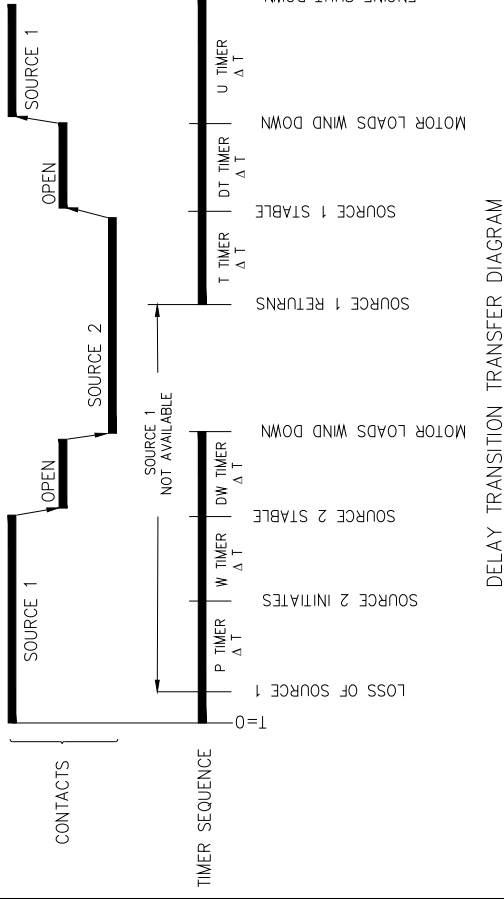


- 1) WHEN SOURCE 1 LINE VOLTAGE OR FREQUENCY DROPS BELOW THE PRESET "FAIL" VALUES, THE SOURCE 1 VOLTAGE SENSING CIRCUIT INITIATES THE ENGINE START CIRCUIT THRU THE ENGINE START TIMER "p".
- 2) WHEN SOURCE 2 LINE VOLTAGE AND FREQUENCY REACH THE PRESET "RESTORE" VALUES (ESTABLISHED DURING THE W TIMER ELAPSE CYCLE), THE MX CONTROLLER INITIATES A TRANSFER SIGNAL THROUGH THE SCR–NO MODULE TO OPERATE THE CNO TRANSFER OPERATOR.
- 3) THE LOAD WILL BE TRANSFERRED TO THE OPEN POSITION. ONCE THE SNO / SEO LIMIT SWITCHES HAVE BEEN ACTIVATED, THE MX CONTROLLER WILL INITIATE THE DW TIME DELAY. AFTER A SET TIME DELAY (ESTABLISHED THRU THE DW TIMER), THE MX CONTROLLER INITIATES A TRANSFER SIGNAL THROUGH THE SCR–E MODULE TO OPERATE THE CE TRANSFER OPERATOR.
- 4) THE LOAD WILL BE TRANSFERRED TO THE SOURCE 2 POSITION. THE TRANSFER SWITCH IS MECHANICALLY LOCKED AND ACKNOWLEDGED THRU THE SE LIMIT SWITCH.
- 5) WHEN SOURCE 1 LINE VOLTAGE AND FREQUENCY REACH THE PRESET "RESTORE" VALUES (ESTABLISHED DURING THE T TIMER ELAPSE CYCLE), THE MX CONTROLLER INITIATES A TRANSFER SIGNAL THROUGH THE SCR–EO MODULE TO OPERATE THE CEO TRANSFER OPERATOR.

6) THE LOAD WILL BE TRANSFERRED TO THE OPEN POSITION. ONCE THE SNO / SEO LIMIT SWITCHES HAVE BEEN ACTIVATED, THE MX CONTROLLER WILL INITIATE THE DT TIME DELAY. AFTER A SET TIME DELAY (ESTABLISHED THRU THE DT TIMER), THE MX CONTROLLER INITIATES A TRANSFER SIGNAL THROUGH THE SCR–N MODULE TO OPERATE THE CN TRANSFER OPERATOR.

7) THE LOAD WILL BE TRANSFERRED TO THE SOURCE 1 POSITION. THE TRANSFER SWITCH IS MECHANICALLY LOCKED AND ACKNOWLEDGED THRU THE SN LIMIT SWITCH.

8) THE MX CONTROLLER WILL INITIATE AN ENGINE COOL–DOWN SEQUENCE. THE ENGINE COOL DOWN SEQUENCE WILL ALLOW THE GENERATOR TO OPERATE UNLOADED UNTIL THE U TIMER SETTING HAS ELAPSED. ONCE COMPLETE, THE CONTROLLER WILL AUTOMATICALLY SHUT DOWN THE ENGINE.



NOTE: A MANUAL "BYPASS" PUSHBUTTON IS AVAILABLE ON THE TRUCONTROL. THIS FEATURE ALLOWS CERTAIN TIMERS TO BE BYPASSED IF THE PRE–SET CONDITIONS HAVE NOT BEEN SET CORRECTLY.

DISCONNECT CONTROL SWITCH (DS):
WHEN THE DISCONNECT CONTROL SWITCH IS PLACED IN THE INHIBIT POSITION, THE CIRCUITS TO THE TRANSFER OPERATORS ARE OPENED AND TRANSFER CANNOT TAKE PLACE

TEST SWITCH:
THE TEST SWITCH SIMULATES A SOURCE 1 LINE FAILURE WHEN ACTIVATED. TO TEST THE ATS, ACTIVATE THE TEST SWITCH ALLOWING THE TRANSFER SWITCH TO TRANSFER TO THE SOURCE 2 POSITION FOLLOWING THE ABOVE DESCRIBED OPERATION. RELEASING THE TEST SWITCH WILL ALLOW THE ATS TO TRANSFER BACK TO THE SOURCE 1 POSITION. TESTING AT LEAST ONCE PER MONTH IS RECOMMENDED. FOR HOSPITAL EMERGENCY SYSTEMS IT IS RECOMMENDED TO TEST ONCE PER WEEK.

SEQUENCE OF OPERATION – CLOSED TRANSITION.

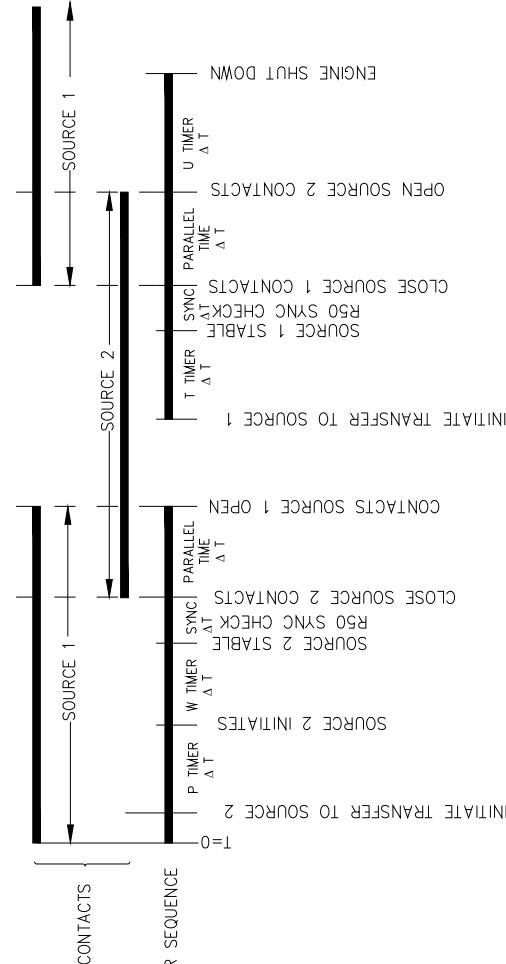
- 1) TO TEST THE ATS, ACTIVATE THE TEST SWITCH TO DROP OUT THE ENGINE START RELAY (P). WHEN THE SOURCE 2 LINE VOLTAGE AND FREQUENCY REACH THE PRESET "RESTORE" VALUES (ESTABLISHED DURING THE W TIMER ELAPSE CYCLE), THE ATS CLOSES INTO SOURCE 2 BY ACTIVATING THE SCR–E MODULE. THIS WILL OPERATE THE CE TRANSFER OPERATOR. THIS TRANSFER WILL OCCUR ONLY AFTER THE SYNC CHECK ENSURES THAT PROPER PHASE RELATIONSHIP BETWEEN BOTH SOURCES.
- 2) AFTER THE LOAD IS PARALLELED TO SOURCE 2, THE TRANSFER SWITCH IS MECHANICALLY LOCKED AND ACKNOWLEDGED THRU THE SE LIMIT SWITCH. THE CONTROLLER THEN INITIATES A TRANSFER SIGNAL THRU THE SCR–NO MODULE WHICH OPENS THE ATS OUT OF SOURCE 1. WHEN THE ATS HAS OPENED OUT OF SOURCE 1, THE SNO LIMIT SWITCH WILL ACTIVATE.
- 3) THE ATS HAS NOW CLOSED INTO THE SOURCE 2 POSITION WITHOUT INTERRUPTING THE LOAD.
- 4) RELEASING THE TEST SWITCH WILL ALLOW A RETRANSFER BACK TO SOURCE 1.

5) WHEN SOURCE 1 LINE VOLTAGE REACH THE PRESET "RESTORE" VALUES (ESTABLISHED BEFORE THE T TIMER ELAPSE), THE ATS CLOSES INTO SOURCE 1 BY ACTIVATING THE SCR–N MODULE. THIS WILL OPERATE THE CN TRANSFER OPERATOR. THIS TRANSFER WILL ONLY OCCUR AFTER THE SYNC CHECK ENSURES PROPER PHASE RELATIONSHIP BETWEEN BOTH SOURCES.

6) AFTER THE LOAD HAS BEEN PARALLELED TO SOURCE 1, THE TRANSFER SWITCH IS MECHANICALLY LOCKED AND ACKNOWLEDGED THRU THE SN LIMIT SWITCH. THE CONTROLLER THEN INITIATES A TRANSFER SIGNAL THRU THE SCR–EO MODULE WHICH OPENS THE ATS OUT OF SOURCE 2.

7) WHEN THE ATS HAS OPENED OUT OF SOURCE 2, THE SEO LIMIT SWITCH ACTIVATED. THE ATS HAS NOW CLOSED BACK INTO THE SOURCE 1 POSITION WITHOUT INTERRUPTING THE LOAD.

8) IN ADDITION, ONCE THE SOURCE 1 STATUS HAS BEEN ACKNOWLEDGED, THE TruCONTROL WILL INITIATE AN ENGINE COOL–DOWN SEQUENCE. THE ENGINE COOL DOWN SEQUENCE WILL ALLOW THE GENERATOR TO OPERATE UNLOADED UNTIL THE U TIMER SETTING HAS ELAPSED ONCE COMPLETE. THE CONTROLLER WILL AUTOMATICALLY SHUT DOWN THE ENGINE.



CLOSED TRANSITION TRANSFER DIAGRAM

9) THE ATS DEFAULTS TO A DELAYED TRANSITION TRANSFER WHEN SOURCE 1 FAILS. THIS SIGNALS THE GENERATOR TO START. AFTER THE GENERATOR VOLTAGE AND FREQUENCY REACH THE PRESET "RESTORE" VALUES, THE ATS TRANSFERS TO THE SOURCE 2. CLOSED TRANSITION TRANSFER IS NOT POSSIBLE WITH ONLY ONE SOURCE AVAILABLE. ONCE CAN SELECT A DELAYED TRANSITION TRANSFER VIA THE OPTIONAL TRANSITION MODE SELECTOR (TMS) FOR TESTING.

10) IF WHILE IN CLOSED TRANSITION MODE, THE ATS FAILS TO OPEN THE SOURCE IT IS ATTEMPTING TO "TRANSFER OUT OF", THE SOURCE THAT THE ATS JUST CLOSED INTO WILL BE OPENED LEAVING THE ATS IN ITS INITIAL SOURCE WHILE DISABLING ALL OTHER TRANSFER

- 13) OPERATIONS UNTIL THE PROBLEM IS CORRECTED AND THE "FAIL TO OPEN LOCKOUT RESET" HAS BEEN PRESSED. PROVISIONS FOR ADDITIONAL PROTECTION IS AVAILABLE VIA AN SET (SHUNT TRIP CONTACT) TO SHUNT TRIP THE GENERATOR CIRCUIT BREAKER. ACTIVATING THE SET CONTACT WILL REMOVE THE GENERATOR FROM THE BUS IF NEITHER OPERATOR OPENED.
- PARALLELLING REQUIREMENTS:
1. THE UNIT IS FACTORY SET TO ACCOMPLISH TRANSFER WITHIN 5 ELECTRICAL DEGREES.
2. REQUIRES AN ISOCHRONUS GOVERNOR WITH AN OPERATING FREQUENCY OF 60 ± 0.2 HZ.
3. REQUIRES A SHUNT TRIP BREAKER ON THE GENERATOR SET WITH A RESPONSE TIME NOT EXCEEDING 50MS.
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WHEN THE DISCONNECT CONTROL SWITCH IS PLACED IN THE INHIBIT POSITION, THE CIRCUITS TO THE TRANSFER OPERATORS ARE OPENED AND TRANSFER CANNOT TAKE PLACE
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14) WHEN THE SOURCE 1 LINE VOLTAGE AND FREQUENCY REACH THE PRESET "RESTORE" VALUES (ESTABLISHED DURING THE W TIMER ELAPSE CYCLE), THE ATS CLOSES INTO SOURCE 2 BY ACTIVATING THE SCR–E MODULE. THIS WILL OPERATE THE CE TRANSFER OPERATOR. THIS TRANSFER WILL OCCUR ONLY AFTER THE SYNC CHECK ENSURES THAT PROPER PHASE RELATIONSHIP BETWEEN BOTH SOURCES.

15) AFTER THE LOAD IS PARALLELED TO SOURCE 2, THE TRANSFER SWITCH IS MECHANICALLY LOCKED AND ACKNOWLEDGED THRU THE SE LIMIT SWITCH. THE CONTROLLER THEN INITIATES A TRANSFER SIGNAL THRU THE SCR–NO MODULE WHICH OPENS THE ATS OUT OF SOURCE 1. WHEN THE ATS HAS OPENED OUT OF SOURCE 1, THE SNO LIMIT SWITCH WILL ACTIVATE.

16) THE ATS HAS NOW CLOSED INTO THE SOURCE 2 POSITION WITHOUT INTERRUPTING THE LOAD.

17) RELEASING THE TEST SWITCH WILL ALLOW A RETRANSFER BACK TO SOURCE 1.

18) WHEN SOURCE 1 LINE VOLTAGE REACH THE PRESET "RESTORE" VALUES (ESTABLISHED BEFORE THE T TIMER ELAPSE), THE ATS CLOSES INTO SOURCE 1 BY ACTIVATING THE SCR–N MODULE. THIS WILL OPERATE THE CN TRANSFER OPERATOR. THIS TRANSFER WILL ONLY OCCUR AFTER THE SYNC CHECK ENSURES PROPER PHASE RELATIONSHIP BETWEEN BOTH SOURCES.

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20) WHEN THE ATS HAS OPENED OUT OF SOURCE 2, THE SEO LIMIT SWITCH ACTIVATED. THE ATS HAS NOW CLOSED BACK INTO THE SOURCE 1 POSITION WITHOUT INTERRUPTING THE LOAD.

21) IN ADDITION, ONCE THE SOURCE 1 STATUS HAS BEEN ACKNOWLEDGED, THE TruCONTROL WILL INITIATE AN ENGINE COOL–DOWN SEQUENCE. THE ENGINE COOL DOWN SEQUENCE WILL ALLOW THE GENERATOR TO OPERATE UNLOADED UNTIL THE U TIMER SETTING HAS ELAPSED ONCE COMPLETE. THE CONTROLLER WILL AUTOMATICALLY SHUT DOWN THE ENGINE.

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24) PARALLELLING REQUIREMENTS:
1. THE UNIT IS FACTORY SET TO ACCOMPLISH TRANSFER WITHIN 5 ELECTRICAL DEGREES.
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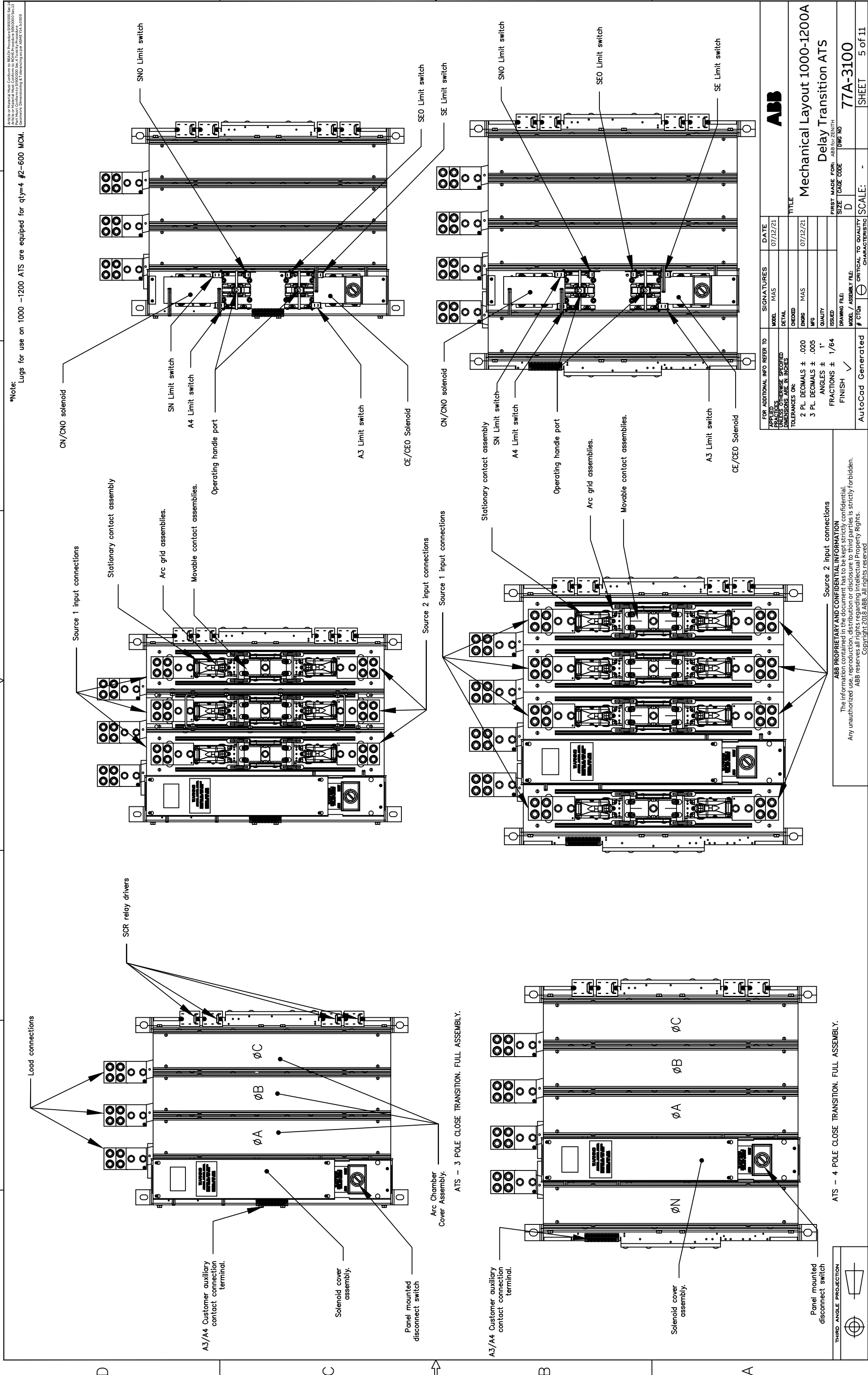
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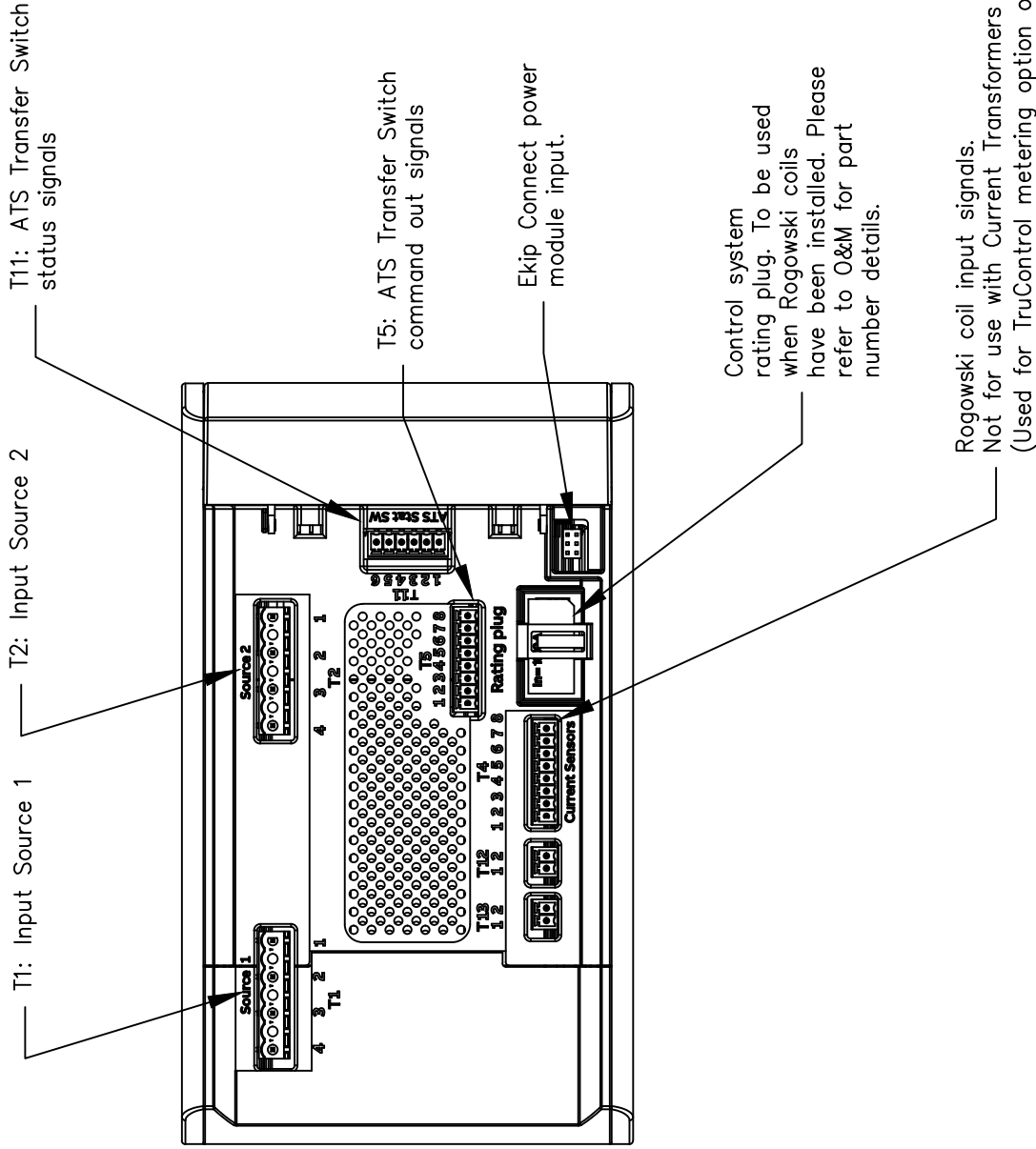
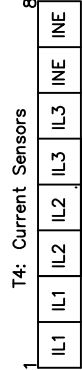
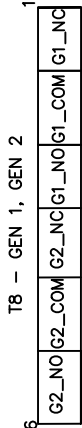
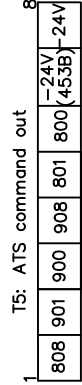
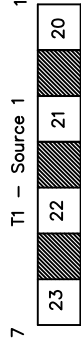
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FOR ADDITIONAL INFO REFER TO		SIGNATURES		DATE	
APPLIED PRACTICES		MODEL			
UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES		DETAIL			
TOLERANCES ON:		CHECKED			
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3 PL. DECIMALS ± .005		WFG			
ANGLES ± 1°		QUALITY			
FRACTIONS ± 1/64		ISSUED			
FINISH		DRAWING FILE:		SIZE	
✓		MODEL / ASSEMBLY FILE:		CAGE CODE	
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				SHEET	
				3 of 11	

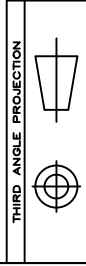


STANDARD PLUG CONNECTION SCHEME – LOCATED ON TRU CONTROLLER

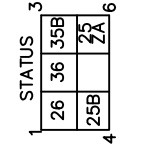
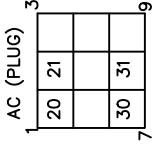
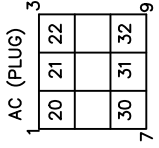
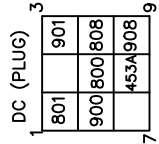


Notes:

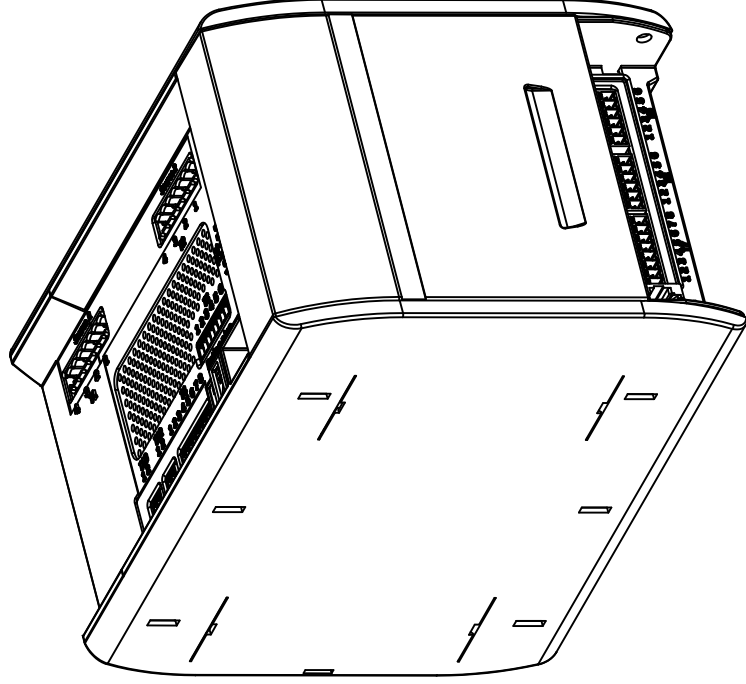
- 1) ABB Zenith TruControl is a fully integrated electrical module that has no field replaceable components. Units that are not operating as intended will require complete replacement. Any attempts to perform hardware repair or maintenance of internal components is not recommended.



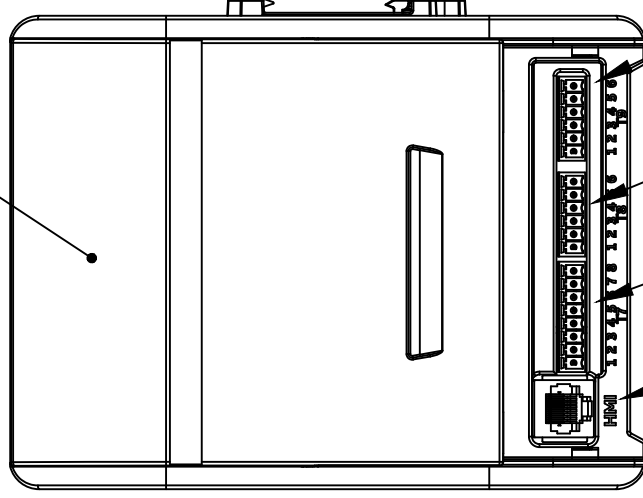
STANDARD PLUG CONNECTION SCHEME – LOCATED ON 63L ATS TO T1 INTERFACE HARNESS



FOR USE ON 1Ø/3Ø SYSTEMS FOR USE ON 3Ø SYSTEMS FOR USE ON 1Ø/3Ø SYSTEMS ONLY FOR USE ON 1Ø/3Ø SYSTEMS



Ekip Connect I/O module access cover. Please refer to page 13 of this drawing set for more details.



Digital input

GEN 1, GEN 2 signal start connections. (GEN 1 is pre-wired at the factory. See page 8 for T-block connection location.)

Digital output

HMI interface cable connection port.

FOR ADDITIONAL INFO REFER TO		SIGNATURES		DATE	
APPLIED	MODEL	MAS		07/12/21	
DESIGNED	DETAIL				
CHECKED	ENGINEER	MAS		07/12/21	
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	3 PL DECIMALS ± .005				
	ANGLES ± 1°				
	FRACTIONS ± 1/64				
	FINISH	✓			
AutoCad Generated		# CTOg		CRITICAL TO QUALITY CHARACTERISTIC	
AutoCad Generated		✓		SCALE: -	
AutoCad Generated		✓		SHEET 6 OF 11	



Tru Control System
ABB Integrated Controller Design

SIZE	CAGE CODE	DWG NO
D	-	77A-3100
FIRST MADE FOR: ABB/07-ZENITH		SHEET 6 OF 11

Rogowski coils for use with metering package.

HMI user interface panel.

Field Installable lift angles for product installation and positioning.

Ekip connect access cover

Tru Electronic Controller

Customer Engine Start Terminal block.

Auxiliary panel mounting location for customer add-on options.

ATS power panel assembly.

Neutral Bar mounting location.

Equipment ground lug.

D

C

B

A



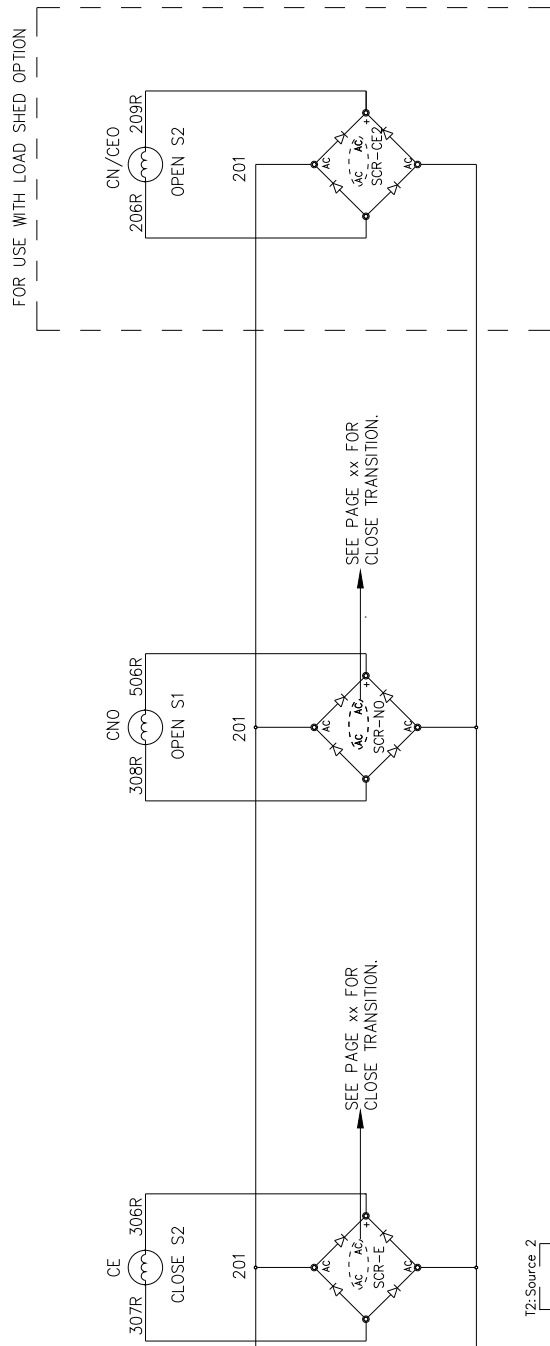
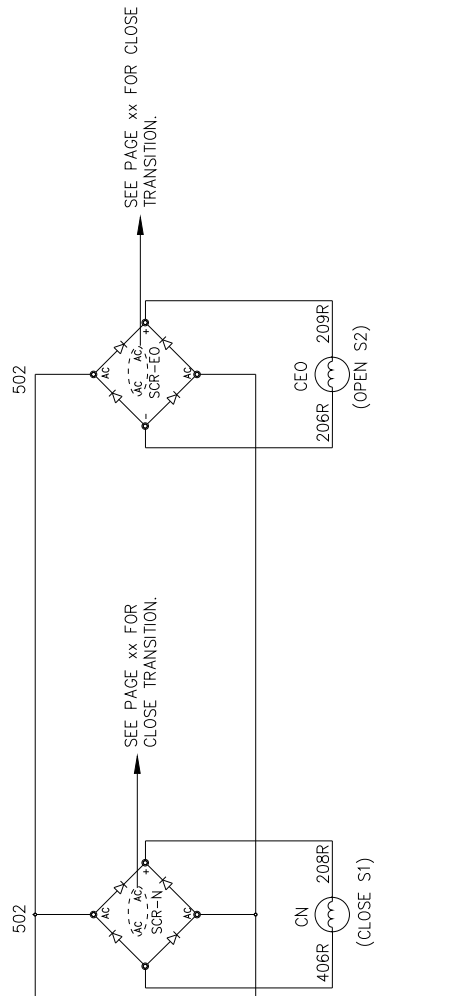
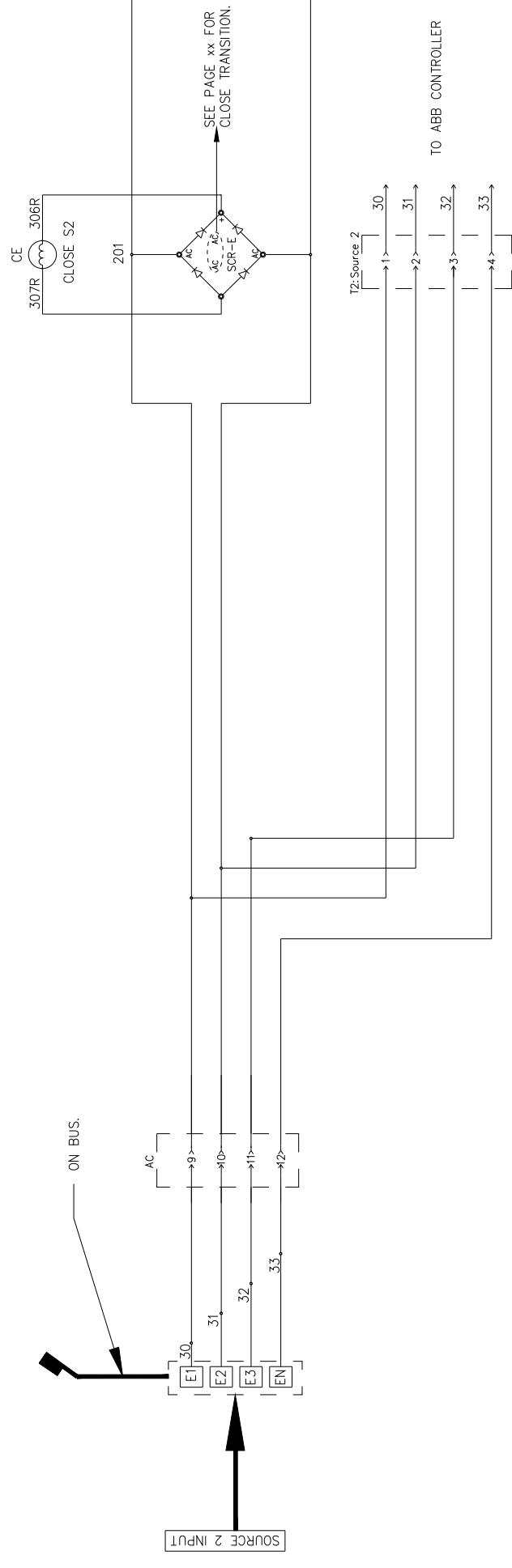
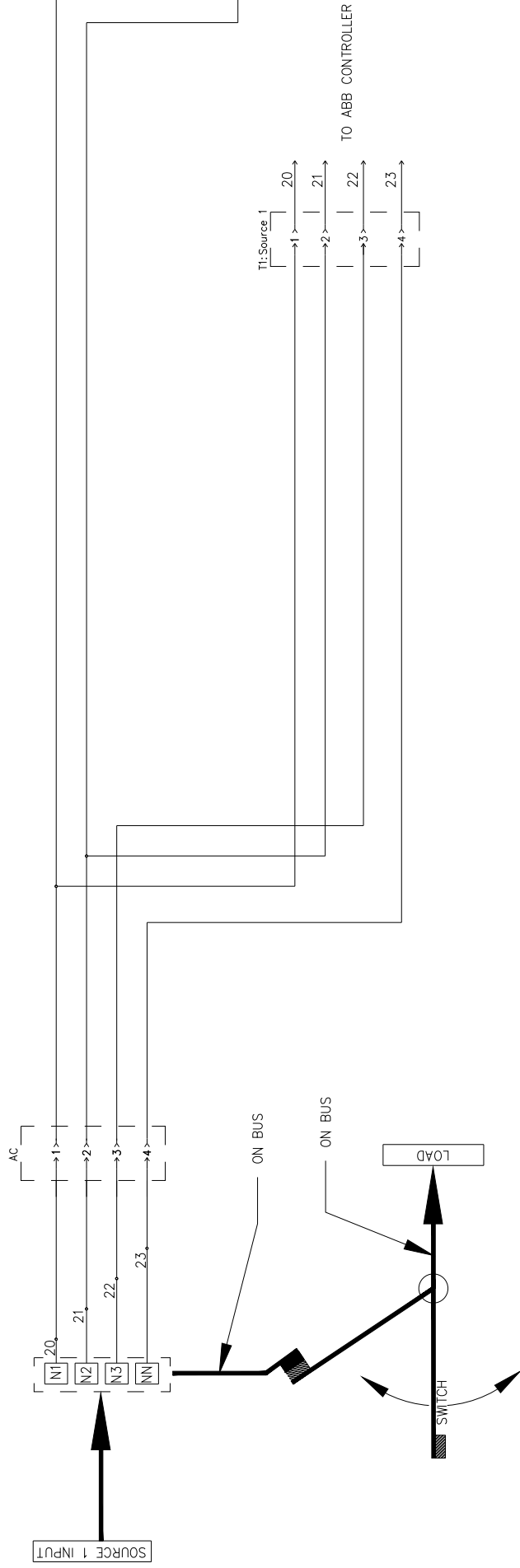
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APPLIED PRACTICES	MODEL	DETAIL	CHECKED	07/12/21	
DIMENSIONS ARE IN INCHES					
TOLERANCES ON:					
2 PL. DECIMALS ± .020					
3 PL. DECIMALS ± .005					
ANGLES ± 1°					
FRACTIONS ± 1/64					
FINISH ✓					
AutoCad Generated		DRAWING FILE:		CRITICAL TO QUALITY	
		# CTOs		CHARACTERISTIC	
		MODEL / ASSEMBLY FILE		SIZE	
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				7 OF 11	
				SCALE:	
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				11	

ABB

Nema enclosed landscape

ABB Integrated Controller Design



FOR ADDITIONAL INFO REFER TO		APPLIED PRACTICES		SIGNATURES		DATE	
UNITS AND DIMENSIONS ARE IN INCHES		SPECIFIED DIMENSIONS ARE IN INCHES		MODEL MAS		07/12/21	
TOLERANCES ON:		CHECKED		DETAIL			
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3 PL. DECIMALS ± .005		MFG					
ANGLES ± 1°		QUALITY					
FRACTIONS ± 1/64		ISSUED					
FINISH ✓		DRAWING FILE:					
		MODEL / ASSEMBLY FILE:					
		D		SIZE		CAGE CODE	
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				77A-3100			
AutoCod Generated		# CTOS		SCALE:		SHEET	
Generated		⊕		CRITICAL TO QUALITY CHARACTERISTIC		8 OF 11	

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Article or Material Must Conform to Reach Procedure S900000 Sec. 4
Article or Material Must Conform to Reach Procedure S900000 Sec. 13
Dimensions are in inches unless otherwise specified.
Geometric Dimensioning & Tolerancing as per ASME Y14.5-2009

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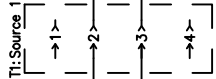
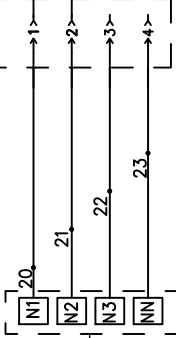
14

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SOURCE 1 INPUT

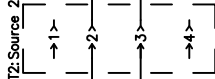
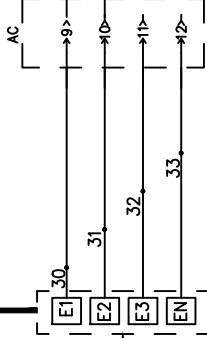


TO ABB CONTROLLER

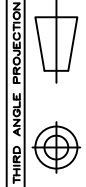
LOAD

SWITCH

SOURCE 2 INPUT



TO ABB CONTROLLER



THIRD ANGLE PROJECTION

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FOR ADDITIONAL INFO REFER TO		SIGNATURES		DATE	
APPLIED	MODEL	MAS		07/12/21	
DETAILS	DETAIL				
TOLERANCES UNLESS OTHERWISE SPECIFIED ARE IN INCHES					
TOLERANCES ON:					
2 PL DECIMALS ± .020					
3 PL DECIMALS ± .005					
ANGLES ± 1°					
FRACTIONS ± 1/64					
FINISH					
AutoCad Generated					
# CTG		# CTG		CRITICAL TO QUALITY CHARACTERISTIC	
Model / Assembly File		Model / Assembly File		Model / Assembly File	
Drawing File		Drawing File		Drawing File	
First Made For		First Made For		First Made For	
Size		Size		Size	
CAGE CODE		CAGE CODE		CAGE CODE	
Dwg No		Dwg No		Dwg No	
77A-3100		77A-3100		77A-3100	
SHEET		SHEET		SHEET	
9 OF 11		9 OF 11		9 OF 11	

ABB

10 ELECTRICAL DIAGRAM
ABB Integrated Controller Design

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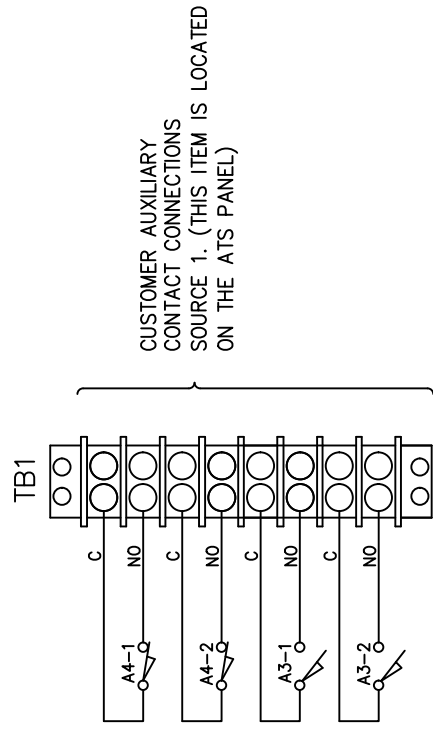
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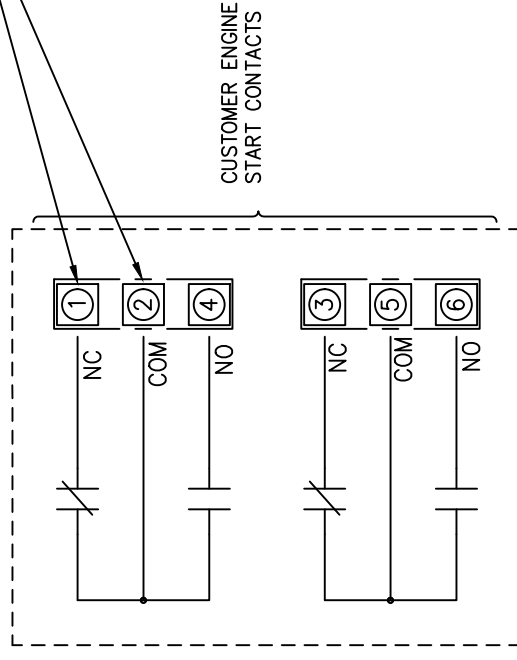
11



NOTE: DIAGRAMS SHOWN WITH ATS IN SOURCE 1 POSITION AND NO POWER AVAILABLE.

AUTOMATIC TRANSFER SWITCH LIMIT SWITCH ACTUATION CHART			
X = ACTUATED	ATS CONTACT LOCATION		
	SOURCE 1	OPEN	SOURCE 2
A3-1,2			X
A4-1,2	X		

CONTACT RATINGS		
RELAY	CONTACT	RATING
ENGINE START	E	5 AMP @ 240 VAC 5 AMP @ 30 VDC
AUXILIARY CONTACTS	A3, A4	15 AMP @ 125, 250 VAC



NOTE: DIAGRAM SHOWN WITH ATS IN NORMAL POSITION
AND NO POWER AVAILABLE.

NOTES

1. ATS SHOWN IN SOURCE-1 POSITION WITH NO POWER AVAILABLE.
2. UNLESS OTHERWISE SPECIFIED ALL CUSTOMER CONNECTION WIRES TO BE MINIMUM #14 AWG., 600V.

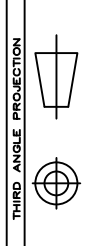


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Ekip Connect Input / Output User Modules

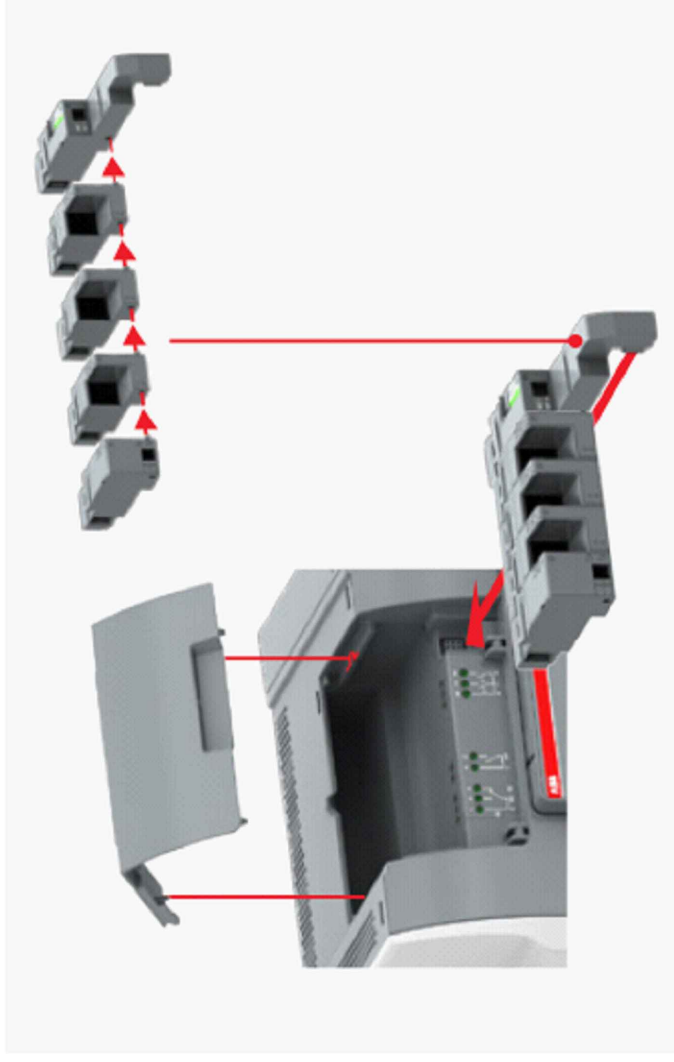


ABB TruControl Automatic Transfer Switch Equipment makes use of ABB Ekip Connect option modules. Please refer to the ABB TruControl Operation and Maintenance Guide for detailed part numbers, operation and settings description for each, and related software for ease of programming.

DETAILS PENDING:

THIS SPACE LEFT OPEN FOR CLOSE TRANSITION CUSTOMER CONNECTIONS, WIRED ALARMS, AND REQUIRED INSTRUCTIONS FOR CLOSE TRANSITION AUTOMATIC TRANSFER SWITCH OPERATION.

FOR ADDITIONAL INFO REFER TO	SIGNATURES	DATE	 Customer I/O connection diagram ABB Integrated Controller Design
TOLERANCES ON:	MODEL	MAS	
2 PL. DECIMALS ± .020	DETAIL	07/12/21	
3 PL. DECIMALS ± .005	CHECKED		
ANGLES ± 1°	ENG'D	MAS	
FRACTIONS ± 1/64	WFG	07/12/21	
FINISH ✓	QUALITY		
	ISSUED		
	DRAWING FILE:		
	MODEL / ASSEMBLY FILE:		
AutoCad Generated	# Ctrls	SCALE: -	SHEET 11 OF 11 77A-3100

Customer I/O connection diagram