

ATS-PLC *Ver 1.0*

PROGRAMMABLE TOUCH-SCREEN UNIVERSAL AUTOMATIC TRANSFER SWITCH CONTROLLER OPERATOR'S MANUAL



*Can be easily adapted to almost all types ATS switches from numerous manufacturers, and can be used as a retrofit controller to update an existing switch or in the assembly and constructions of new Transfer Switches.
It incorporates modern Internet controls and communications protocols*

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SECTION 1: INTRODUCTION

Setting up and programming the ATS-PLC is intuitive and easy. We encourage you to bench test the unit by **CONNECTING THE BATTERY POWER ONLY TO THE UNIT** and engage with the unit without reading the manual to get a feel of its capabilities and use -- then read the manual.

DO NOT CONNECT MAIN OR STANDBY POWER WHEN BENCH TESTING

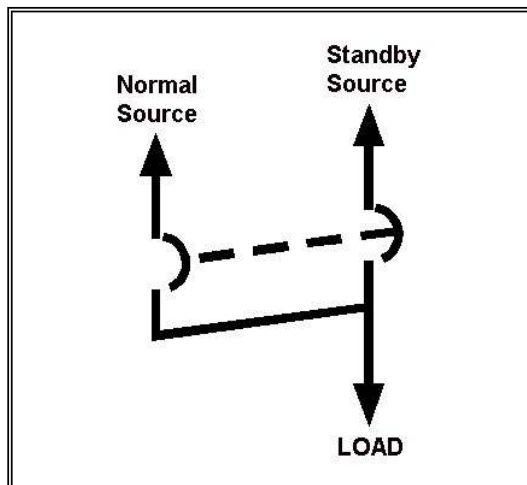
1.1 Preliminary Comments and Safety Precautions

This manual covers the installation, operation and maintenance of the ATS-PLC Automatic Transfer Switch Controller. This manual is for use by authorized and qualified personnel only.

WARNING
HIGH VOLTAGES CAN KILL.

1.2 Overview

Transfer switches protect critical electrical loads from loss of power by starting a standby (emergency) generator and backing up the normal grid power with the generator. The transfer switch connects either the normal or the standby supply to the load. Eventually after the grid is restoration, the ATS connects the load back to the grid.



1.3 Product Overview

The ATS-PLC is a programmable multifunction touch-screen automatic transfer switch controller with a 5.7 inch color touch screen. It incorporates internally most operational relays and can easily replace all conventional ATS controller. The interface is friendly with plenty of settings and configurations to suit almost all ATS's. It works with single phase/3 phase 3 wires/ 3 phase 4 wires systems.

All configurations are stored internally preventing loss of data and settings during a power outage.

1.4 Functions & Capabilities

- Compact size and easy installation
- 5.7" inch color LCD touch-screen
- Program and function setting via touch-screen operation
- Voltage, current, frequency and KVA readings for normal and standby power and with time displays
- Voltage, current and frequency readings displayed digitally or analog display
- Normal and standby power phase voltage monitoring and protection
- Normal and standby power frequency monitoring and protection
- Normal and standby reverse phase sequence protection
- Normal & standby overload or short circuit trip monitoring & protection (when using ATS's with trips)
- Exercise with or without load.
- 1 to 4 weeks exercise and ATS testing.
- Pre-alert DANGER signal output for scheduled automatic Exercise / testing
- Transfer FAIL alarms
- Compatibility with all types of ATS switches
- Optional USB / RS485 and Ethernet remote control (mobile proxy) for Iphone, Android and PC
- Program on-site or from remote (mobile) device (PC, Smart Phone).
- Prevents loss of data during power outage
- Front panel display provides status and alarm indications.
- 40 line event log
- 4 digits password protection
- Supports (English and Spanish)

1.5 Electrical Characteristics

System Power

Item	Content	Factory Preset
System Phase	3 Phase 4 Wires / 3 Phase 3 Wires / Single Phase	3 Phase 3 Wires
Current Transformer (CT)	X/5A (X = Primary Current, 5A = Secondary Ratio) X = Available/50/100/150/200/250/300/400/500/600/800/ 1000/1200/1500/1600/2000/3000/4000/5000/6000 (A)	1000/5A

Time Delay Setting

Item	Setting Range	Unit	Factory Preset
Time Delay Emergency to Normal (TDEN)	0 ~ 1800 sec	2 sec/unit	10 sec
Time Delay Normal to Emergency (TDNE)	0 ~ 1800 sec	2 sec/unit	10 sec
Timer Delay Engine Start (TDES)	0 ~ 300 sec	2 sec/unit	10 sec
Timer Delay Engine Cooling (TDEC)	0 ~ 1800 sec	2 sec/unit	30 sec
Time Delay OFF position (TDOF)	0 ~ 300 sec	2 sec/unit	4 sec

Protection Setting

Item	Setting Range	Unit	Factory Preset
Normal/ standby Over Voltage Protection	110V ~ 530V	10V/unit	250V
Over Voltage Reset Value	-20V ~ 0V	1V/unit	-5V
Normal/ standby Under Voltage Protection	80V ~ 470V	10V/unit	250V
Under Voltage Reset Value	0V ~ 20V	1V/unit	5V
Normal/ standby Over Frequency Protection	51Hz ~ 75Hz	1Hz/unit	65Hz
Over Frequency Reset Value	-10Hz ~ 0Hz	1Hz/unit	-1Hz
Normal/ standby Under Frequency Protection	40Hz ~ 59Hz	1Hz/unit	55Hz
Under Frequency Reset Value	0Hz ~ 10Hz	1Hz/unit	1Hz
Abnormality Confirmation Time Delay	0 ~ 99 sec	1 sec/unit	10 sec
Reverse Phase Sequence Protection	Enabled / Disabled		Disabled

Brightness Adjustment

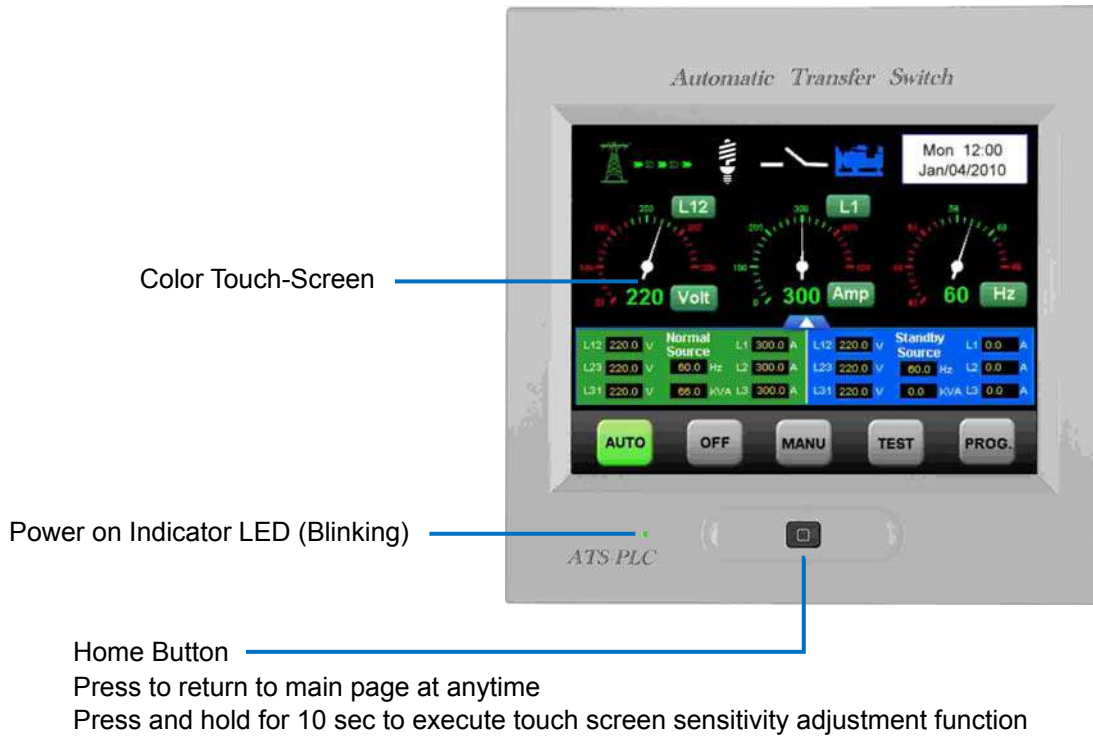
Item	Setting Range	Unit	Factory Preset
Brightness Adjustment	Level 1 ~ Level 8	1 level	Level 6
Screen Saver	2 min ~ 10 min or cancelled	1 minutes	3 min

Communications transmission

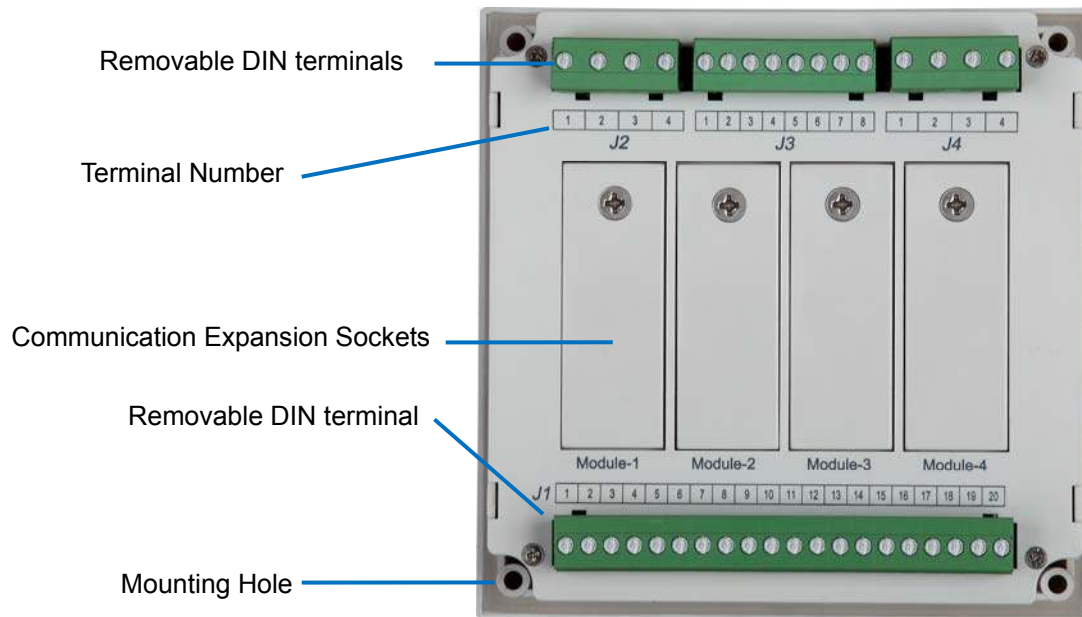
Item	Setting Range	Factory Preset
Remote Operation	Enable/Disable	Disable
Baud-rate	1200/2400/9600/19200/38400/57600	38400
RS485 Slave Address	00 ~ 99 (Valid value 01 ~ 99 ; 00 Disabled)	00 (Disabled)

1.6 Exterior Overview

Front



Rear



1.7 ATS-PLC Quickly Start

Step 1: See chapter-5 and study the different diagrams to connect different ATSS. Then wire your ATS like in the drawings

Step 2: Connect the DC power and press the OFF button



Step 3: Press PROG then System Setup



Step 4: Set time and date (see 2.7.3.1)



Step 5: Set Language English or Spanish (See 2.7.3.2)



Step 6: Now go back to Parameters Setup & Set system Power (see 2.7.5.1)



Step 7: Select ATS switch type (See 2.7.5.3)



Step 8: Set Engine exerciser settings (See 2.7.5.4)



Step 9: Setting ATS protections for Normal & Standby (See 2.7.5.5)



Step10: Set Power on Normal AC volt input and set the ATS-PLC under Manual mode.



Step11: Operational test

Manually start the genset and transfer the load from Normal to Standby using the Normal & Standby buttons on the screen



Step12: Manually transfer the load back to Normal Source and stop the genset by pressing the Engine Stop button under the Engine Logo
























Step13: Repeat Step 11 & 12 and confirm the ATS is working

Step14: Set the ATS-PLC back to AUTO and finished the quick start procedure.



SECTION 2: TOUCH SCREEN PANEL OVERVIEW

2.1 Status Icons

Icon	Function		
	Normal power / Grid		Incorrect password entered. System locked (Contact dealer)
	Emergency power / Standby		Engine remote start
	Load		TDEN/TDNE/TDEC/TDES Time delay countdown
	Power source connected		Return to last page (Modification will not be saved if pressed in setting mode)
	Power source not connected		Enter / Save
	Connecting failure		Increase
	Overload or trip warning		Decrease
	Reverse phase sequence warning		Move right
	ATS failure		Move left
	Incorrect operation		Event logs erase
			Mute

2.2 Start-up Screen Display

Start-up Screen Displays for 3 sec then enters operation mode

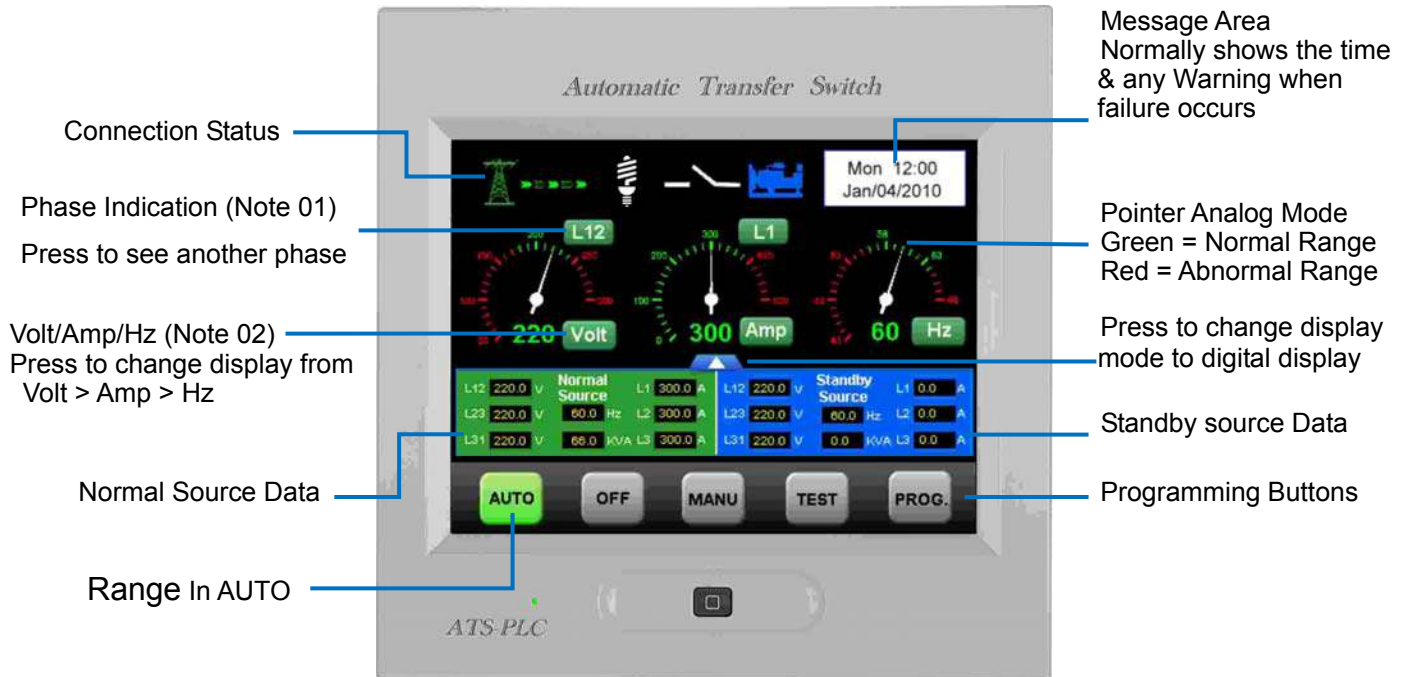
Press to skip start-up screen



Attention! The Start-up Logo on the screen can be changed by the user, See **APPENDIX 0**

2.3 Auto Mode

2.3.1 Analog Gauge the Analog Screen Display

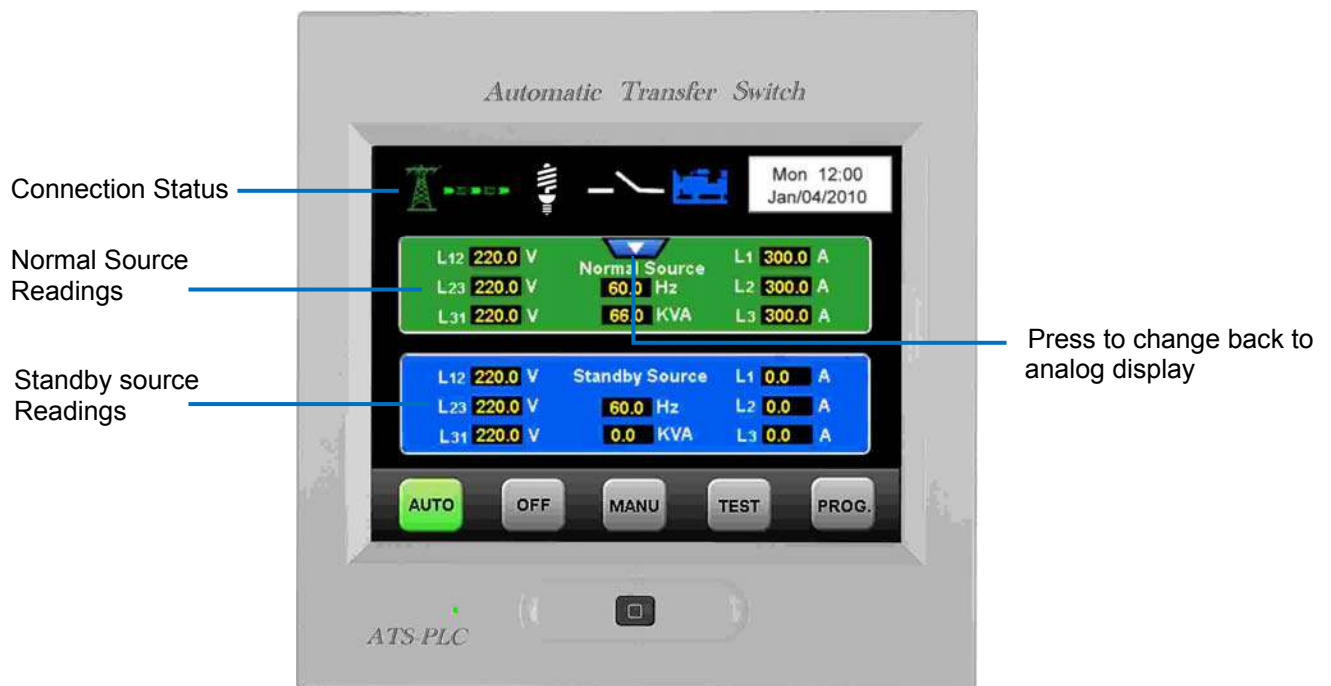


(Note 01) 3 Phase 3 Wires selection sequence = L12 > L23 > L31.

3 Phase 4 Wires selection sequence = L12 > L23 > L31>L1N>L2N>L3N

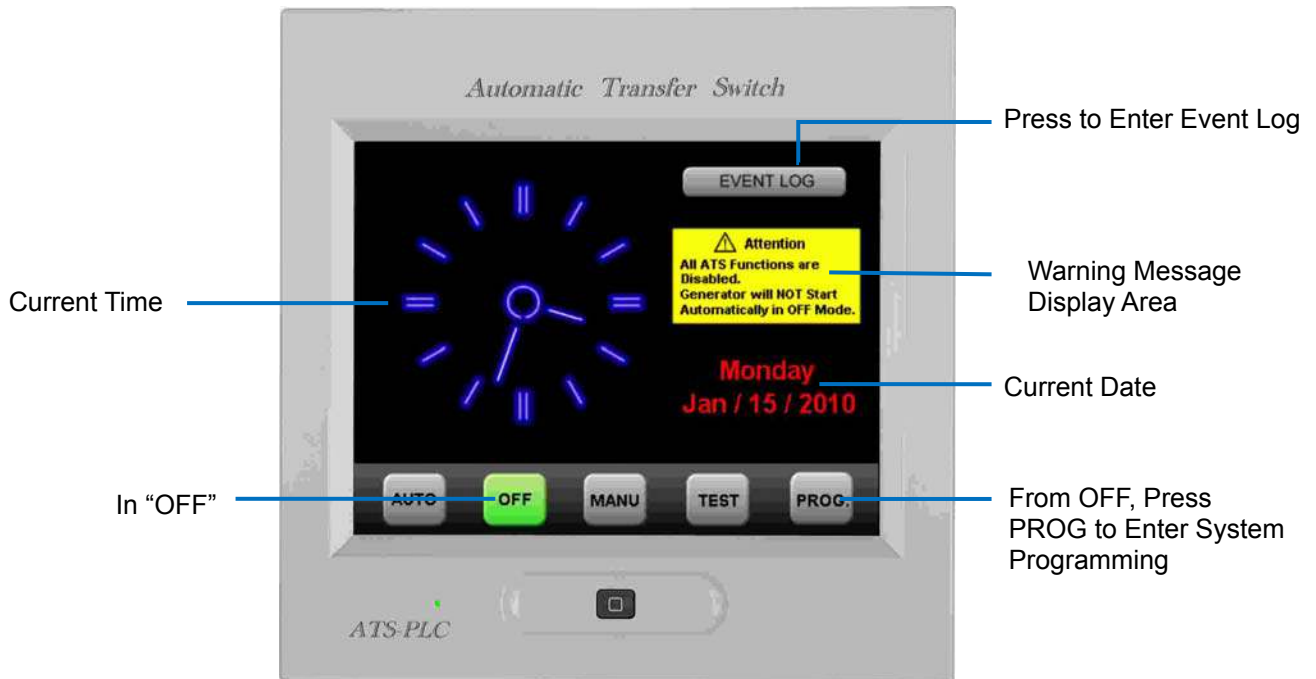
(Note 02) Volt/Amp/Frequency display sequence = Volt > Amp > Hz

2.3.2 Digital Main Screen Display

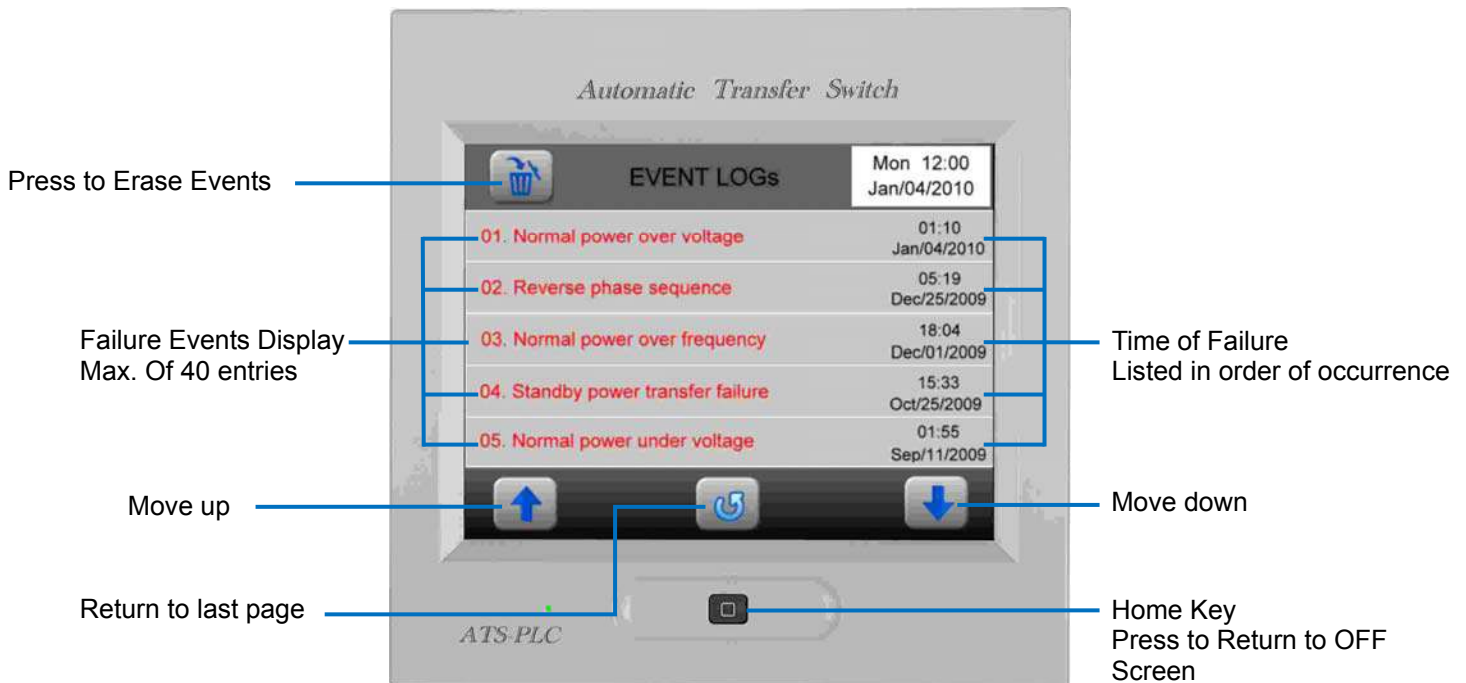


2.4 IN OFF – The Home Screen

2.4.1 OFF Screen



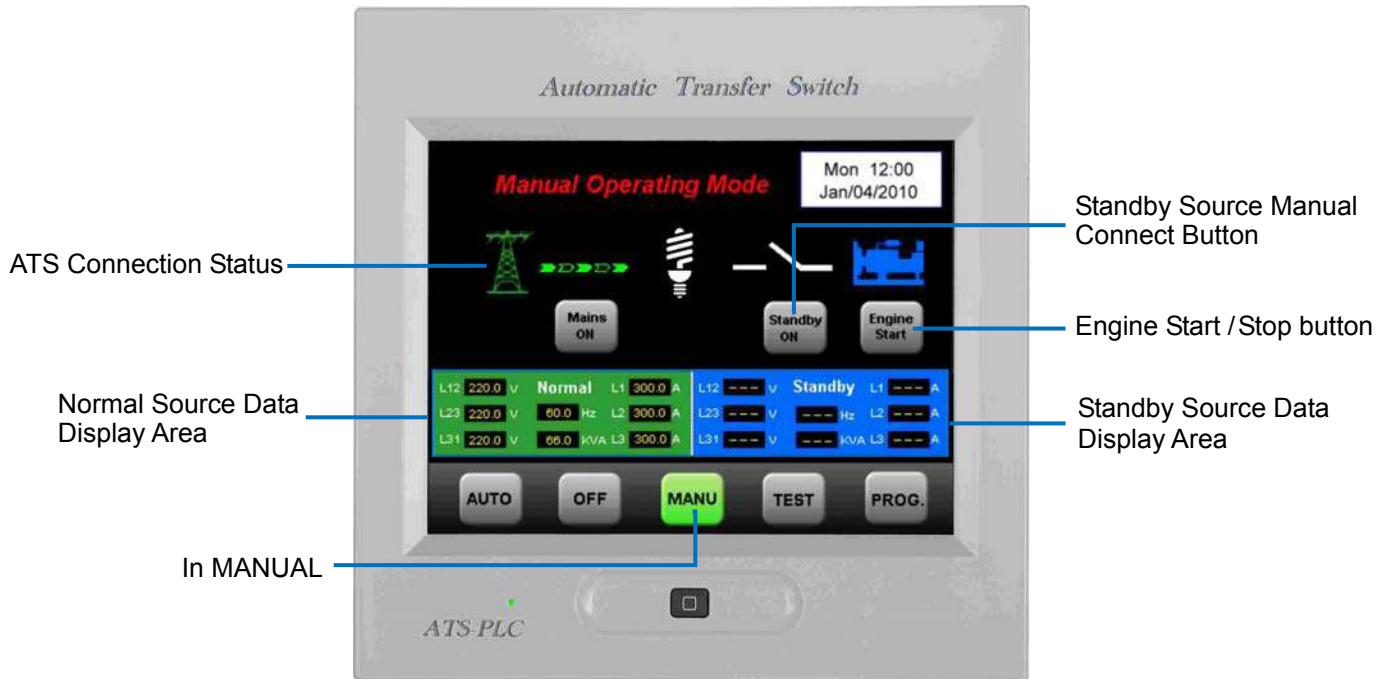
2.4.2 Event Log Display



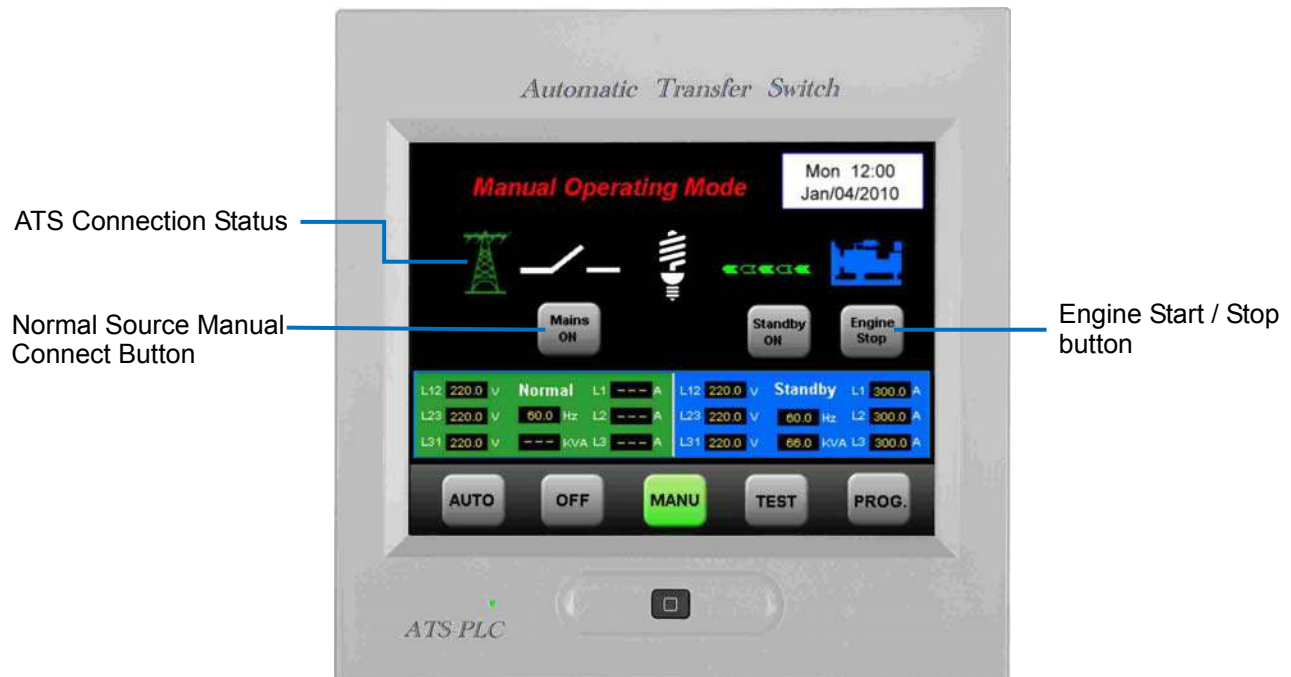
Attention! If a new entry is not selected within 60 sec. the screen automatically returns to OFF

2.5 In Manual Mode

2.5.1 Display Screen in Manual with the (Normal Source Supplying Power to the Load)

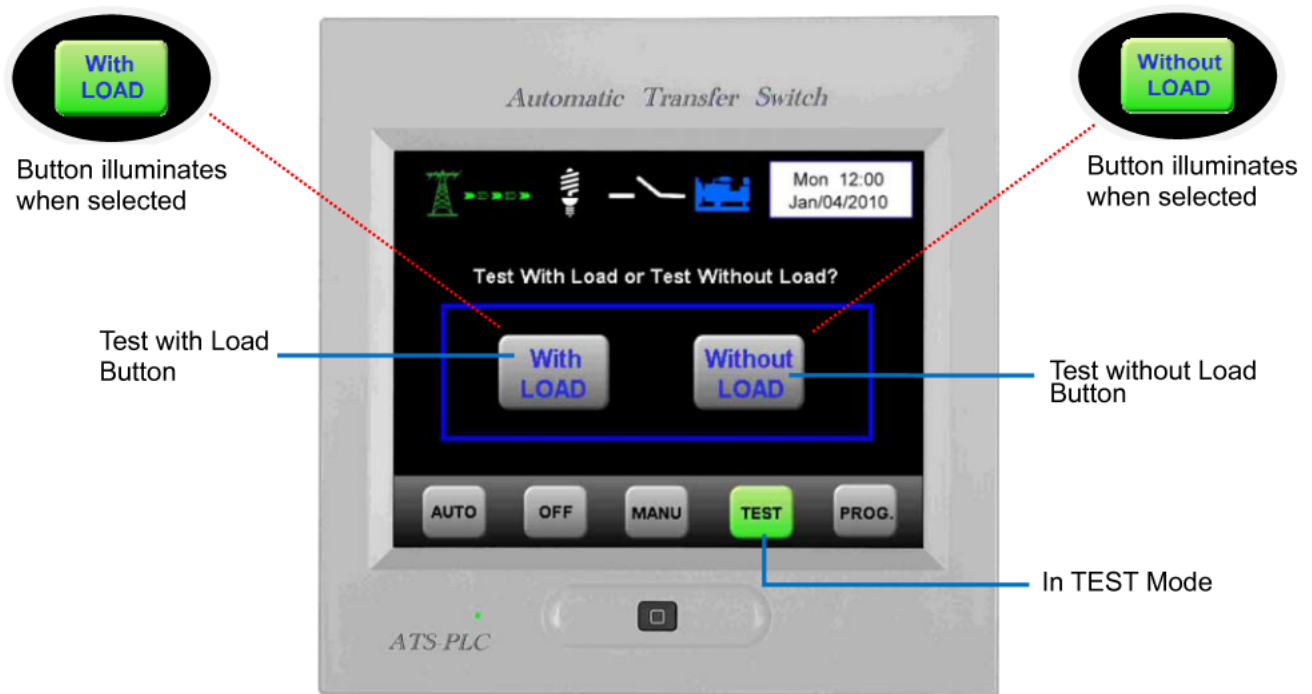


2.5.2 Display Screen in Manual with the (Standby Source Supplying Power to the Load)



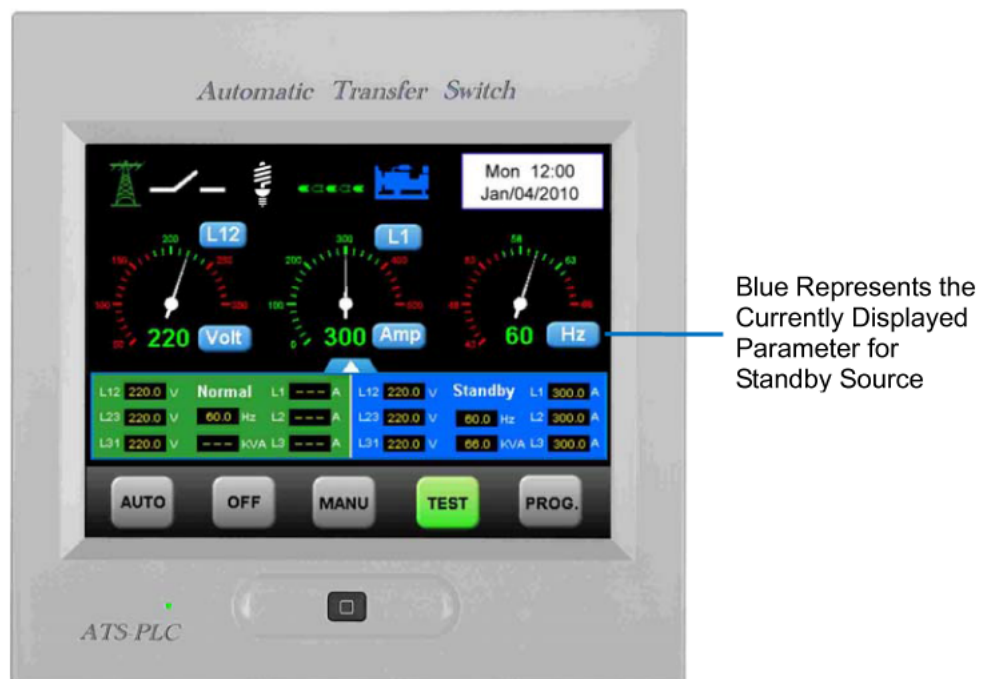
2.6 TEST Mode

2.6.1 With Load / Without Load Selection



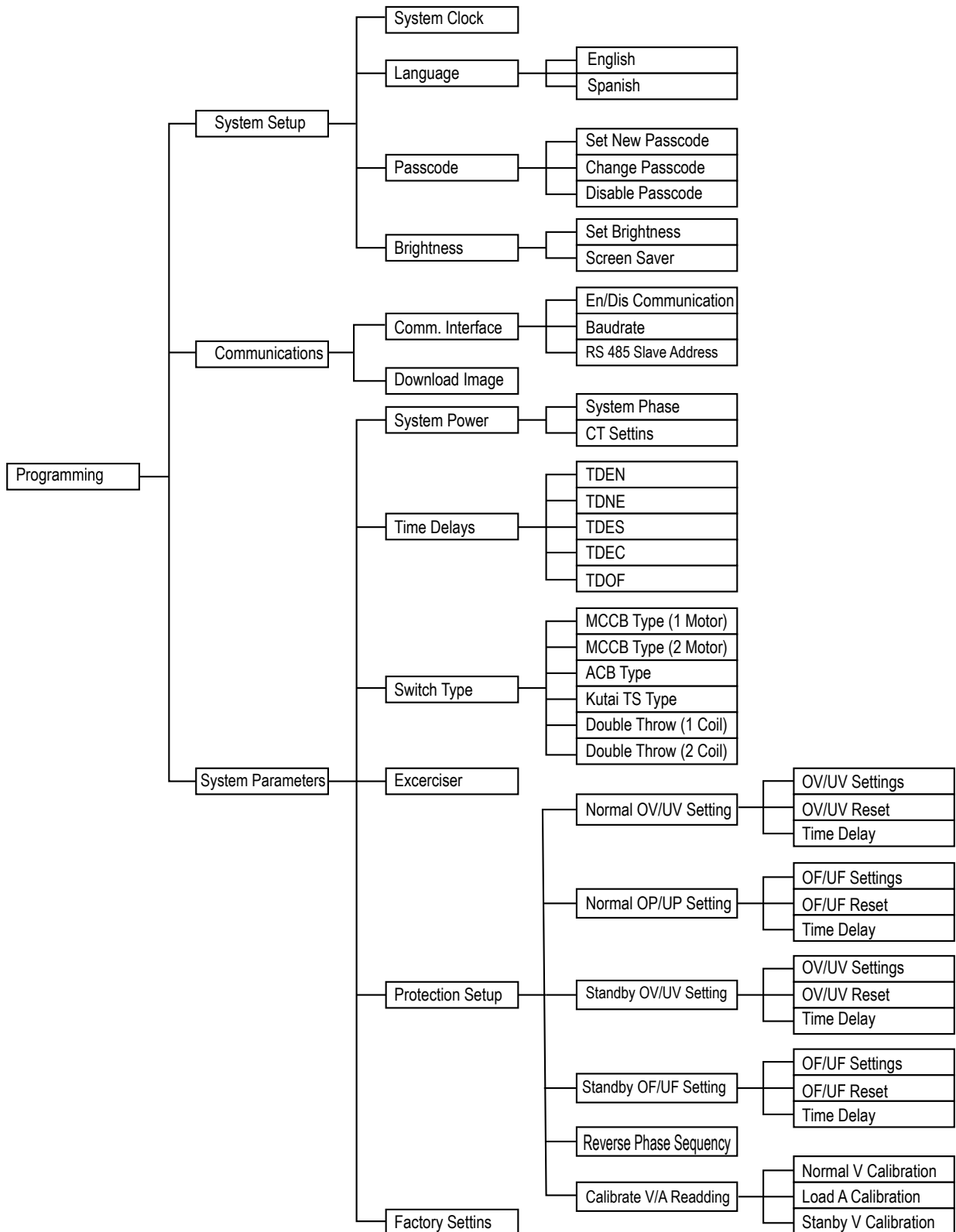
Attention! For SAFETY the ATS-PLC goes into TEST WITH LOAD if a real emergency occurs while doing a manual TEST WITHOUT LOAD

2.6.2 The Screen Display When Testing With Load

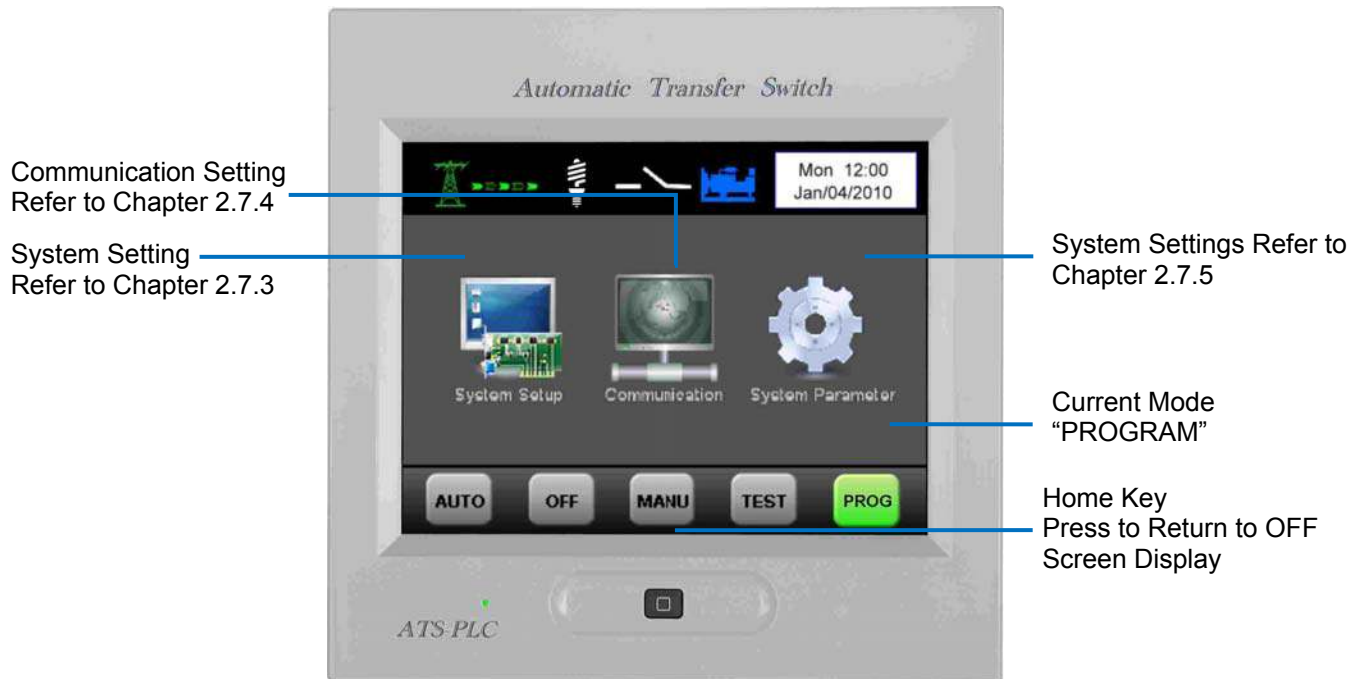


2.7 Program Mode (PROG)

Attention! Before doing any Programming **PROG**, first press **OFF** then press **PROG** otherwise an operation failure message will be displayed. (See illustration in 2.7.2 MANU Mode Procedure Error Warning)

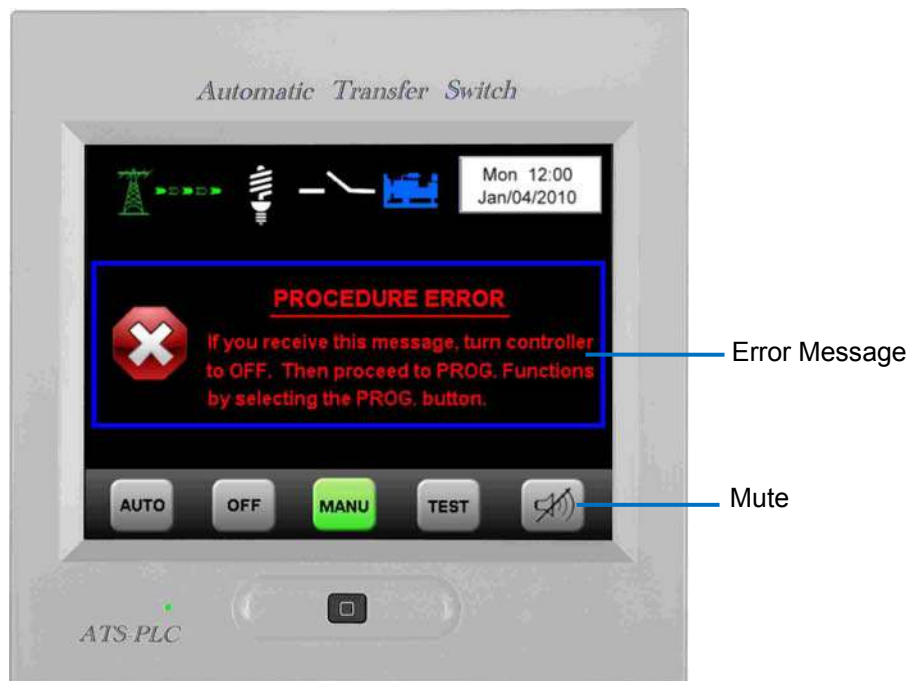


2.7.1 Programming Display Screen



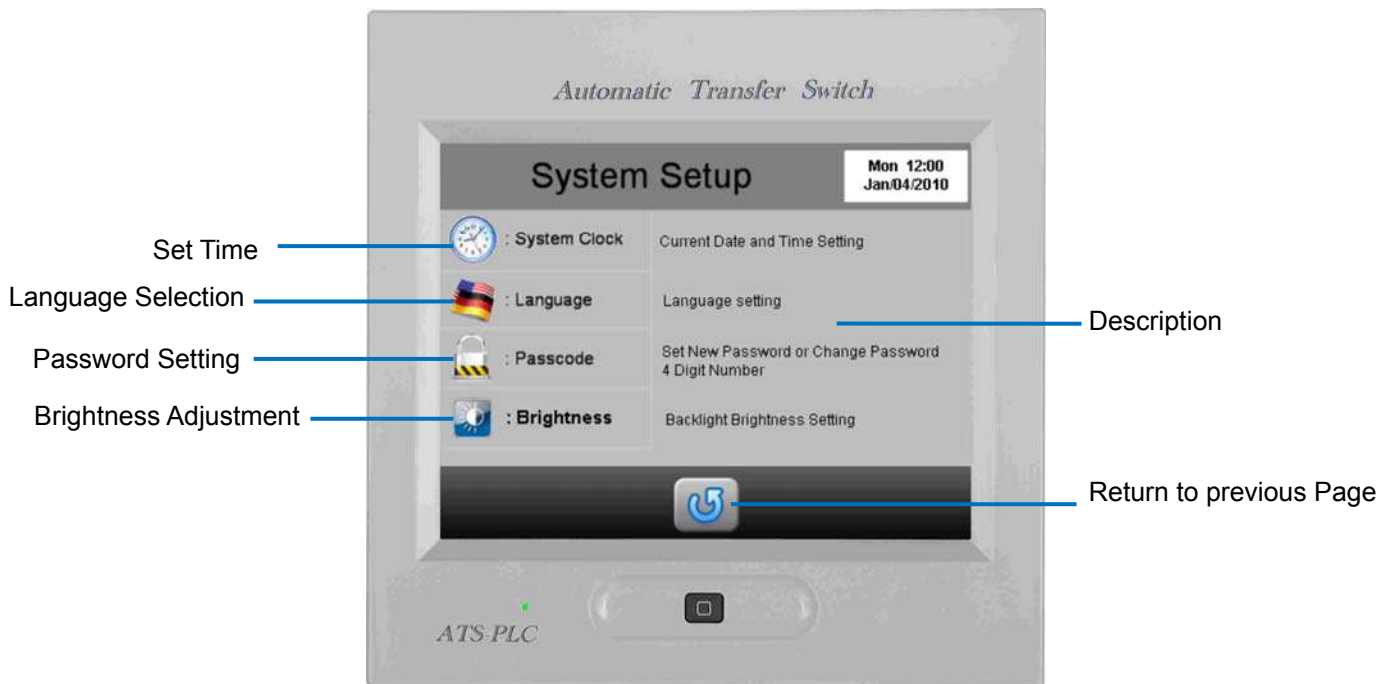
Attention! If a new entry is not selected within 60 sec. the screen automatically returns to OFF

2.7.2 Enter Program Mode Procedure Error Warning

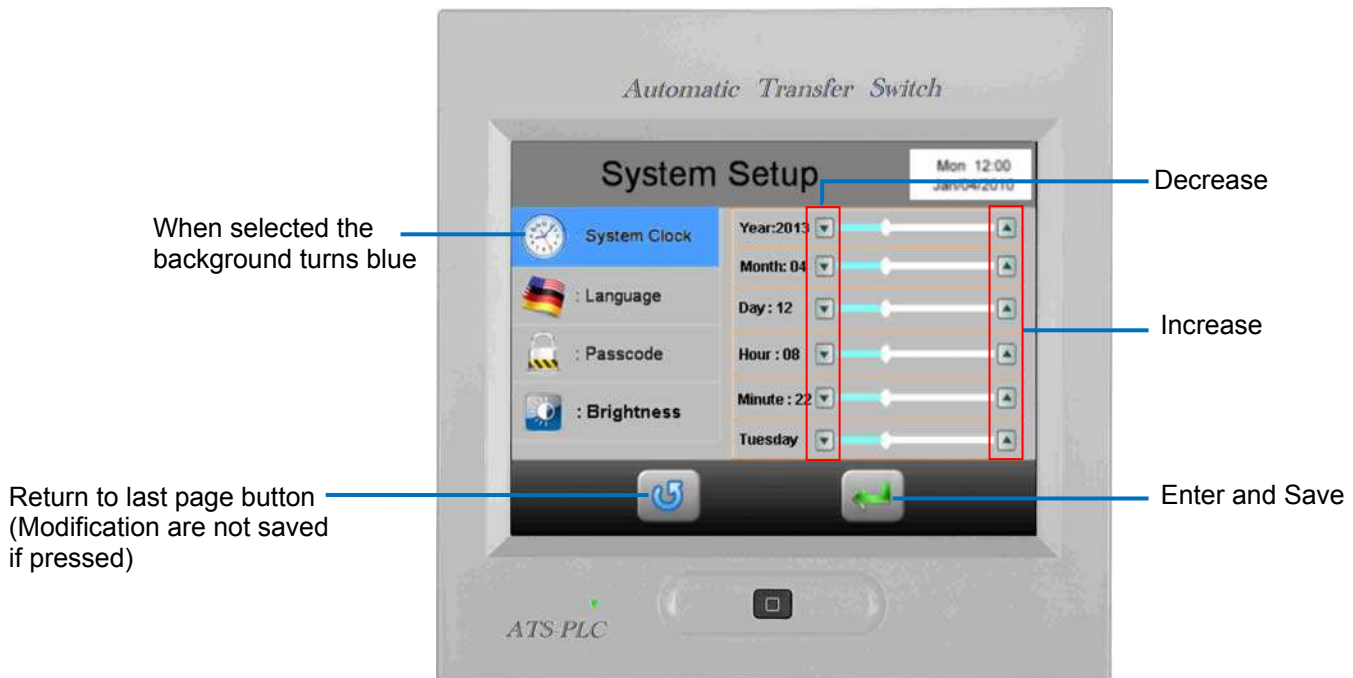


Attention! Error messages are displayed for 5 sec, and then returns to the previous screen.

2.7.3 System Setup



2.7.3.1 System Clock Setting



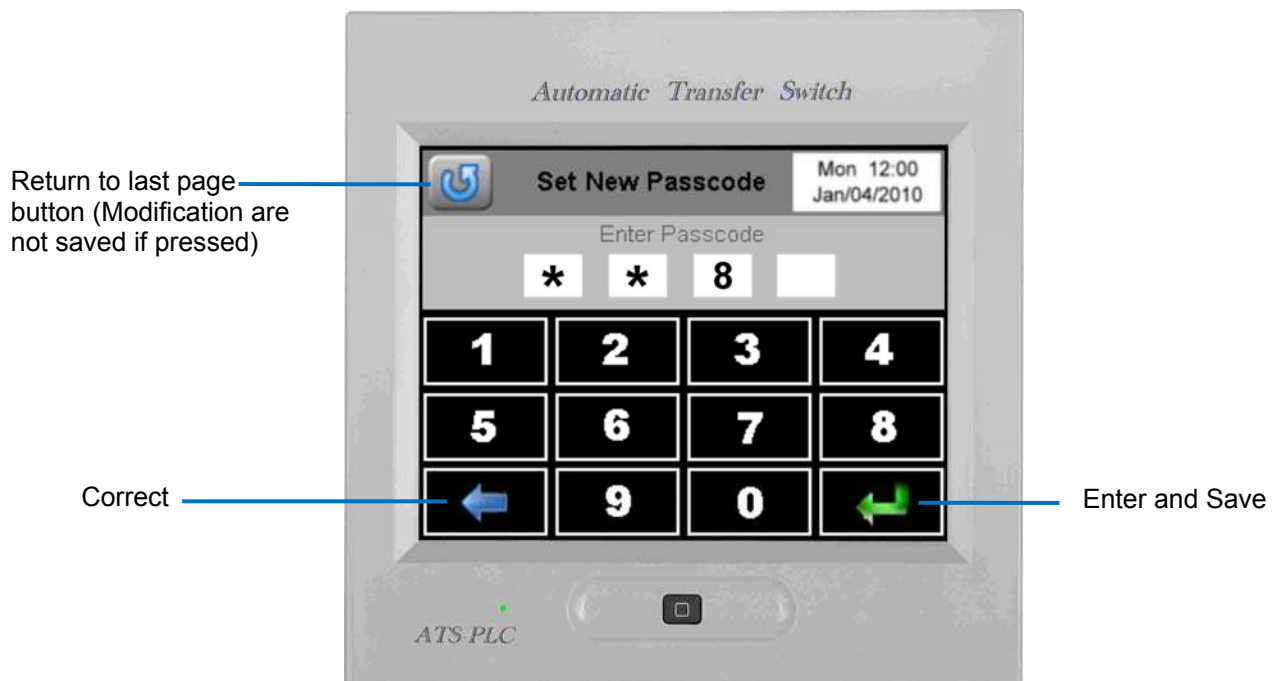
Attention! The clock adjustment directly affects the automatic exerciser and event log, therefore it is important set the correct time and date when install the unit for the first time.

2.7.3.2 Language Setting

Currently ATS-PLC supports only English and Spanish.



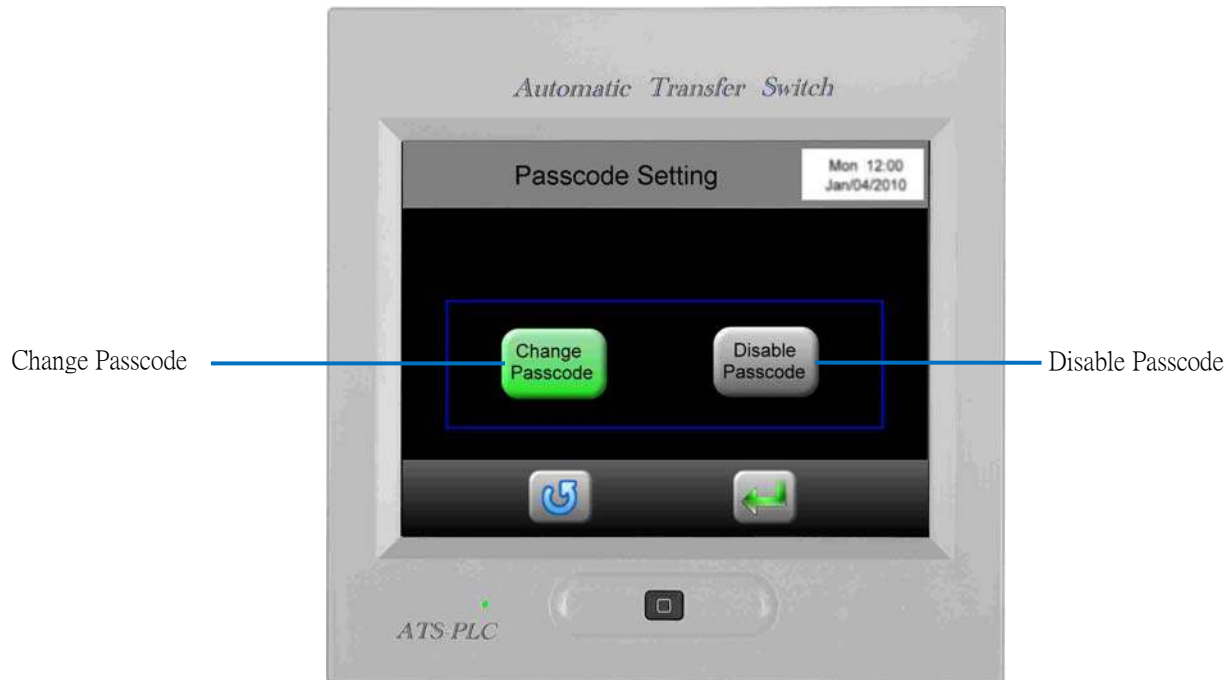
2.7.3.3 Select Pass code setting



Attention! The Pass code protects only the authority to change or adjust the parameter setting, will not affect the operation of the controller's functions.

2.7.3.4 Change or Disable Pass code

Once pass code is set, to change or disable the pass code, enter "System Setup" and click "Pass code"



2.7.3.5 Brightness Adjustment



2.7.4 Communication Setup

In this setting, user can choose to run the remote communication interface settings and download personalization of the startup screen function.

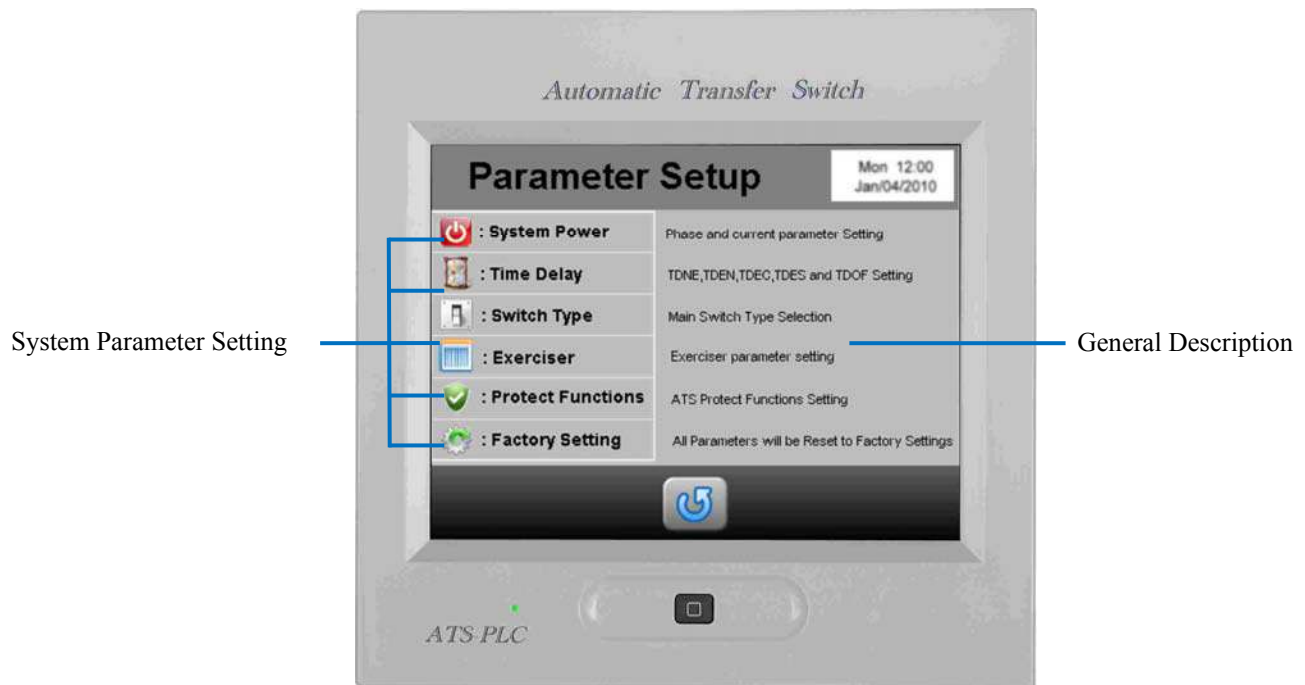


Attention! For Startup Screen download program, See Appendix 02.

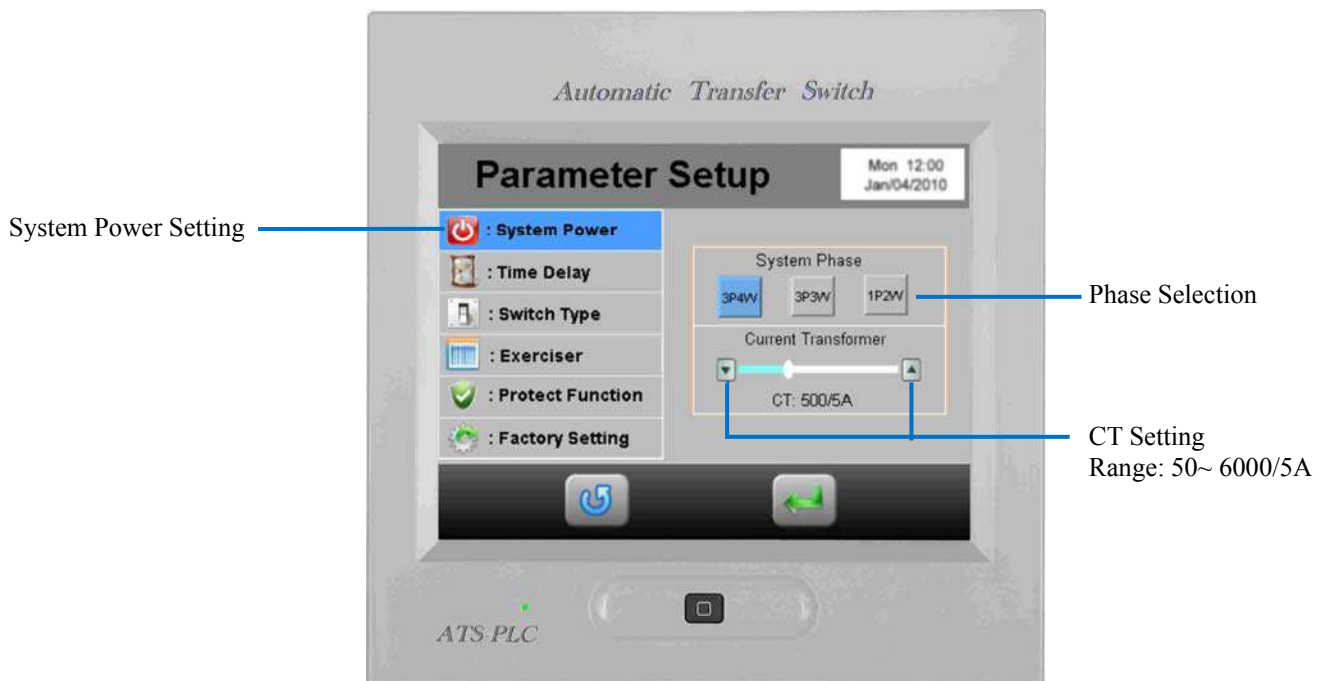
2.7.4.1 Remote Communication Interface Setting



2.7.5 System Parameter Setting



2.7.5.1 System Power Setting

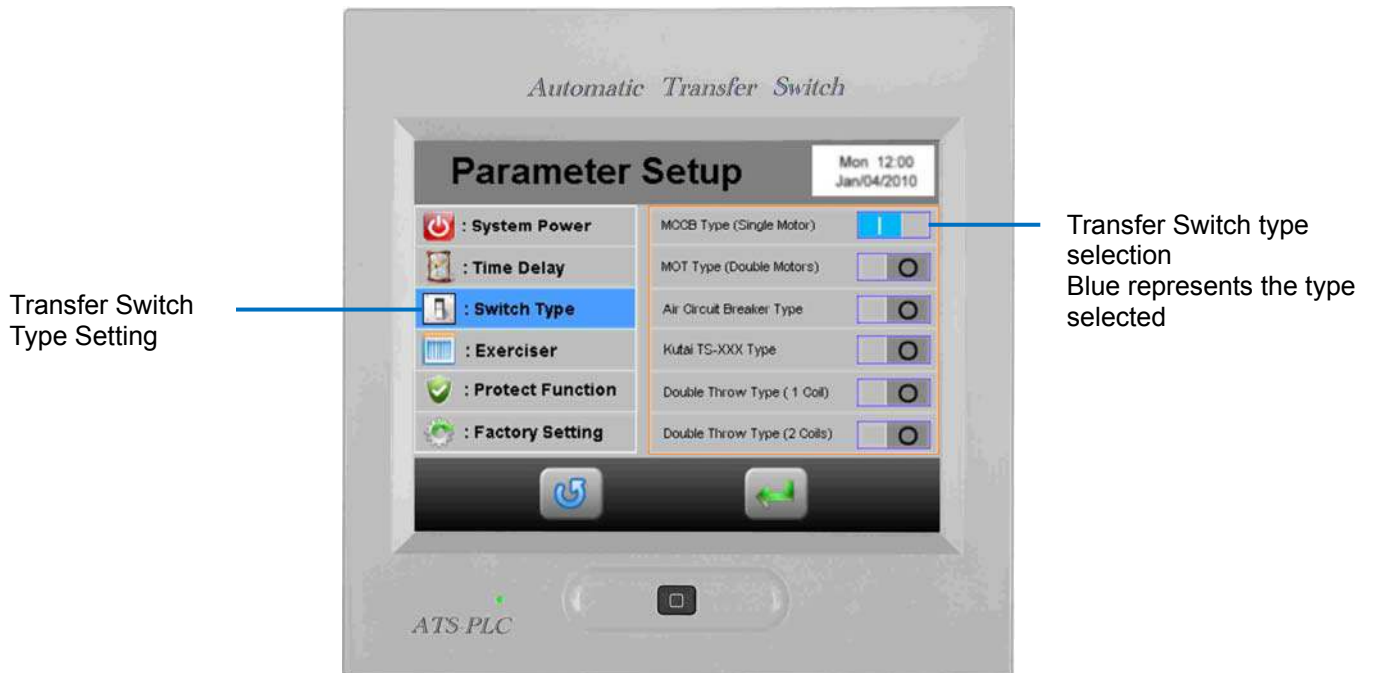


2.7.5.2 Time Delay Setting



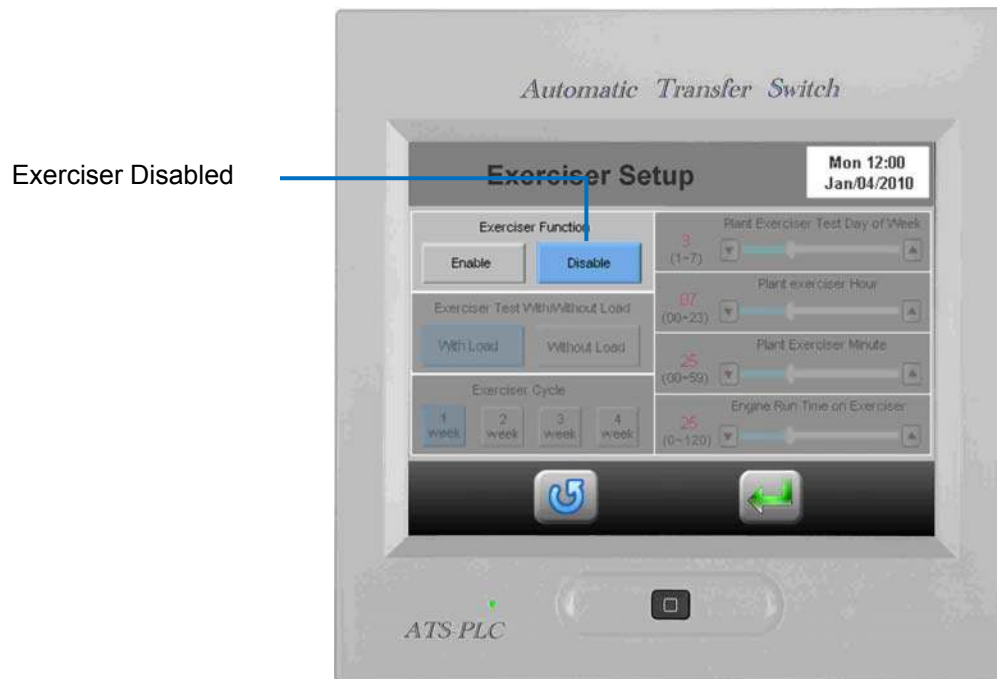
Attention! All time delay setting is 2 seconds per Unit

2.7.5.3 Transfer Switch Type Setting

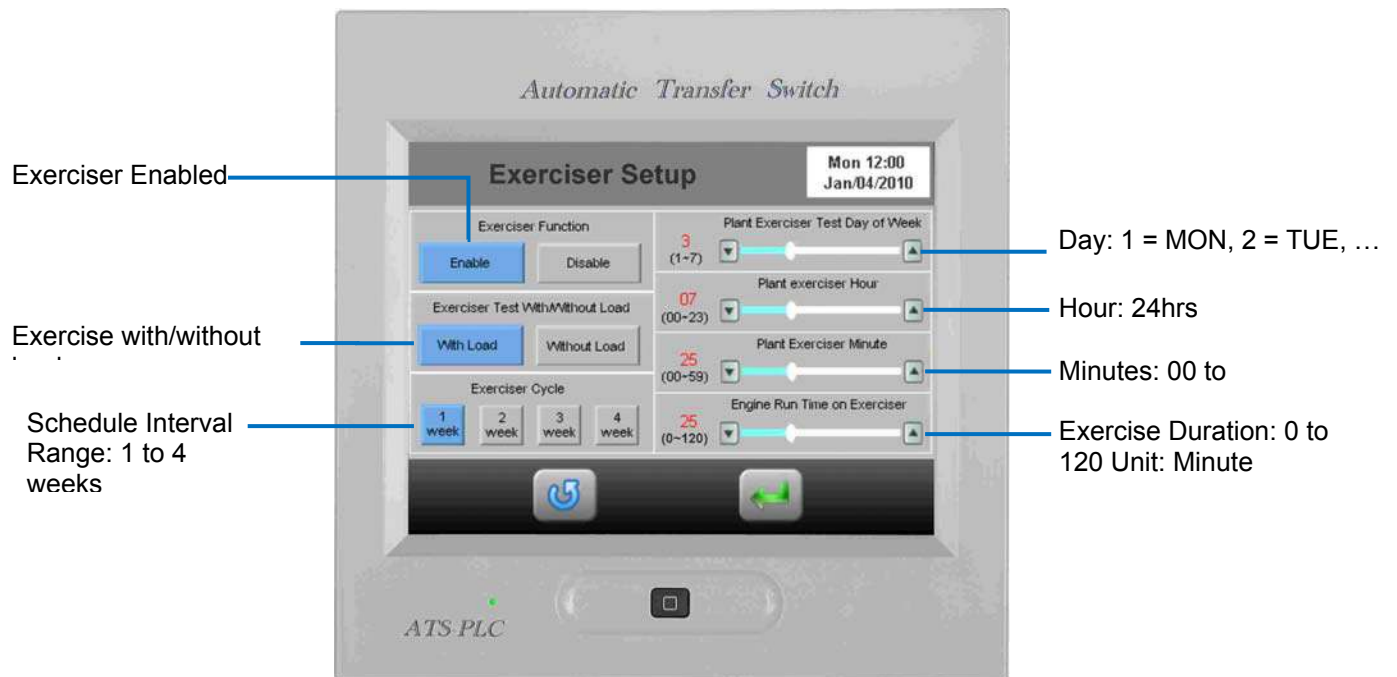


Attention! If a different type Transfer Switch is selected, the ATS may fails to operate.

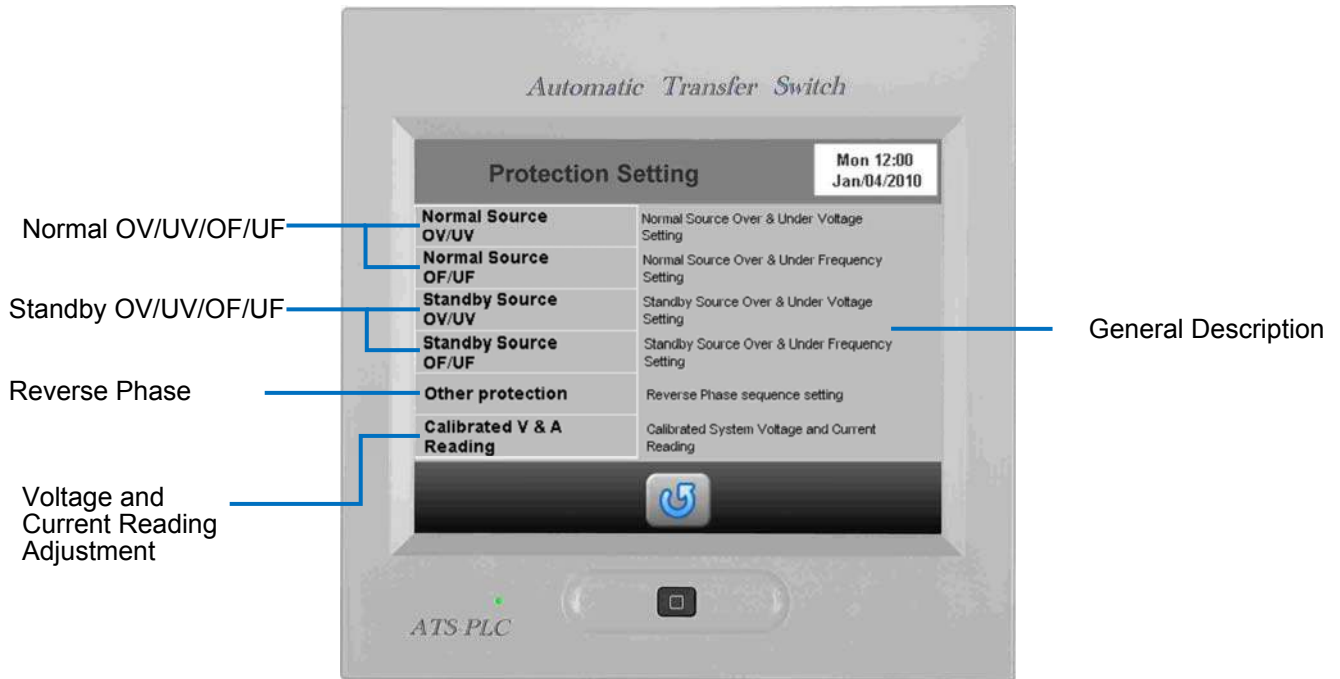
2.7.5.4 Scheduled Automatic Testing / Exerciser Setting



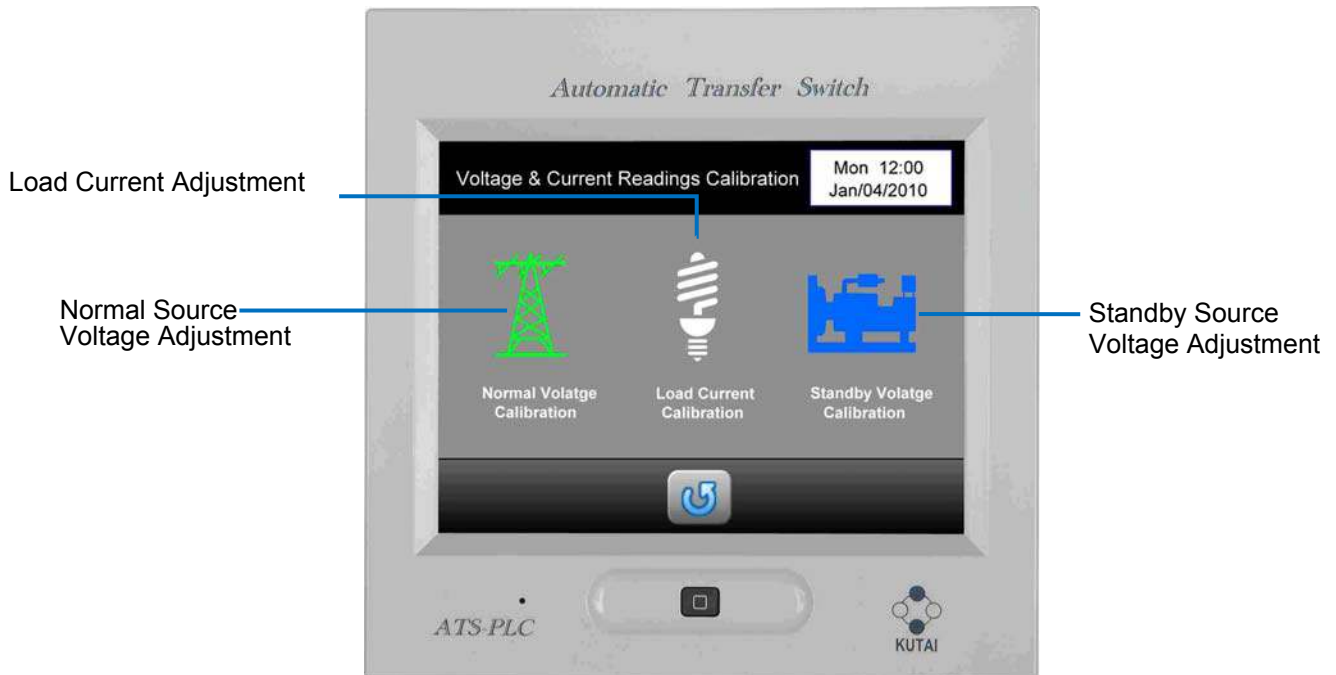
Attention! When the Exerciser is disabled, all corresponding adjustments are lost.



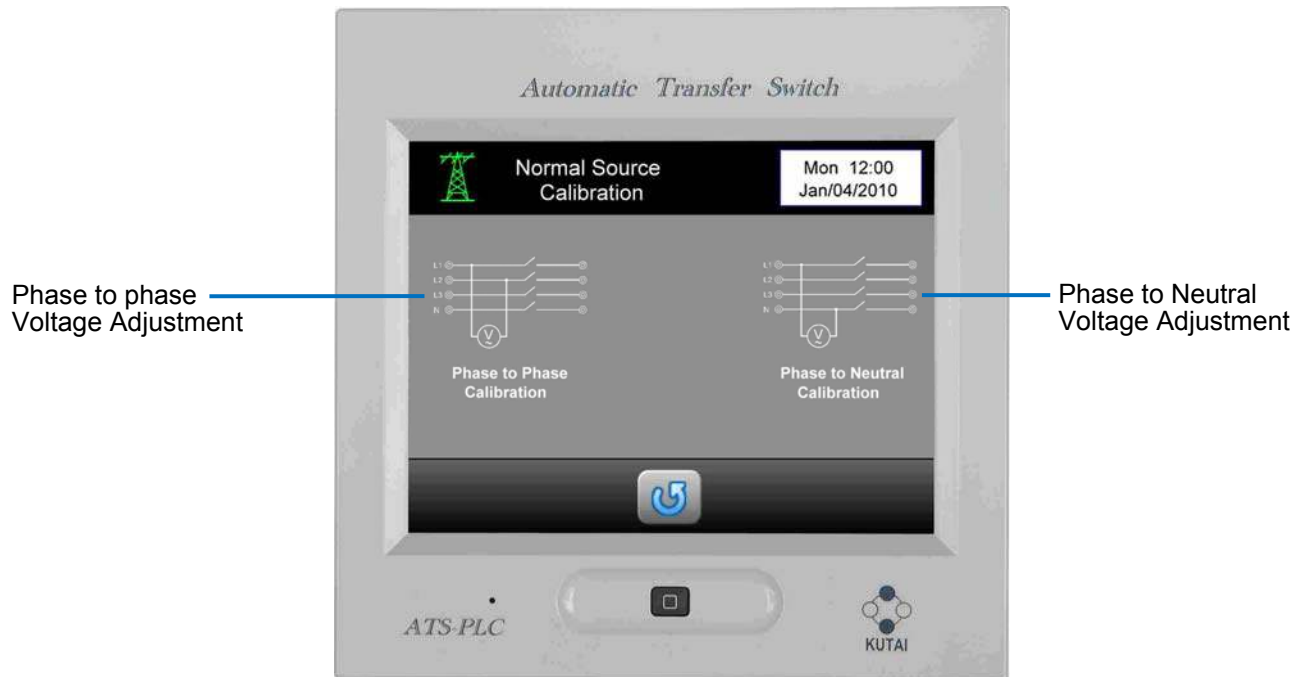
2.7.5.5 Voltage, Frequency Protection and Voltage and Current Reading Adjustment



Voltage and Current Adjustment

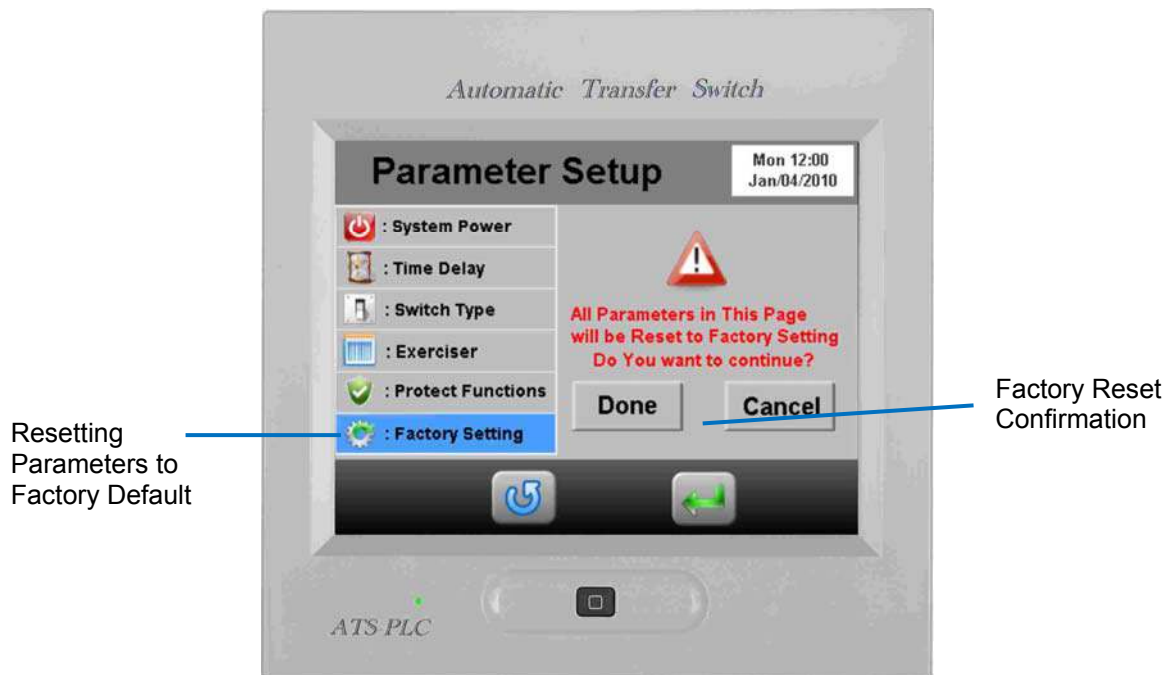


Normal Source Voltage Adjustment



Attention! This screen is displayed in 3 Phase 4 Wire system voltage settings only

2.7.5.6 Reset to Factory Setting



Attention! When factory reset, all system parameters will be reset to factory settings, the default setting.

SECTION 3: KCU-XX COMMUNICATION MODULE SETTING

By installing the KCU-XX modules (eg: KCU-01, KCU-02, KCU-03 etc.) to the ATS-PLC, the user can operate or monitor the generator remotely.

- KCU-01 – USB communication module
- KCU-02 – RS-485 communications module
- KCU-03 – Ethernet communications module

WARNING

A remote start signal from the ATS-PLC can start the engines at anytime without warning. Place a “Danger” warning sign next to the generator, stating that this generator can start at anytime!” also install a warning buzzer or a flashing light. **Unexpected engine starts can result in serious injury or death.** When performing service or maintenance, always disconnect the remote start signal wires.

WARNING

WHEN SERVICING OR OPERATING NEXT TO THE GENERATOR, MAKE SURE THE REMOTE START IS OFF, TO ENSURE THE SAFETY OF THE SERVICE PERSONNEL.

The KCU-03 Ethernet module installed on the ATS-PLC you can remotely monitor and operate the ATS and generator using an I Phone or Android smart phones. Free Apps are available for Apple iOS5.1 or above and Android operating systems 2.3.3 or above. Free software can be downloaded from App Store or Google Play by key in “McPherson” and hit search.

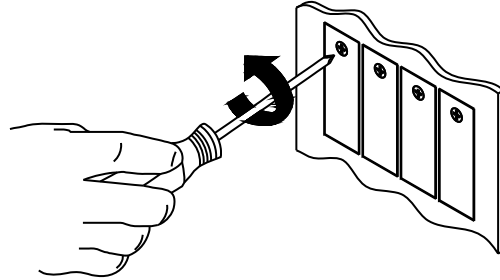
For corresponding remote communication settings See Section 2.7.4.1 and KCU-XX user manuals and software user manuals

WARNING

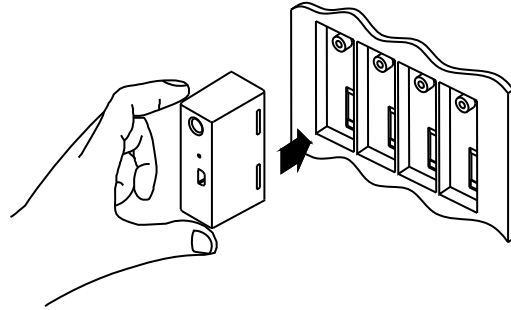
ATS-PLC with KCU-02 module constitutes a closed LAN network. Each controller address can be set from 1 to 99 and cannot be repeated. Same transmission rate is a must!!

The installation for the KCU-XX communication module on the ATS-PLC controller is fairly simple.

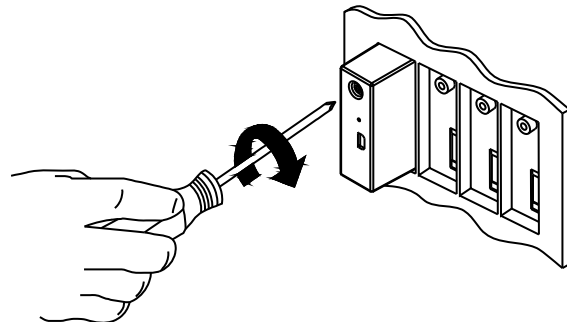
Step 1: Remove the slot cover from the back of controller.



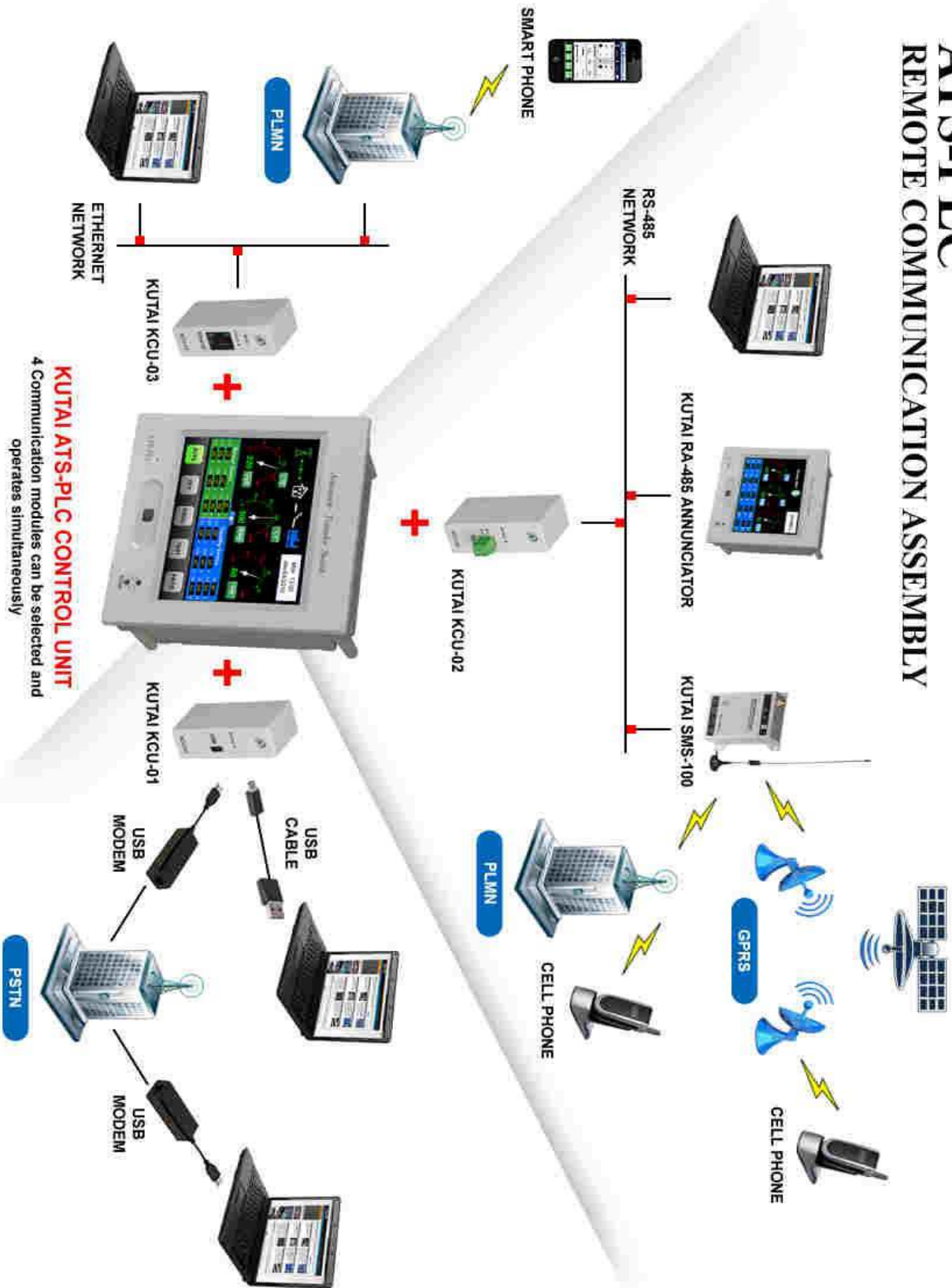
Step 2: Insert the new KCU-XX into the ATS-PLC communication slot.



Step 3: Tighten the screw.



ATS-PLC REMOTE COMMUNICATION ASSEMBLY

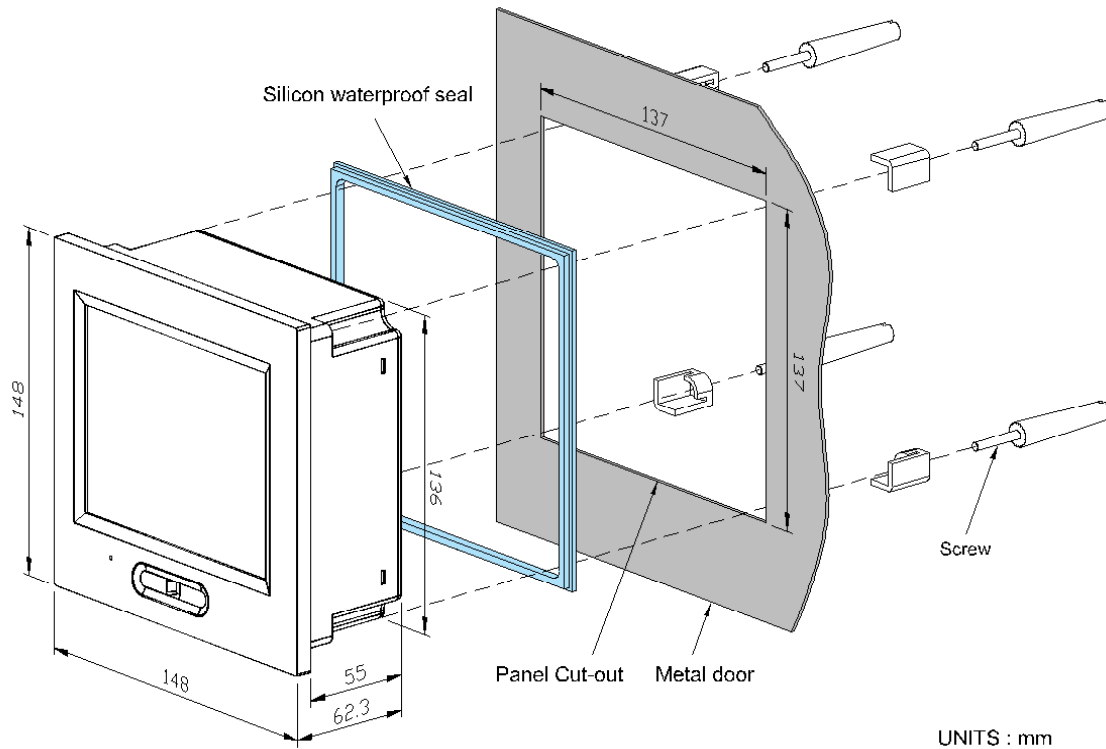


SECTION 4 : SPECIFICATION AND INSTALLATION

4.1 General Specification

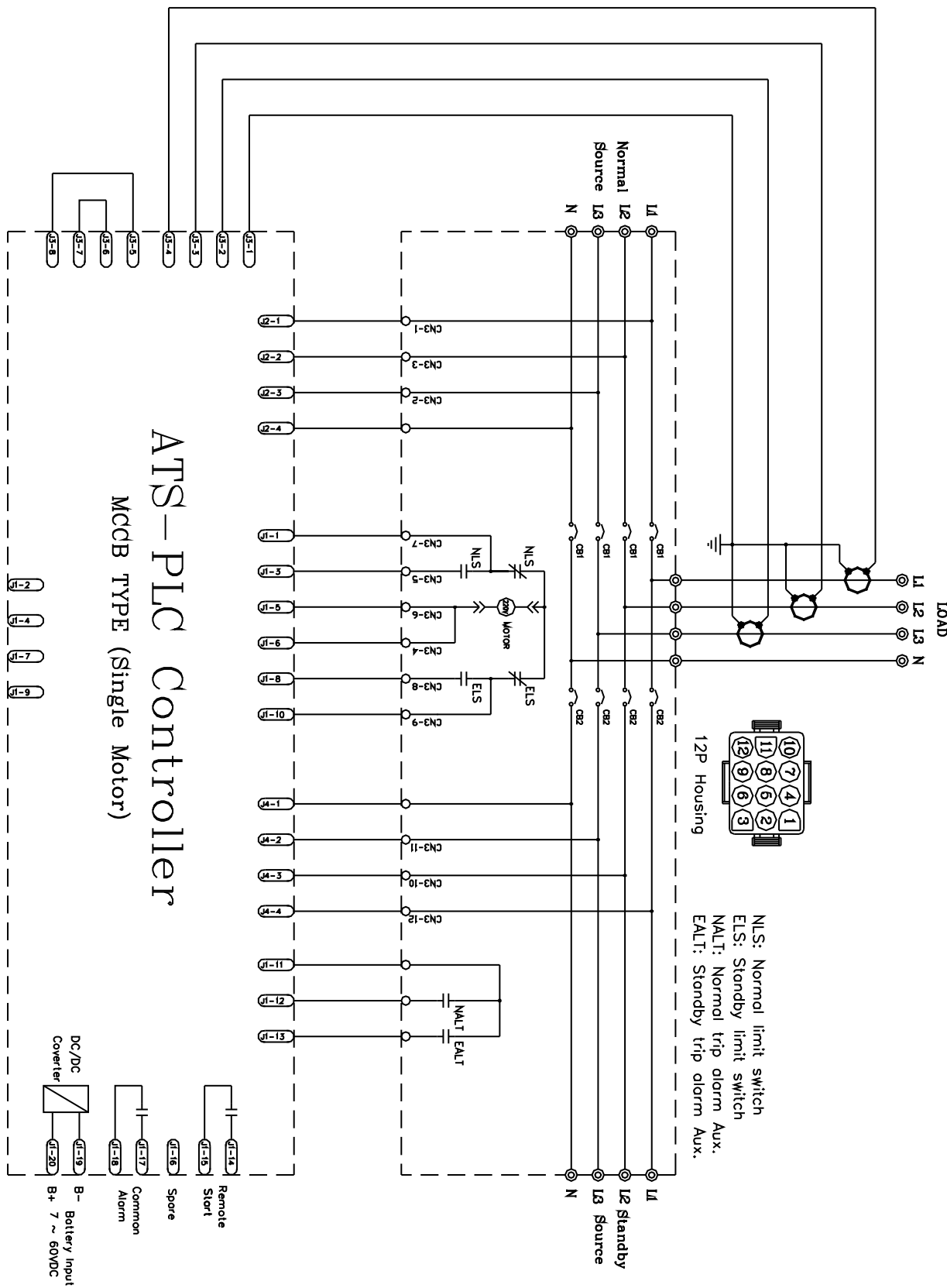
SUBJECT	SPECIFICATION
AC Voltage Sensing	50 VAC to 530 VAC 50/60 HZ
Frequency Sensing	40HZ to 75HZ
Remote Start Output	7A @ 250VAC Max
Normal Source Output	7A @ 250VAC Max
Emergency / Standby Source Output	7A @ 250VAC Max
Warning Signal Output	7A @ 250VAC Max
Operating Temperature	-20°C ~ 70°C
Storage Temperature	-30°C ~ 80°C
Relative Humidity	Below 90%
Weight	750g ± 2%

4.2 Unit Dimension and Installation Reference (Unit: mm)

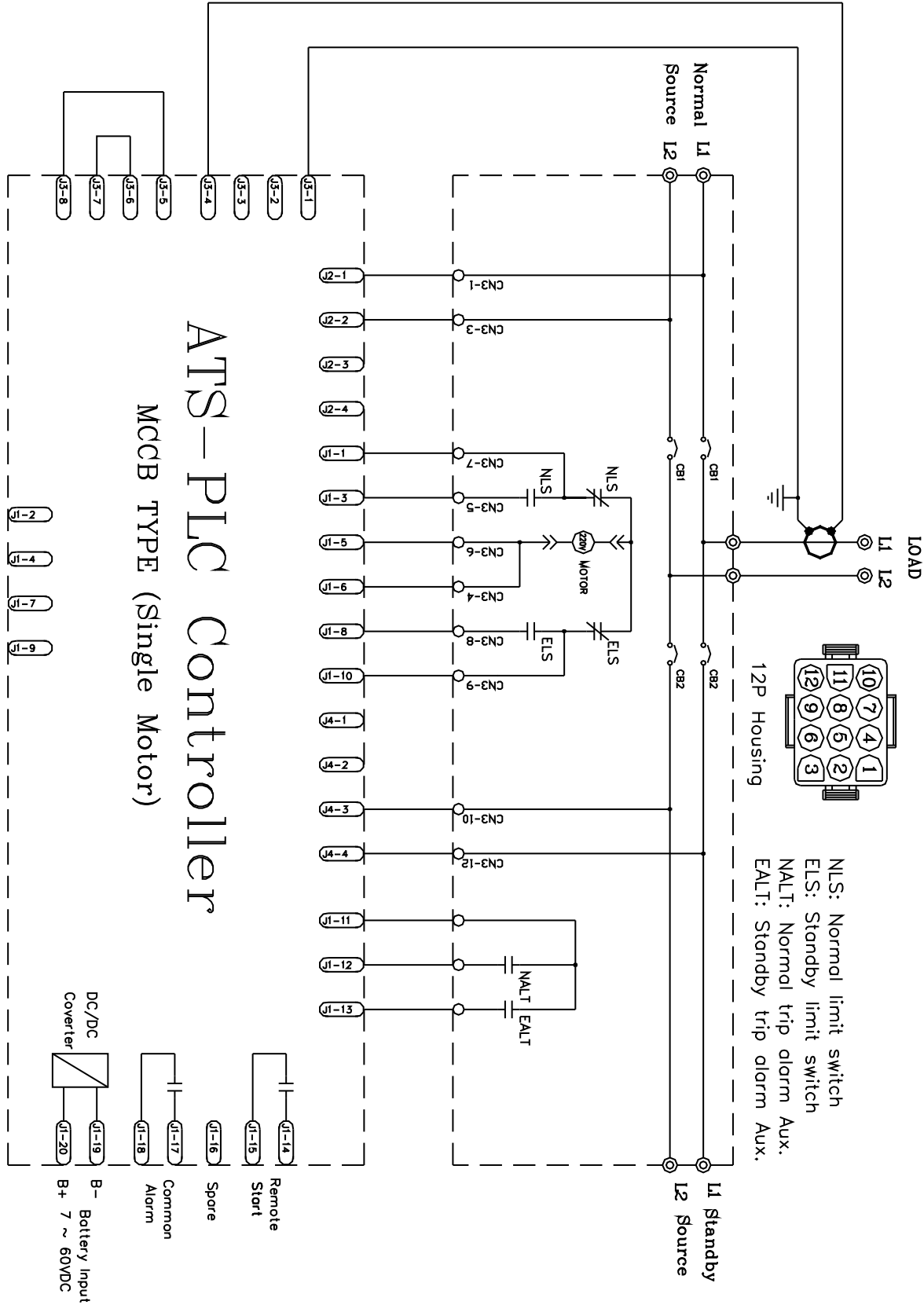


SECTION 5 : TYPICAL WIRING

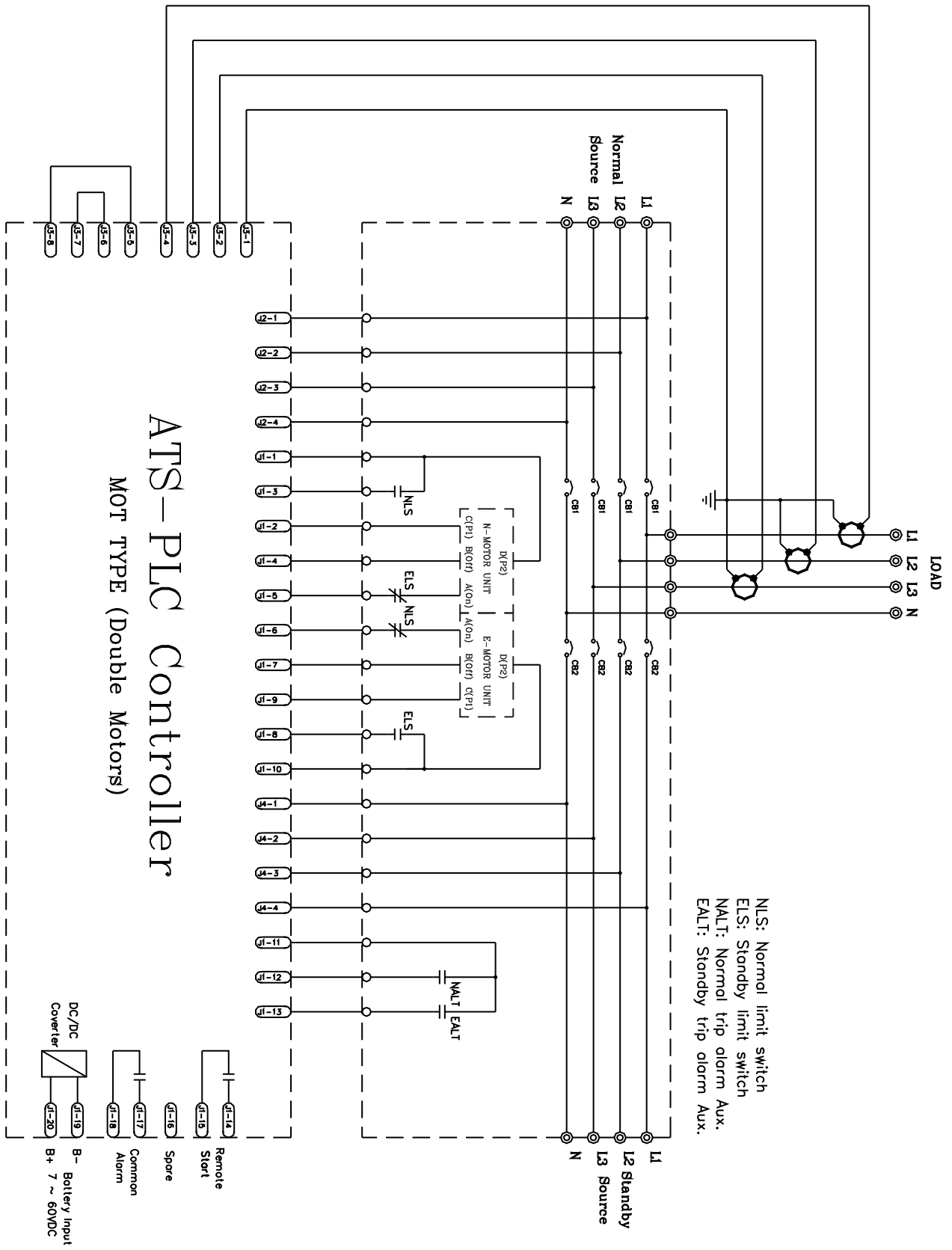
5.1 MCCB Type ATS Wiring Diagram (3P/4P)(220VAC) also called the BTS switch



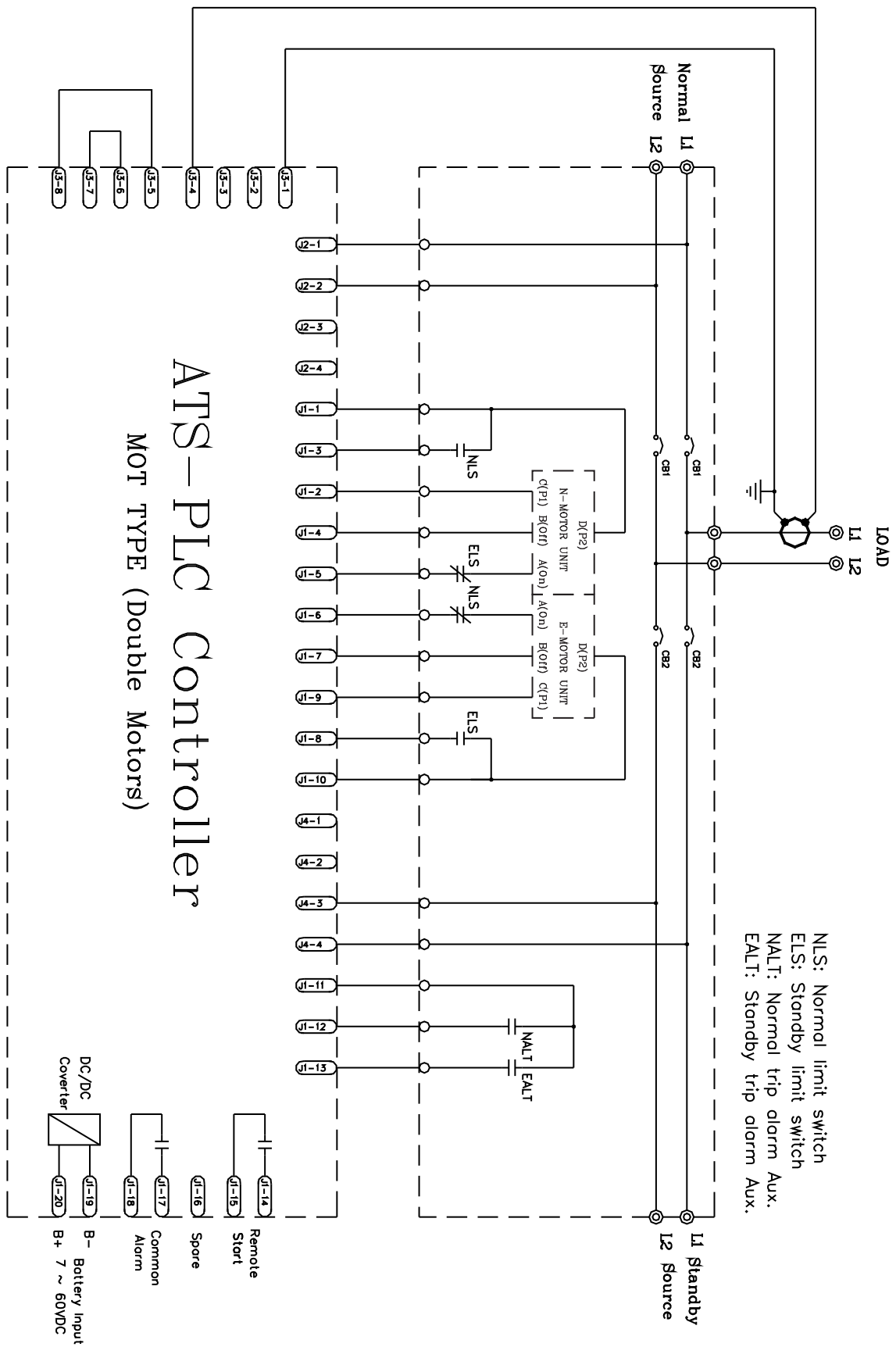
5.2 MCCB Type ATS Wiring Diagram (2P)(220VAC)



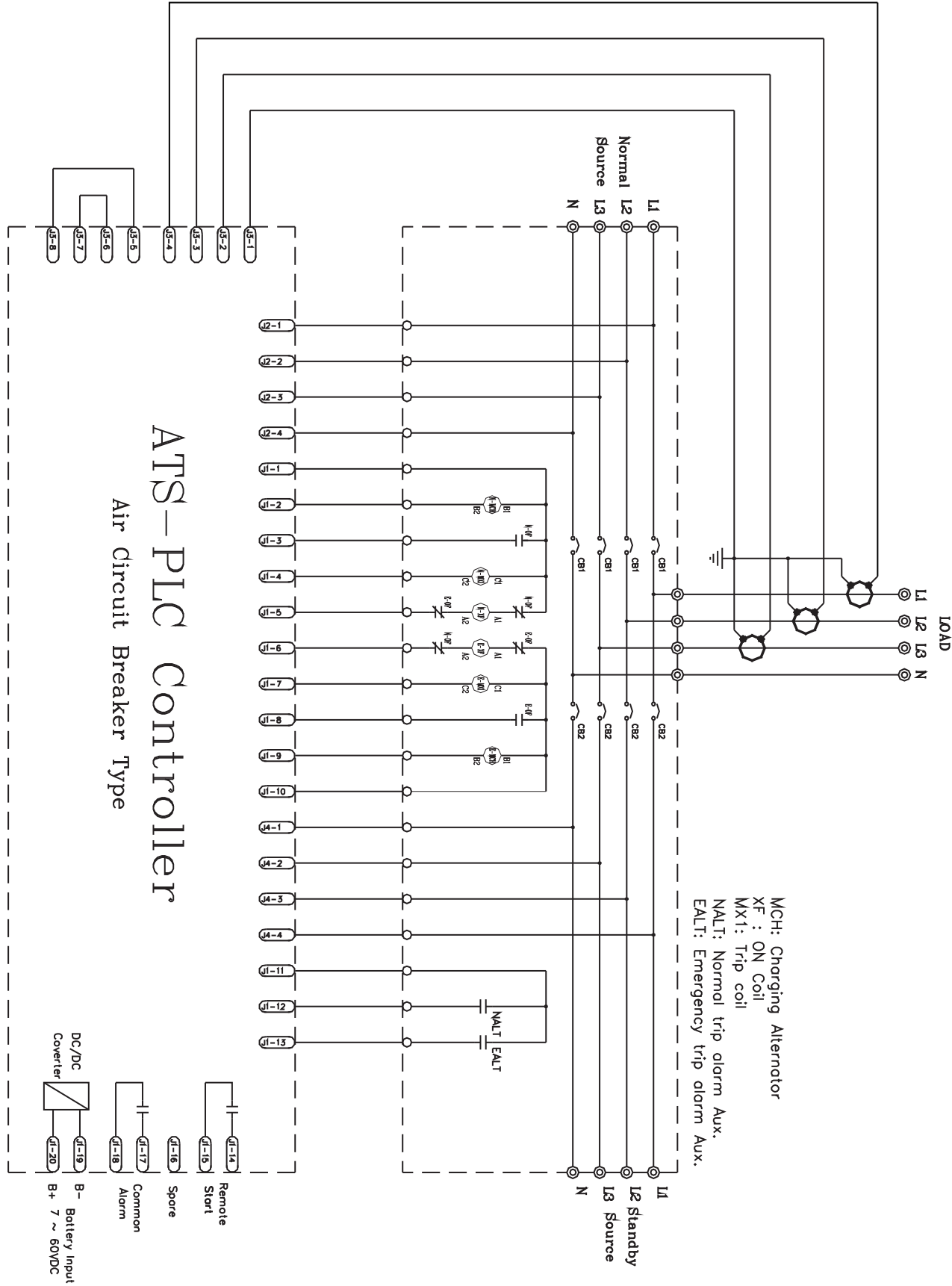
5.3 MOT Type ATS Wiring Diagram (3P/4P)(220VAC) Motor Operated MCCB



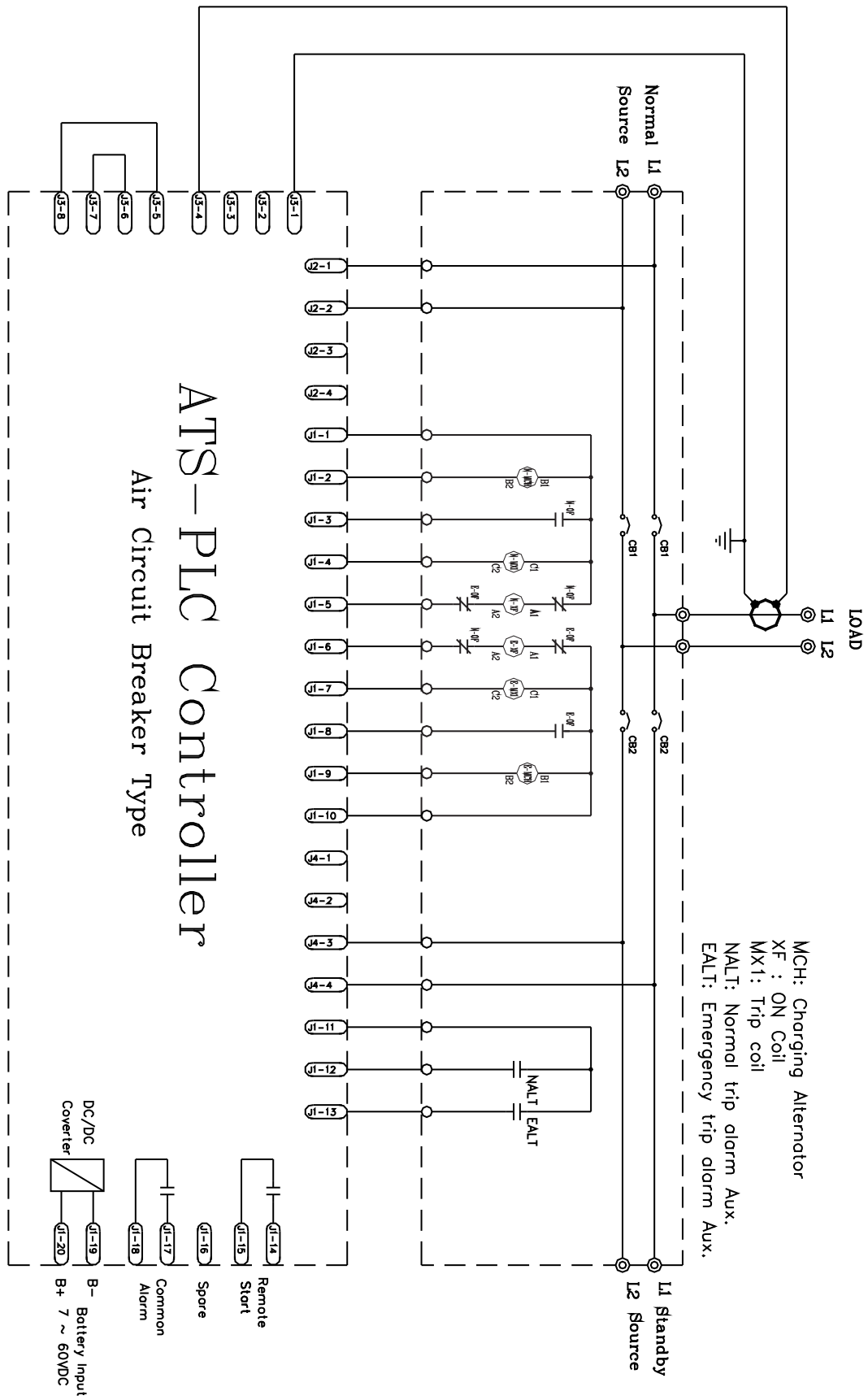
5.4 MOT Type ATS Wiring Diagram (2P)(220VAC)



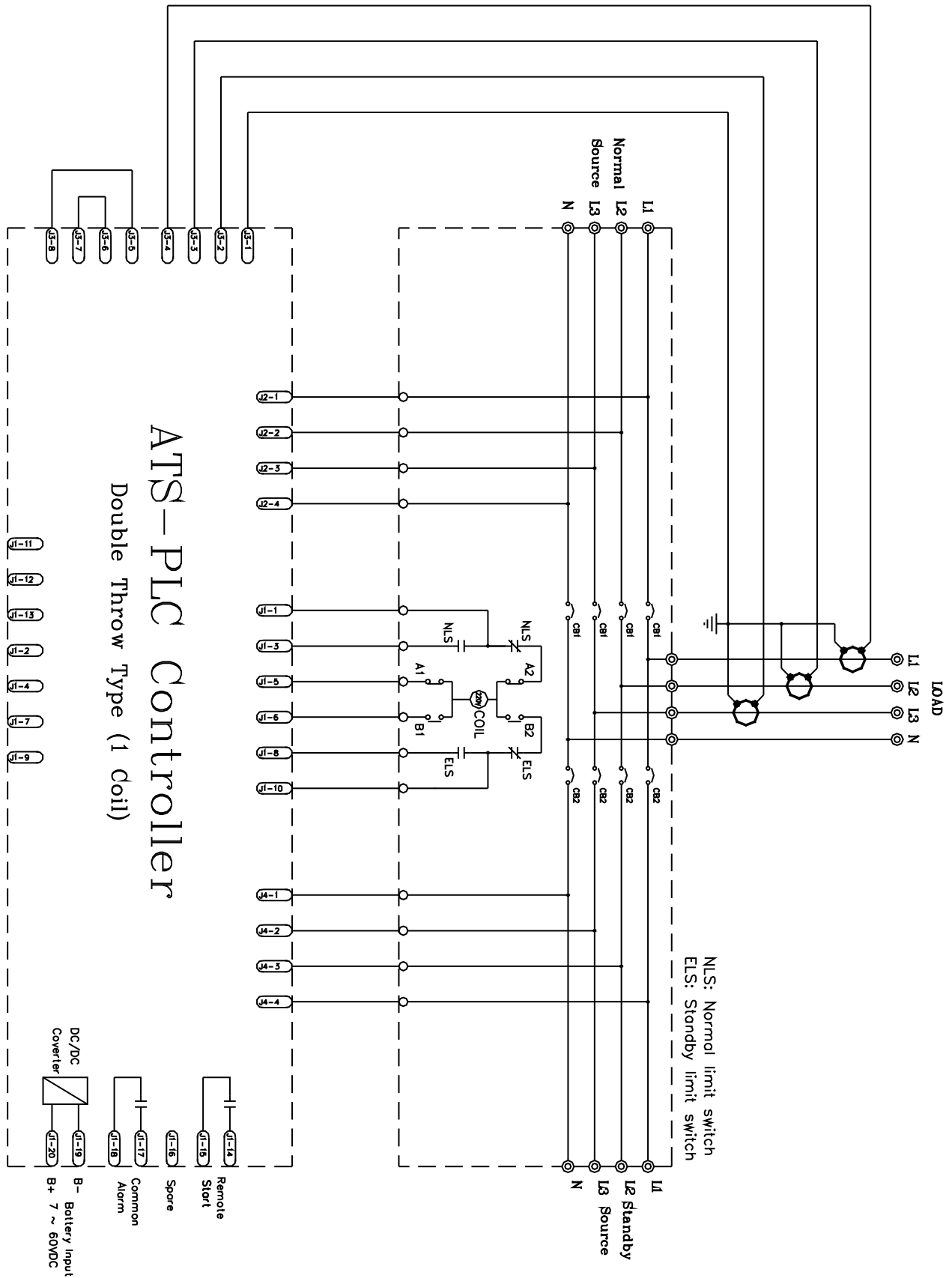
5.5 Air Circuit Breaker Type ATS Wiring Diagram (3P/4P)(220VAC)



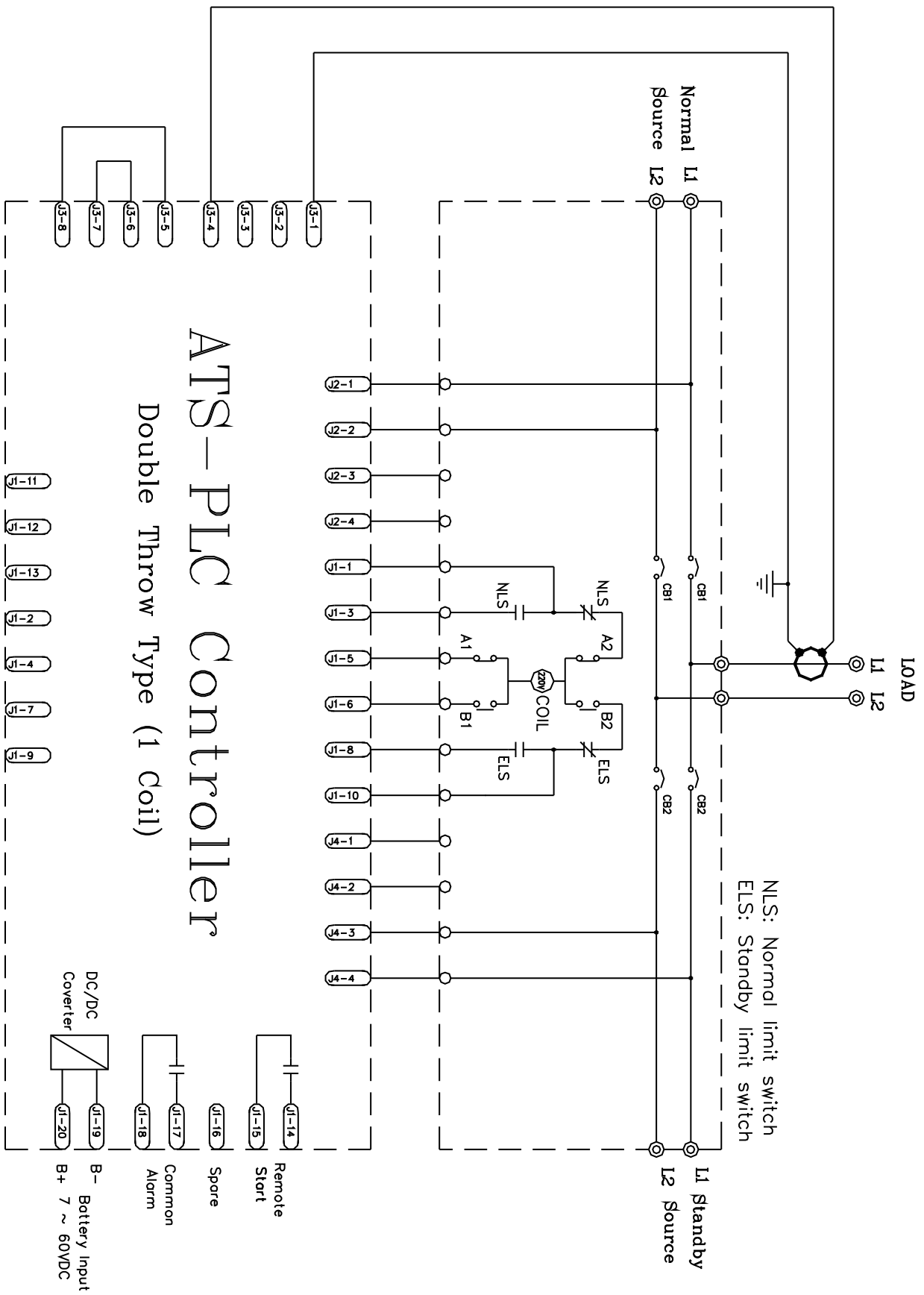
5.6 Air Circuit Breaker Type ATS Wiring Diagram (2P)(220VAC)



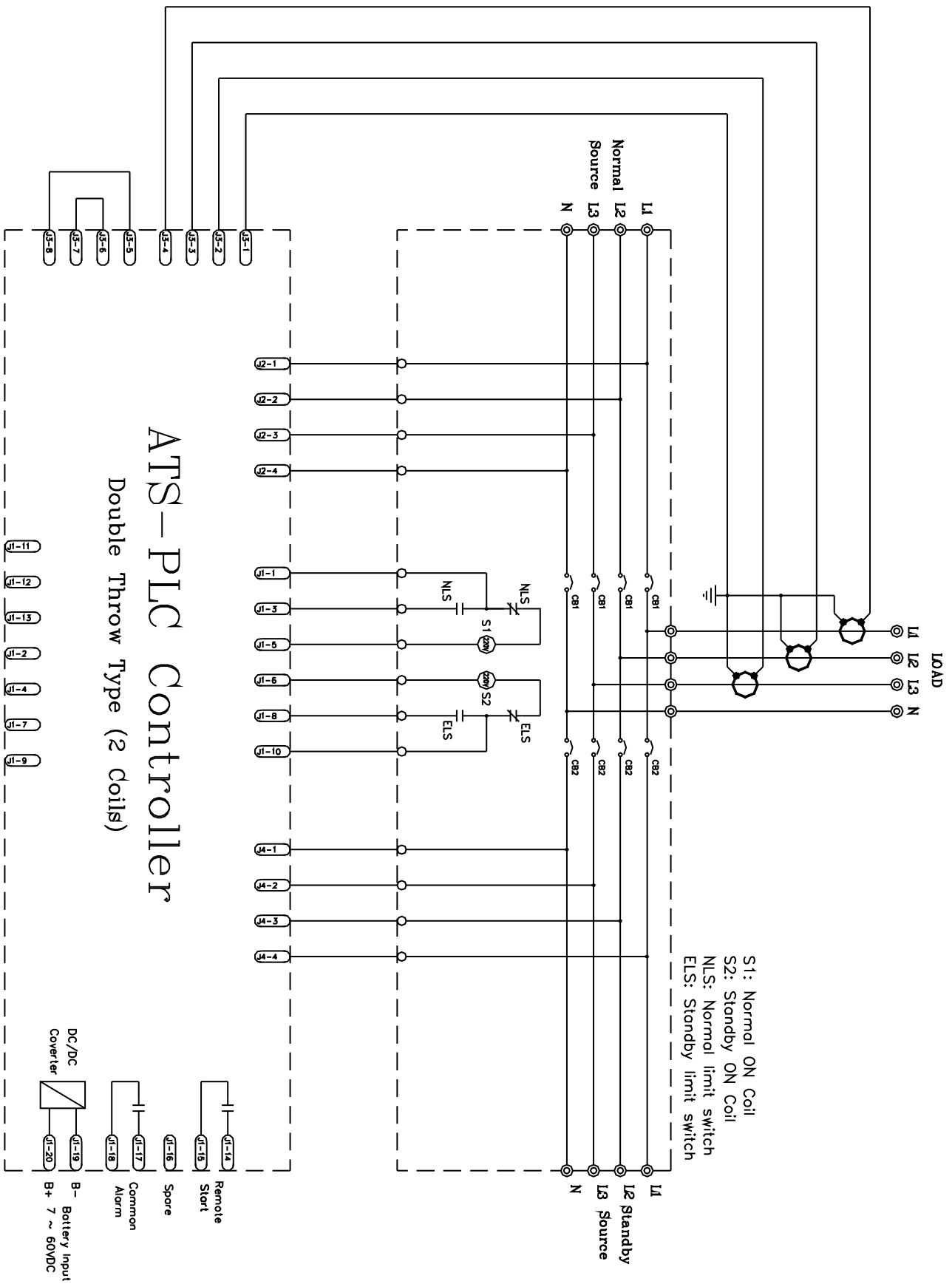
5.7 Single Coil Double Throw Type ATS Wiring Diagram (3P/4P)(220VAC)



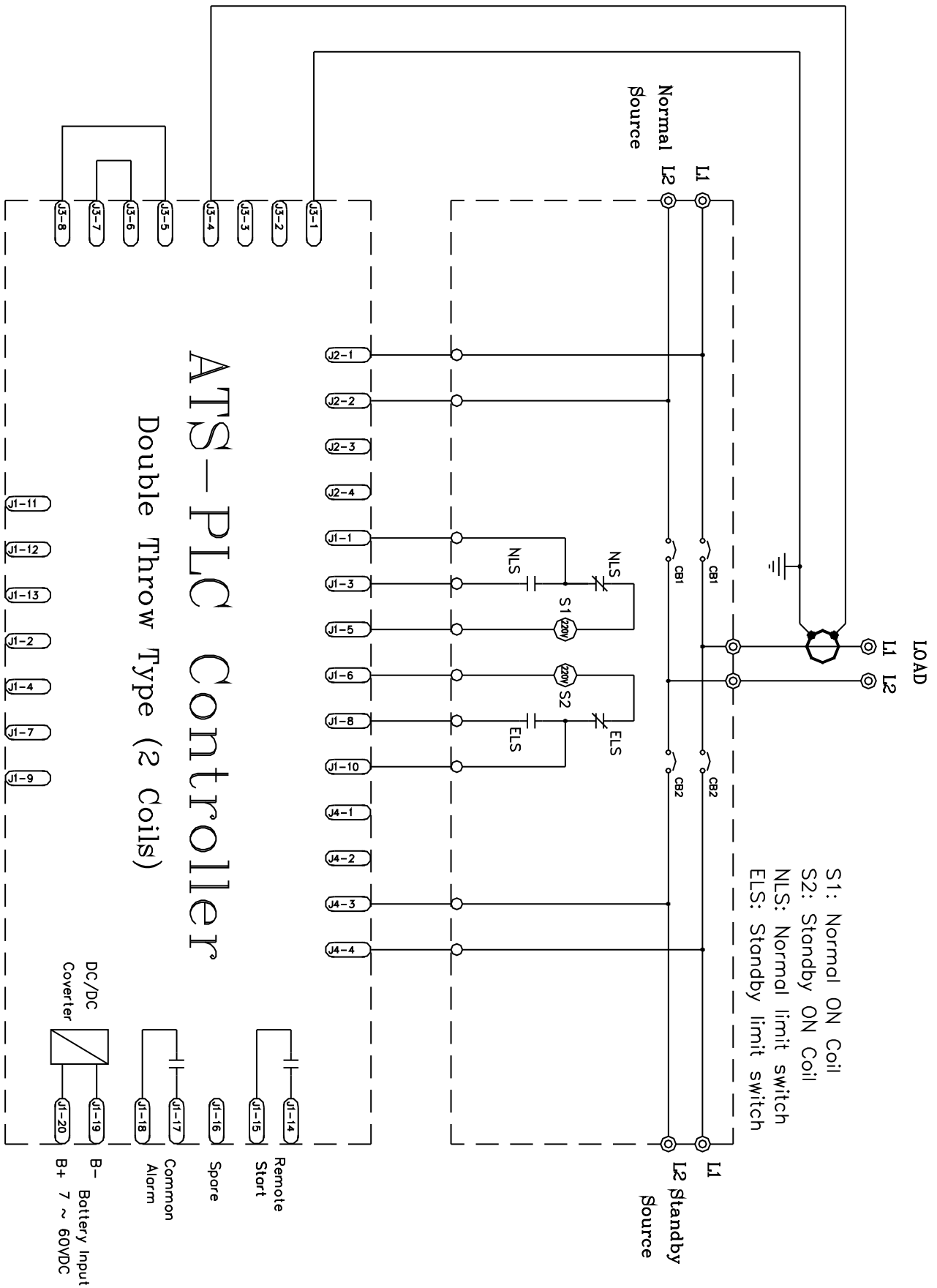
5.8 Single Coil Double Throw Type ATS Wiring Diagram (2P)(220VAC)



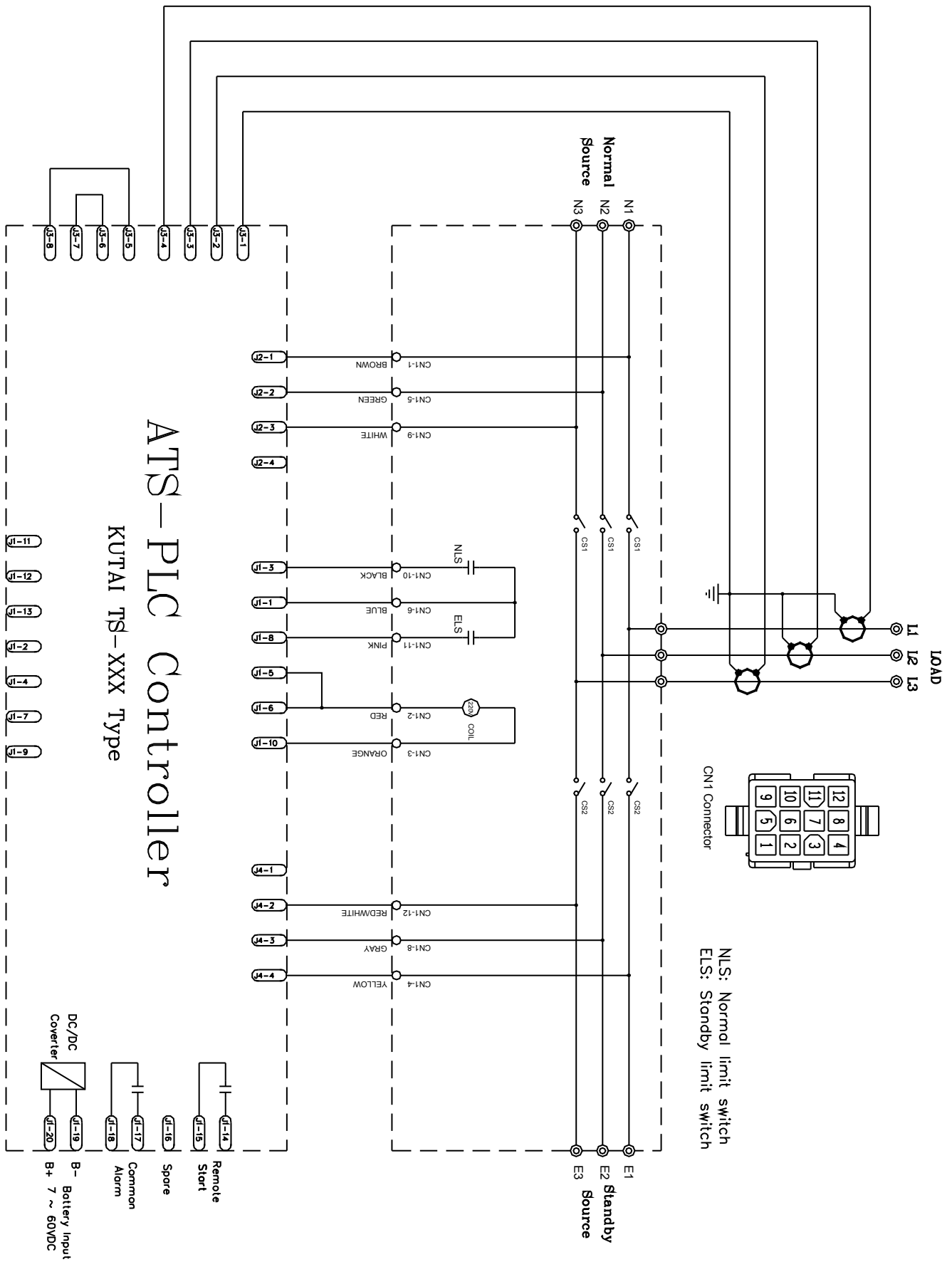
5.9 Dual Coil Double Throw Type ATS Wiring Diagram (3P/4P)(220VAC)



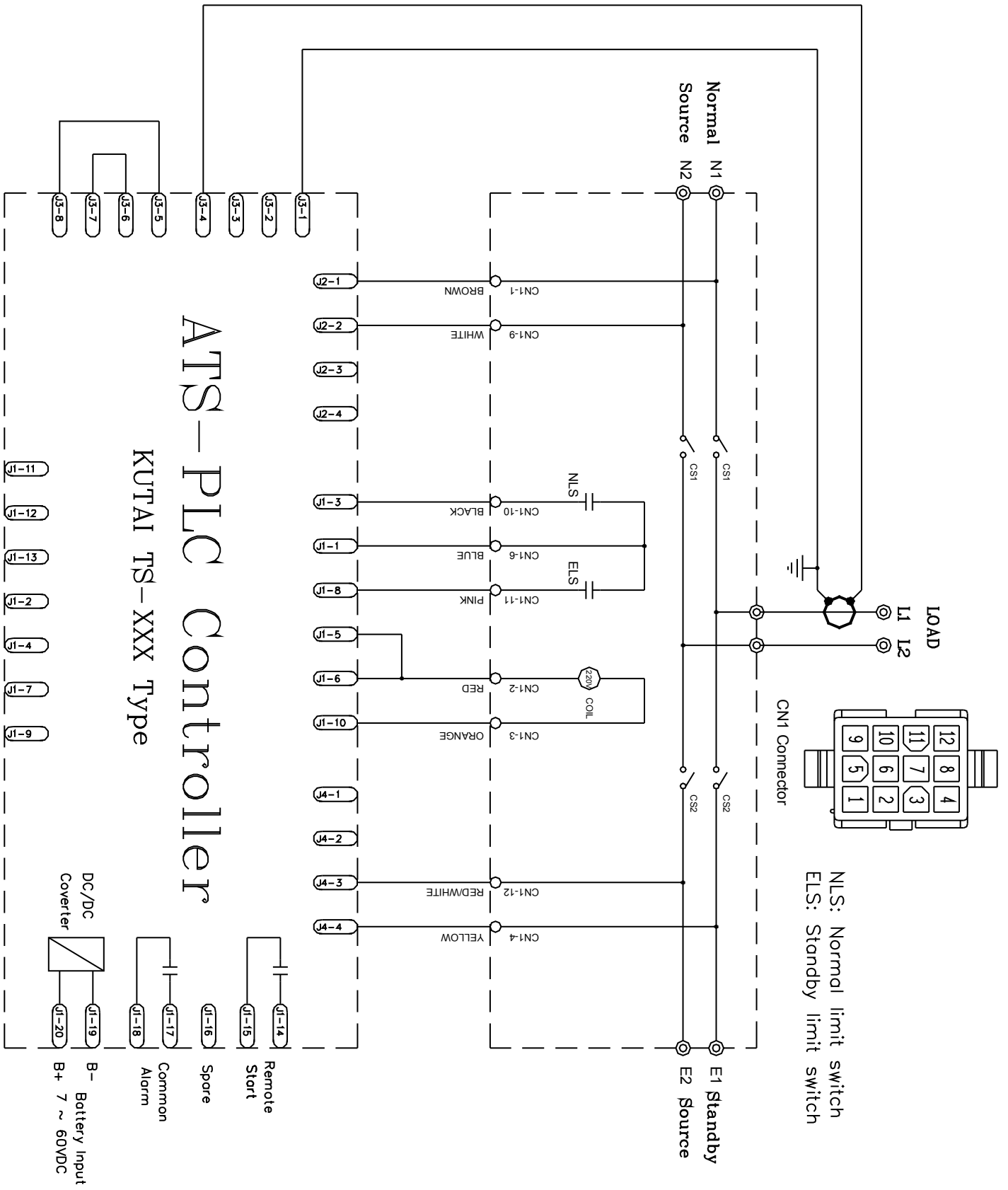
5.10 Dual Coil Double Throw Type ATS Wiring Diagram (2P)(220VAC)



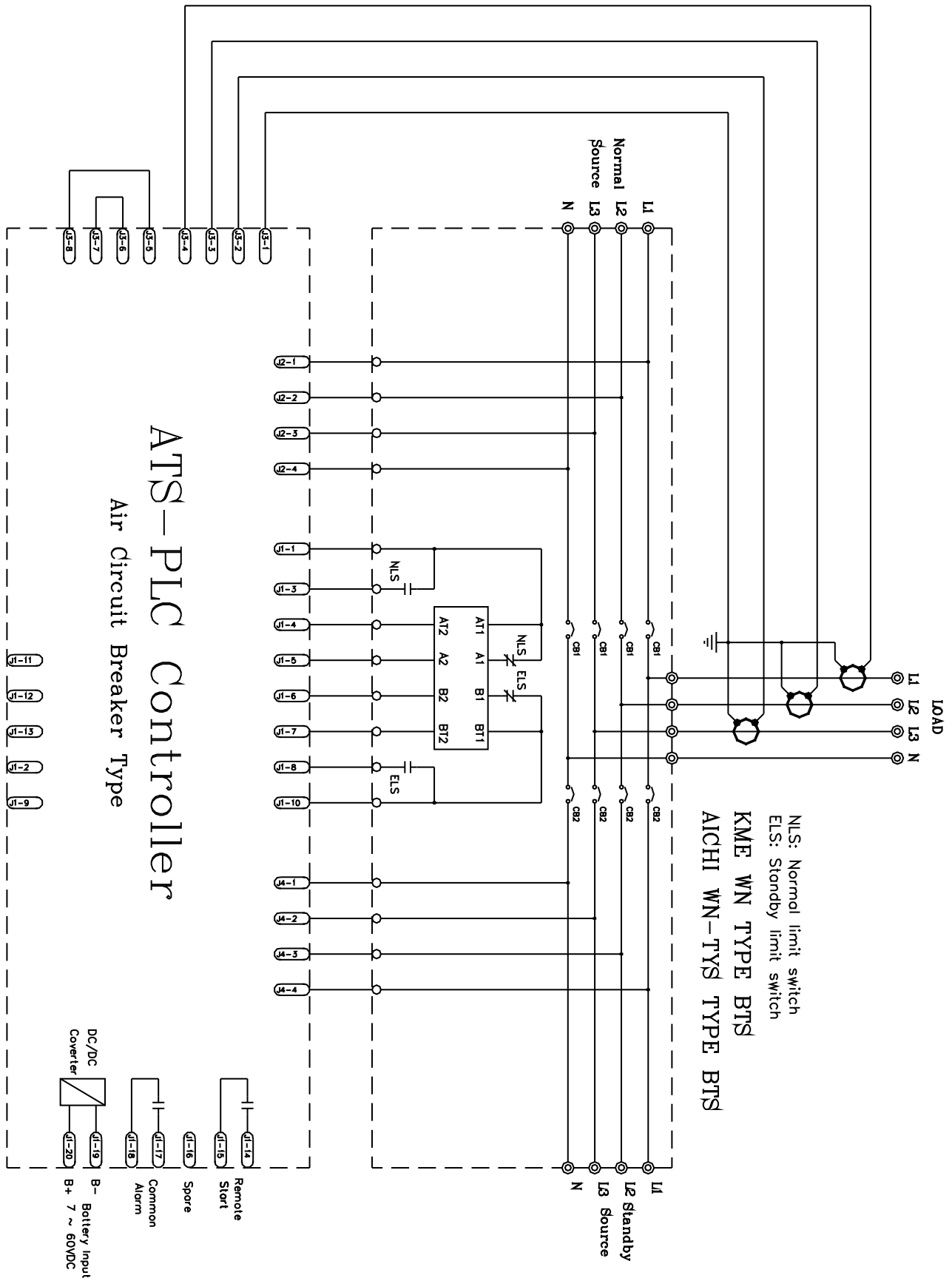
5.11 KUTAI TS-XXX Type ATS Wiring Diagram (3P)(220VAC)



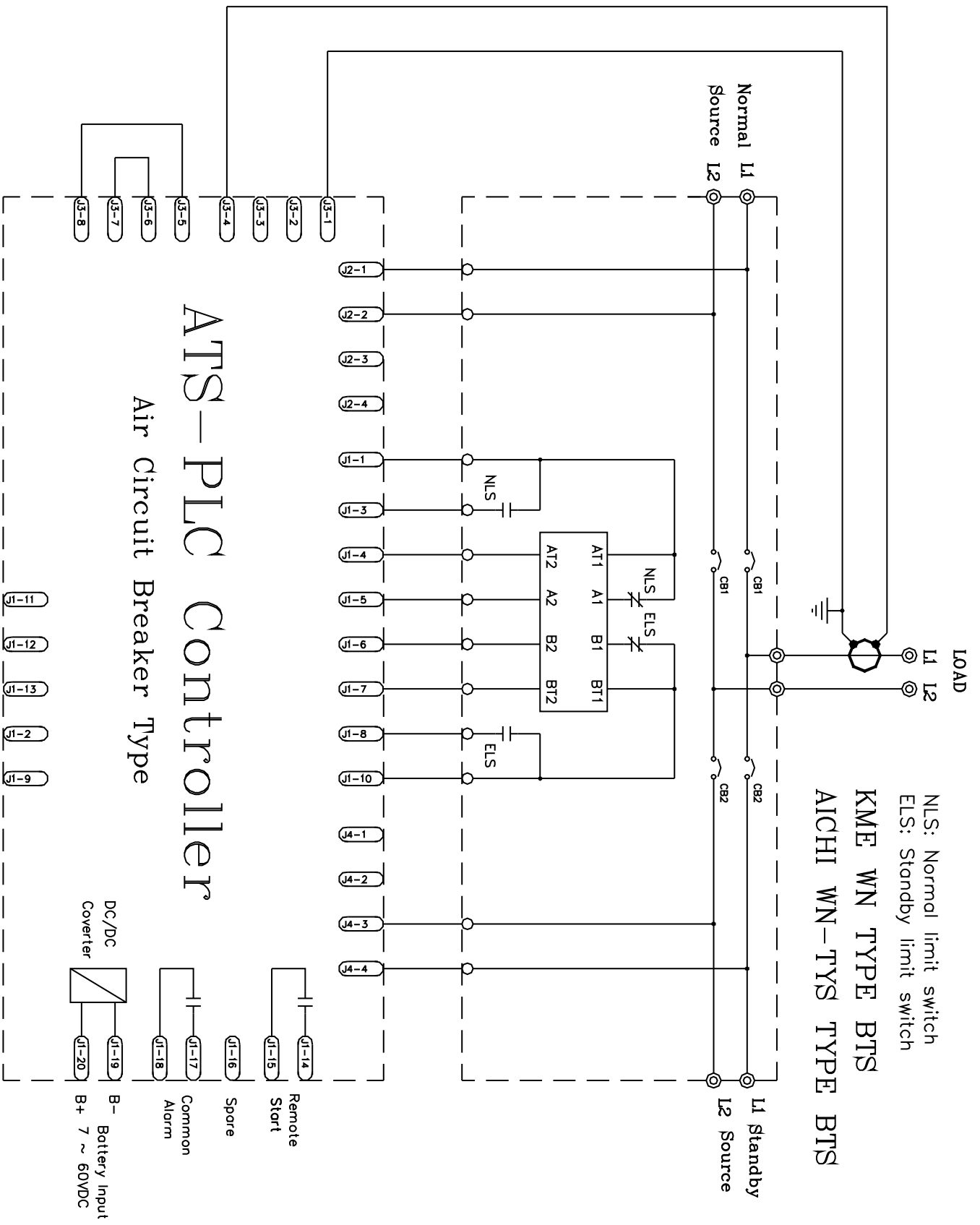
5.12 KUTAI TS-XXX Type ATS Wiring Diagram (2P)(220VAC)



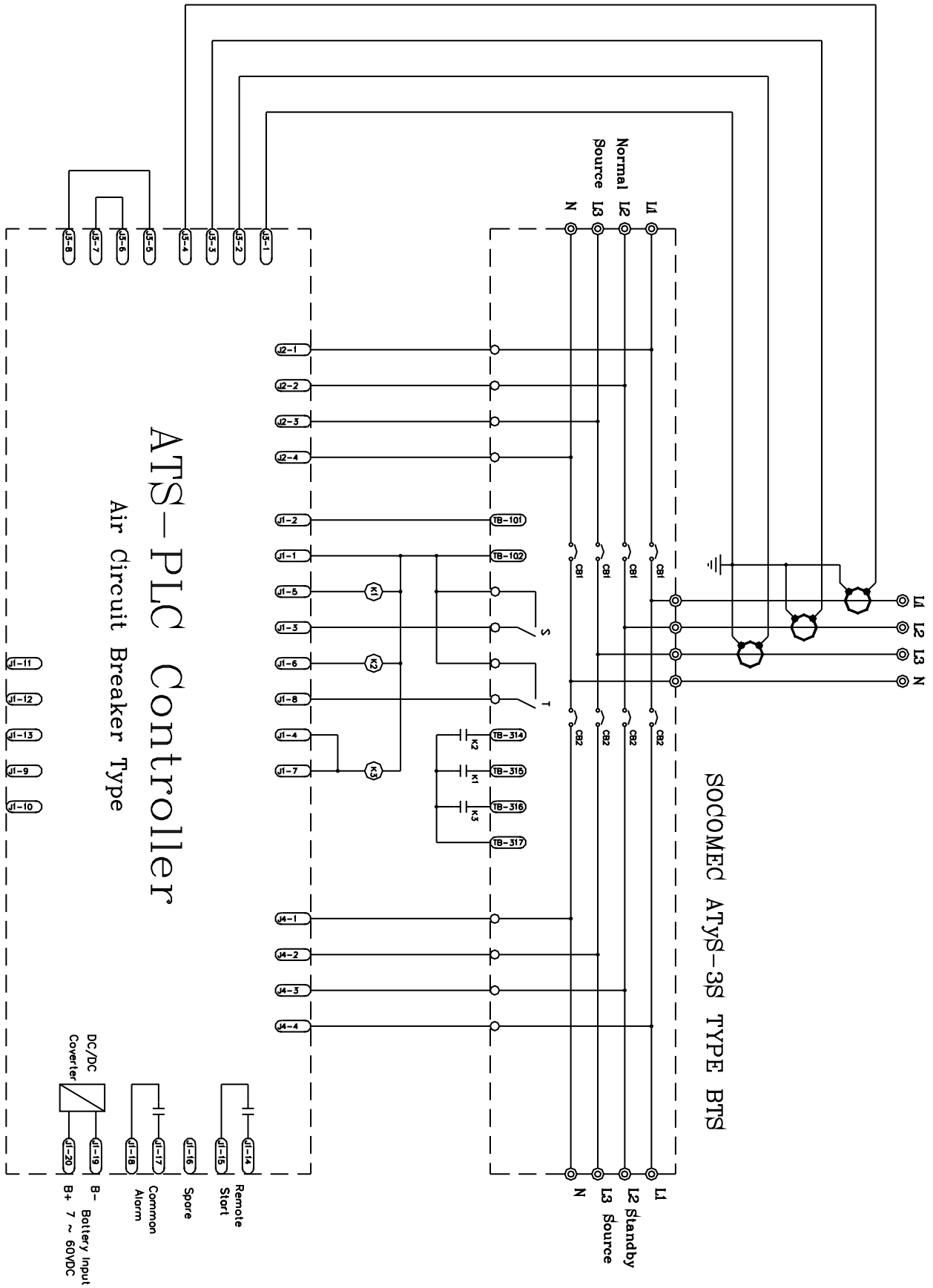
5.13 KME WN Type and AICHI WN type ATS Wiring Diagram (3P/4P)(220VAC)



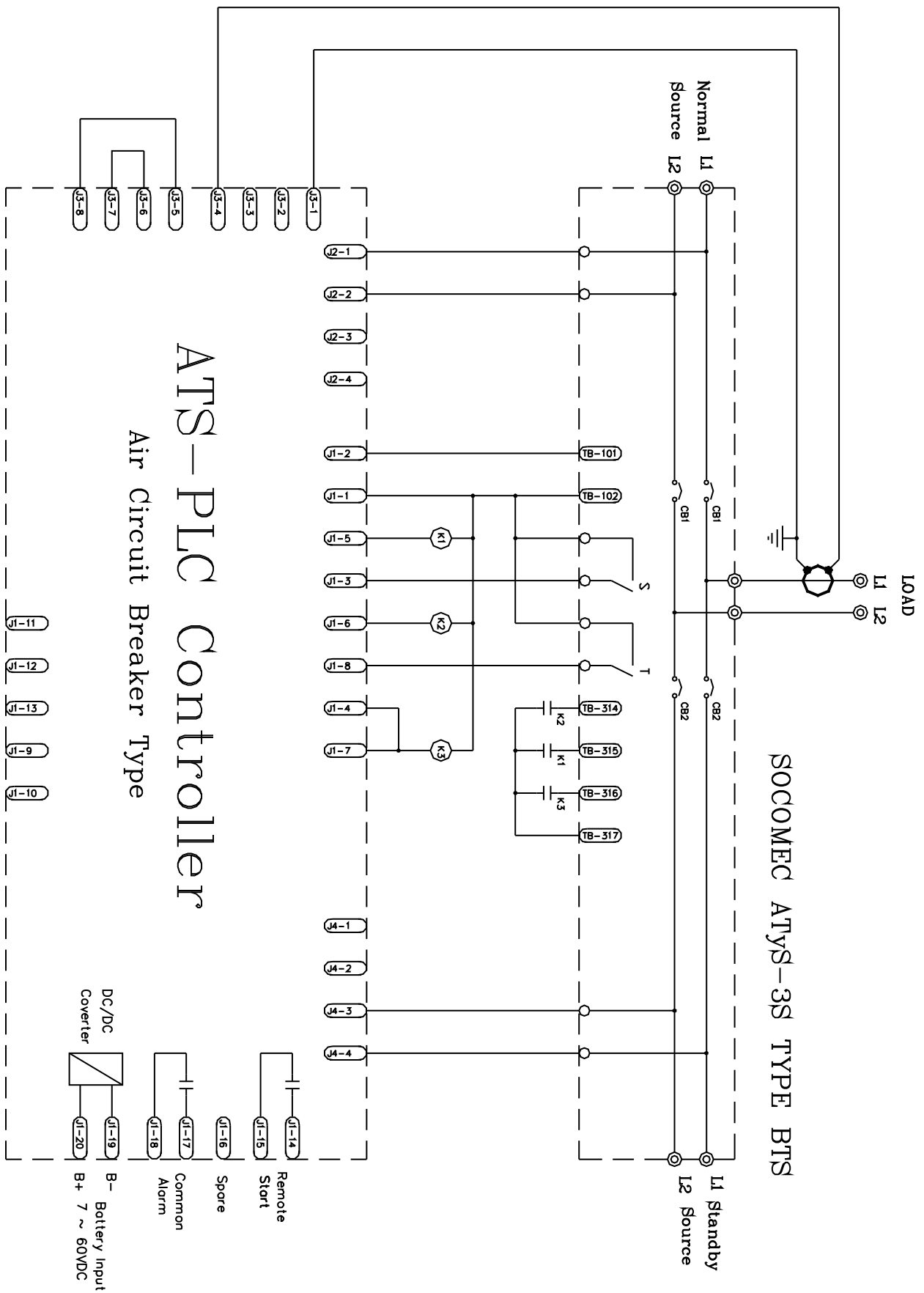
5.14 KME WN Type and AICHI WN type ATS Wiring Diagram (2P)(220VAC)



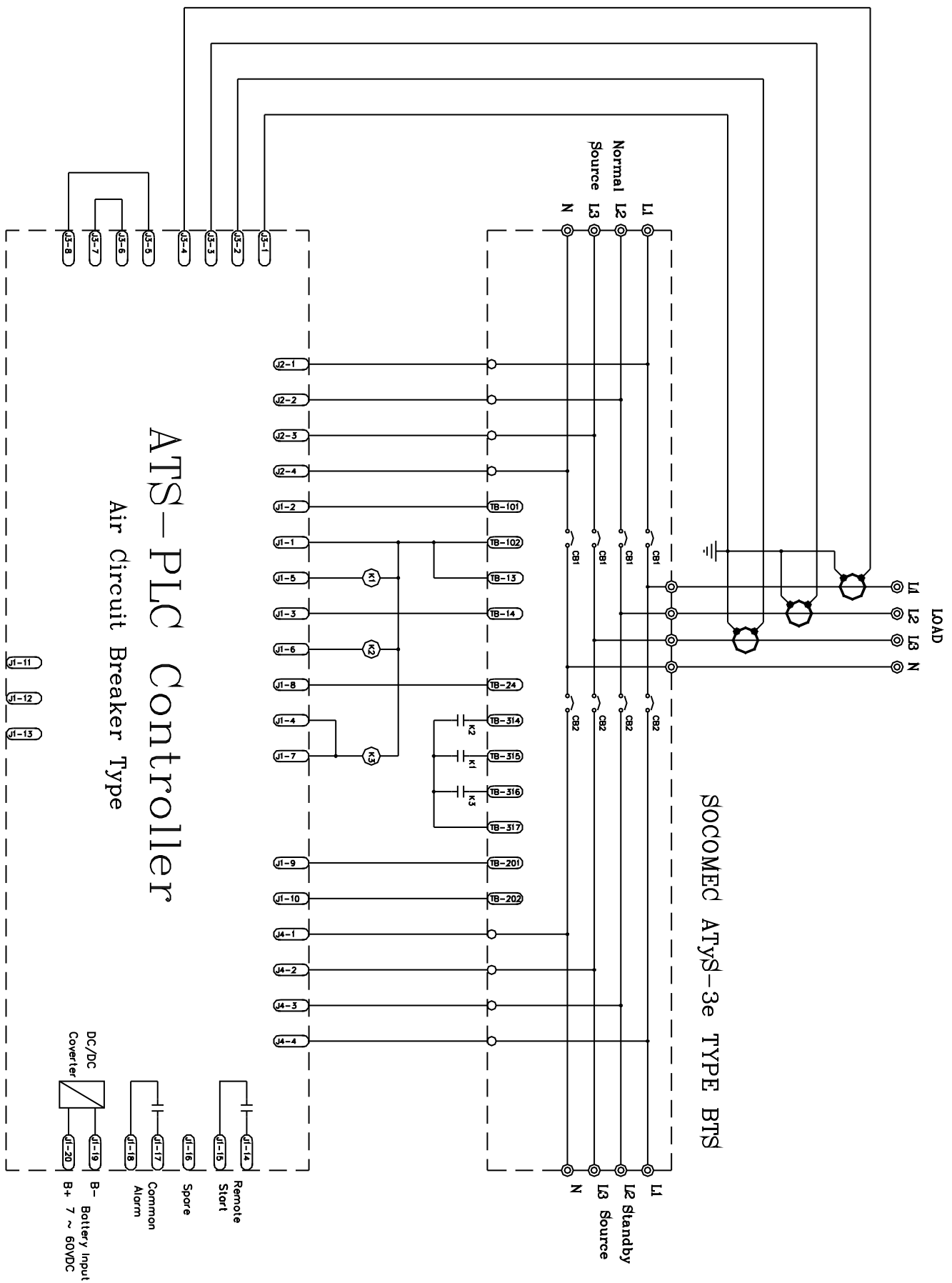
5.15 SOCOMEC ATyS-3S type ATS Wiring Diagram (3P/4P)(220VAC)



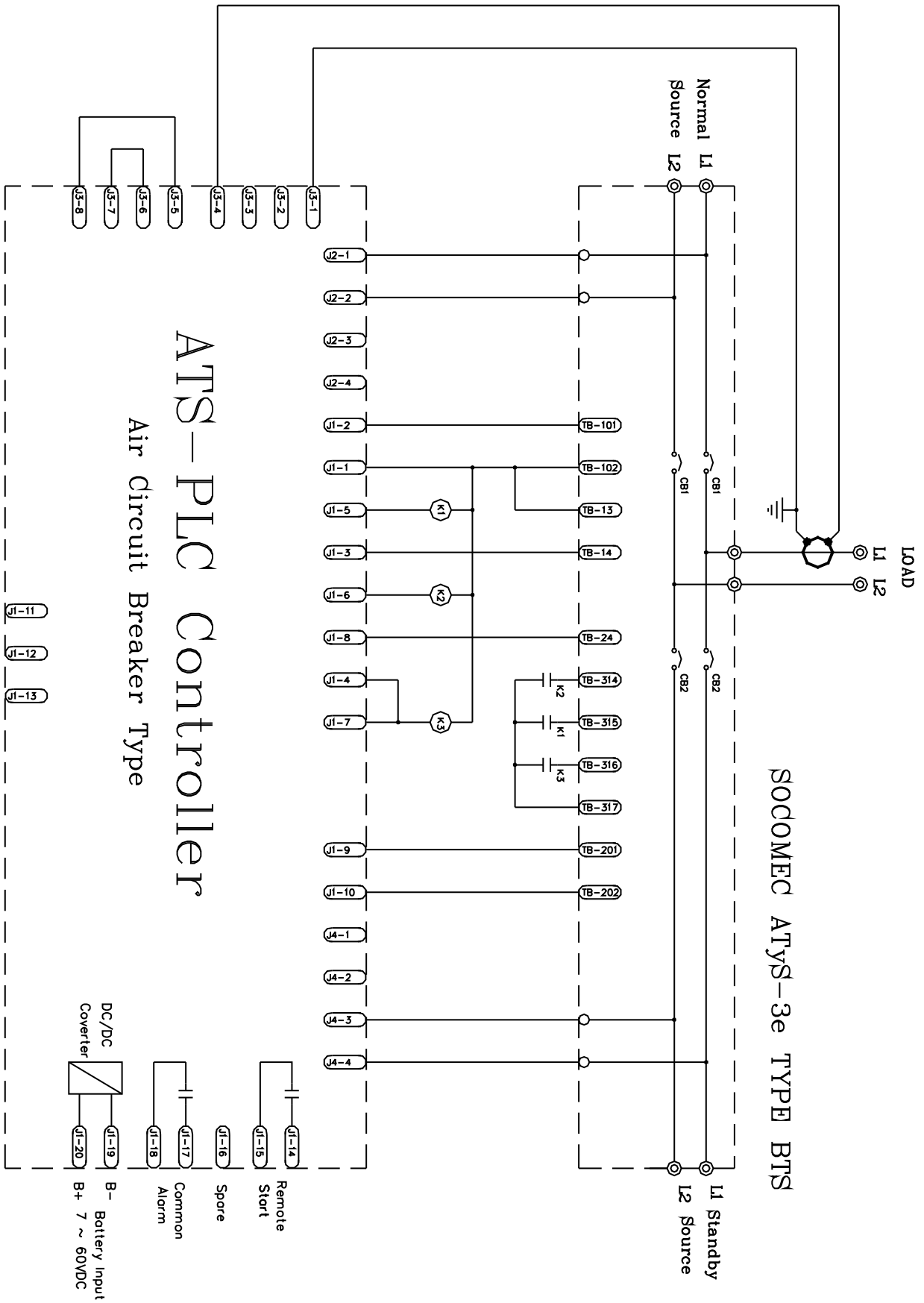
5.16 SOCOMEC ATyS-3S type ATS Wiring Diagram (2P)(220VAC)



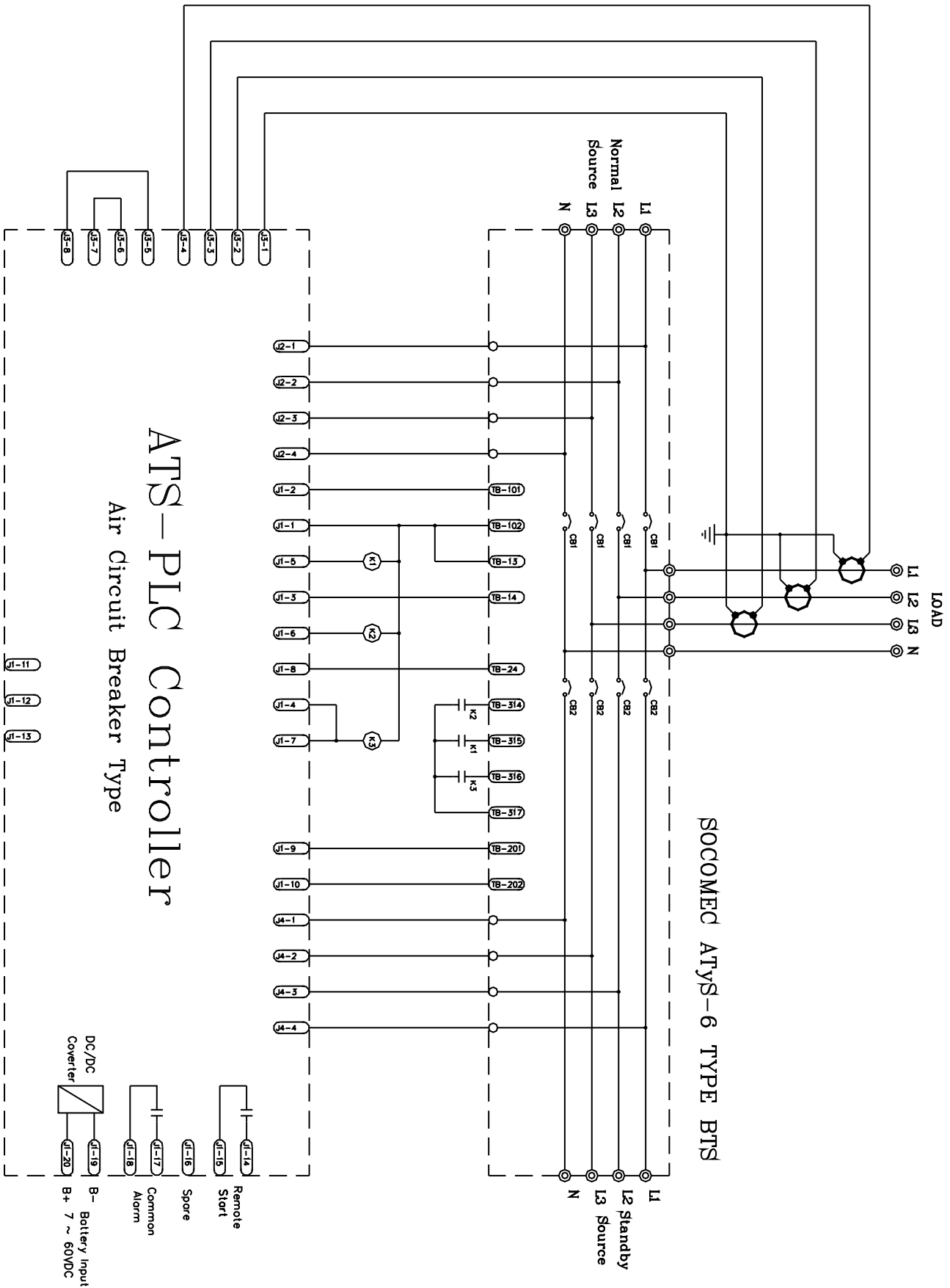
5.17 SOCOMEC ATyS-3e type ATS Wiring Diagram (3P/4P)(220VAC)

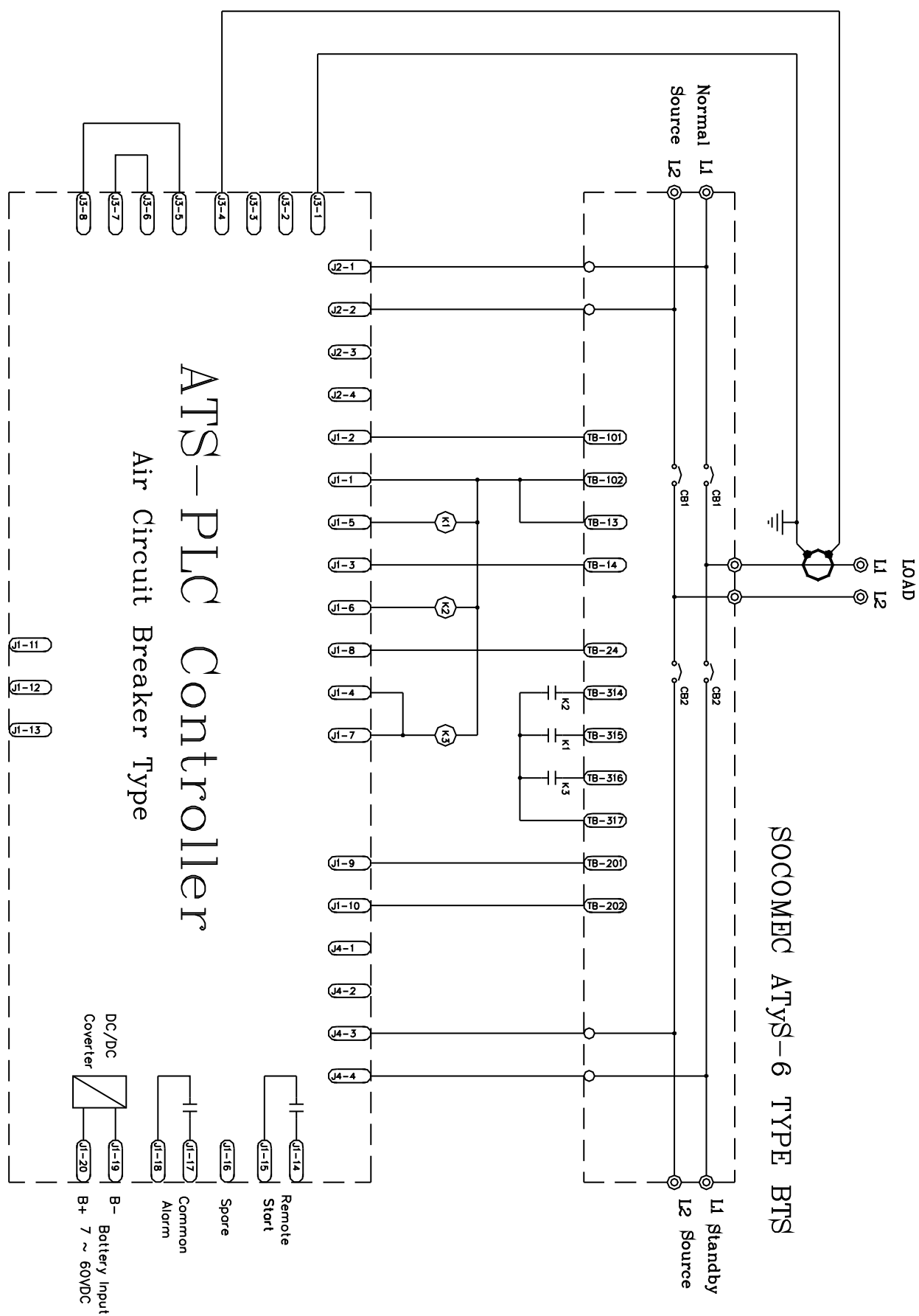


5.18 SOCOMEC ATyS-3e type ATS Wiring Diagram (2P)(220VAC)

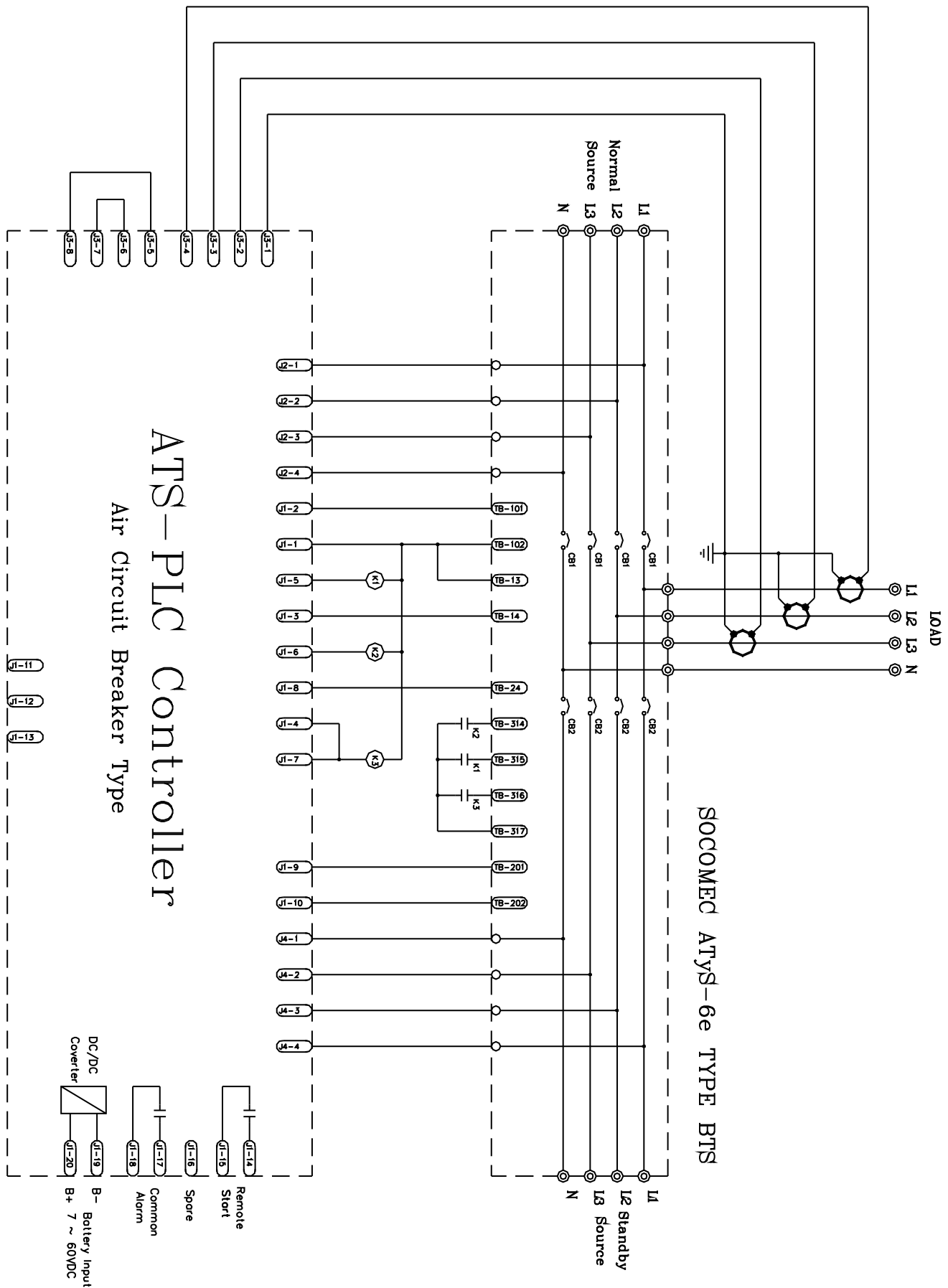


5.19 SOCOMEC ATys-6 type ATS Wiring Diagram (3P/4P)(220VAC)

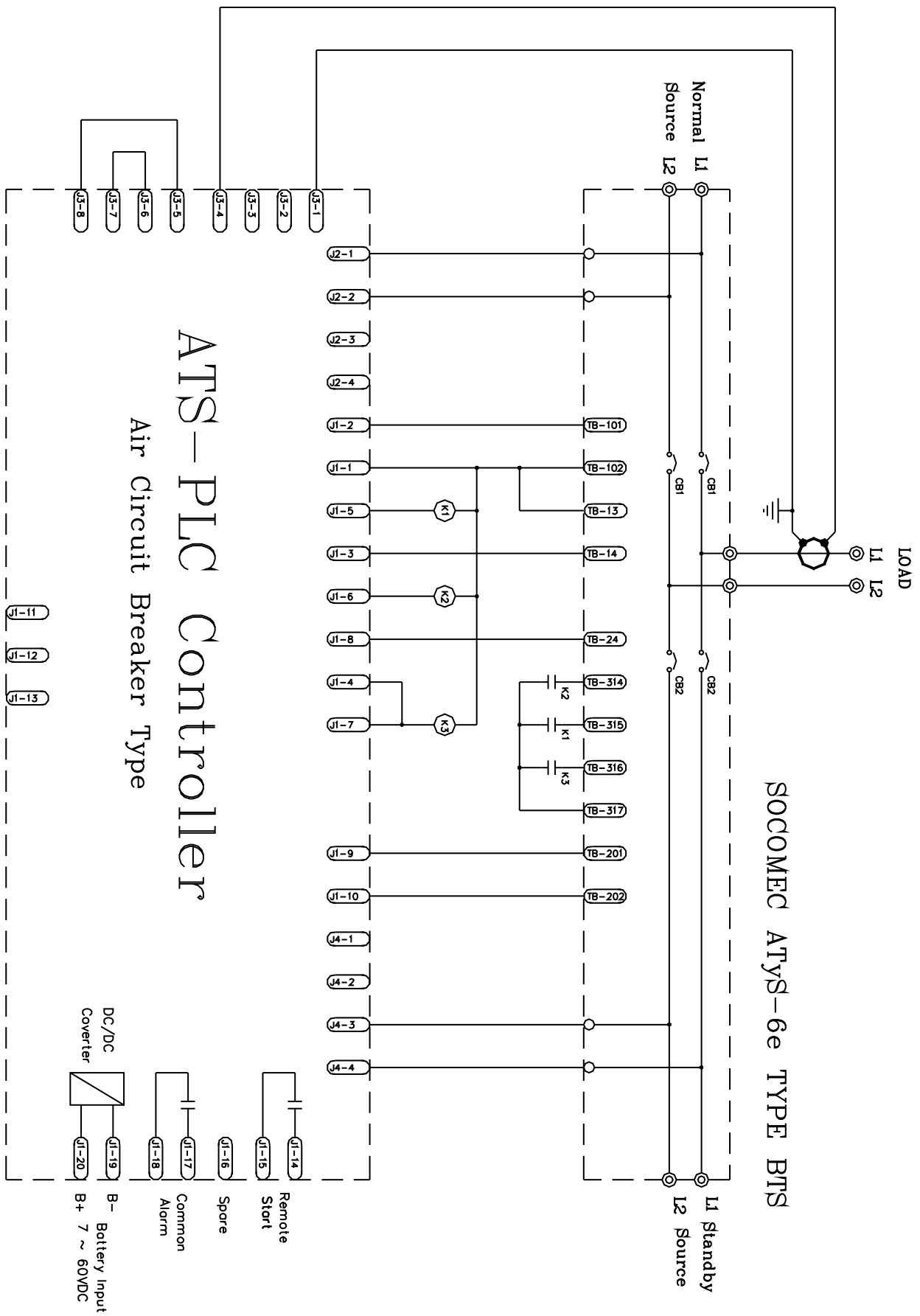




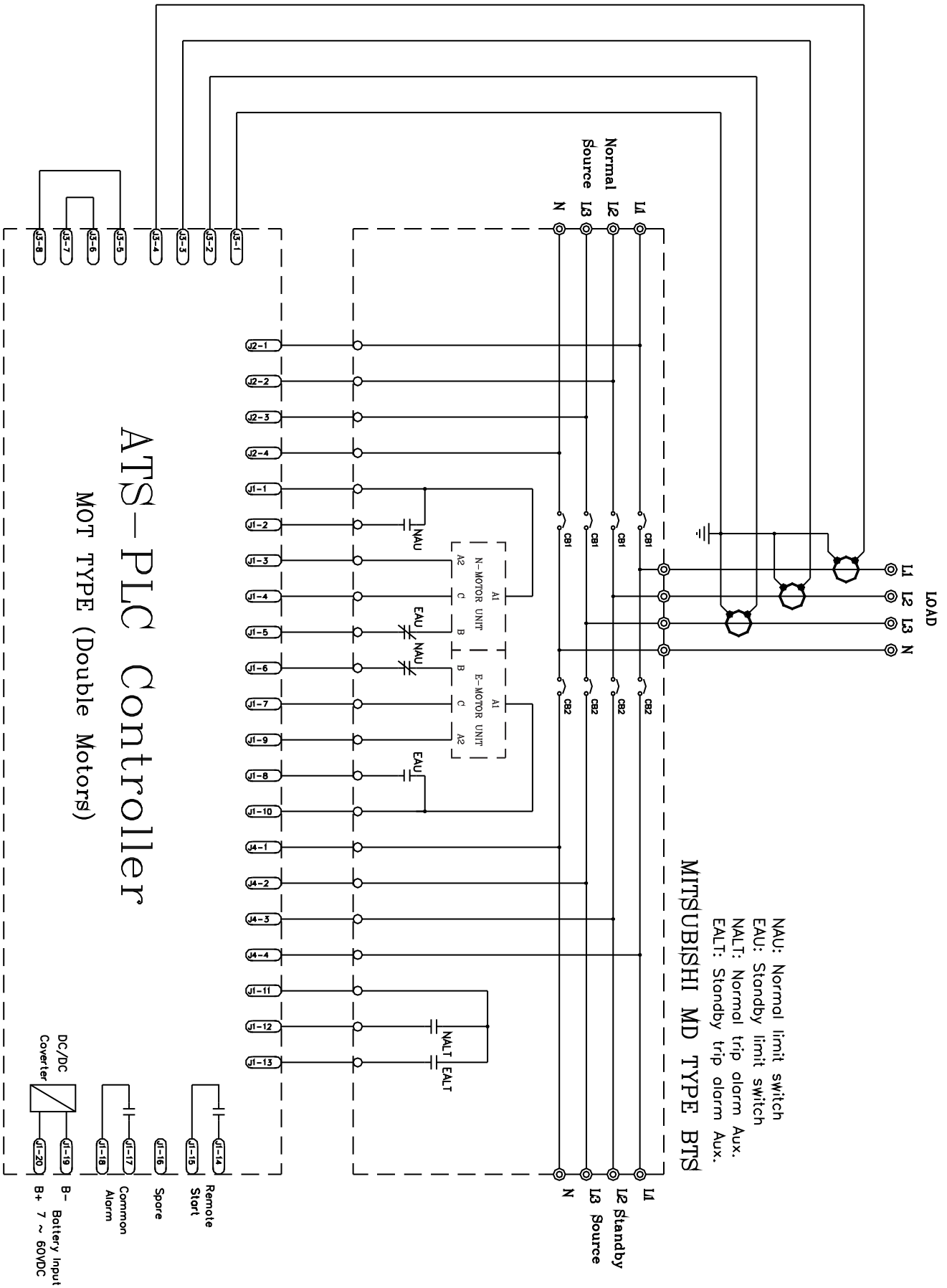
5.21 SOCOMEC ATyS-6e type ATS Wiring Diagram (3P/4P)(220VAC)



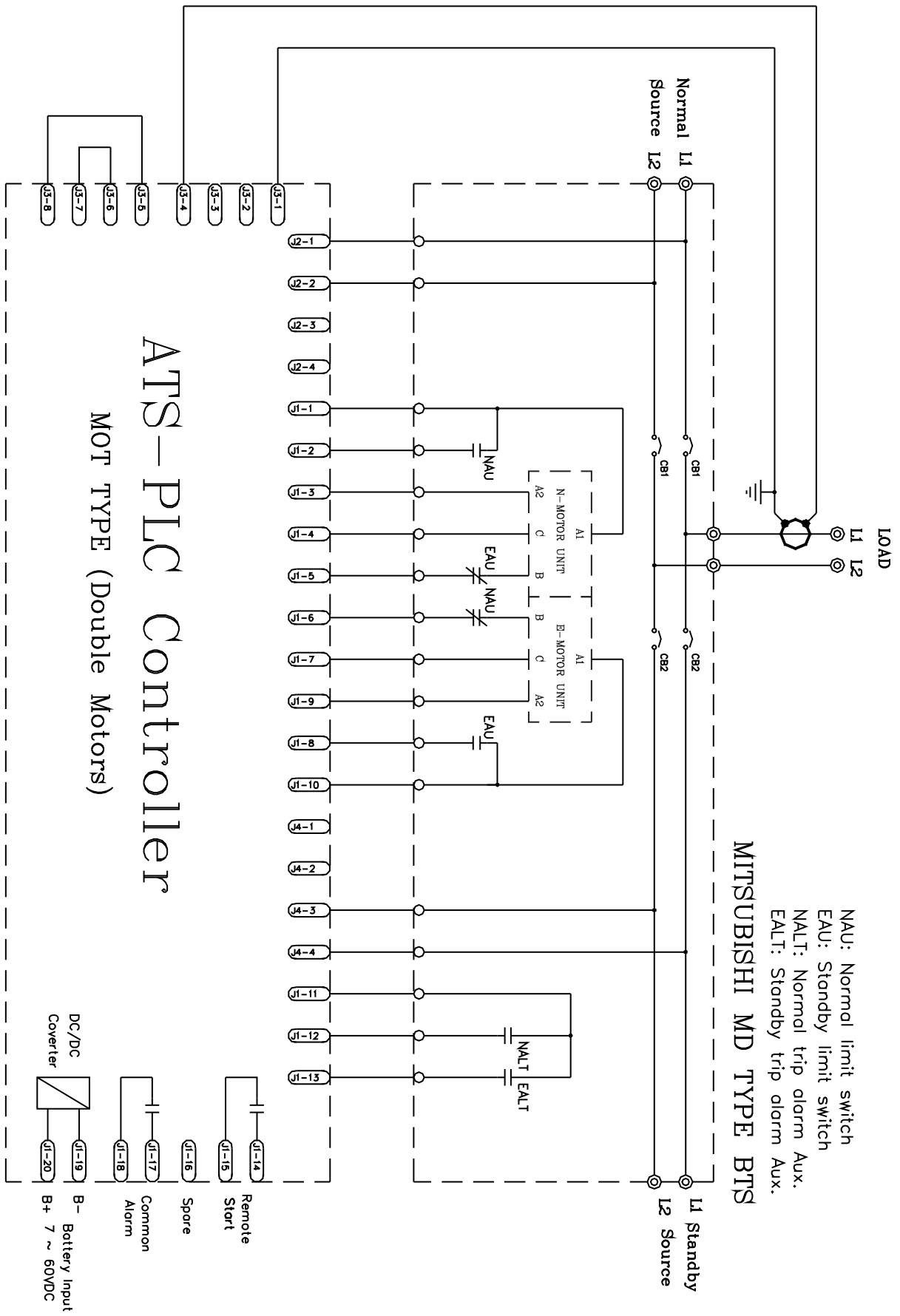
5.22 SOCOMEC ATyS-6e type ATS Wiring Diagram (2P)(220VAC)



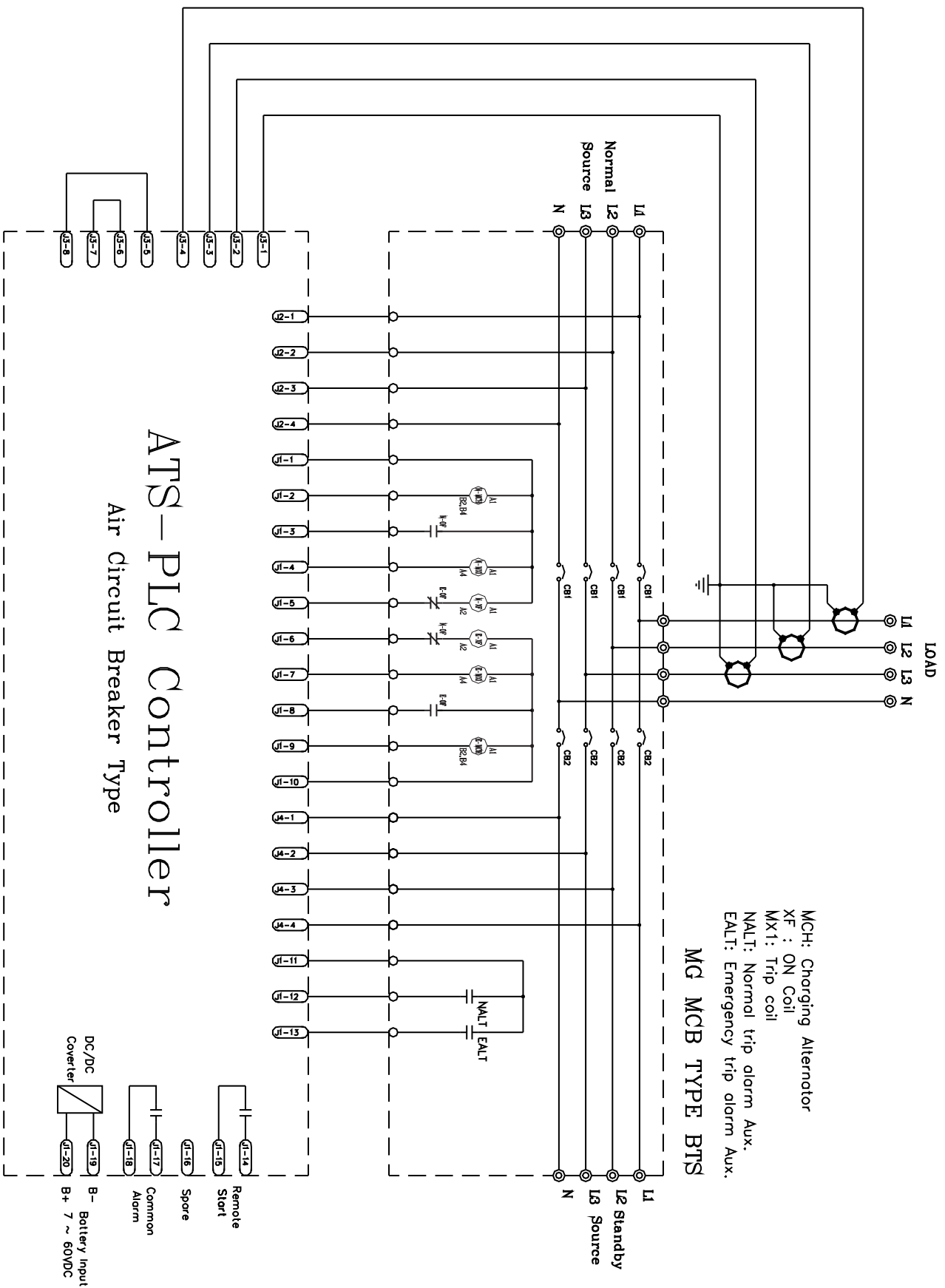
5.23 MITSUBISHI MD type ATS Wiring Diagram (3P/4P)(220VAC)



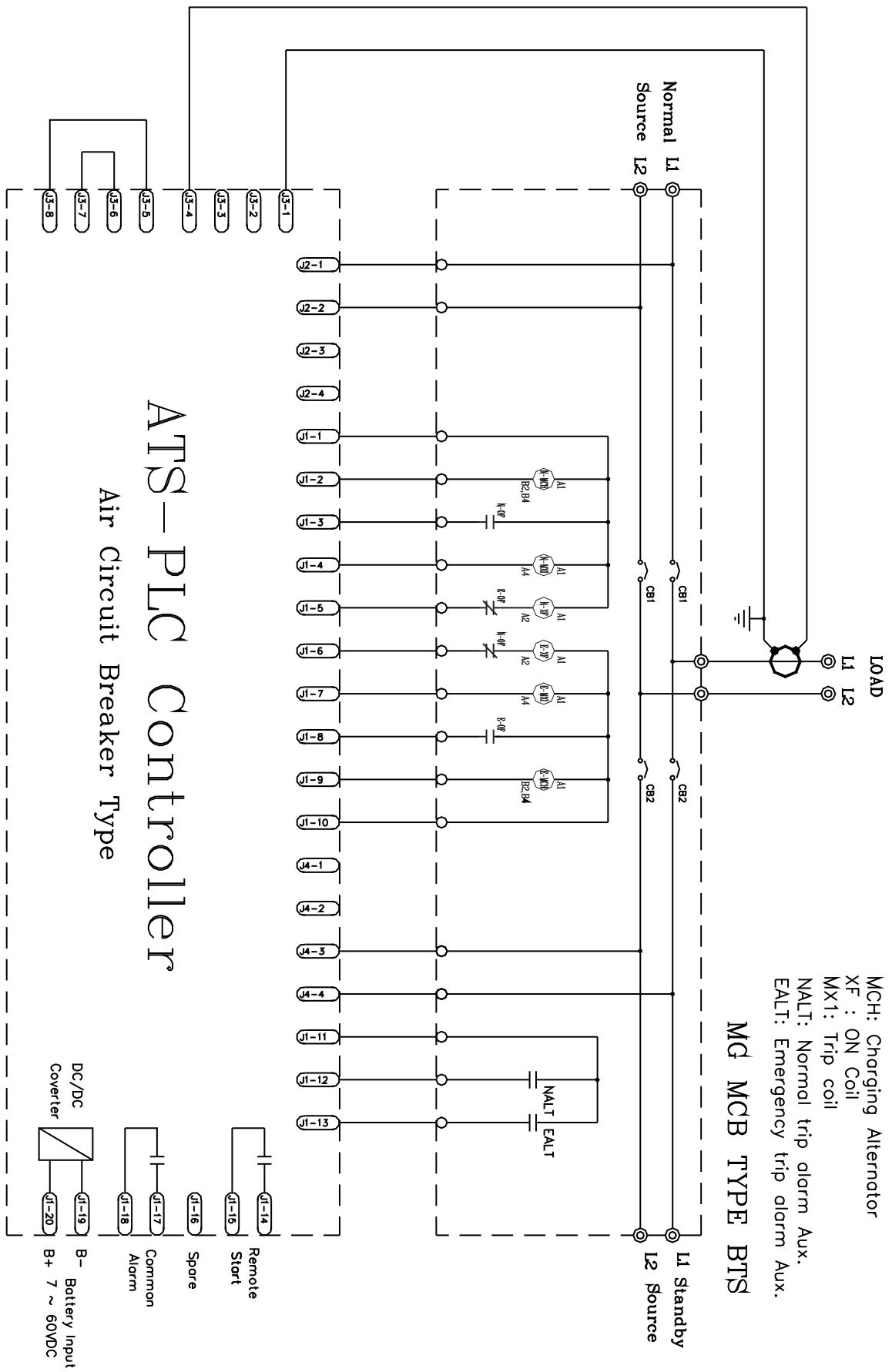
5.24 MITSUBISHI MD type ATS Wiring Diagram (2P)(220VAC)



5.25 MERLIN GERIN MCB type ATS Wiring Diagram (3P/4P)(220VAC)



5.26 MERLIN GERIN MCB type ATS Wiring Diagram (2P)(220VAC)



APPENDIX 01: Touch Screen Sensitivity Calibration

*The accuracy and sensitivity is precisely adjusted in factory, unless necessary, do not recalibrate.

Attention! Never use sharp and pointy objects when calibrating touch screen. Use standard touch panel stylus only to prevent damage to the screen.

Step 1: Power on controller.

Step 2: Press and hold “Home” key for 10secs to enter the calibration (As shown in the below illustration).



Step 3: first coordinate will first appear in the upper left-hand corner, aim for the center of the coordinate and press. Total of 7 coordinates needs to be calibrated



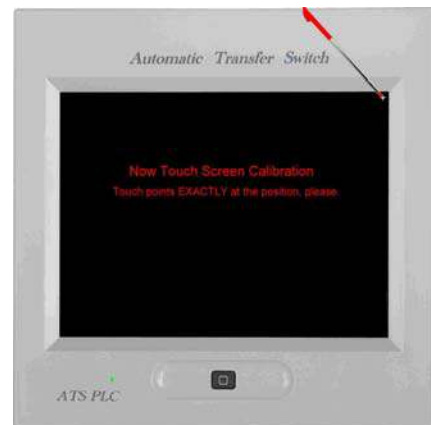
Step 4: 2nd coordinate.



Step 5: 3rd coordinate.



Step 6: 4th coordinate.



Step 7: 5th coordinate.



Step 10: After all 7 coordinates are successfully calibrated, the screen will display "Saving Calibration Parameters" to end the sensitivity calibration.



Step 8: 6th coordinate.



Attention! Once sensitivity calibration begins, all coordinate must be calibrated, before system is able to return to normal operation. If accidentally touched the screen or inaccurate adjustment is made during calibration, completed the rest of calibration first before resuming to step 1 and recalibrate.

Step 9: 7th coordinate (last calibration).



APPENDIX 02: Download Start-up Screen

When powering up the ATS-PLC, the system will display a customizable start-up screen. This chapter will provide you with the step by step instruction on how to setup customizing start-up screen.

Note 1: The Start-up Screen picture format is limited to **bmp**, **jpg** and **png** files only with image size **630*390**. The system will proportionally reduce the image size if image size exceeds the limit.

Note 2: To download the image from PC to ATS-PLC, user will need to connect a KCU-01 USB communication module (optional) to the controller.



KCU-01 USB Module

Step 1: Before connecting the ATS-PLC to the PC, user must first install the “KCU-01 Modules” and “ATS-PLC Image Transfer Software” software to the PC. Drivers are supplied in the supplied software disk or can be downloaded from Kutai Electronics website www.kutai.com.tw.

Step 2: Remove all other communication module(s) leaving only KCU-01 module installed.

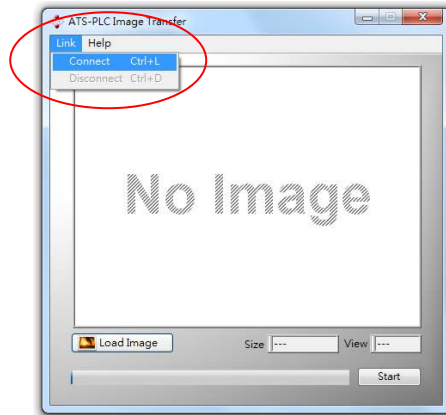


Step 3: Turn on the DC power.

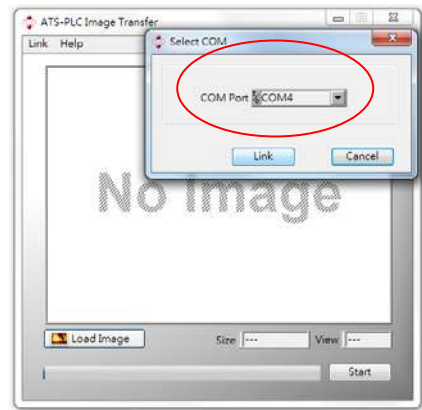
Step 4: Connect the USB cable to the KCU-01 and PC.

Step 5: Execute the “ATS-PLC Image Transfer Software”.

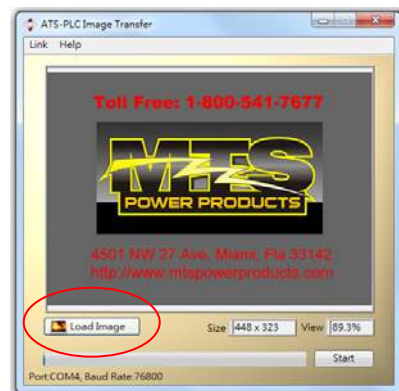
Step 6: Click on “Link” and select “Connect” to connect to the KCU-01 module



Step 7: Select the correct COM Port.



Step 8: Click “Load Image” and select the image wishes to upload.



Step 9: Enter Communication Setup and click on “ATS-PLC Communication Interface”.



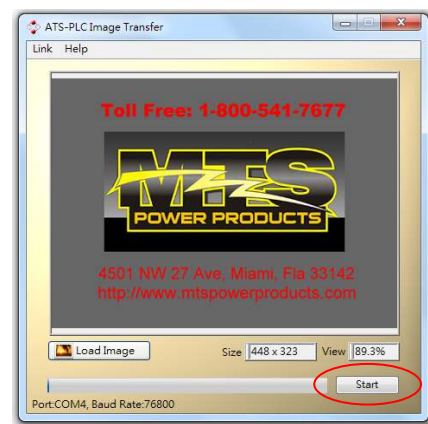
Step 12: The controller will display the follow screen.



Step 10: Disable ATS-PLC communication function.



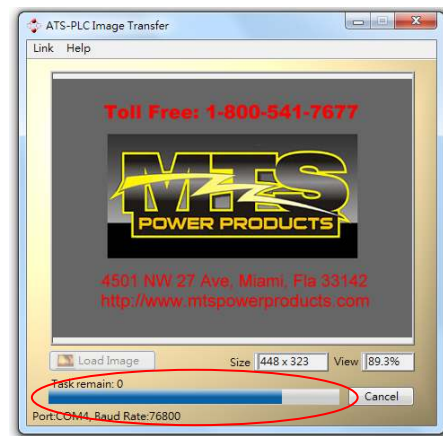
Step 13: Click on “Start” on PC screen to begin file download.



Step 11: Return to Communication Setup and click “Download Image”.



Step 14: File downloading.

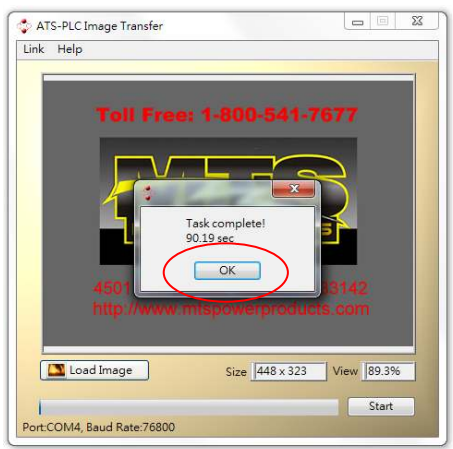


Step 15: Downloading completed.



Attention! After image is downloaded (**Step 15**), if user wishes to change to other image, or download image to another controller, remove USB connection from PC and re-plug it again and retrace back to Step 2.

Step 16: Click on "OK" to end the downloading sequence.



Step 17: Click on "Link" and select "Disconnect" and remove the USB connection.

