLEASE REFER TO THE TSC7320 CONTROLLER MANUAL

COLOR KEY

BK	BLACK
BE	BLUE
BN	BROWN
GN	GREEN
GY	GREY
OR	ORANGE
PE	PURPLE
R	RED
W	WHITE
Y	YELLOW
V	VIOLET

GENERAL NOTES

1	COLOR CODE: ALL WIRING IS GREY UNLESS NOTED. SAFETY GROUND WIRES ARE GREEN
2	WIRE TYPE: ALL WIRING SHALL BE 18AWG UNLESS NOTED.
3	WIRE NUMBERS TO MATCH TERMINAL NUMBERS, UNLESS NOTED
4	REFER COVER PAGE / SELECTED OPTION LIST FOR PROJECT SPECIFIC DETAILS
5	ANALOG INPUT GROUND CONNECTIONS MUST BE ON THE ENGINE BLOCK AND MUST BE TO THE SENSOR BODIES.

GX			
T1	TYPE	T2	REF
4	NO	7	B–5
1	NC		
5	NO	8	B–5
2	NC		
6	NO	9	C–5
3	NC		

UX			
T1	TYPE	T2	REF
4	NO	7	B–4
1	NC		
5	NO	8	B–4
2	NC		
6	NO	9	C–4
3	NC		

TTG			
T1	TYPE	T2	REF
4	NO	7	20B–B–6
5	NO	8	20B–C–6

TTU			
T1	TYPE	T2	REF
4	NO	7	20B–B–6
5	NO	8	20B–C–6

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SHEET No.

DRAWING No. | REFERENCE DRAWINGS

No.	REVISIONS	BY	AUTH	DATE
12	UPDATED TRANSFER NEUTRAL DELAY RANGE 0–300SEC	SK	OG	23–08–04
11	UPDATED DIGITAL INPUT/OUTPUT PROGRAMMING DETAILS	SK	OG	23–06–15
10	PRODUCTION CHANGES ARE INCORPORATED	SN	OG	23–03–31
9	TSC7320 FACTORY DEFAULT SETTINGS UPDATED	SN	OG	23–03–23
8	UX & GX RELAY FORM C CONTACTS ADDED	SN	OG	23–03–20

THOMSON POWER SYSTEMS

AUTOMATIC TRANSFER SWITCH
TSC7320 TRANSFER SWITCH CONTROLLER
ATS DC CONTROL SCHEMATIC, STD
100 – 800A

CUSTOMER THOMSON POWER SYSTEMS
CUSTOMER ORDER No. C–XXXXXX | WORK ORDER No. W–XXXXXX
DRAWN BY SK | AUTH BY OG | DATE 22–11–09 | REV 12
DRAWING/FILE No. TSC700E101 | SHEET 20C

THOMSON™
POWER SYSTEMS

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

TSC 7320 Controller Program Version **1.4.2**
TSC 7320 Controller Firmware Version **7.6.2**

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

PAGE

A. Introduction 2
B. Check Equipment Delivery 2
C. Check Line Voltage/Amperage 2
D. Installation Requirements 2
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P. Configuring The Daylight Savings Time Feature 19
Q. Voltage Configuration Change Procedure 19
R. Configuring The Phase Rotation 20

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 the TSC 7320 Controller. For other model types including Closed Transition, Dual Generator, or Dual Source please contact Thomson Power Systems.

NOTE: Rev 3 of this Quick Start Guide applies to TSC 7320 with firmware version 7.6.2 & program version 1.4.2.

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 website. 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 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 may be 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 (Pg. 3) for withstand current ratings on Standard TS 870 type transfer switches. Refer to electrical ratings shown Table #2 (Pg.3) for interrupting ratings for Service Entrance type ATS or ATS that are supplied with power switching devices with an integral trip unit.

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% of the maximum continuous current.

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.**

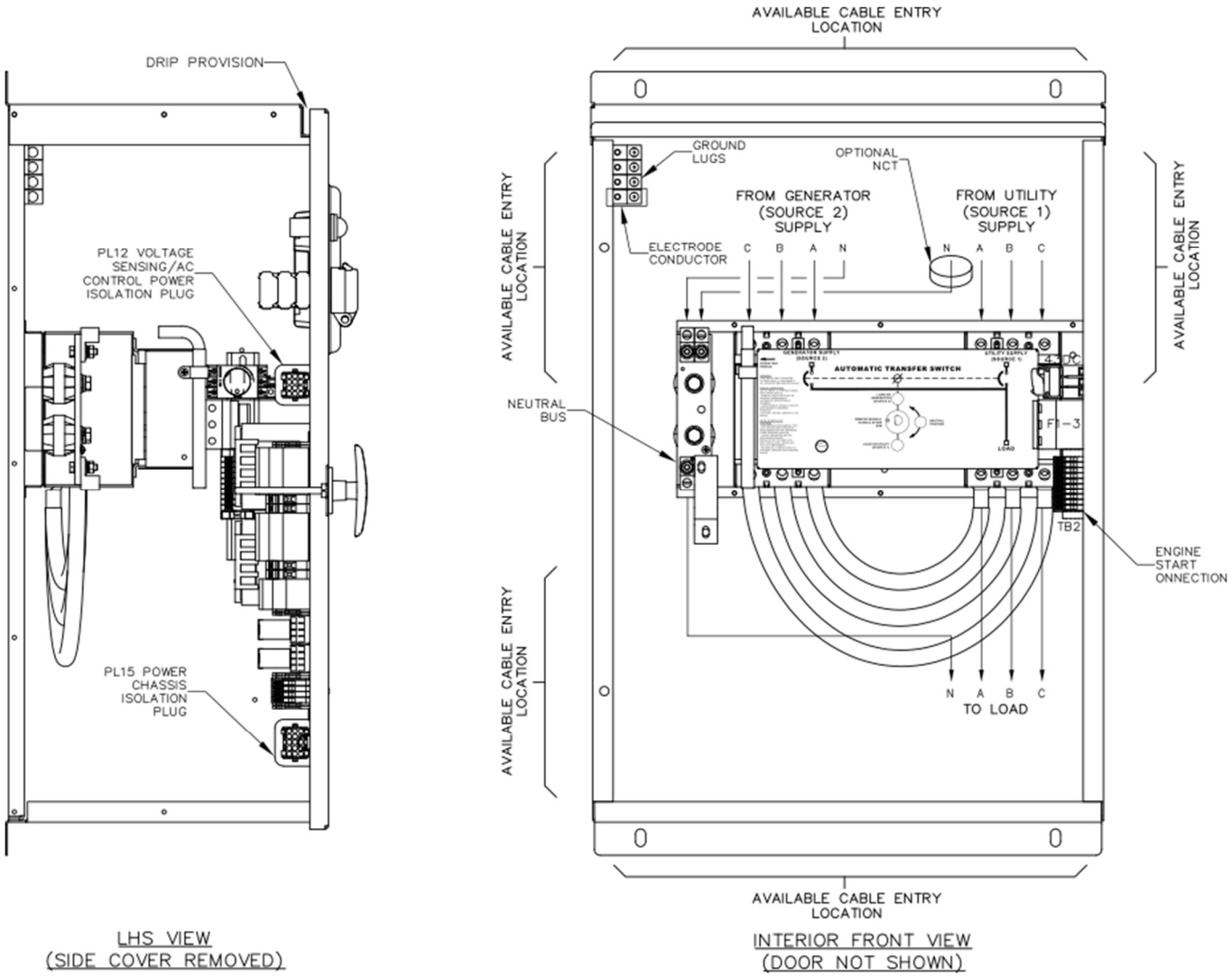
Table #2
Interrupting Current Ratings (for ATS with Integral Overcurrent Trip Units)

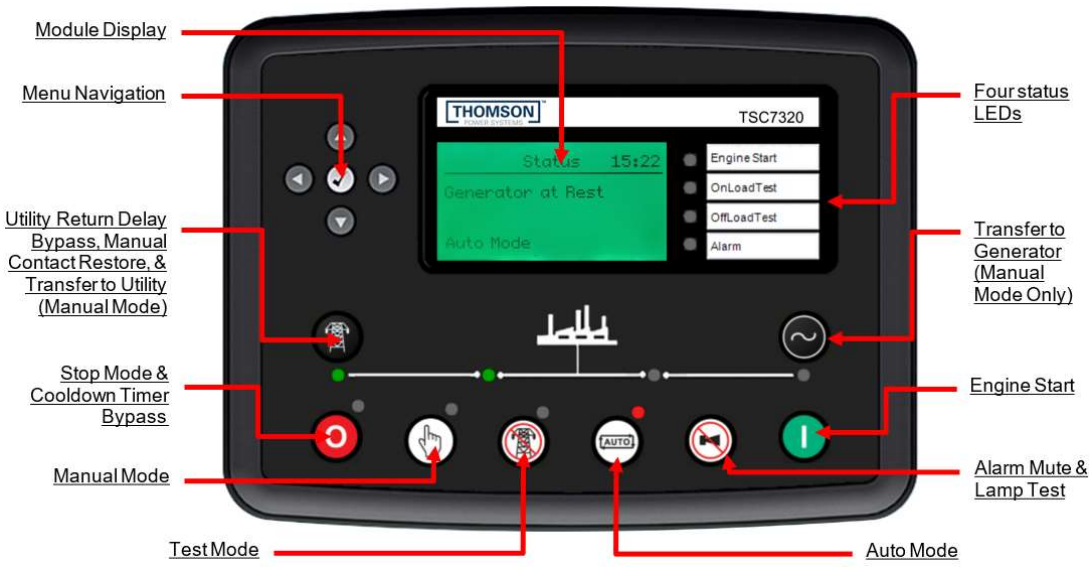
BASIC MODEL	MAX VOLTAGE (VOLTS)	RATED CURRENT (AMPS)	INTERRUPTING CURRENT RATING (AMPS) (RMS) [1]		
			No Upstream Overcurrent Protection Required		
			@240V	@480V	@600V
TS87xA-0100	600	100	65,000	25,000	14,000
TS87xA-0150	600	150	65,000	25,000	14,000
TS87xA-0200	240	200	65,000	N/A	N/A
TS87xA-0250[3]	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.
3. Withstand rating specified is for 250A, 3P. For 250A, the 4P rating are 65KA@240V, 35KA@480V and 22KA@600V.

F. Typical Interior Component Layout Drawing

100A—200A service entrance 3 pole model 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

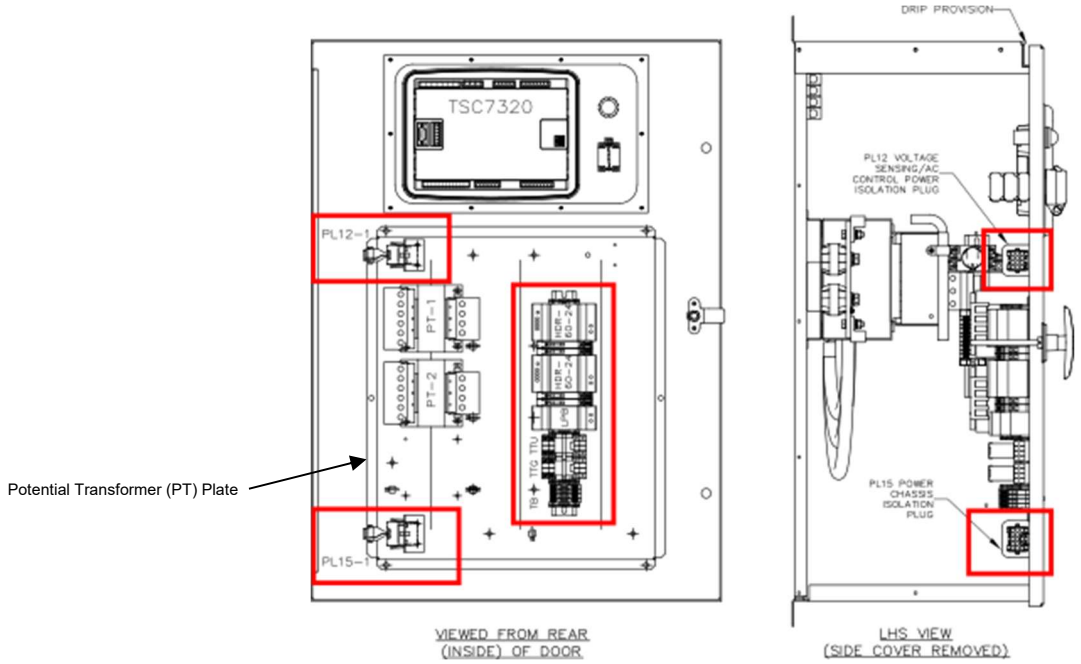
BASIC MODEL	NUMBER OF POLES	DIMENSIONS INCHES (mm) [1]			SHIPPING WEIGHT	TERMINAL RATING [2]	
		HEIGHT	WIDTH	DEPTH	lbs (KG)	QTY PER PHASE	RANGE [3]
100A	2, 3, 4	31.1 (790)	22.3 (566)	14 (356)	143 (65)	1	#14 - 1/0
150A	2, 3, 4	31.1 (790)	22.3 (566)	14 (356)	143 (65)	1	#2 - 4/0
200A	2, 3, 4	31.1 (790)	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.

[1] Enclosure dimensions are for reference. (DO NOT USE FOR CONSTRUCTION)
[2] All cable connections suitable for copper or aluminum
[3] 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 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 by 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.

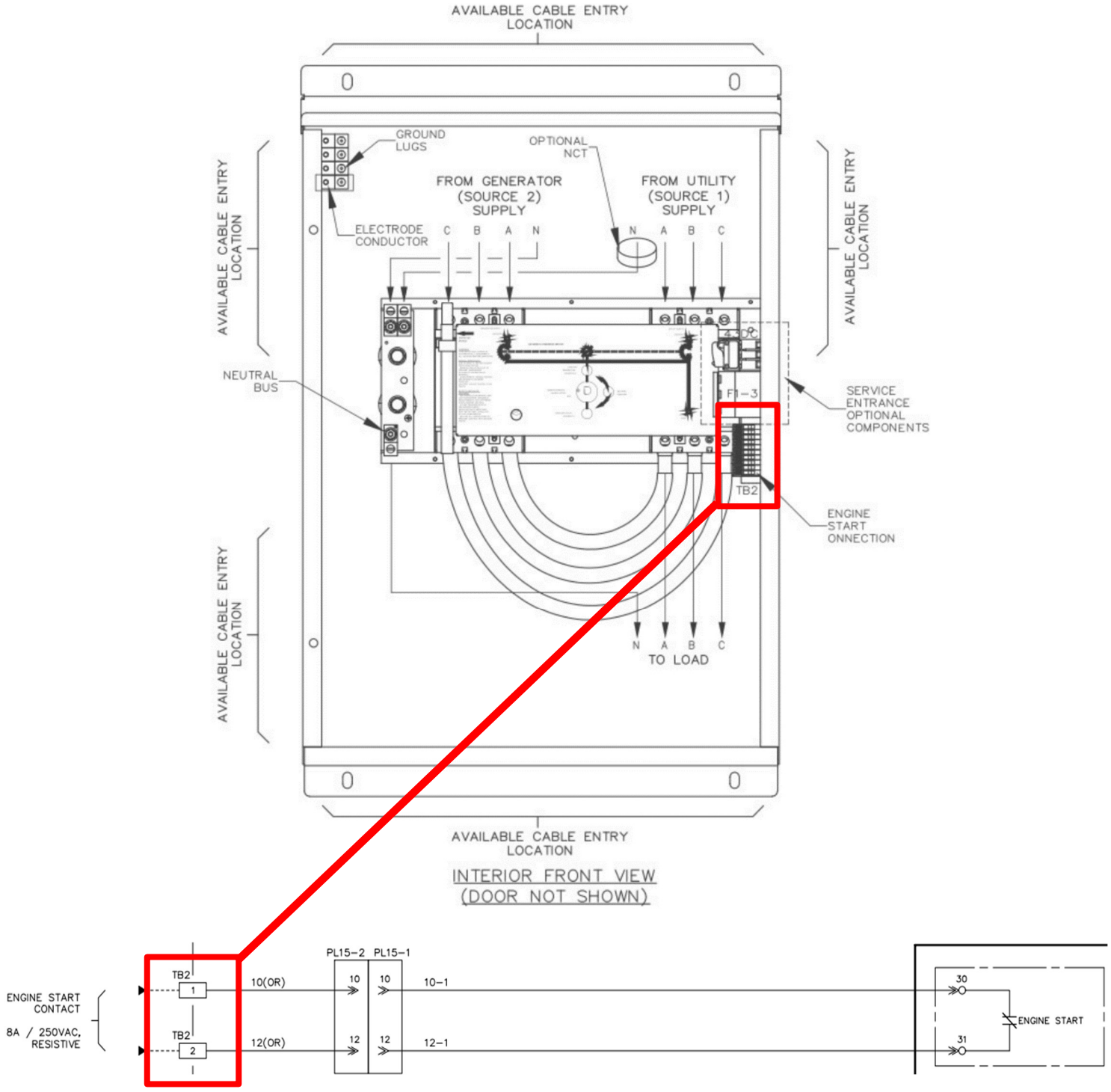
I. Engine Start Wiring Connections

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 mains transient delay time setting.

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



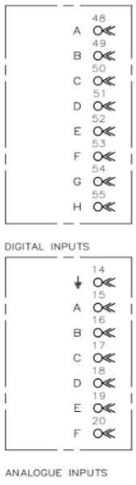
J. Remote Input Wiring Connections

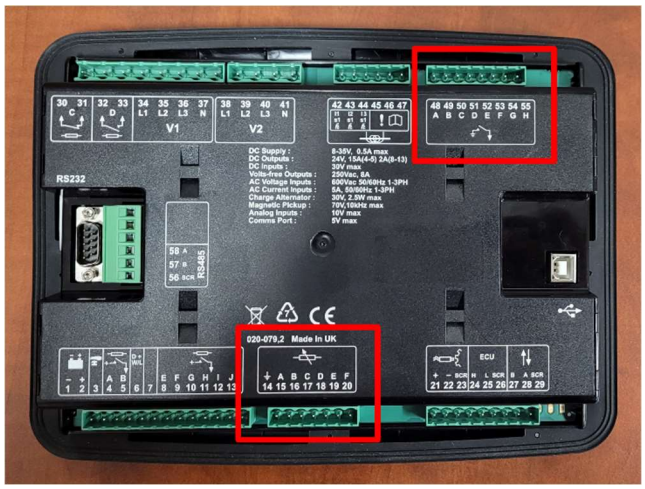
The TSC 7320 is equipped with 14 inputs total with default settings per table shown below. Of the 14 inputs, 5 are user programmable inputs that are factory programmed to voltage configuration selection and the auto restore inhibit. See the inputs table below for more information on the which pins are user programmable. 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: The TSC 7320 controller has switch to ground inputs, do not apply any voltage to the input terminals as this will cause damage to the TSC 7320 controller.

Changing an input that is not user programmable will cause the ATS to malfunction and may cause damage to personnel or equipment. Only change inputs that are user programmable.





Inputs	Pin No.	User Programmable	Descriptions
DIGITAL INPUT A	48	NO	GENERATOR BREAKER FEEDBACK
DIGITAL INPUT B	49	NO	MAINS BREAKER FEEDBACK
DIGITAL INPUT C	50	NO	UTILITY INHIBIT TRANSFER
DIGITAL INPUT D	51	NO	MANUAL OPERATION
DIGITAL INPUT E	52	NO	OPEN TRANSITION WITH NEUTRAL DELAY
DIGITAL INPUT F	53	NO	SERVICE DISCONNECT REQUEST
DIGITAL INPUT G	54	NO	REMOTE OFF LOAD TEST
DIGITAL INPUT H	55	NO	REMOTE ON LOAD TEST
GROUND	14	N/A	277/480V 3PH 4W CONFIGURATION
ANALOGUE INPUT A	15	YES	120/240V 1PH 3W CONFIGURATION
ANALOGUE INPUT B	16	YES	120/208V 3PH 4W CONFIGURATION
ANALOGUE INPUT C	17	YES	139/240V 3PH 4W CONFIGURATION
ANALOGUE INPUT D	18	YES	347/600V 3PH 4W CONFIGURATION
ANALOGUE INPUT E	19	YES	AUTO RESTORE INHIBIT
ANALOGUE INPUT F	20	NO	GENERATOR INHIBIT TRANSFER & UTILITY RETURN DELAY BYPASS

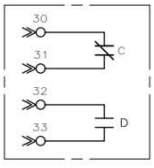
K. Output Contacts

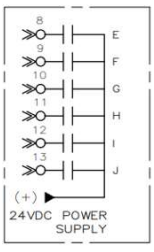
The TSC 7320 is provided from the factory with 8 digital outputs and 2 dry contact outputs with default settings per the table shown below. Of the 10 total outputs, 4 are user programmable, and are pins 4, 5, 12, and 13 as shown in the outputs table below. Refer to the TSC 7320 Manual for further information on programming changes as required. Two of the digital outputs are rated 15A @ 24VDC, and the remaining digital outputs are rated 2A @ 24VDC resistive. The dry output contacts are rated at 8 amps @ 250VAC resistive. One of the dry contacts is normally closed and the other contact is normally open.

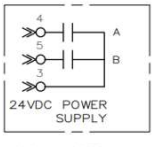
NOTE: All control wiring required for any programmable output connections must be made directly to the door mounted TSC 7320 controller as per drawing below. All output wire cabling that may be installed must be suitably routed and protected across the door hinge to prevent possible mechanical damage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

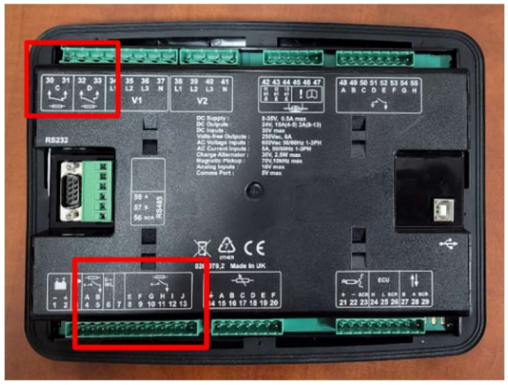
WARNING: Do not apply any voltage across the output contacts as this will cause damage to the TSC 7320 controller. Connect a load in series with applicable voltage/current as specified.

Changing an output that is not user programmable will cause the ATS to malfunction and may cause damage to personnel or equipment. Only change outputs that are user programmable.









Outputs	Pin No.	Rating (Resistive)	User Programmable	Descriptions
DC OUTPUT A	4	15A @ 24VDC	YES	ATS ON SOURCE 2 (PWR FROM PIN 3)
DC OUTPUT B	5	15A @ 24VDC	YES	ATS ON SOURCE 1 (PWR FROM PIN 3)
DC OUTPUT E	8	2A @ 24VDC	NO	TRANSFER TO GENERATOR
DC OUTPUT F	9	2A @ 24VDC	NO	TRANSFER TO UTILITY
DC OUTPUT G	10	2A @ 24VDC	NO	TRANSFER TO NEUTRAL
DC OUTPUT H	11	2A @ 24VDC	NO	CLOSED TRANSITION MODE
DC OUTPUT I	12	2A @ 24VDC	YES	FAIL TO TRANSFER
DC OUTPUT J	13	2A @ 24VDC	YES	ATS NOT IN AUTO MODE
RELAY OUTPUT C	30	8A @ 250VAC	NO	ENGINE START CONTACTS (N/C)
	31			
RELAY OUTPUT D	32	8A @ 250VAC	NO	LOAD DISCONNECT CONTACTS (N/O) (ELEVATOR PRE/POST)
	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 program version 1.4.2, and firmware version 7.6.2. 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 - 300 sec	3 sec	N/A
ElevatorPreTimer	Elevator Pre-park Timer	0 - 86400 sec	10 sec	N/A
ElevatorPostTimer	Elevator Post-park Timer	0 - 86400 sec	10 sec	N/A
Start Timers				
Mains Transient Delay	Mains Failure / Restore Delay	0 - 30 sec	2 sec	N/A
Cranking	Program Version >1.3.3 - Cranking Timer	3 - 60 sec	20 sec	N/A
Safety On Delay	Program Version <1.3.3 - Cranking Timer	5 - 60 sec	20 sec	N/A
Warming	Generator Warmup Timer	0 - 3600 sec	2 sec	N/A
Load / Stopping Timers				
Return Delay	Utility Return Timer	0 - 18000 sec	300 sec	N/A
Cooling	Generator Engine Cooldown Timer	0 - 3600 sec	300 sec	N/A
Generator Options				
AC System	AC Electrical Configuration		3PH, 4W	N/A
Generator Phase Rotation Alarm	Phase Rotation Detection Enable	Active / Inactive	Active	N/A
Generator Phase Rotation[2]	Generator Phase Rotation	L1-L2-L3 L3-L2-L1	L1-L2-L3	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
Loading Voltage	Under Voltage Pickup Threshold	52 - 411V PhN	249V PhN	90
Nominal Voltage	Nominal Voltage	53 - 412V PhN	277V PhN	100
Over Voltage Alarm Return	Over Voltage Pickup Threshold	54 - 413V PhN	305V PhN	110
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 Alarm Trip	Under Frequency Alarm Threshold	0.0 - 74.3Hz	51.0 Hz	85
Under Frequency Pre-Alarm Trip	Under Frequency Pre-Alarm Threshold	0.1 - 74.4 Hz	51.1 Hz	85
Loading Frequency	Pickup Frequency Threshold	0.2 - 74.5 Hz	54.0 Hz	90
Nominal Frequency	Nominal Frequency	0.3 - 74.6 Hz	60.0 Hz	100
Over Frequency Shutdown Trip	Over Frequency Alarm Threshold	0.6 - 74.9 Hz	74.9 Hz	125
Mains Options				
AC System	AC Electrical Configuration		3PH, 4W	N/A
Mains Phase Rotation Alarm	Phase Rotation Detection Enable	Active / Inactive	Active	N/A
Mains Phase Rotation[2]	Mains Phase Rotation	L1-L2-L3 L3-L2-L1	L1-L2-L3	N/A
Mains Alarms[1]				
Under Voltage Alarm Trip	Under Voltage Alarm Threshold	50 - 412V PhN	234V PhN	84
Under Voltage Return	Under Voltage Pickup Threshold	51 - 413V PhN	249V PhN	90
Over Voltage Return	Over Voltage Pickup Threshold	52 - 414V PhN	305V PhN	110
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	51.0 Hz	85
Under Frequency Return	Under Frequency Pickup Threshold	0.1 - 74.8 Hz	54.0 Hz	90
Over Frequency Return	Over Frequency Pickup Threshold	0.2 - 74.9 Hz	66.0 Hz	110
Over Frequency Trip	Over Frequency Alarm Threshold	0.3 - 75.0 Hz	69.0 Hz	115

[1] Alarm threshold values must cascade in value

[2] These settings are linked to one another, must be identical, and can only be changed in the generator options section

Function	Description	Range	Factory Default Value	Percentage of nominal
Alternate Voltage configurations				
Alternate Configuration 1				
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
Loading Voltage	Under Voltage Pickup Threshold	52 - 411V PhN	108V PhN	90
Nominal Voltage	Nominal Voltage	53 - 412V PhN	120V PhN	100
Over Voltage Alarm Return	Over Voltage Pickup Threshold	54 - 413V PhN	132V PhN	110
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
Under Voltage Return	Under Voltage Pickup Threshold	51 - 413V PhN	108V PhN	90
Over Voltage Return	Over Voltage Pickup Threshold	52 - 414V PhN	132V PhN	110
Over Voltage Alarm Trip	Over Voltage Alarm Threshold	53 - 415V PhN	139V PhN	116
Alternate Configuration 2				
208V Generator Voltage and Alarms[1]				
AC System	AC Electrical Configuration		3PH, 4W	
Generator Phase Rotation Alarm	Phase Rotation Detection Enable	Active / Inactive	Active	N/A
Generator Phase Rotation[2]	Generator Phase Rotation	L1-L2-L3 L3-L2-L1	L1-L2-L3	N/A
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
Loading Voltage	Under Voltage Pickup Threshold	52 - 411V PhN	108V PhN	90
Nominal Voltage	Nominal Voltage	53 - 412V PhN	120V PhN	100
Over Voltage Alarm Return	Over Voltage Pickup Threshold	54 - 413V PhN	132V PhN	110
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	
Mains Phase Rotation Alarm	Phase Rotation Detection Enable	Active / Inactive	Active	N/A
Mains Phase Rotation[2]	Mains Phase Rotation	L1-L2-L3 L3-L2-L1	L1-L2-L3	N/A
Under Voltage Alarm Trip	Under Voltage Alarm Threshold	50 - 412V PhN	101V PhN	84
Under Voltage Return	Under Voltage Pickup Threshold	51 - 413V PhN	108V PhN	90
Over Voltage Return	Over Voltage Pickup Threshold	52 - 414V PhN	132V PhN	110
Over Voltage Alarm Trip	Over Voltage Alarm Threshold	53 - 415V PhN	139V PhN	116
Alternate Configuration 3				
240V Generator Voltage and Alarms[1]				
AC System	AC Electrical Configuration		3PH, 4W	
Generator Phase Rotation Alarm	Phase Rotation Detection Enable	Active / Inactive	Active	N/A
Generator Phase Rotation[2]	Generator Phase Rotation	L1-L2-L3 L3-L2-L1	L1-L2-L3	N/A
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
Loading Voltage	Under Voltage Pickup Threshold	52 - 411V PhN	125V PhN	90
Nominal Voltage	Nominal Voltage	53 - 412V PhN	139V PhN	100
Over Voltage Alarm Return	Over Voltage Pickup Threshold	54 - 413V PhN	153V PhN	110
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	
Mains Phase Rotation Alarm	Phase Rotation Detection Enable	Active / Inactive	Active	N/A
Mains Phase Rotation[2]	Mains Phase Rotation	L1-L2-L3 L3-L2-L1	L1-L2-L3	N/A
Under Voltage Alarm Trip	Under Voltage Alarm Threshold	50 - 412V PhN	117V PhN	84
Under Voltage Return	Under Voltage Pickup Threshold	51 - 413V PhN	125V PhN	90
Over Voltage Return	Over Voltage Pickup Threshold	52 - 414V PhN	153V PhN	110
Over Voltage Alarm Trip	Over Voltage Alarm Threshold	53 - 415V PhN	161V PhN	116
Alternate Configuration 4				
600V Generator Voltage and Alarms[1]				
AC System	AC Electrical Configuration		3PH, 4W	
Generator Phase Rotation Alarm	Phase Rotation Detection Enable	Active / Inactive	Active	N/A
Generator Phase Rotation[2]	Generator Phase Rotation	L1-L2-L3 L3-L2-L1	L1-L2-L3	N/A
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
Loading Voltage	Under Voltage Pickup Threshold	52 - 411V PhN	312V PhN	90
Nominal Voltage	Nominal Voltage	53 - 412V PhN	347V PhN	100
Over Voltage Alarm Return	Over Voltage Pickup Threshold	54 - 413V PhN	382V PhN	110
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	
Mains Phase Rotation Alarm	Phase Rotation Detection Enable	Active / Inactive	Active	N/A
Mains Phase Rotation[2]	Mains Phase Rotation	L1-L2-L3 L3-L2-L1	L1-L2-L3	N/A
Under Voltage Alarm Trip	Under Voltage Alarm Threshold	50 - 412V PhN	294V PhN	85
Under Voltage Return	Under Voltage Pickup Threshold	51 - 413V PhN	312V PhN	90
Over Voltage Return	Over Voltage Pickup Threshold	52 - 414V PhN	382V PhN	110
Over Voltage Alarm Trip	Over Voltage Alarm Threshold	53 - 415V PhN	400V PhN	115
Alternate Configuration 5				
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
Loading Voltage	Under Voltage Pickup Threshold	52 - 411V PhN	94V PhN	85
Nominal Voltage	Nominal Voltage	53 - 412V PhN	110V PhN	100
Over Voltage Alarm Return	Over Voltage Pickup Threshold	54 - 413V PhN	126V PhN	115
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	93V PhN	85
Under Voltage Return	Under Voltage Pickup Threshold	51 - 413V PhN	94V PhN	85
Over Voltage Return	Over Voltage Pickup Threshold	52 - 414V PhN	110V PhN	100
Over Voltage Alarm Trip	Over Voltage Alarm Threshold	53 - 415V PhN	126V PhN	115

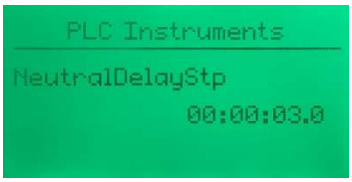
M. Transfer Switch Operation

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

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

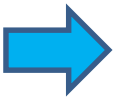
The following 7 settings can be changed in the non-restricted area:

- Daylight Savings Time Currently Active
- Enable Daylight Savings Feature
- Enable Utility Return Delay Bypass Feature
- Neutral delay timer
- Enable Elevator Function
- Elevator pre-timer
- Elevator post-timer



With the transfer switch energized and on the Utility source, follow the procedure below to access the above settings:

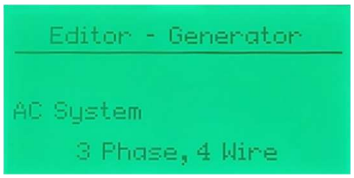
- Put the Transfer Switch into the “STOP” mode, by pressing the red stop button in the lower left corner of the controller.
- Use the left or right navigation keys to find the “PLC Instrumentation Page”.
- Use the up or down navigation keys to find the setting to be adjusted.
- Press the center checkmark button, the header will change to “PLC editor” and the setting 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 shown, press the center checkmark to save the setting’s new value.
- The setting displayed on the screen should stop flashing, and the header will change back to “PLC Instruments”.
- If more settings need to be adjusted, repeat the above procedure.
- To resume normal operation, push the auto mode button, and navigate back to the status page.



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

With the transfer switch energized and on the Utility source, follow the procedure below to login to the TSC 7320 controller:

- Put the Transfer Switch into the “STOP” mode, by pressing the red stop 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.
- For more detailed information on changing the AC configuration, or changing the phase rotation, refer to section Q or R respectively.
- To save settings and exit the editor mode, hold the center checkmark button for 5 seconds while not editing any settings.
- When the controller exits the editor section, the controller will automatically return to auto mode.

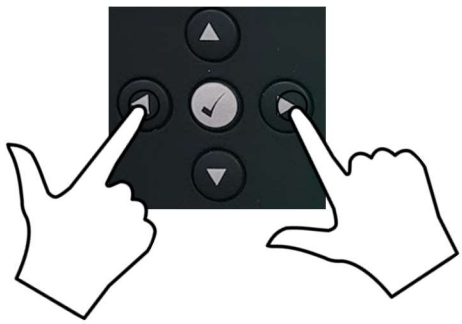


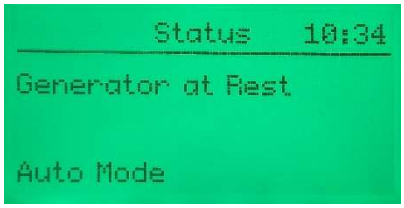
b. Display Screen Navigation

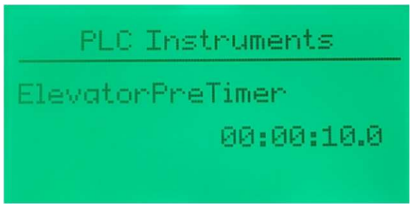
The TSC 7320 controller has pre-programmed display pages which are selected manually using the buttons on the front of the controller, by pushing the left and right navigation buttons.

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

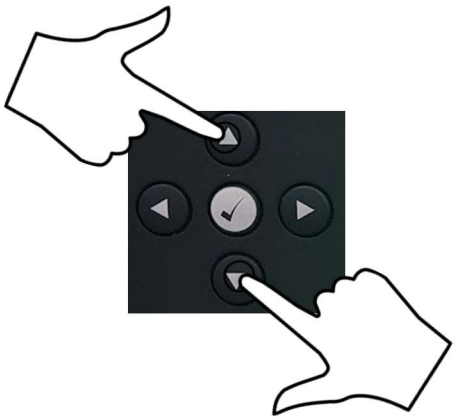
← Status – Engine – Generator – Mains – Alarms – Event Log – Communications – System Information – Schedule – PLC Instruments – About →







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 will automatically transfer to Generator (Source 2) during a Utility (Source 1) failure and will automatically return to Utility after it has been restored.	Outputs automatically operate ATS mechanism per automatic sequence of operation.	Contact closes to start engine during a Utility failure and opens to stop the engine once transferred back to Utility.
STOP MODE 	ATS will immediately attempt to transfer to Utility and stay there. The ATS will not automatically operate during a Utility power failure. The ATS cannot be operated manually in this mode. The Stop button can also be pushed to cancel a Gen cooldown timer if desired.	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.	Engine start will not automatically close during a Utility power failure[1] Engine start will open and stop the Gen if it was previously running.
TEST MODE 	ATS will not automatically operate during a Utility power failure. The ATS will transfer to Utility if there is a Generator power failure while load is on the Generator. The ATS cannot be operated manually using the front panel buttons, OR by using the manual operation handle in this mode.	Outputs may momentarily energize to move ATS mechanism to the Utility or Generator position depending on the operating conditions.	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 MODE 	Manual mode allows the ATS position to be changed using the front panel buttons. **To transfer to Gen**, push the green engine start button to start the Gen, and wait for the Gen available light to illuminate. Then, push the gen button to request a transfer. **To transfer to Utility**, wait for the Utility available light to illuminate. Then, push the Utility button to request a transfer. ATS can be operated manually using the buttons on the front of the controller but not by using the manual operation handle.	Outputs may momentarily energize to move ATS mechanism to the Utility or Generator position depending on the user inputs and may move the mechanism if a source fails while they are both active.	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 TSC 7320 will change to the Auto mode. Provided service disconnect switch is required for use.	Outputs momentarily energize to move ATS mechanism to the neutral position. If the mechanism is moved away from neutral, the controller will automatically move it back.	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 the ONLOAD TEST is initiated via the controller buttons, a Utility power failure condition will be simulated. The controller will then automatically start the Generator and the ATS will transfer to Generator supply. When the TEST input is terminated and the Utility is healthy, 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. Output automatically opens when test mode is terminated and ATS is back on Utility power.
EXERCISE ON LOAD TEST	When the ONLOAD TEST is initiated via controller inputs or exercise scheduler, a Utility power failure condition will be simulated. The controller will then automatically start the Generator and the ATS will transfer to Generator supply. When the TEST input is terminated and the Utility is healthy, 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 is initiated via the controller buttons, the engine will start and run, but the ATS will not transfer to the Generator unless there is a fault. When OFF LOAD TEST is terminated, engine will stop.	Outputs do not change state unless the Utility supply fails while the Gen is running and healthy.	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 is initiated via controller inputs or the exercise scheduler, 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 during the Off Load test.	Output automatically closes to start engine during the OFF-LOAD test mode. Output automatically opens when test mode ends.
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 (after its power reservoir de-energizes). If desired, this can be prevented by connecting the optional 24 VDC input to a battery or power supply.

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 for longer than the 2 second mains transient delay, a generator start sequence will be initiated.
GEN START	The Generator start request will activate once the mains transient delay expires.
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 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

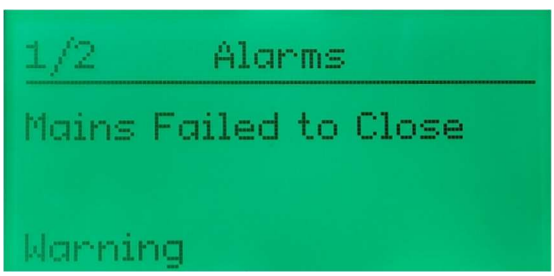
ON LOAD TEST 	To initiate an ATS On Load Test, press the test button on the TSC 7320 controller to enter test mode. Next, press the gen start button (green), and the controller will start the Generator and once it reaches the nominal voltage and frequency, the switch will be transferred to the Generator 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 an immediate return to Utility request followed by the engine cooldown timer starting. If the Utility is available, the ATS will transfer to Utility and stop the engine ignoring the utility return delay and extended neutral delay (if longer than 3 sec). If the Utility is not available, the controller will turn off the Generator, and attempt to transfer to Utility, and may generate a Gen failed to Open or 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, unless the Utility source becomes unhealthy. To stop the Off Load Test and return to normal, press the STOP button, and the controller will start timing the cooldown timer. To cancel the cooldown timer, the stop button can be pushed again. If the Auto mode button is pushed instead of the stop button, the controller will start the return delay timer (even though the mechanism is in the Utility position) and may skip the cooldown timer.

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.
NOTE: Some mechanism related timers require the controller to be put into stop mode, and then by holding the alarm button to be cleared.



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

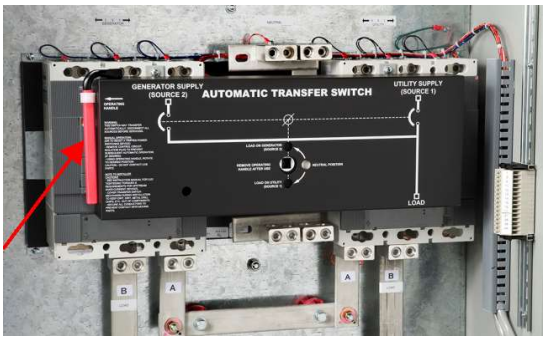
1. This equipment must be serviced only by qualified electrical personnel utilizing safe work practices and appropriate Personal Protective Equipment (PPE).
2. Many components of this equipment operate at line voltage. DO NOT TOUCH. Use only electrically isolated tools.
3. Install and close all covers 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

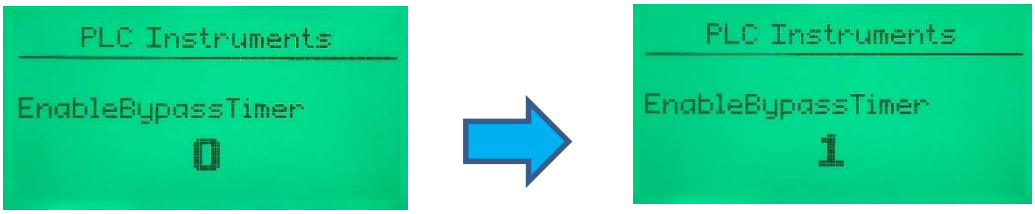


7. Insert manual handle into the center hole of the transfer switch mechanism.
8. To manually operate mechanism, rotate handle to the desired position as labeled on the ATS mechanism cover. Do not over-torque handle once position has been attained.
9. Once ATS is manually operated to desired position,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

h. Utility Return Delay Bypass

The TSC 7320 supports the feature to skip the Utility return delay and transfer back to the Utility source quicker.

This feature is disabled by default but can be enabled by changing the value of the “Enable Bypass Timer” to “1”. Refer to section M(a) for more details.



After the Bypass Timer function is enabled, the Utility return delay can be skipped by either pushing the “Mains” button on the front face of the controller (see photo below), or by activating the gen inhibit input (Analog Input F, pin 20) while the utility return delay is timing.

Note: using the Return Delay Bypass will also bypass the Elevator pre/post timers and may perform an open transition transfer.

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.

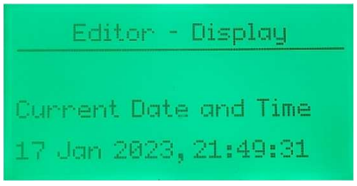
    NOTE: The ATS Engine Start contact CLOSES to start the engine and OPENS to stop the engine.
11. Ensure the inside of the transfer switch enclosure is clean from all dust, and other foreign materials.
12. Close the transfer switch enclosure door and tighten all door screws.
13. Visually verify on the 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 Mains page is matching the rating of the ATS. If the voltage is not matching, refer to Section O, *Section Q, and Section R* of the quick start guide to modify the controller settings. If the voltage, configuration, and phase rotation match the incoming power, 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. If Automatic Daylight Savings time adjustments are desired, refer to section P for more details.
   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. Refer to section R for more details.

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 mains transient 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

ATS Potential Transformer Tap Change and TSC 7320 Software Programming are the two sections below that need to be followed to change the system voltage of the ATS. Details of each step can be found below:

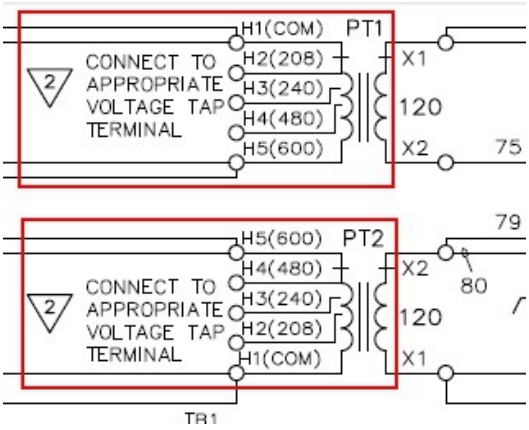
a) ATS Potential Transformer Tap Change

DANGER

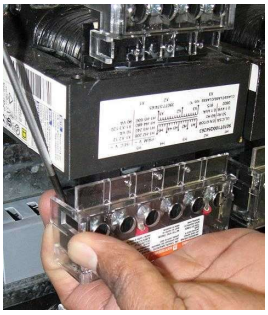
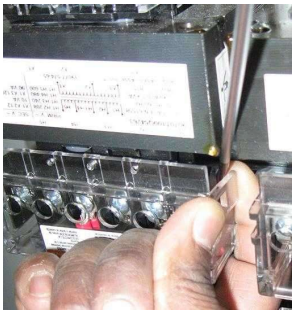
HAZARD OF ELECTRICAL SHOCK, EXPLOSION, OR ARC FLASH

- 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 all multi-tap potential transformers (PTs). (Refer to wiring schematic diagram below).

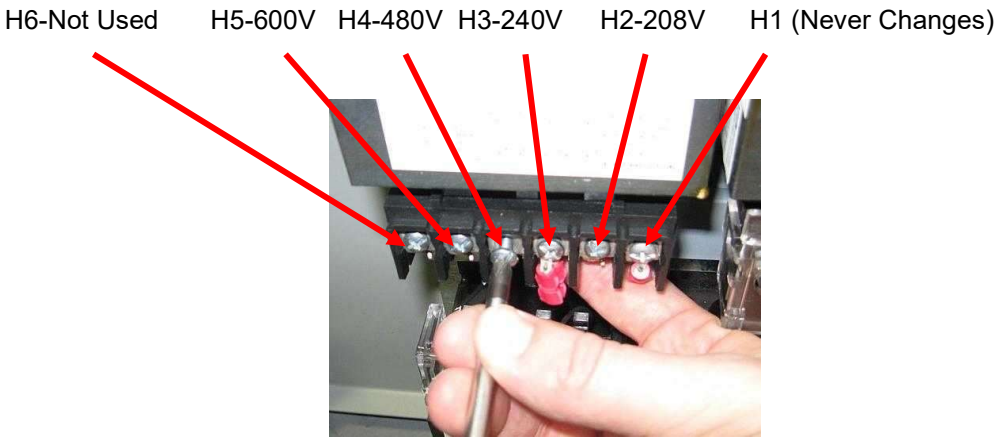


4. Carefully remove the potential transformer high voltage side covers by prying up on the edge of the cover with a ¼" Flat Head Blade screwdriver and lifting off.


NOTE: 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.

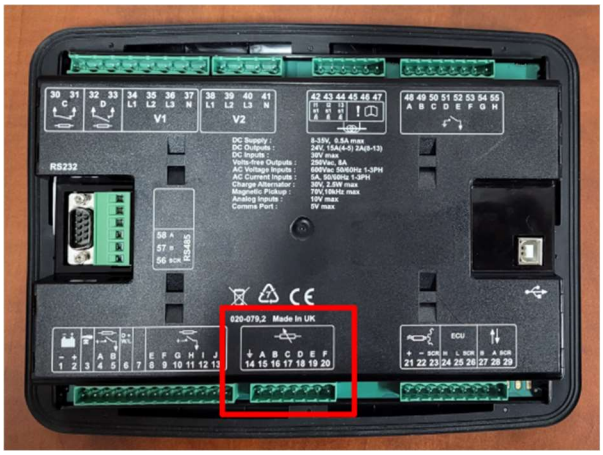
9. Repeat the steps 4 to 8 for all Potential Transformers.

b) TSC 7320 Voltage Change Procedure

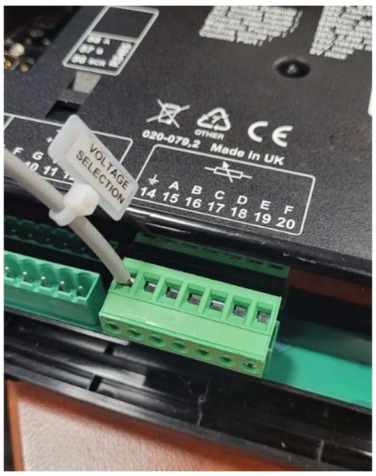
To change system voltage on the TSC 7320 controller, the ATS can be energized or de-energized to change the system voltage. If the ATS is energized, please ensure the mechanism is in the Utility position, and place the controller in “Stop” mode by pushing the red button in the lower left corner. It is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

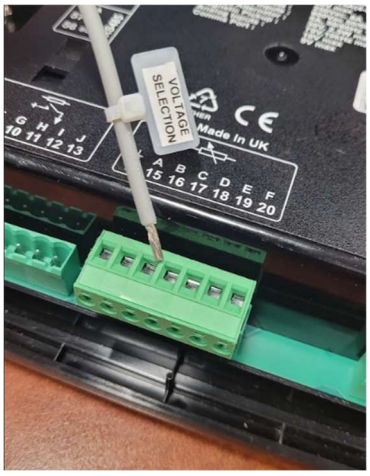
NOTE: All system voltage changes are ONLY done via connecting a designated wire to a different terminal on the TSC 7320 controller. All alarm values are ONLY changed via software programming.

1. Locating the PIN: First find pins 14 to 18 on the backside of the TSC 7320 controller. There will be a wire connected to one of the pins (usually pin 14), and that wire will have a label specifying it as the voltage selection wire.



2. Removing the wire: Using a small flat head screwdriver, loosen the terminal screw for the connected pin (14 in this example), and remove the voltage selection wire out of the pin.

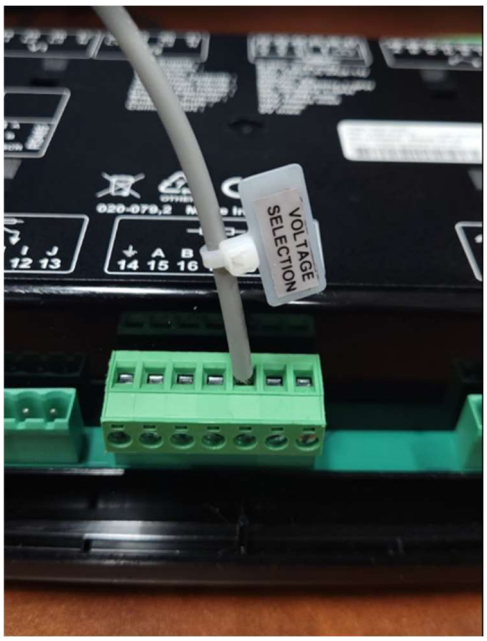




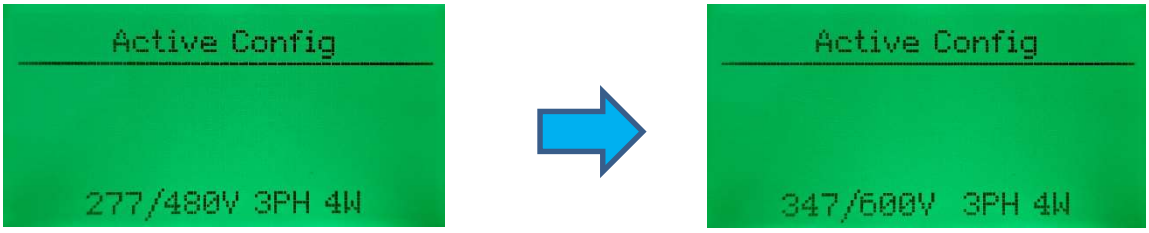
3. Choosing voltage configuration: There are 5 different options that dictate the different configurations, and they are listed in the table below. Select one of the options below based on the ATS requirements. If the required AC configuration is not listed below, please refer to section Q on how to change it.

Inputs	Pin No.	Descriptions
GROUND	14	277/480V 3PH 4W CONFIGURATION
ANALOGUE INPUT A	15	120/240V 1PH 3W CONFIGURATION
ANALOGUE INPUT B	16	120/208V 3PH 4W CONFIGURATION
ANALOGUE INPUT C	17	139/240V 3PH 4W CONFIGURATION
ANALOGUE INPUT D	18	347/600V 3PH 4W CONFIGURATION

4. 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.



5. 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.



6. 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.

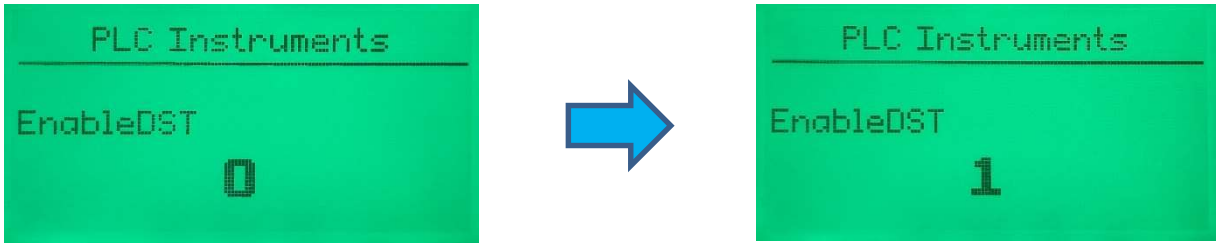
Note: If the TSC 7320 needs to be reprogrammed using the DSE Configuration Suite PC software, a custom engine configuration file will be required. Please contact the 24-hour Thomson phone support line at 1-888-888-0110 for the file and instructions.

P. Configuring The Daylight Savings Time Feature

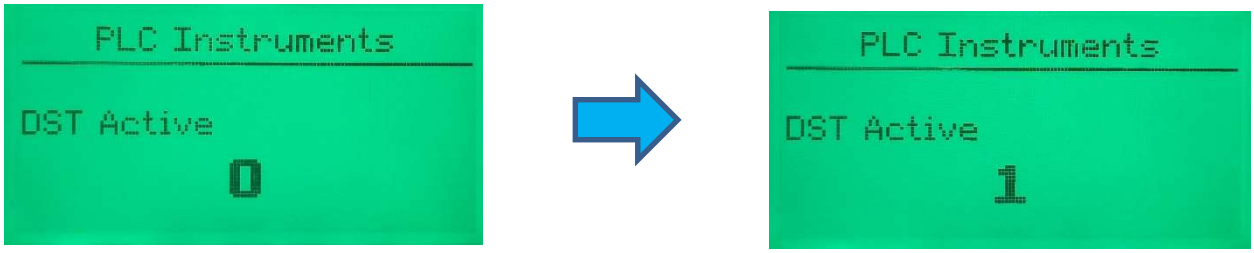
When properly configured, the TSC 7320's daylight savings time follows the Canadian & US time change dates, so it advances an hour on the second Sunday of March at 2:00 AM and falls back an hour on the first Sunday of November at 2:00 AM.

There are two different settings that need to be adjusted for daylight savings time to automatically change the time in the spring and fall.

First the "Enable DST" setting needs to be adjusted in the PLC instruments section to have a value of 1, and not 0. Please refer to section M(a) for information on how to access and adjust the settings. This setting allows the controller to automatically adjust the time and is disabled by default (set to 0).



Second is "DST Active" and this needs to be adjusted depending on time of year. If the panel is being commissioned in between the second Sunday of March and the first Sunday of November (Spring & Summer), the value needs to be set to a value of 1. If the panel is being commissioned between the first Sunday of November, and the second Sunday of March (Fall and Winter), the value needs to be set to a value of 0. This setting only needs to be adjusted one time, and it will automatically change to represent if Daylight Savings time is currently active.



Q. Voltage Configuration Change Procedure

This section details the steps required to change the controller voltage configuration from the default configuration to a different configuration (e.g. 3PH 4W to high leg delta).

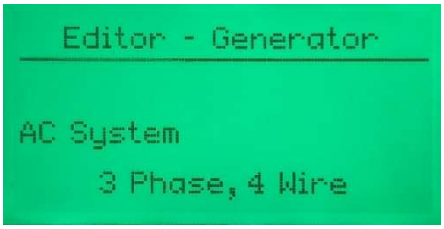
Start by choosing which voltage configuration to start with. It is usually best to choose the configuration closest to the desired voltage. For example, if the voltage on site is 240V 3Ph 3W, its recommended to start with Analogue Input C (Pin 17).

After a configuration has been chosen, it can either be modified from the front panel using the editor section, or by using the DSE Configuration Suite PC software. This Quick Start guide covers using the front panel editor below.

Inputs	Pin No.	Descriptions
GROUND	14	277/480V 3PH 4W CONFIGURATION
ANALOGUE INPUT A	15	120/240V 1PH 3W CONFIGURATION
ANALOGUE INPUT B	16	120/208V 3PH 4W CONFIGURATION
ANALOGUE INPUT C	17	139/240V 3PH 4W CONFIGURATION
ANALOGUE INPUT D	18	347/600V 3PH 4W CONFIGURATION

Log into the restricted access area of the settings editor. Please refer to section M(a) for more information.

Navigate to the "Generator" page in the editor section, and then use the up and down arrows to find the sub page that says, "AC System".

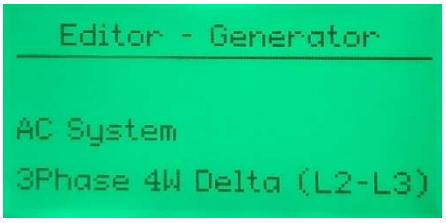


Press the center checkmark button, and the AC System setting should start flashing.

While the setting is flashing, use the up and down navigation keys to select the desired configuration.
In the example below, the controller is being changed from a 3Ph 4W, to a 3Ph 4W delta (L2-L3).

The configuration can be set to any of the following options:

1PH 2W
1PH 3W (L1-L2)
1PH 3W (L1-L3)
2PH 3W (L1-L2)
2PH 3W (L1-L3)
3PH 3W
3PH 4W
3PH 4W DELTA (L1-L2)
3PH 4W DELTA (L1-L3)
3PH 4W DELTA (L2-L3)



After the desired configuration is selected, push the center checkmark button again to select the setting.
Any other adjustments to the timers, voltage settings, frequency settings, etc. can be done before saving and exiting.
When all the adjustments have been made, press, and hold the center checkmark button for approximately 5 seconds, and the controller will save the changes, and exit the editor mode.

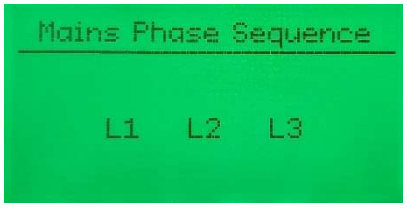
For more information on setting the phase rotation, please refer to section R below.

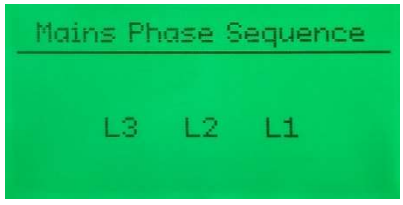
NOTE: Thomson Power Systems Automatic Transfer Switches are usually equipped to monitor 3PH 4W systems. For 3PH 3W applications, the neutral sensing wires for Utility (pin 41) and Generator (pin 37) may need to be disconnected from the controller's terminals and properly insulated to avoid potential false voltage readings.

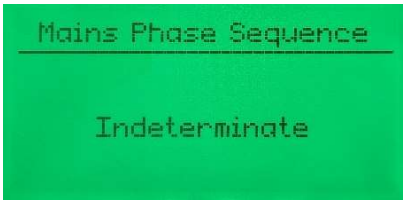
R. Configuring The Phase Rotation

The TSC 7320 is equipped with a phase rotation monitor, and is factory programmed to search for L1-L2-L3 systems (also known as A-B-C or clockwise rotation). If the controller is reading a L3-L2-L1 (C-B-A, counterclockwise) rotation, it will attempt to start and transfer to the Generator source. This is only applicable to 3PH 4W and 3PH 3W configurations, refer to section Q above if the site voltage configuration is not 3PH 4W or 3PH 3W.

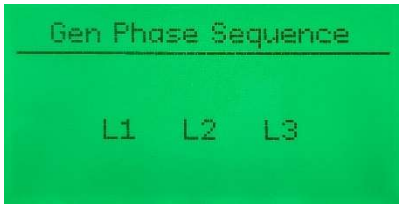
To check what phase rotation the controller is currently reading, use the left and right navigation buttons to find the "Mains" section.
Then use the up and down navigation buttons to find the "Mains Phase Sequence" screen. The screen will display the measured phase rotation on the utility side of the ATS, and will say L1-L2-L3, L3-L2-L1, or "Indeterminate". See the photos below:

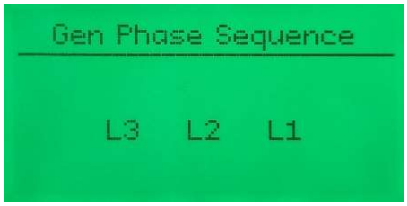


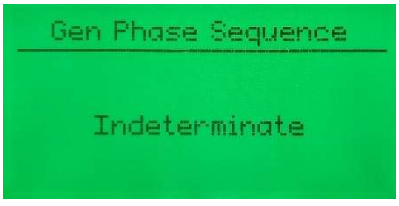




Record what the transfer switch is reading on the utility, and then navigate to the "Generator" section. Then use the up and down navigation buttons to find the "Gen Phase Sequence" screen. Like above, the page will show the measured phase rotation on the gen side. It will state one of the same options as above: L1-L2-L3, L3-L2-L1, or "Indeterminate". Record what the controller is reading.







If the controller reads L1-L2-L3 on both sources, then there are no programming changes required.

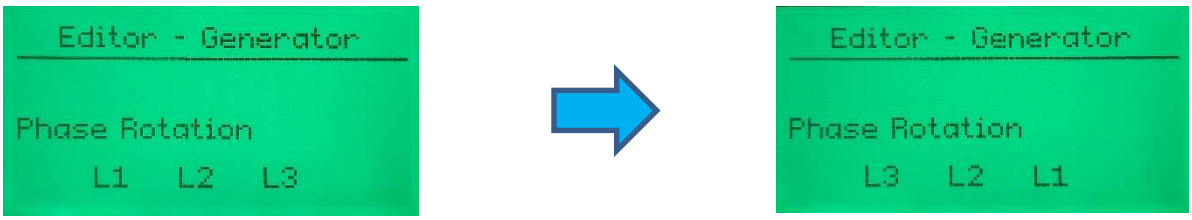
If the controller reads L1-L2-L3 on one source and L3-L2-L1 on the other source, then there is a wiring error. Check the incoming power phase rotation, and the sensing harness to the controller.

If the controller reads “Indeterminate” for any of the sources, then the source is either dead, or the incoming power has a configuration that is not 3PH 4W or 3PH 3W. Check section Q for more information on how to adjust the controllers AC Configuration.

If the controller reads L3-L2-L1 on both the mains and the generator, then either the cables need to be changed physically, or by adjusting the phase rotation settings in the front panel editor.

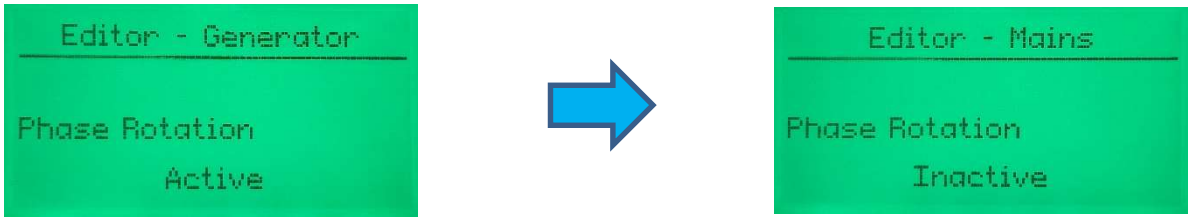
To change the phase rotation in the front panel editor, log into the restricted area (refer to Section M(a) for more information). After the controller has been logged into the restricted editor section, use the left and right navigation buttons to find the generator section. Then use the up and down buttons to find the Phase Rotation setting that lists the rotation. Press the center checkmark button and change the default L1-L2-L3 setting to L3-L2-L1.

Note: changing the rotation setting in the generator section will automatically change the mains phase rotation to match the new setting.



Push the center checkmark button to stop changing the setting.

The same procedure can be followed to disable the phase rotation alarm all together if desired.
Find the Phase Rotation setting that states “Active” and change the setting to “Inactive”.
Locate the mains phase rotation setting to also change to “Inactive”, and the phase rotation detection will now be disabled.



Push the center checkmark button to stop changing the setting and hold the button again for 5 seconds to save and exit.

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