ATS-33 *Ver1.3*

Automatic Transfer Switch Control Unit
Operation Manual

KUTAI ELECTRONICS INDUSTRY CO., LTD.
TEL : +886-7-8121771 FAX : +886-7-8121775 Website : www.kutai.com.tw
Headquarters : No.3, Ln. 201, Qianfu St., Qianzhen Dist., Kaohsiung City 806037, Taiwan

TABLE OF CONTENTS

Section ***Page***

SECTION 1 : INTRODUCTION

1.1 Preliminary Comments and Safety Precautions

This technical document is intended to cover most aspects related with the installation, operation and maintenance of the ATS-33 Automatic Transfer Switch Controller. This manual is for authorized and qualified personnel only.

WARNING
High voltage will cause severe injury or death

1.2 Product Overview

The ATS-33 controller represents a state-of –the-art advancement in automatic transfer switch controls, where utility power is unavailable and generators must be in a constant operational state. The ATS-33 design is specifically tailored for the dual generator power system: a two-generator system, one primary generator and its back-up or stand-by generator. The ATS-33 controller manages the automatic start-up and transfer of load between the primary and stand-by generators, whether the power-loss is an unexpected event or scheduled. Additionally, the controller can be programmed to deliver a set operation duty cycle, which enables both the primary and stand by generators to operate in relay duty.

The ATS-33 Controller provides an unmatched degree of programmed flexibility. It provides all the necessary administration to ensure that the ATS switch operates properly through a series of programmed sensing and timing functions.

Controller's features：

- Microprocessor based with touch screen.
- Smart touch screen (touch sensor) design.
- Compact size with user-friendly LED display.
- Programmable for cycle-mode or fix-mode displays for 3-phase and 1-phase voltages and frequencies.
- All programming and operations are done from the front screen interface.
- Monitor both primary and stand-by generator for over and under voltages.
- Monitor both primary and stand-by generator for over and under frequency.
- Dry-contact alarm for transfer fail and over-cranking.
- Manual force-bypass.
- Compatible with almost all ATS switches.
- Optional USB / RS485 / Ethernet remote (mobile proxy) communication functions.
- Program on-site or from remote (mobile) device (PC, Smart Phone).
- Auto-saved settings (memory preserved throughout all power disconnects and resets).
- Front panel display provides source status and fail alarm indications.

1.3 Functions / Features

The primary function of ATS-33 controller is to monitor power sources and provide the necessary intelligence to operate a seamless and automatic transfer of load between two generators.

1.3.1 Operational Simplicity

From installation to programming and to usage, the ATS-33 controller is designed with operational simplicity in mind. The user-friendly front panel interface simplifies routine operation, programming and setting adjustments.

1.3.2 Standard Features

All logic settings for different ATS's are preprogrammed and stored in its non-volatile random-access memory (NVRAM), this memory retains its information when power is turned off. Some features and set points are user adjustable.

Feature 1 : Generator Duty Cycle – start attempts settings

You can program the ATS-33 to switch the lead generator duty by time or start-run attempts. When the working generator times out, or runs a number of times the ATS-33 starts the next generator and makes this one the lead generator. (See lines 3 & 4)

Adjustable duty time range：01 – 999 Hours.

Feature 2 : Transferring Time Delay

The ATS-33 control unit provides a time delay when transferring the switch from the primary to standby generator. Countdown begins when the standby source becomes available. (Refer to program line 5 & 6)

Adjustable time delay range：00 – 250 sec

Feature 3 : Time Delay Engine Cool-down

Controller permits the generator to continue to run unloaded after retransfer to the other generator is complete. Countdown begins when the transferring is complete. (Refer to program line 7)

Adjustable time delay range：00 – 250 sec

Feature 4 : Time Delay OFF Position

Time Delay on OFF keeps the switch in the center neutral OFF position (completely disengaged) before transferring to the other side. (Refer to program line 8)

Adjustable time delay range：00 – 99 sec

Feature 5 : Under / Over voltage Sensing

The controller monitors the voltage of each phase of both generators' power source. User adjustable settings are provided. (Refer to program line 9, 10, 11, 15, 16 & 17)

Adjustable over voltage range：110 – 500 Vac
Adjustable under voltage range：80 – 470 Vac

Feature 6 : Under / Over frequency Sensing

The controller monitors the frequency of the normal and standby power source. User adjustable settings are provided. (Refer to program line 12, 13, 14, 18, 19 & 20)

Adjustable over frequency range：51 – 70 Hz
Adjustable under frequency range：45 – 59 Hz

Feature 7 : Fail Alarm Output

There are three different abnormal statuses whereby the controller will setoff the dry contact alarm output. The auxiliary contact may be wired to a highly audible alarm panel to indicate a malfunction with the ATS system. The three abnormal statuses are：

- Send start signal failure / generator fails to start.
- Transfer failure occurred.
- Abnormal voltage and frequency during generator duty time period.

SECTION 2 : OPERATOR PANEL

2.1 General

Get acquainted with the ATS-33：

- Front Display Window
- Operate Touch Buttons
- Panel LEDs Display

2.2 Display Window

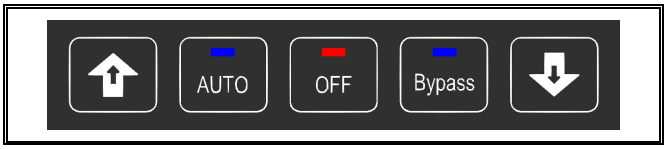
The ATS-33 controller has a four-digit, seven-segment displayer to monitor all parameters, setting and messages.

The screen display's：

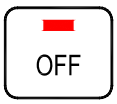
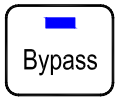
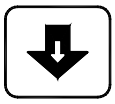
- Dual generators voltage / Duty time / Parameter display
- Time delay countdown display
- Program setting parameter display

2.3 Operate Touch Buttons

The front panel employs five sensitive capacitive touch and release buttons.



Touch Buttons Reference Table

ICON	DESCRIPTION
	**Increase / Selection Touch Button** ● Press to increase value ● Press to select phase voltage
	**AUTO Touch Button** ● Press to engage AUTO ● Press to reset alarm output
	**OFF Touch Button** ● Press to into OFF mode ● Press to enter program mode
	**Bypass Touch Button** ● Press to force a transfer
	**Decrease / Selection Touch Button** ● Press to decrease value ● Press for Volt / Duty / Freq display

2.3.1 Increase (▲) Button

In AUTO, each touch of the up arrow (▲) changes the display to the next phase voltage reading.

However, when programming every touch of the up (▲) button increases the displayed parameter by a single unit. If held, the up (▲) button continues to scroll.

2.3.2 Decrease (▼) Button

Under AUTO operate status, each touch of the decrease (▼) button will change the real parameter display between voltage, duty time and frequency.

However, when programming every touch of the down (▼) button decreases the displayed parameter by a single unit. If held, the down (▼) button continues to scroll.

2.3.3 Auto Button

When selecting the AUTO key, the ATS-33 runs in automatic mode lighting the corresponding LED to indicate the selection. The controller automatically starts the generator, transfer and retransfers from source to source as commanded by the features supplied and the preprogrammed setting.

In AUTO, all anomaly are accompanied by its matching alarm output make sure all failures are corrected before touching the auto key to reset the alarm signal.

WARNING

When any failure occurs at its duty time, the controller will shut down the engine, sound an alarm output and switch to the other generator. The failed engine will not start again unless the user manually resets the alarm output by touching the AUTO key.

2.3.4 Bypass Function Button

The Bypass button provides for a manual override of pre-programmed functions. When the ATS-33 is in AUTO, touching the Bypass key ignores the current timers and setting, and the controller will force-start the second generator and transfer the switch from the current working generator to the second generator. The Bypass function can be activated only in AUTO.

LEDs status under Bypass mode

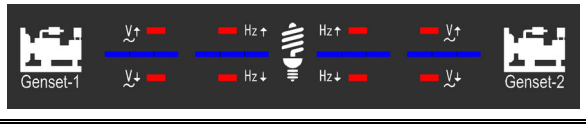
2.3.5 OFF Button

Touching the OFF key, turns the ATS-33 OFF engaging a flashing red LED instantly disabling all functions.

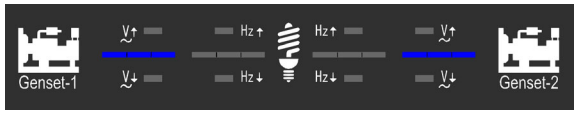
When in program mode, touching the off button allows the user to change the program line table and set the desire parameter using decrease (▼) or increase (▲) button.

2.4 Panel LED Outputs

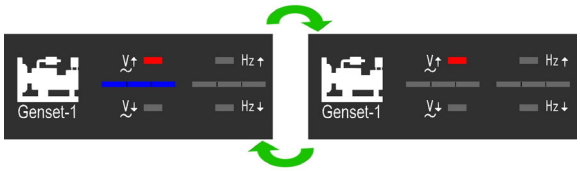
Eight individual red and blue LEDs light bars perform or indicating each function.



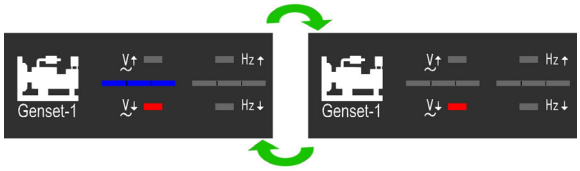
Information concerning the LEDs output



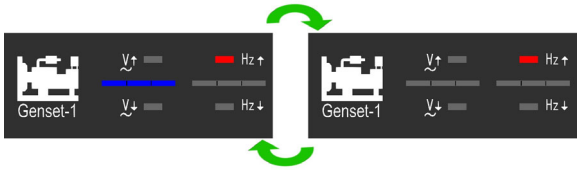
Power available display for G1 and G2



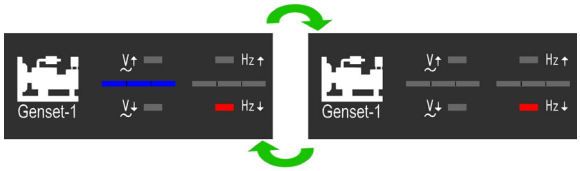
Generator-1 Over Voltage



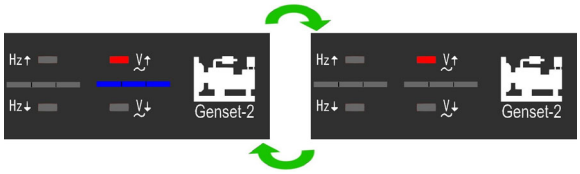
Generator-1 Under Voltage



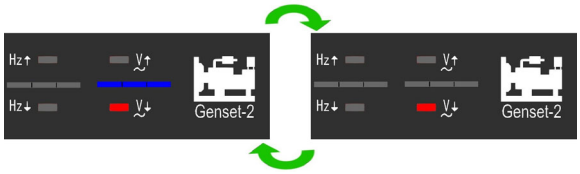
Generator-1 Over Frequency



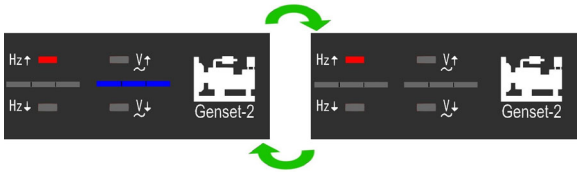
Generator-1 Under Frequency



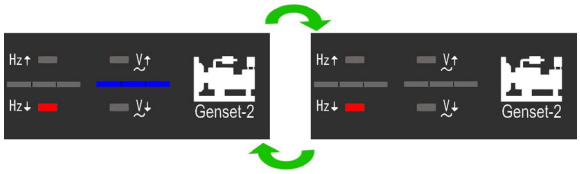
Generator-2 Over Voltage



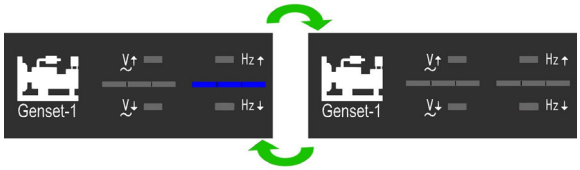
Generator-2 Under Voltage



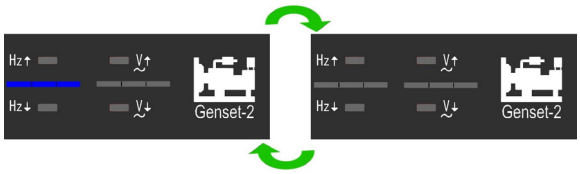
Generator-2 Over Frequency



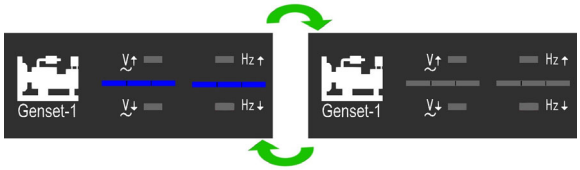
Generator-2 Under Frequency



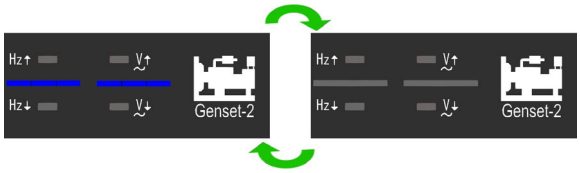
Generator-1 Transfer Failure



Generator-2 Transfer Failure



Generator-1 Fail to Start



Generator-2 Fail to Start

SECTION 3 : OPERATION

3.1 General

The five functions of the ATS-33：

- Automatic mode
- OFF mode
- Bypass mode
- Programming mode
- KCU-XX Remote Communication

The practical use of each operation under each category will be explained in this section. It is assumed that prior sections are understood, and the operator has a basic understanding of the hardware.

3.2 AUTO Mode

The AUTO mode of the ATS-33 controller provides for automatic start, transfer and retransfers from source to source as dictated by the programmed values.

The ATS-33 controller constantly monitors the condition of both generators' power sources thus providing the required intelligence for transfer operations.

For example, the ATS-33 control unit automatically initiates a start and transfer of power when the working generator duty time countdown to zero or when power fails or voltage level drops below a preset value at its duty time. Exactly what the ATS-33 controller will initiate in response to a given system condition depends upon the combination of standard and selected optional features.

3.3 OFF Mode

In OFF the ATS-33 disables all the transfers and protection functions, the display window and all the LEDs are turned off.

Both remote start signals are also disabled in OFF and the ATS can't transfer the load to any source automatically.

However, when programming, the OFF button allows you to move to the next program line and then change the values for that line using down (▼) and up (▲) buttons.

Controller Panel Lighting Test
This checks the LED lights. Press the OFF button, all panel LEDs must light up.

3.4 Bypass Mode

If the ATS-33 is running in AUTO, pressing the bypass button ignores its current duties and force starts the next generator, and transfer's power from this generator to the other. If the second generator fail to start or its voltage and frequency does not become available, the controller keeps the load connected to the working generator and triggers an alarm.

Activate the Bypass only when in AUTO.

3.5 Programming Instruction

You program the ATS-33 from the front faceplate.
To start, set the controller to OFF and press & hold the OFF button for 4 seconds. The word "Vr1.0" appears on the display for 2 seconds, showing the software version.

You are now ready to start the line-by-line programming sequence. Always press the OFF key to move to the next line. To change the parameter, on each line use the up (▲) and down (▼) arrows. Repeatedly pressing the up (▲) or down (▼) key, changes the displayed by one. To change faster, hold the buttons down.

Remember to always press the "OFF" button to move to the next line or until the "End" appears on the screen.
Note : To end and exit at any time, hold the "OFF" key down for 4 seconds.

If you make an error or need to return to factory settings, stay or reenter programming and then hold the AUTO keys down for 4 seconds, until the word "Au.Po" appears on the screen verifying that all programming lines are factory reset back like in the manual. (See line-by-line programming table for ATS-33 factory settings).

3.6 Remote Communication Instruction

You can monitor and control the two gen-set on a remote PC using the optional KCU-XX remote communication modules.

WARNING

A remote start signal can activate the ATS-33 and the engines can start 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 flash light. Unexpected engine starts can result in serious injury or death. When performing service or maintenance, always disconnect the remote start signal input.

ATS-33 uses with KCU-40 can access remote monitoring via a smartphone, optional KCU-30 module can achieve remote monitoring, setting, and operation directly via a smartphone.
Currently supports devices with iOS 5.1 or higher from Apple and all other brands using Android operating system version 2.3.3 or higher, applicable for smart 3C products with internet capabilities
Free GenOnCall® App currently available for Apple iOS and Android operating system. User can download free software from App Store or Google Play.

The corresponding program settings for ATS-33 installed with KCU-XX module includes item (23), (24), (25) Programming item (23) is a must. When Item (23) is set to "00", then the remote monitoring software is restricted to read information only whereas remote command is strictly forbidden.

If KCU-70 – Modbus TCP communication module is installed, additional program setting on lines (24) is needed.

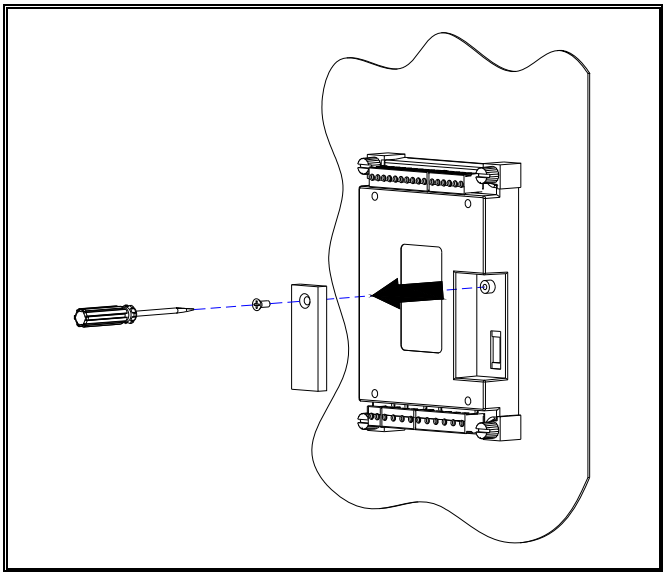
For more detail, information refers to the KCU-XX manual.

NOTE

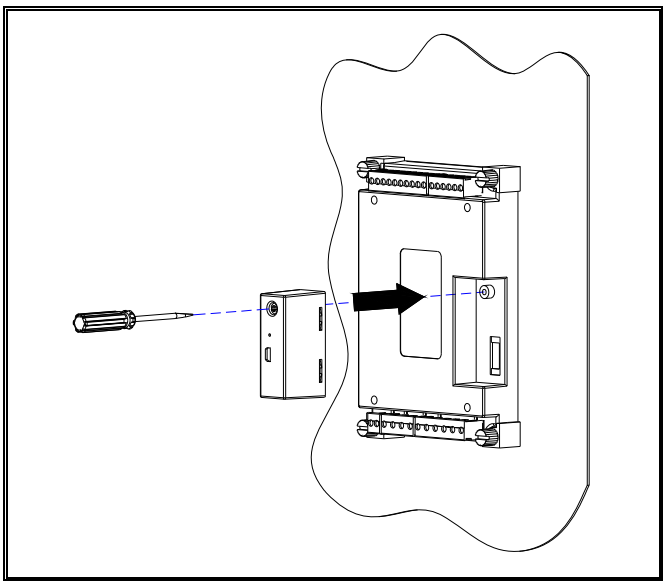
ATS-33 with KCU-70 module constitutes a closed LAN network. Each controller address can be set from 1 to 99 and not to be repeated.

The installation for the KCU-XX communication module on the ATS-33 controller is fairly simple.

Step 1：Remove cover on the back of the ATS-33.



Step 2：Plug in tighten the screw on the KCU-XX module to the ATS-33 PCB.

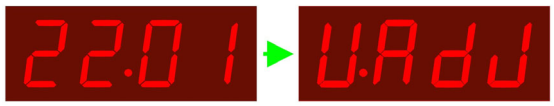


3.7 Voltage Adjustment (If Needed)

The ATS-33 voltage readings are factory set and calibrated. However, if you need to modify any voltage reading, follow these steps.

Step 1 : Manually start the primary and standby generators.

Step 2 : Enter Program mode and set the program item (22) to (01). “VAdJ” will appear on the display window.



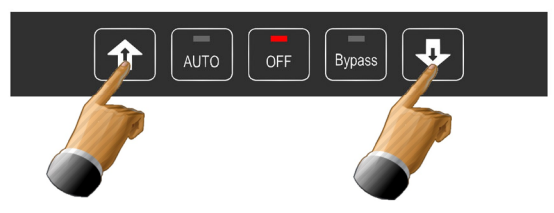
Step 3 : Select the phase you wish to re-calibrate by pressing the OFF key.

EX. Generator-1 Phase L12 Calibration

EX. Generator-2 Phase L23 Calibration

Step 4 : Use a good quality voltmeter as a reference to calibrate the ATS-33 voltage reading to the desired phase.

Step 5 : With the up (▲) and down (▼) buttons reset the voltage reading on the ATS-33.



Step 6 : Press the “OFF” button to move to the next phase or until the word “End” appears on the screen. To exit hold the “OFF” key at any time for 4 sec.

End Programming Display

Step 7 : If you get “FAIL”, the calibration is null. Touch OFF to reset and repeat Step 1.

Calibration Failure

3.8 Line By Line Programming Table

LINE	DESCRIPTION	VALUE	FACTORY SETTING
1	Is this ATS operating in 1 phase or 3 phase?	00 → 1 Phase 01 → 3 Phase	**01**
2	Selected the Switch type of ATS	00) MCCB type ATS (Single motor) 01) Mot type ATS (Dual motors) 02) Air circuit breaker (ACB) 03) Double throw type (Single coil) 04) Double throw type (Dual coils) 05) Kutai TS-XXX type ATS 06) Magnetic contact type	**00**
3	Generator-1 duty time	01 – 999 Hours	**12 Hr**
4	Generator-2 duty time	01 – 999 Hours	**12 Hr**
5	Time delay Generator-1 to Generator-2	00 – 250 sec	**5 sec**
6	Time delay Generator-2 to Generator-1	00 – 250 sec	**5 sec**
7	Time delay engine cool-down	00 – 250 sec	**15 sec**
8	Time delay OFF position	00 – 99 sec	**5 sec**
9	Generator-1 over voltage setting	11 – 55 (110 – 550V)	**25 (250V)**
10	Generator-1 under voltage setting	08 – 47 (80 – 470V)	**18 (180V)**
11	Time delay if there is a problem with Generator-1 voltage output	00 – 99 sec (00 = Without voltage monitor function)	**10 sec**
12	Generator-1 over frequency setting	51 – 75 Hz	**65 Hz**
13	Generator-1 under frequency setting	45 – 59 Hz	**55 Hz**
14	Time delay if there is a problem with Generator-1 frequency output	00 – 99 sec (00 = Without frequency monitor function)	**10 sec**
15	Generator-2 over voltage setting	11 – 55 (110 – 550V)	**25 (250V)**
16	Generator-2 under voltage setting	8 – 47 (80 – 470V)	**18 (180V)**
17	Time delay if there is a problem with Generator-2 voltage output	00 – 99 sec (00 = Without voltage monitor function)	**10 sec**
18	Generator-2 over frequency setting	51 – 75 Hz	**65 Hz**
19	Generator-2 under frequency setting	45 – 59 Hz	**55 Hz**
20	Time delay if there is a problem with Generator-2 frequency output	00 – 99 sec (00 = Without frequency monitor function)	**10 sec**
21	Display mode setting	00 → Cyclic mode 01 → Fix mode	**00**
22	Do you want to adjust system voltage reading?	00 → No 01 → Yes	**00**
23	Enable remote control by KCU-XX Module	00 → No 01 → Yes	**00**
24	KCU-70 module address setting	00 → None 01 – 99	**00**
25	Baud rate setting	01 → 115200 04 → 19200 07 → 4800 02 → 57600 05 → 14400 08 → 2400 03 → 38400 06 → 9600 09 → 1200	**03**

3.9 Specification Summary

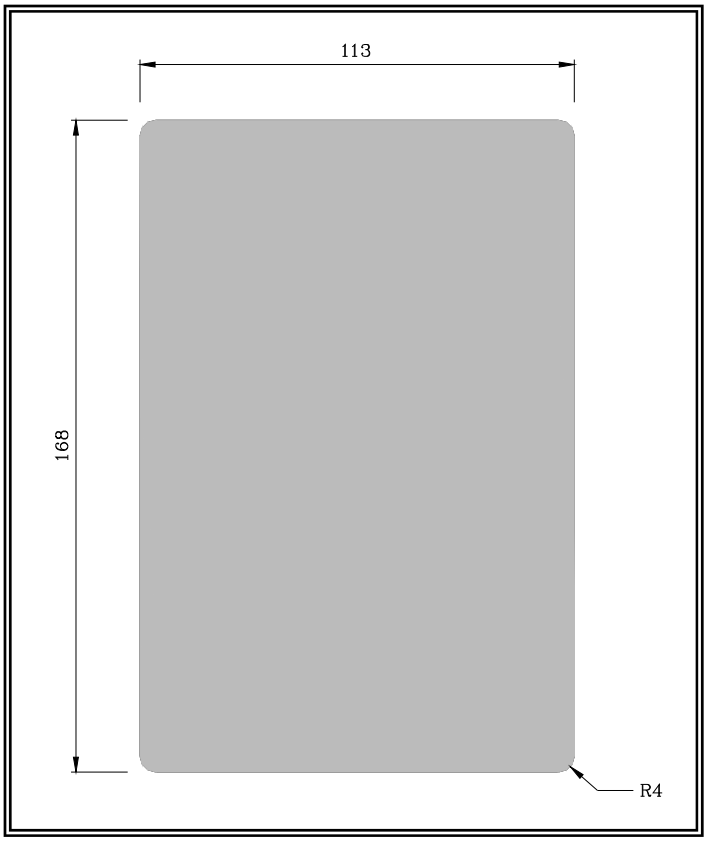
DESCRIPTION	SPECIFICATION
DC Power Supply Voltage	8 – 40 Vdc
AC Voltage Measurement Range	50 – 510 Vac 50/60 Hz
Frequency Measurement Range	45 – 70 Hz
Remote Start Contact	7A @ 250 Vac Max
Generator-1 ON Contact	7A @ 250 Vac Max
Generator-2 ON Contact	7A @ 250 Vac Max
Alarm Output Contact	7A @ 250 Vac Max
Operating Temperature	-20 to +60 ˚C
Storage Temperature	-30 to +80 ˚C
Operating Humidity	Max. 90%
Panel Cut-Out	168.0 (L) x 113.0 (W) +/- 0.5 mm
Dimensions	180.0 (L) x 125.0 (W) x 42.0 (H) mm
Weight	495 g +/- 2%

SECTION 4: INSTALLATION INSTRUCTIONS

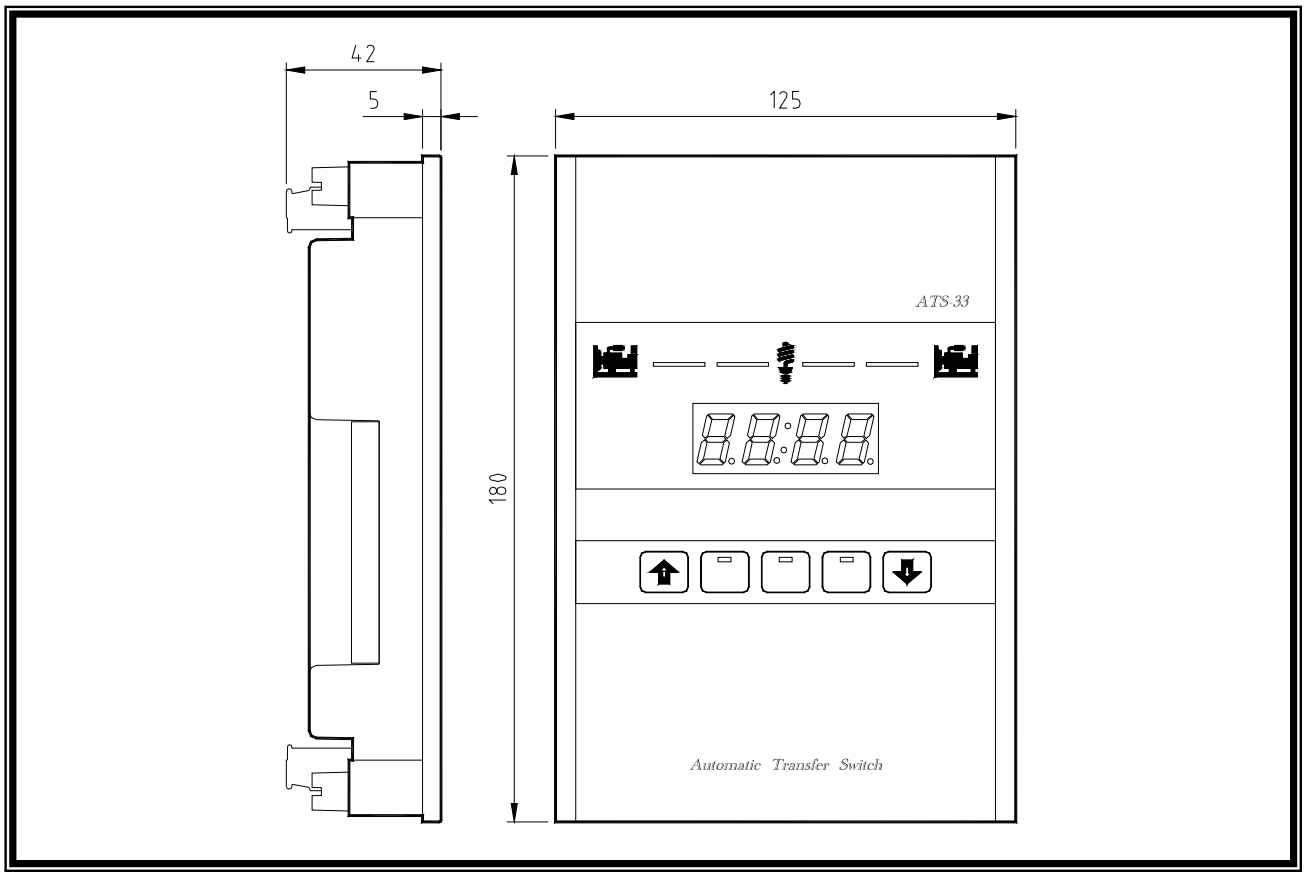
4.1 General

The ATS-33 controller has been designed for front panel mounting.

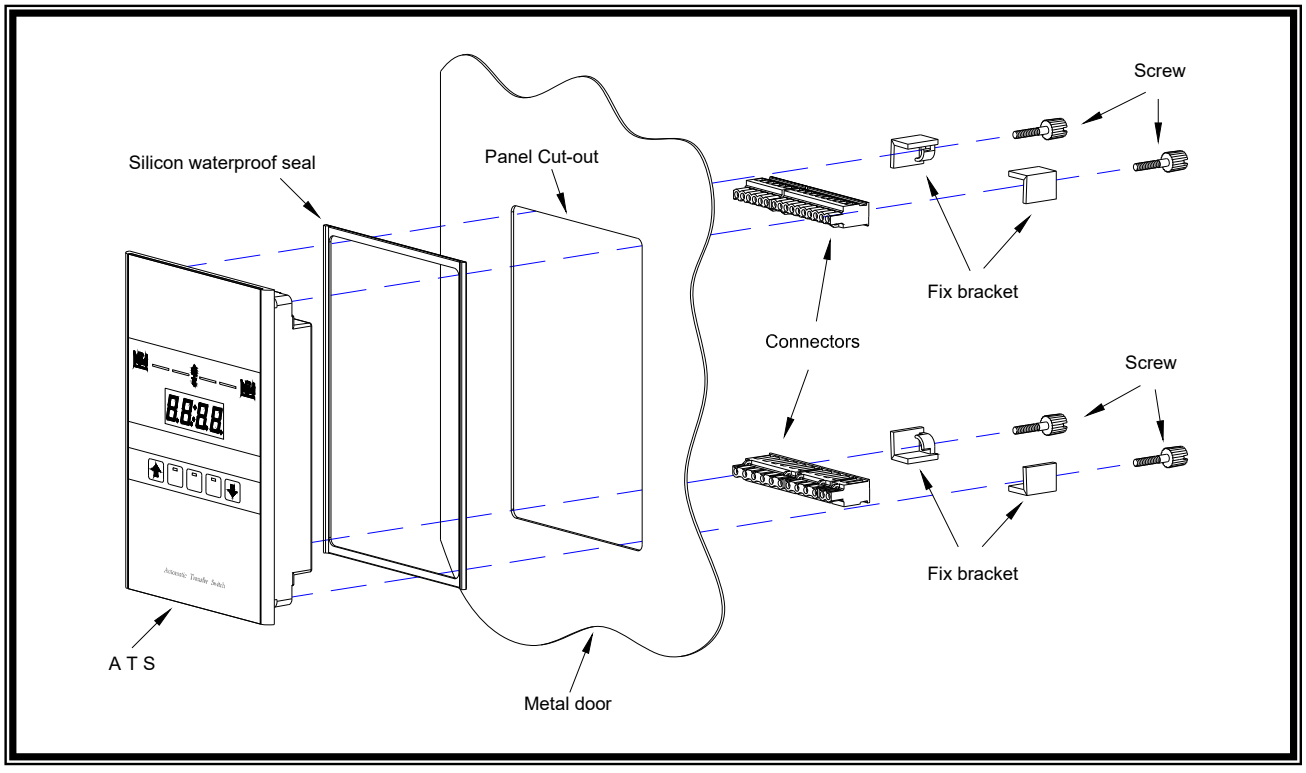
4.2 Panel Cut-Out (All Dimensions in mm.)



4.3 Unit Dimensions (All Dimensions in mm.)

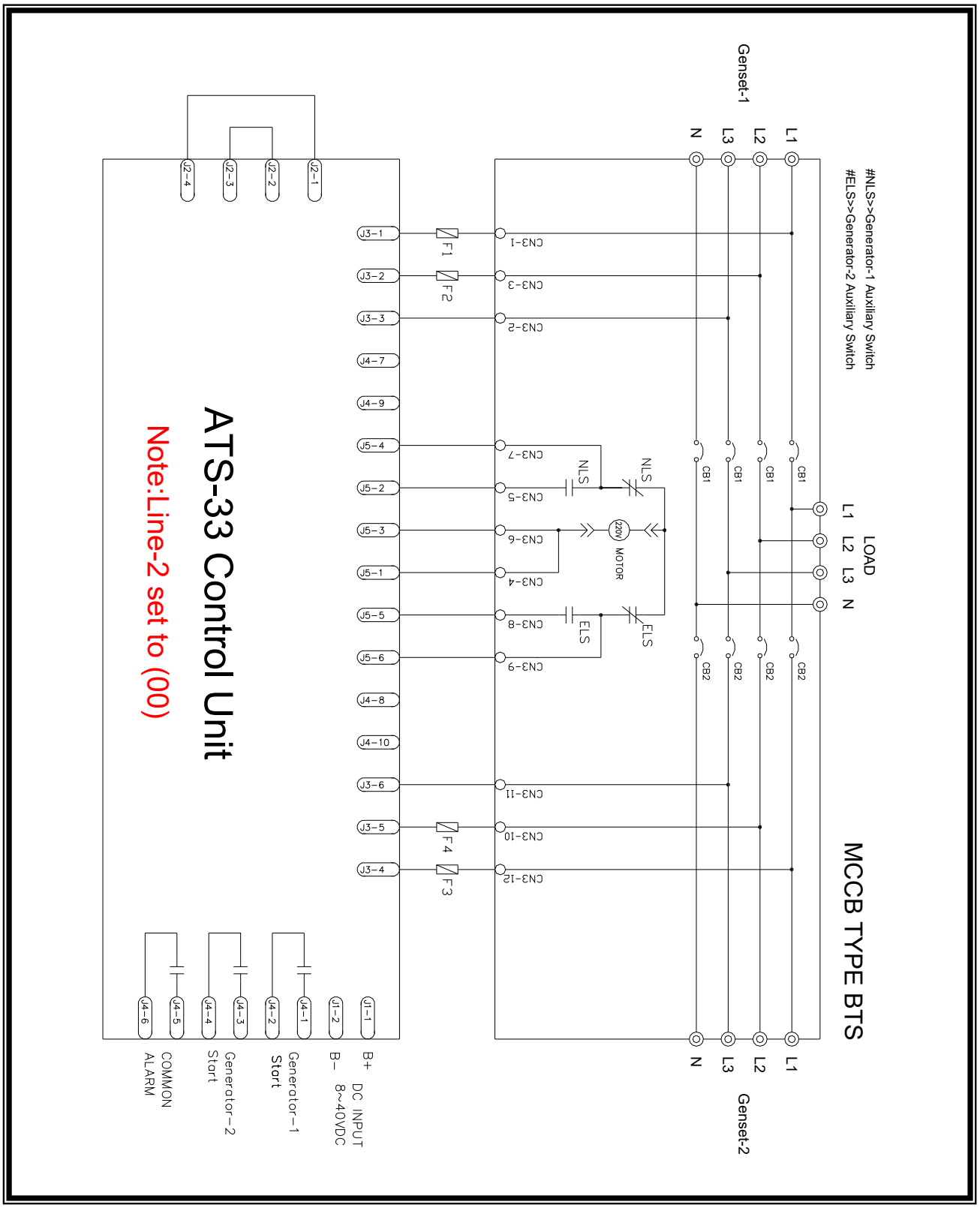


4.4 Installation Reference

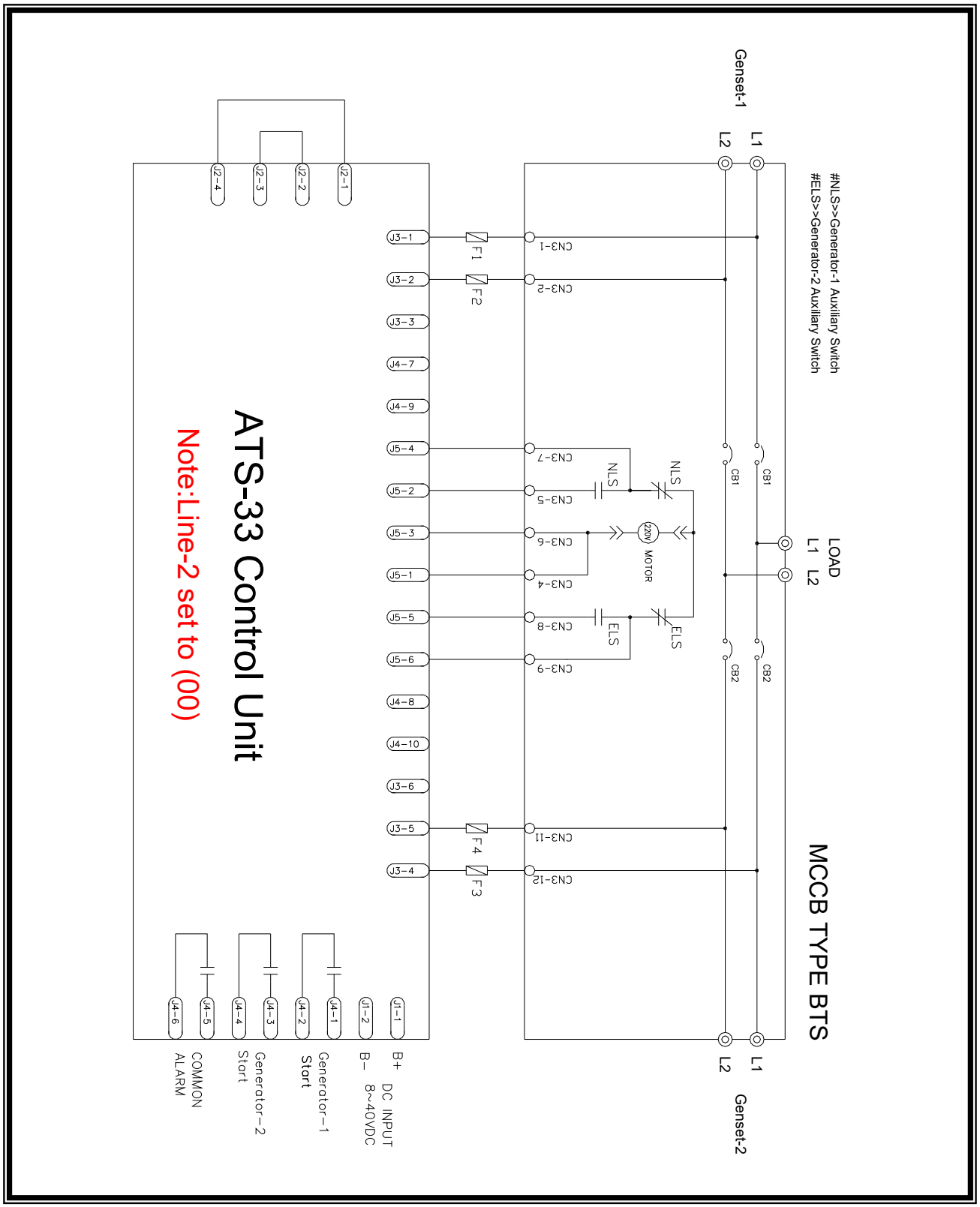


SECTION 5 : TYPICAL WIRING

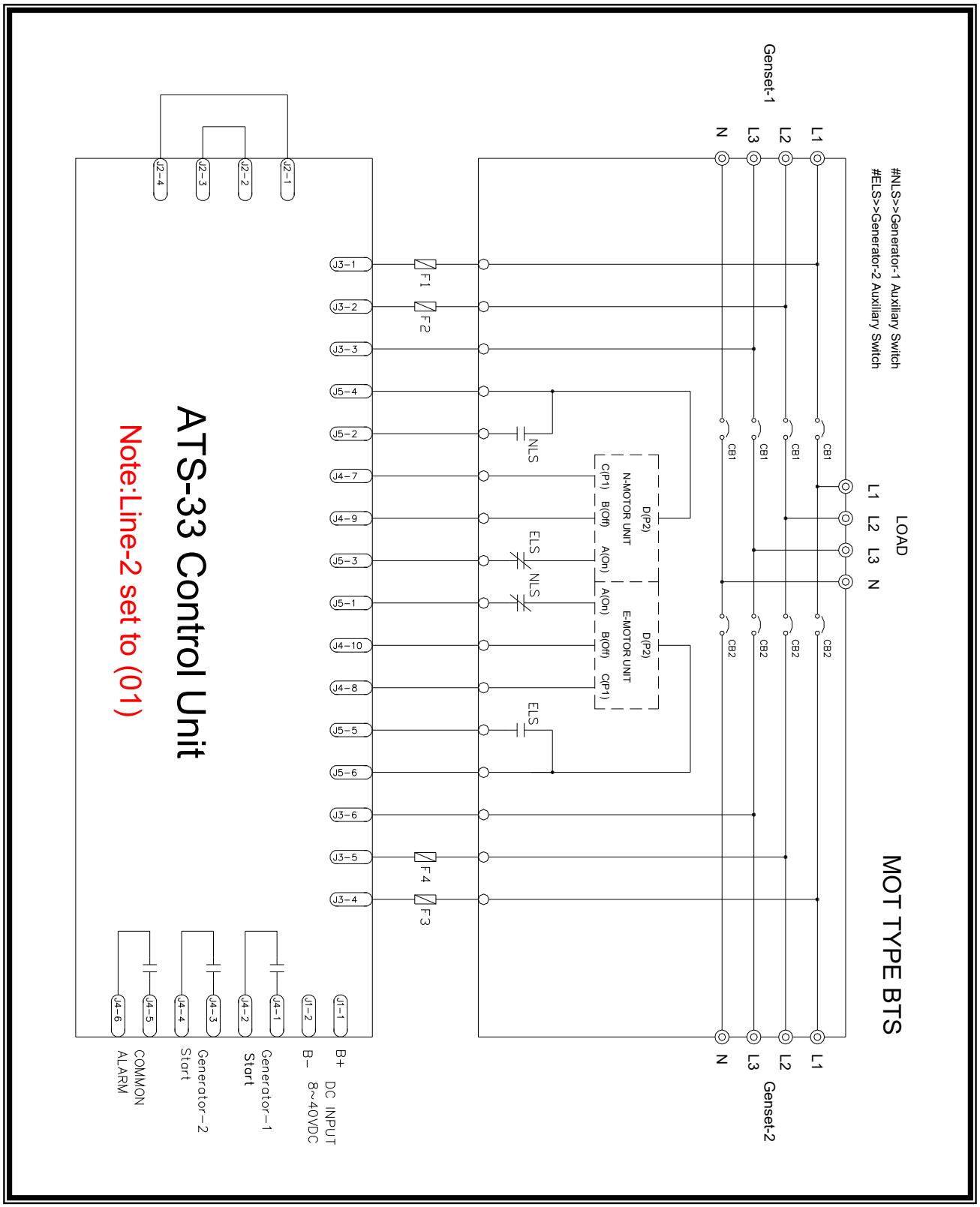
5.1 MCCB Type ATS Wiring Diagram (3P/4P 220 Vac)



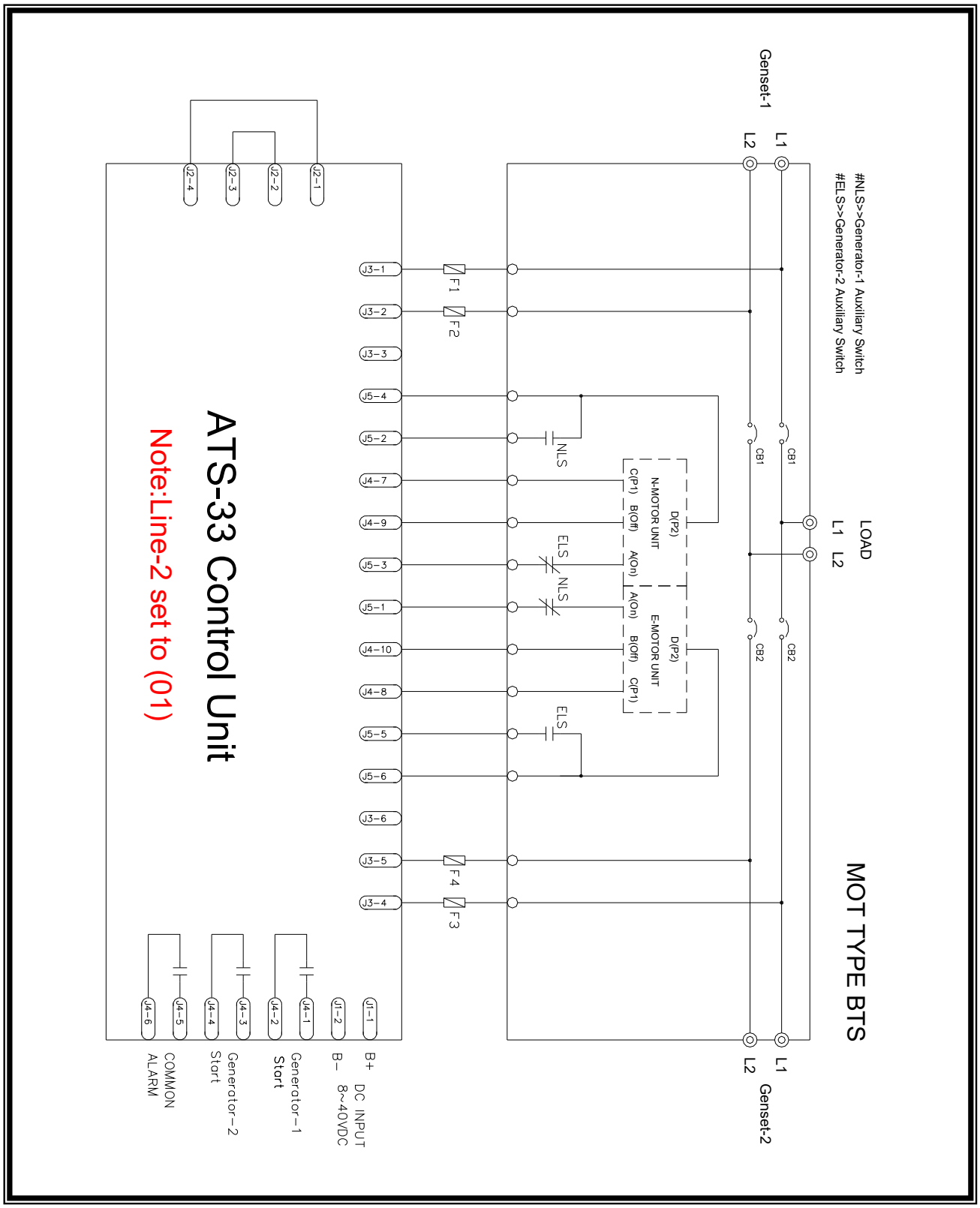
5.2 MCCB Type ATS Wiring Diagram (2P 220 Vac)



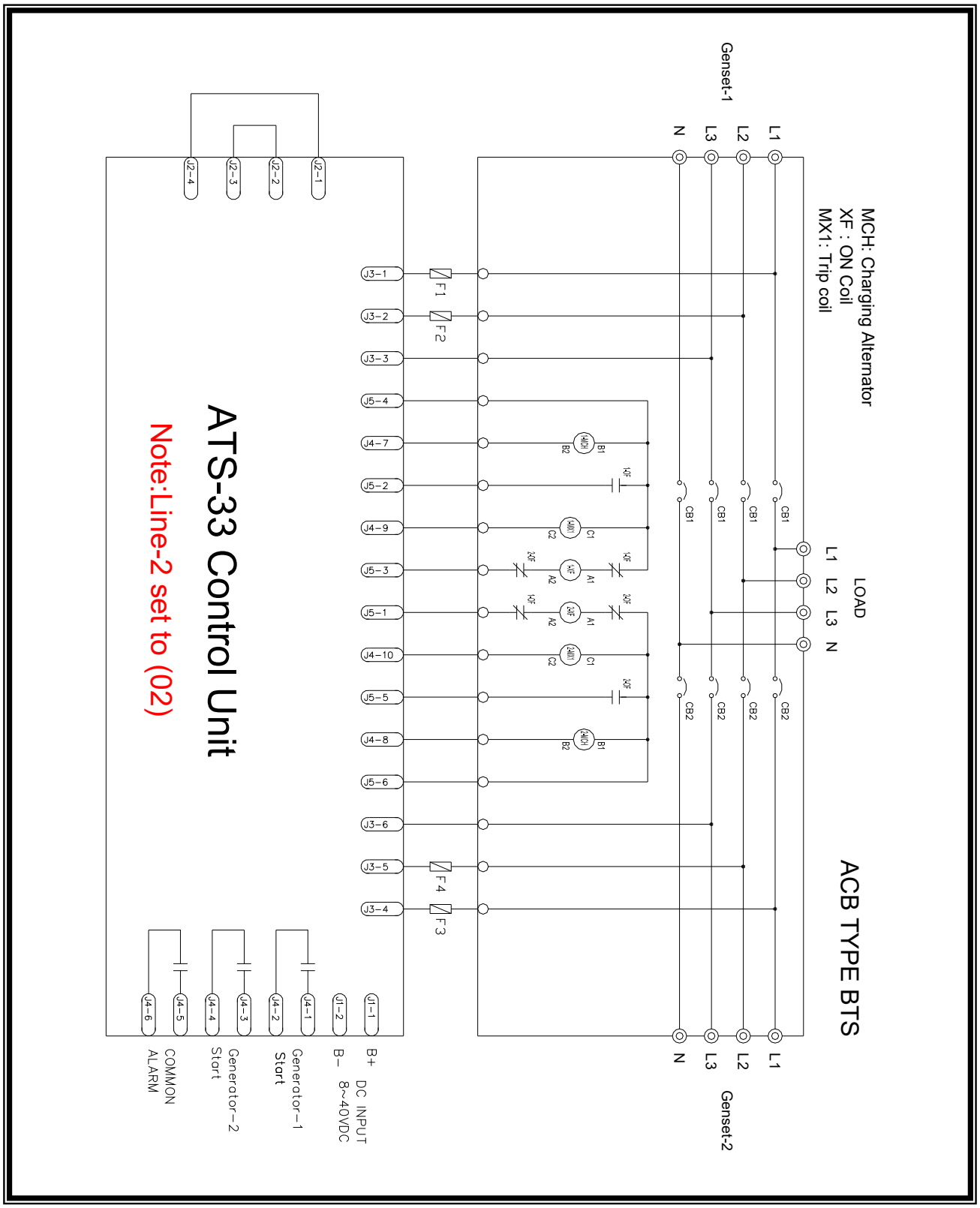
5.3 MOT Type ATS Wiring Diagram (3P/4P 220 Vac)



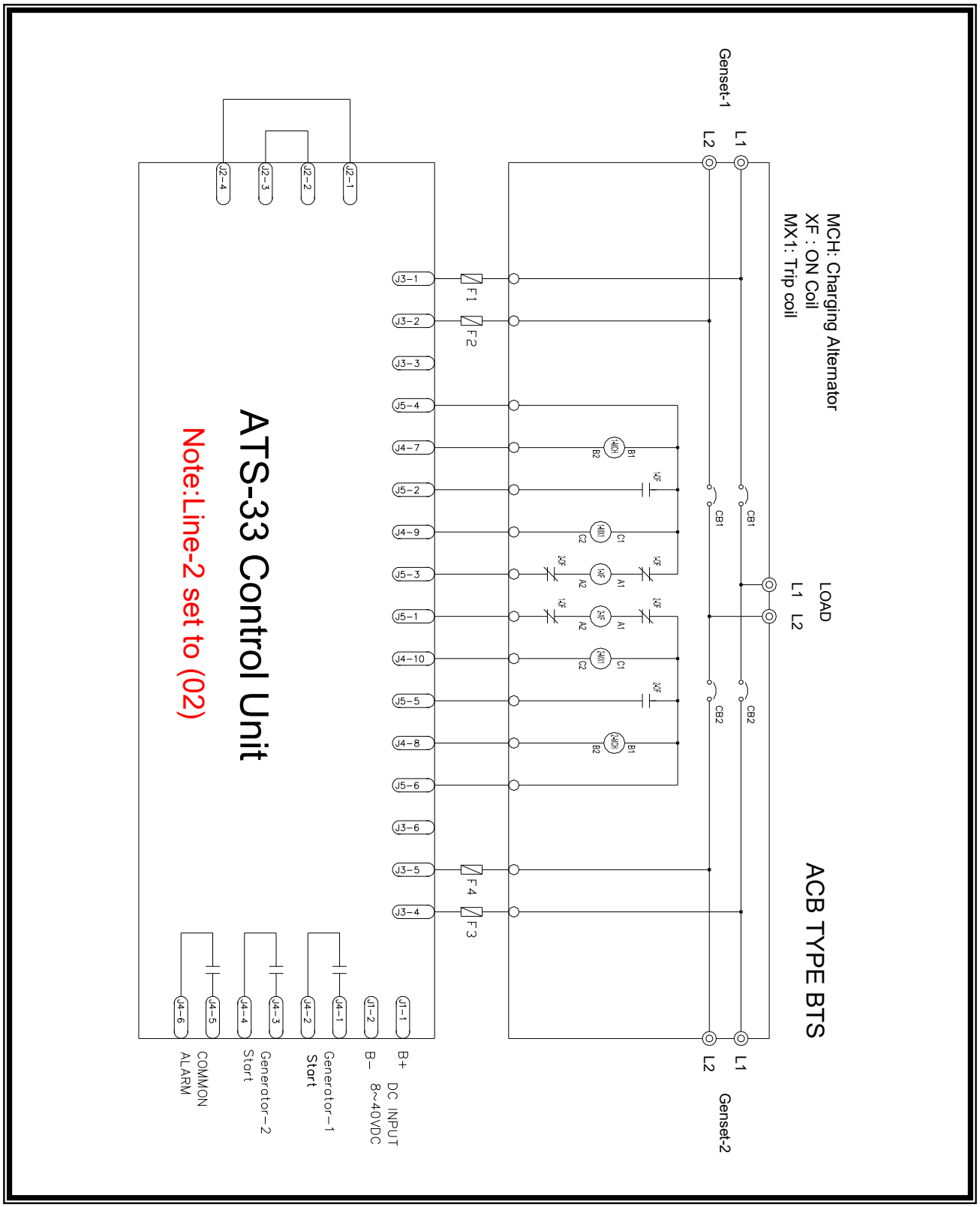
5.4 MOT Type ATS Wiring Diagram (2P 220 Vac)



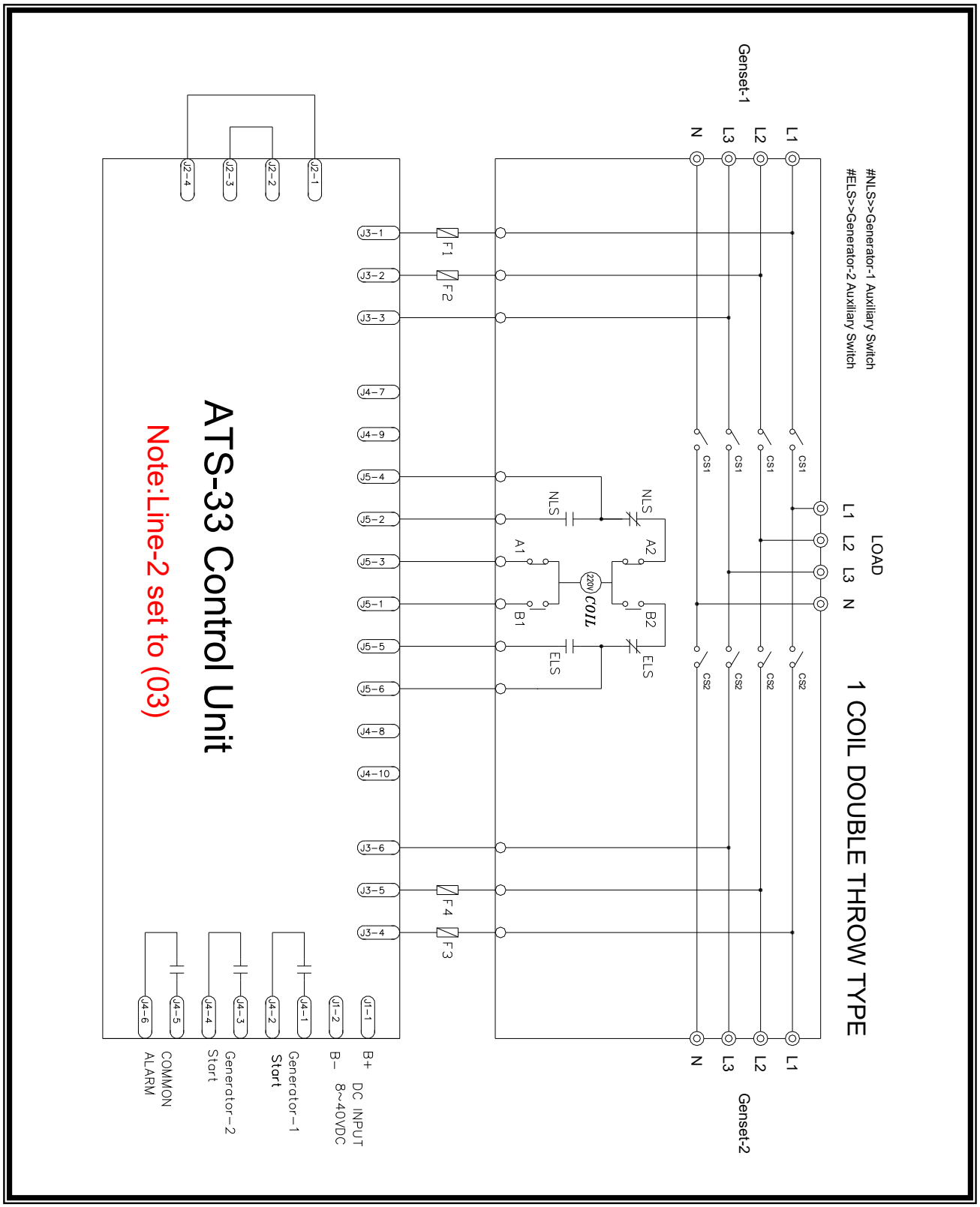
5.5 Air Circuit Breaker Type ATS Wiring Diagram (3P/4P 220 Vac)



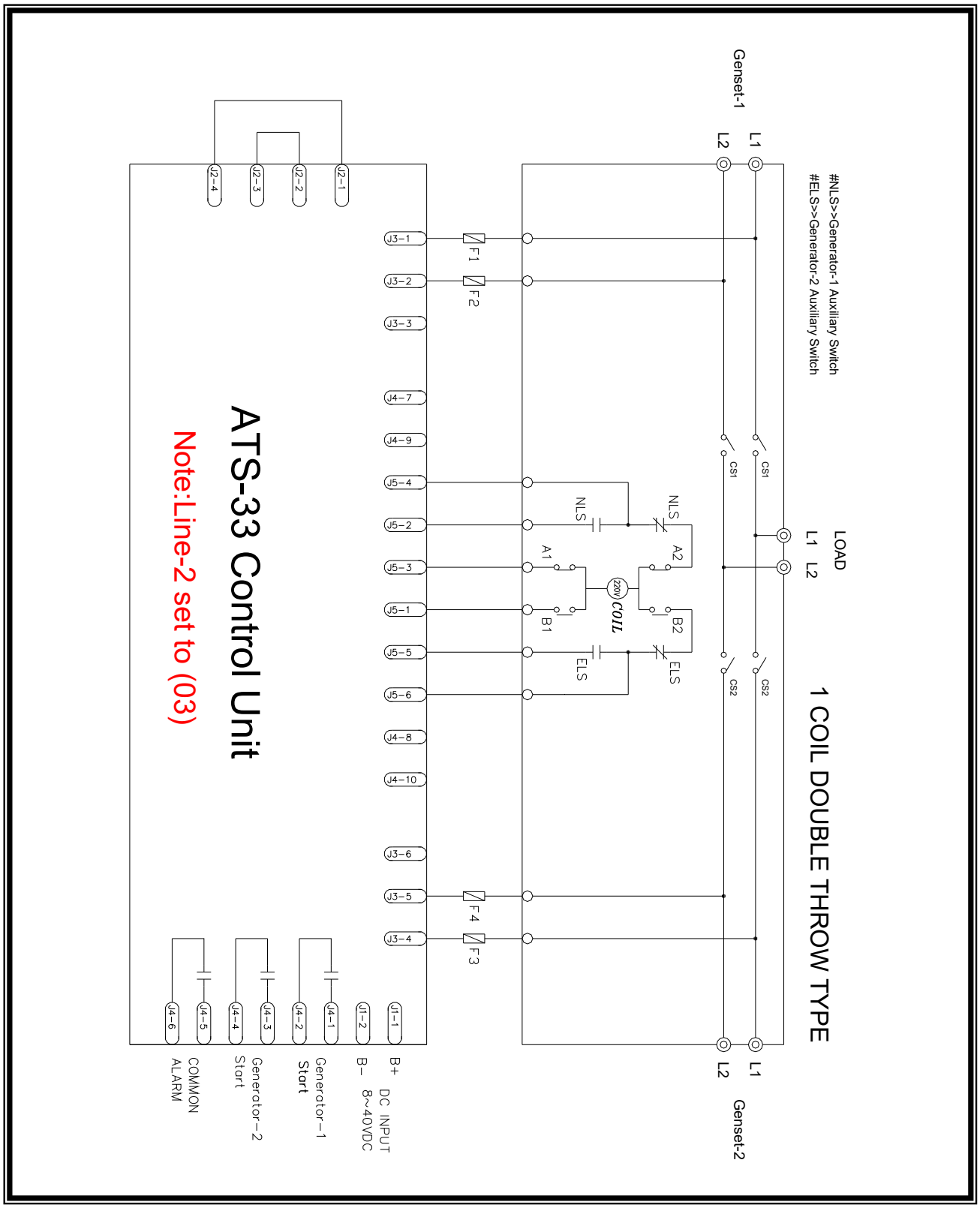
5.6 Air Circuit Breaker Type ATS Wiring Diagram (2P 220 Vac)



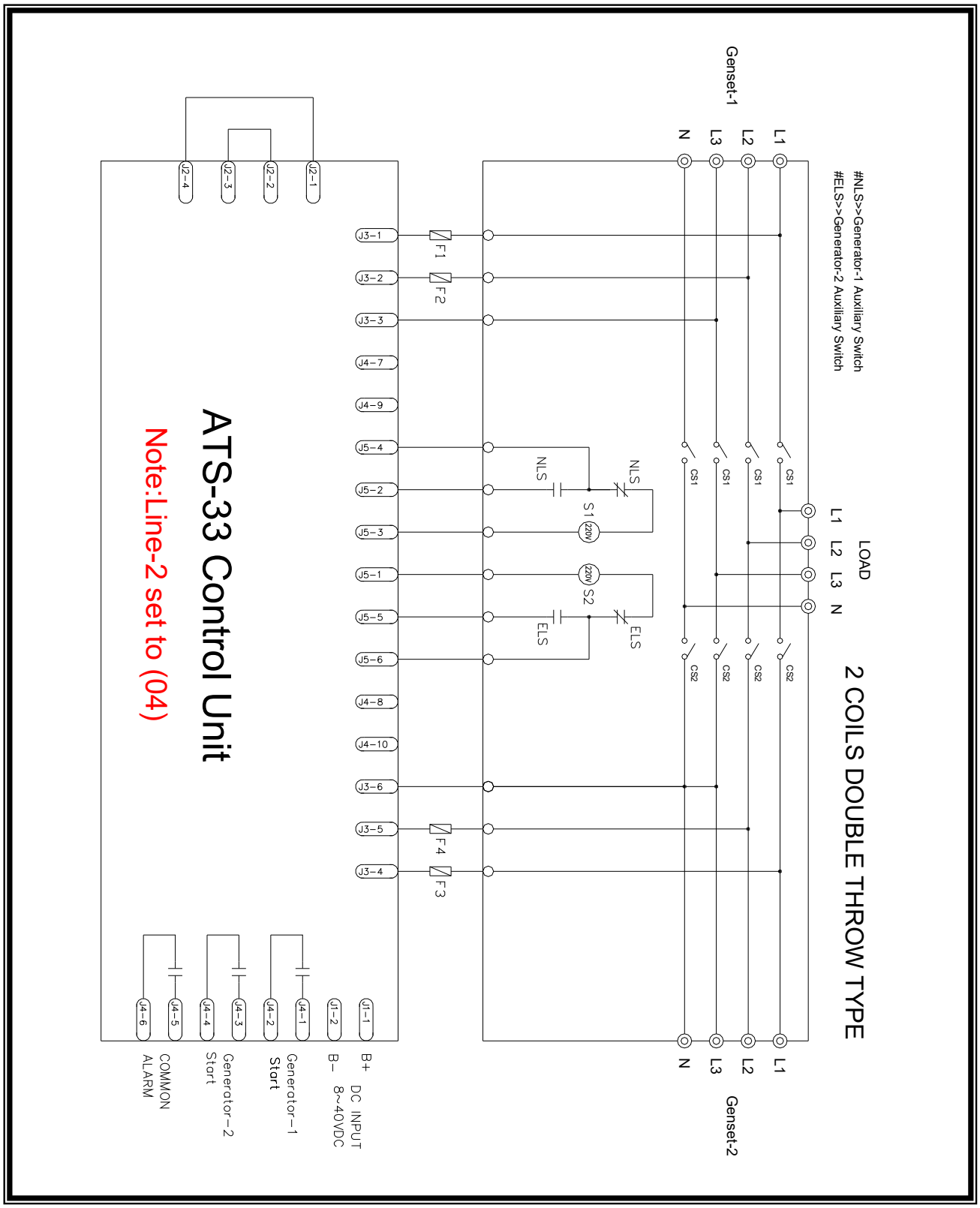
5.7 Single Coil Double Throw Type ATS Wiring Diagram (3P/4P 220 Vac)



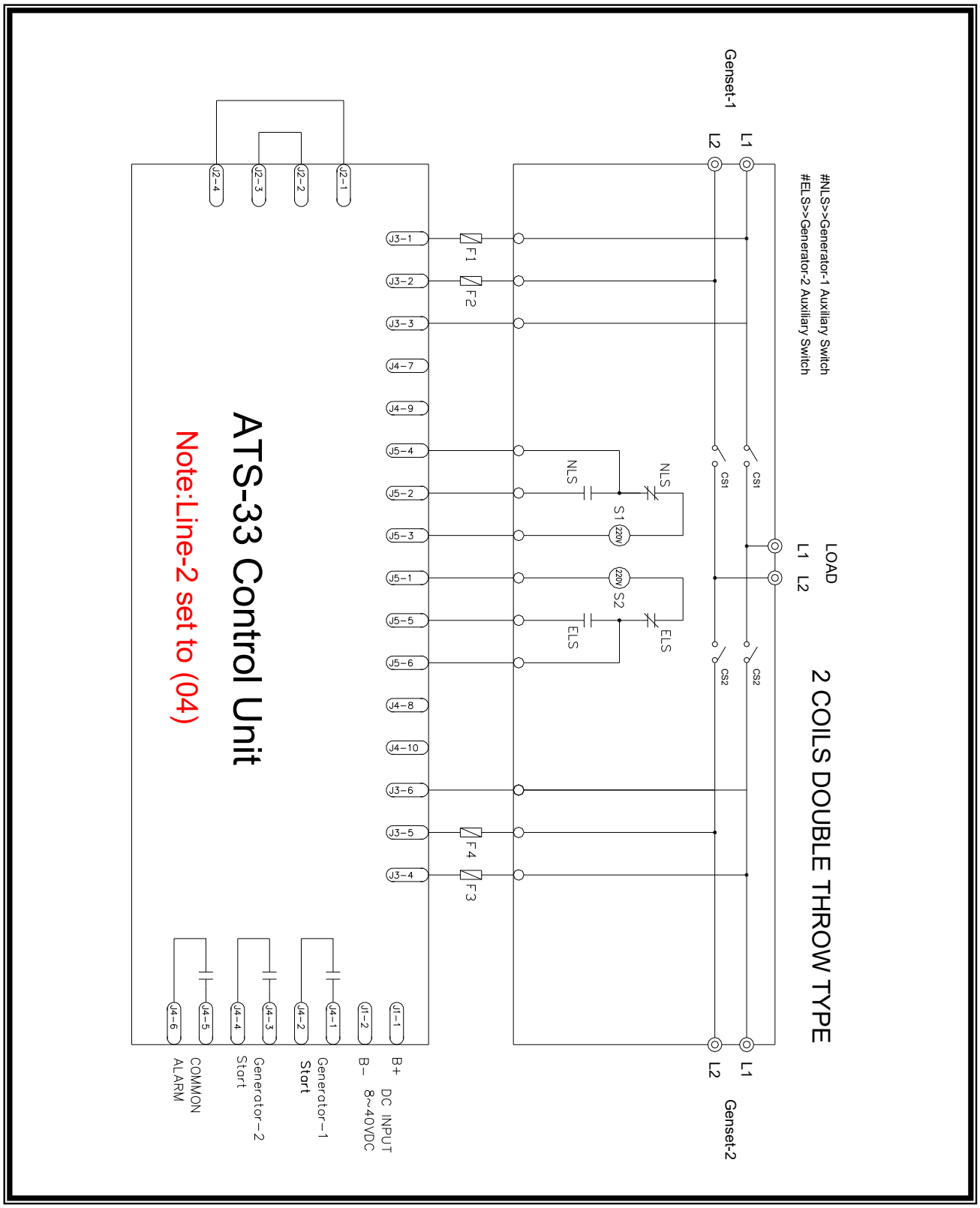
5.8 Single Coil Double Throw Type ATS Wiring Diagram (2P 220 Vac)



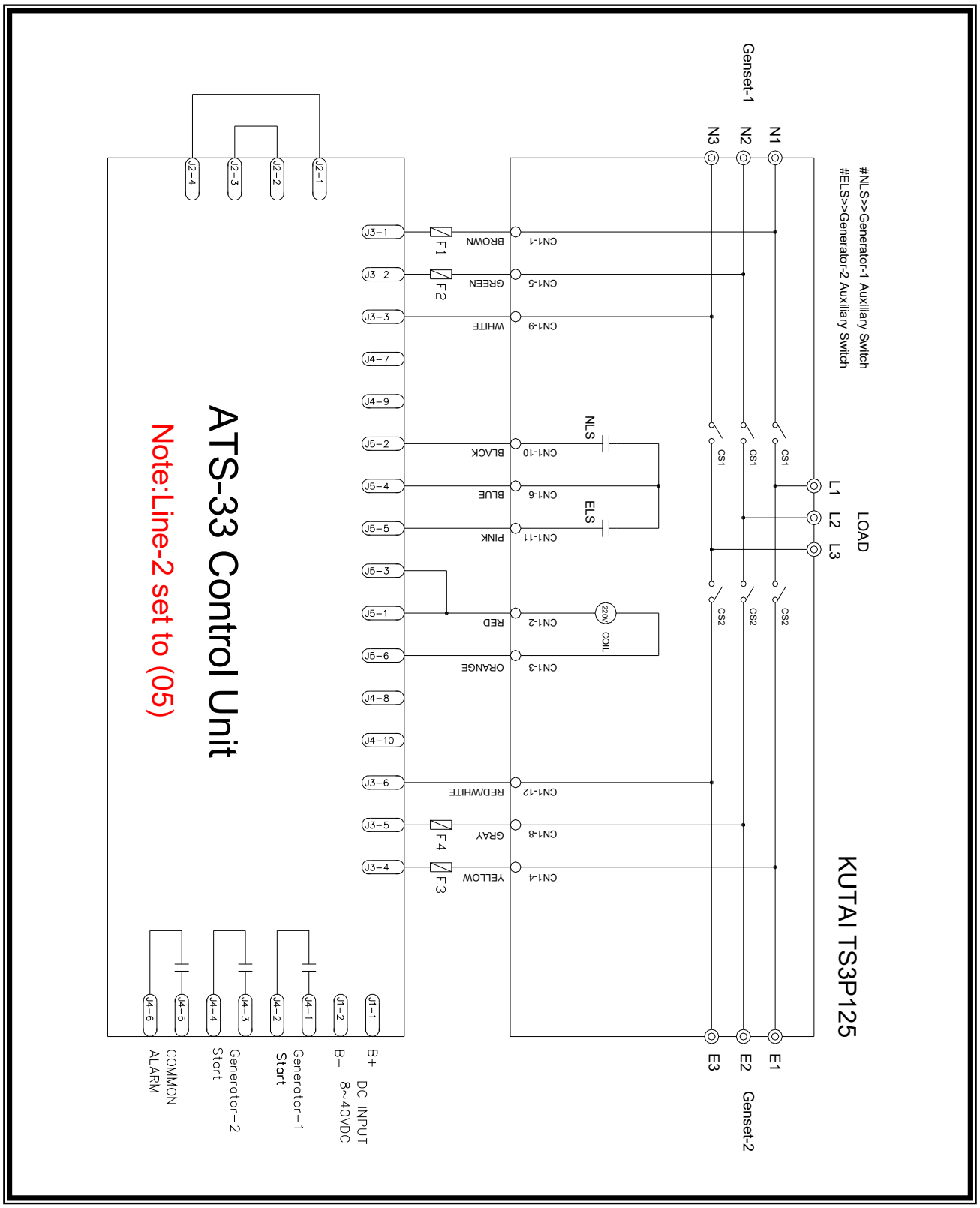
5.9 Dual Coil Double Throw Type ATS Wiring Diagram (3P/4P 220 Vac)



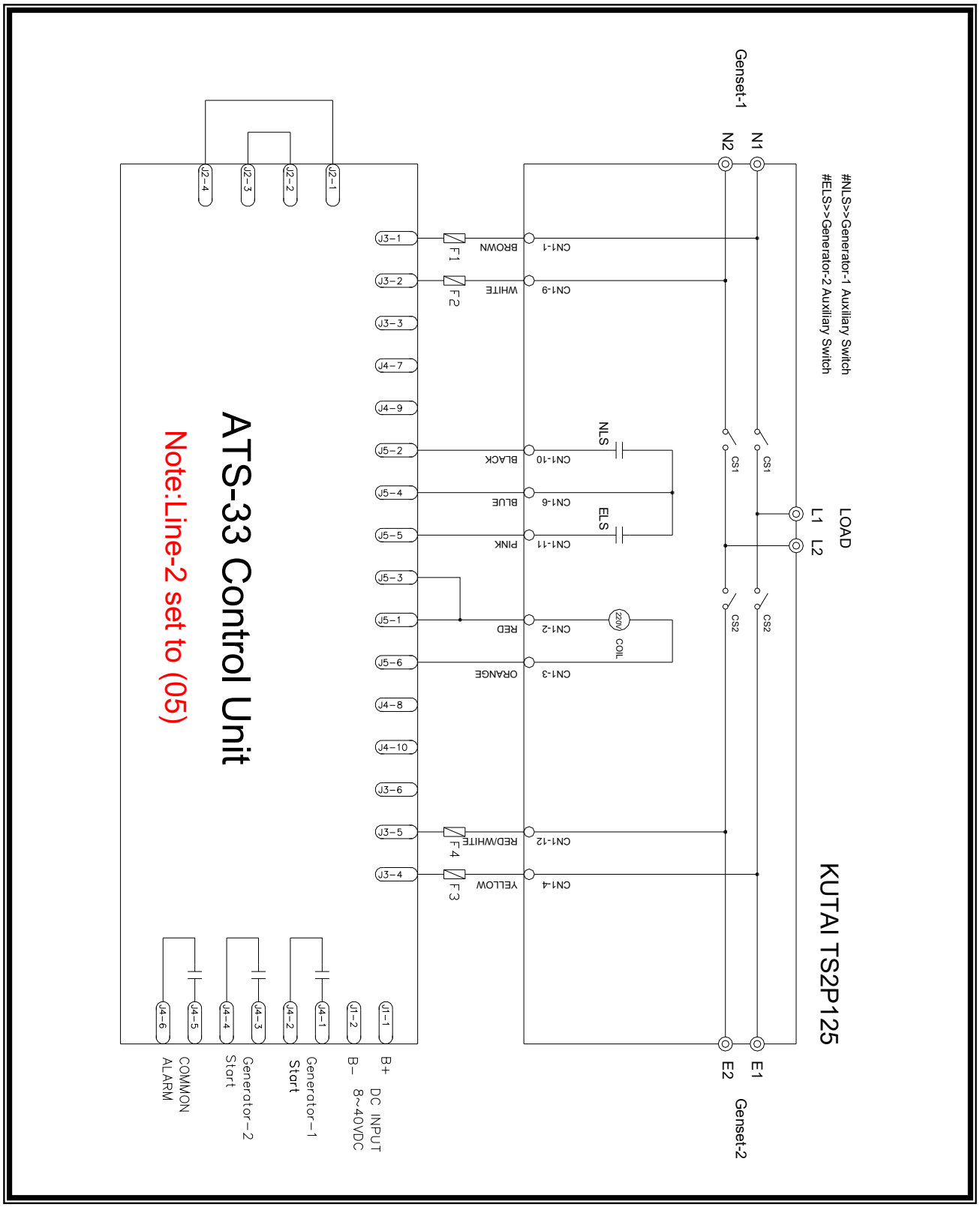
5.10 Dual Coil Double Throw Type ATS Wiring Diagram (2P 220 Vac)



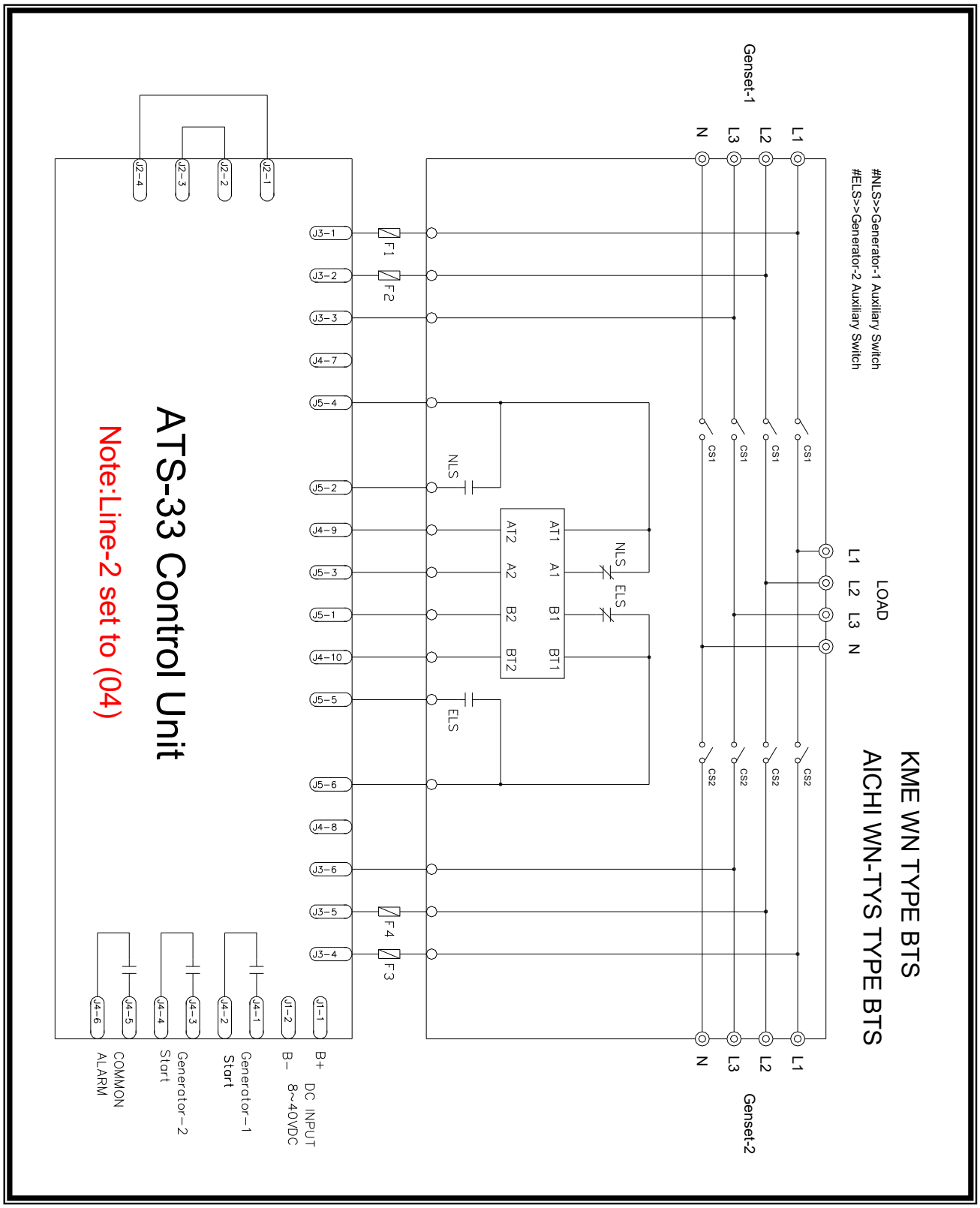
5.11 KUTAI TS-XXX Type ATS Wiring Diagram (3P/4P 220 Vac)



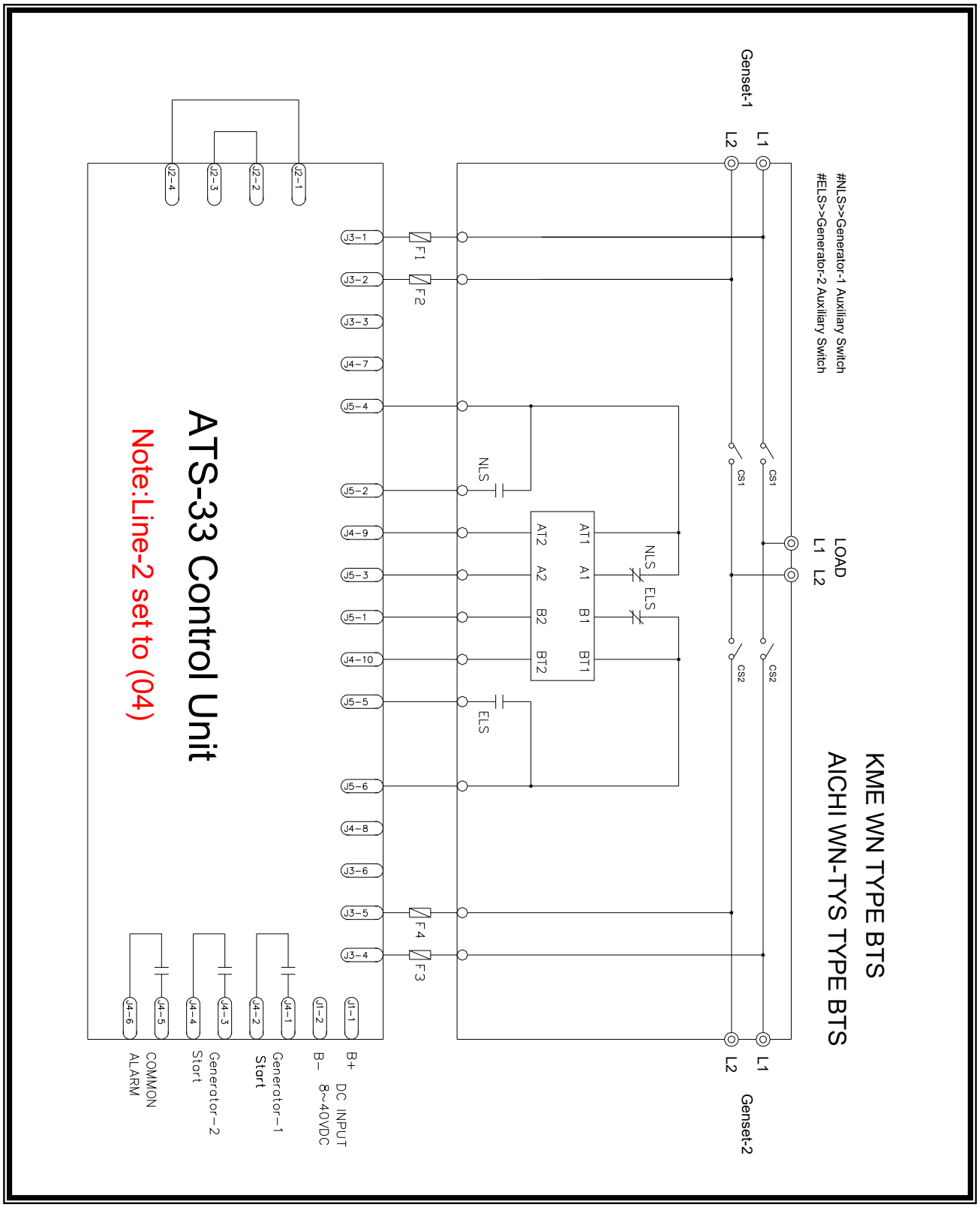
5.12 KUTAI TS-XXX Type ATS Wiring Diagram (2P 220 Vac)



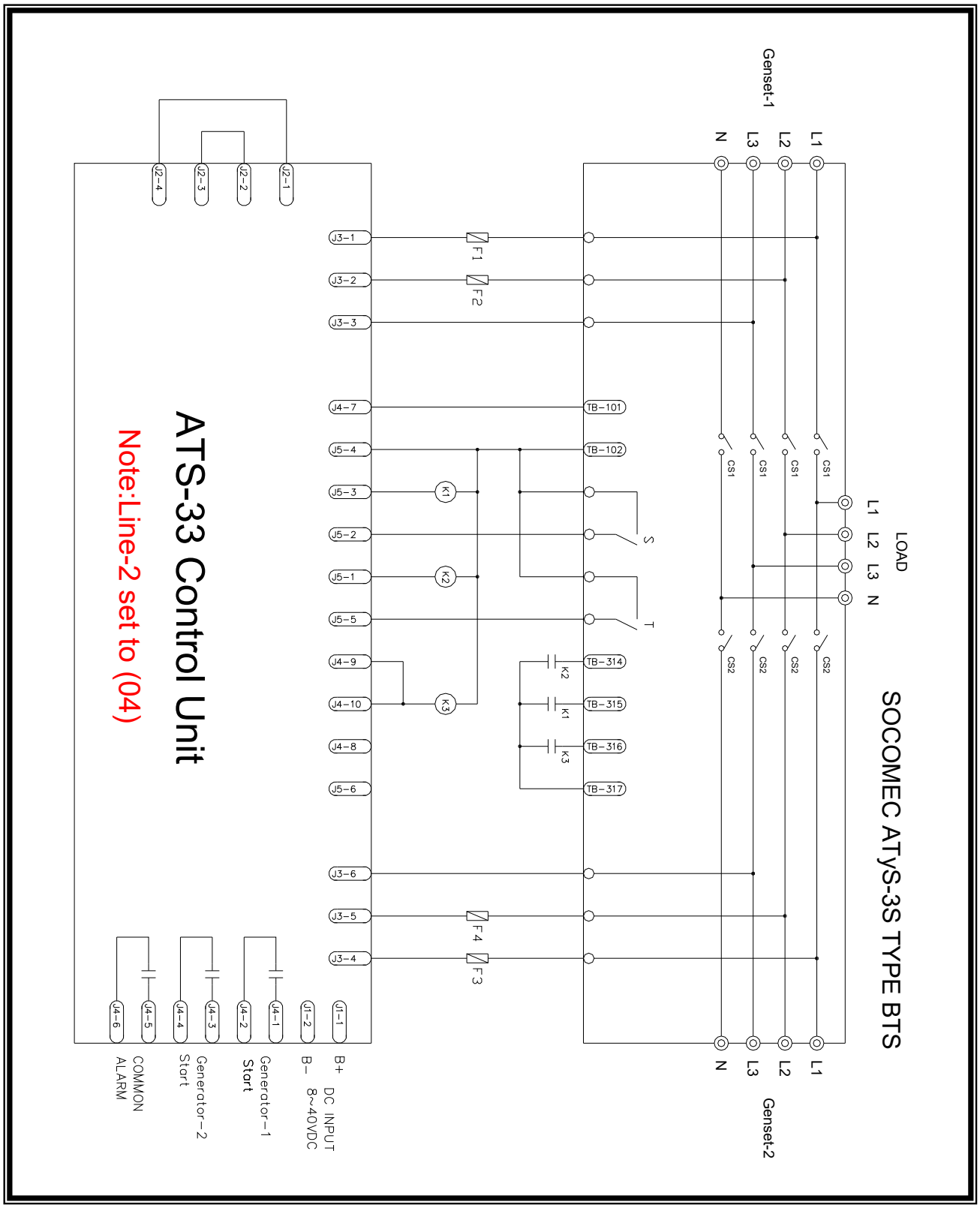
5.13 KME WN Type and AICHI WN type ATS Wiring Diagram (3P/4P 220 Vac)



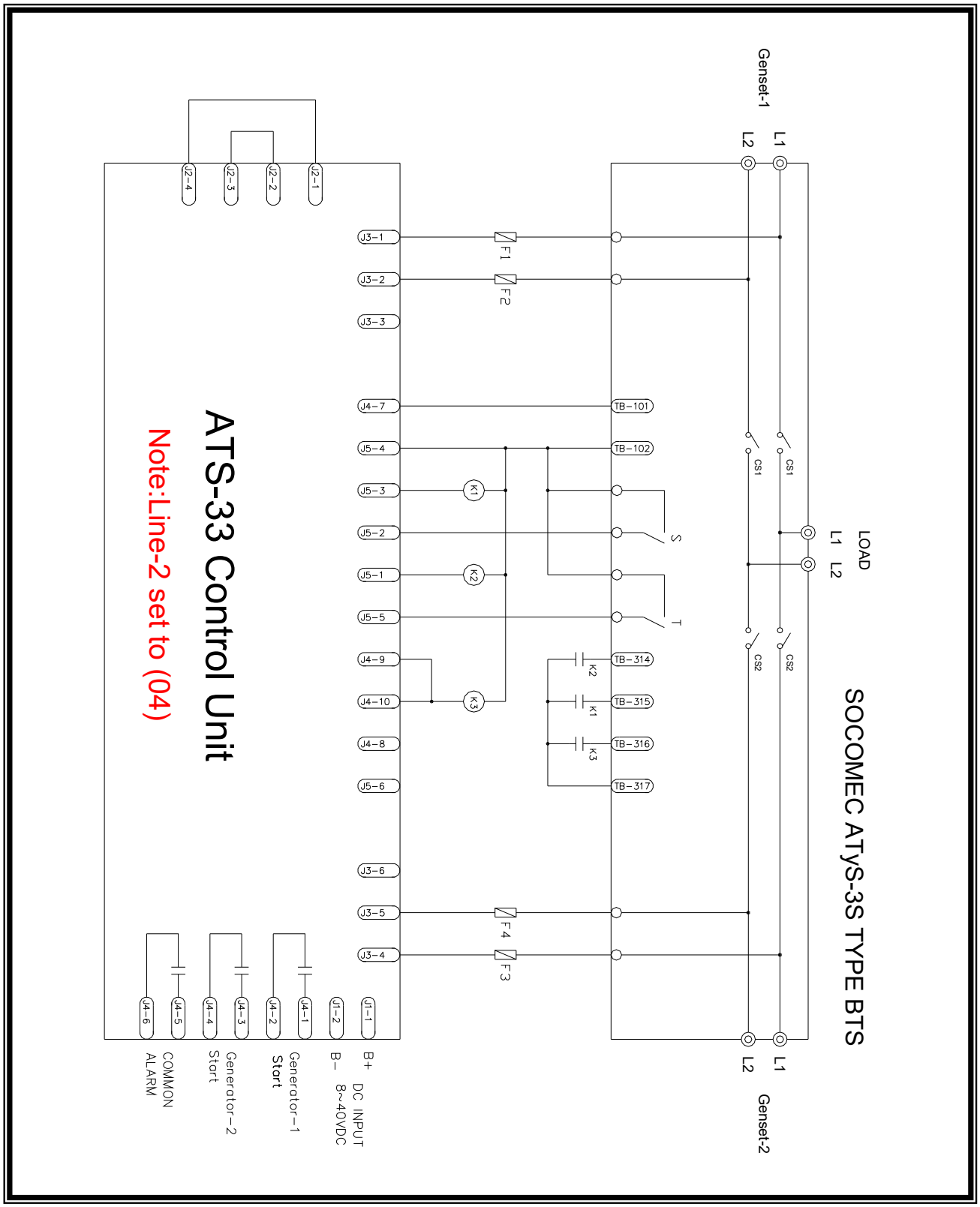
5.14 KME WN Type and AICHI WN type ATS Wiring Diagram (2P 220 Vac)



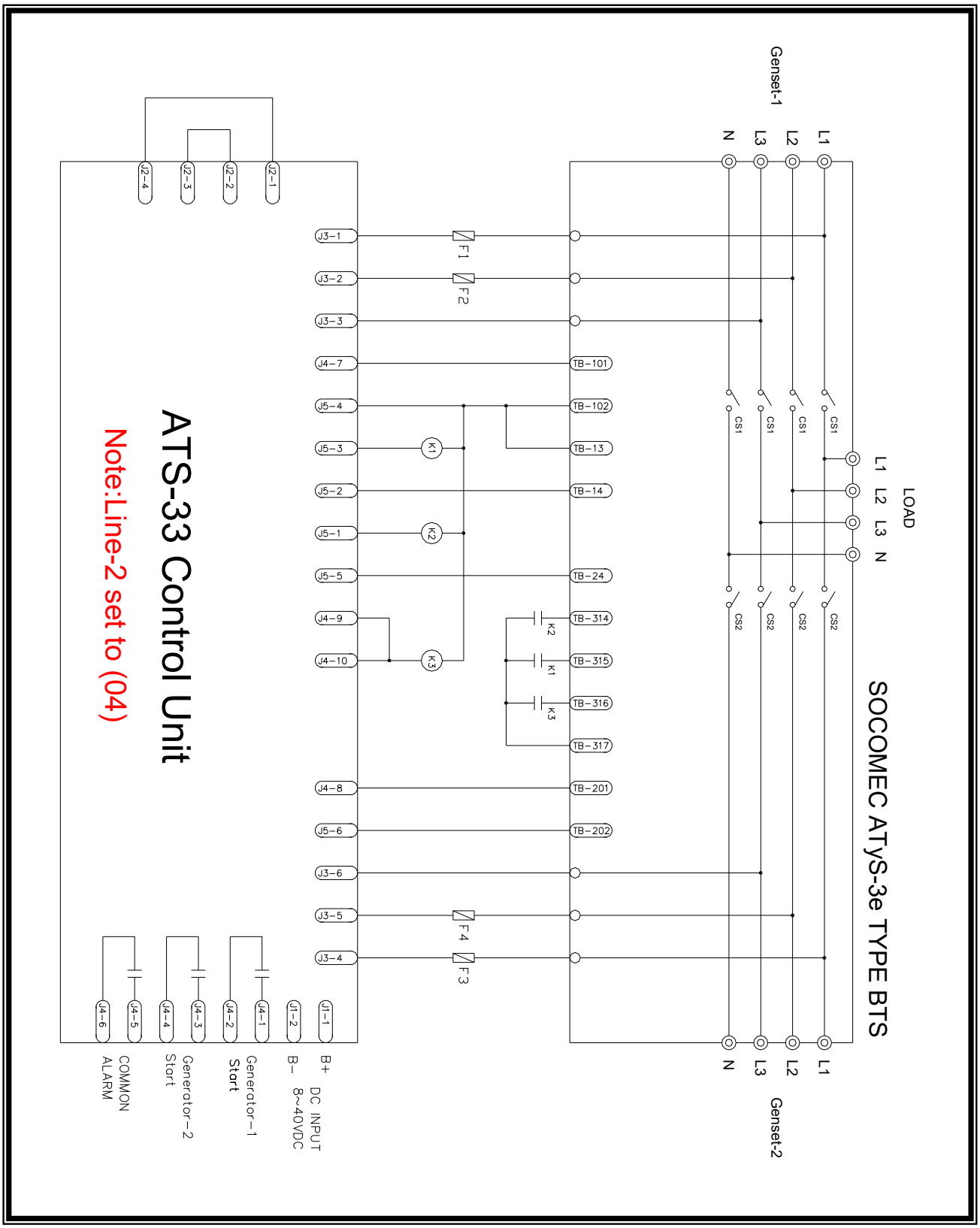
5.15 SOCOMEC ATyS-3S type ATS Wiring Diagram (3P/4P 220 Vac)



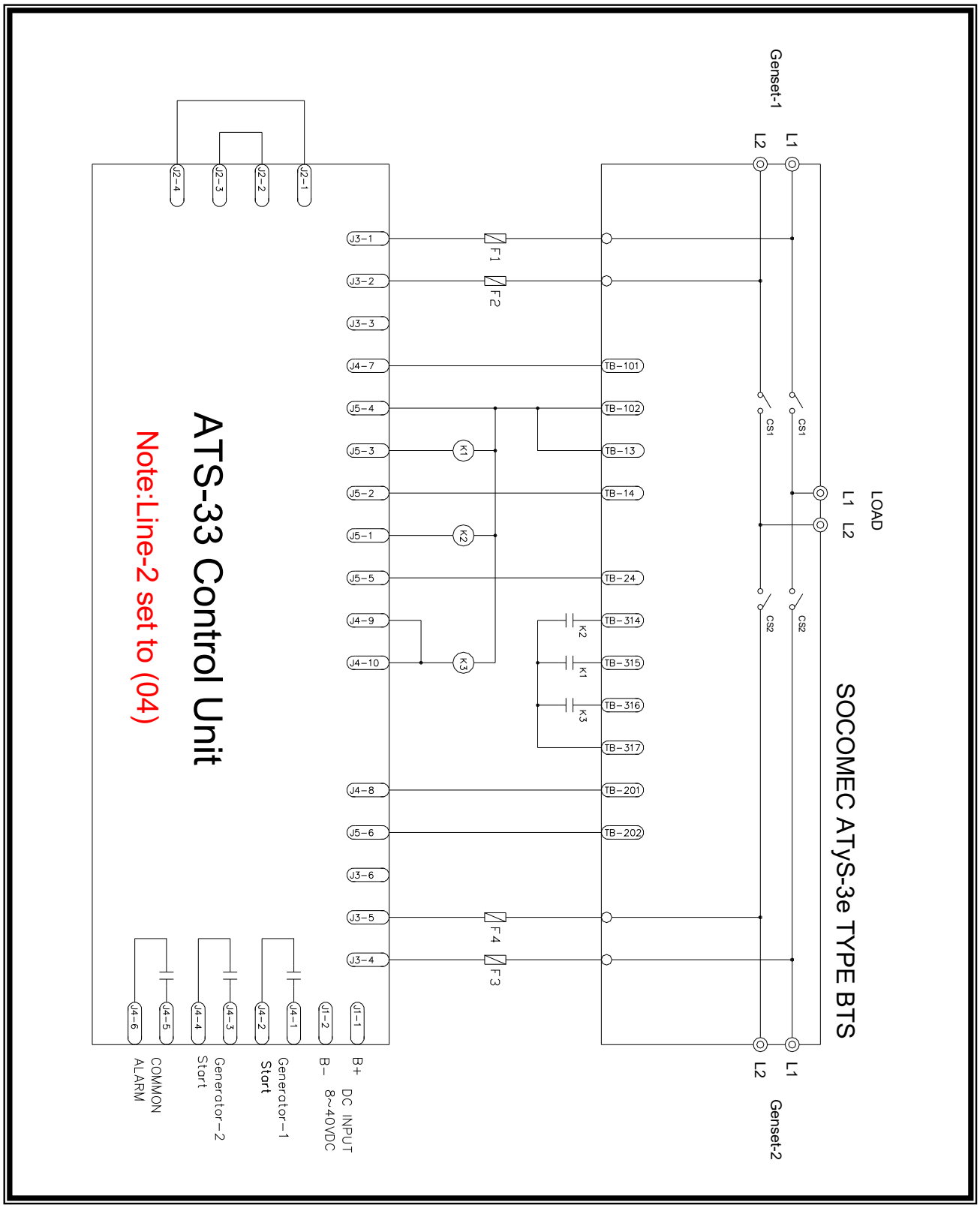
5.16 SOCOMEC ATyS-3S type ATS Wiring Diagram (2P 220 Vac)



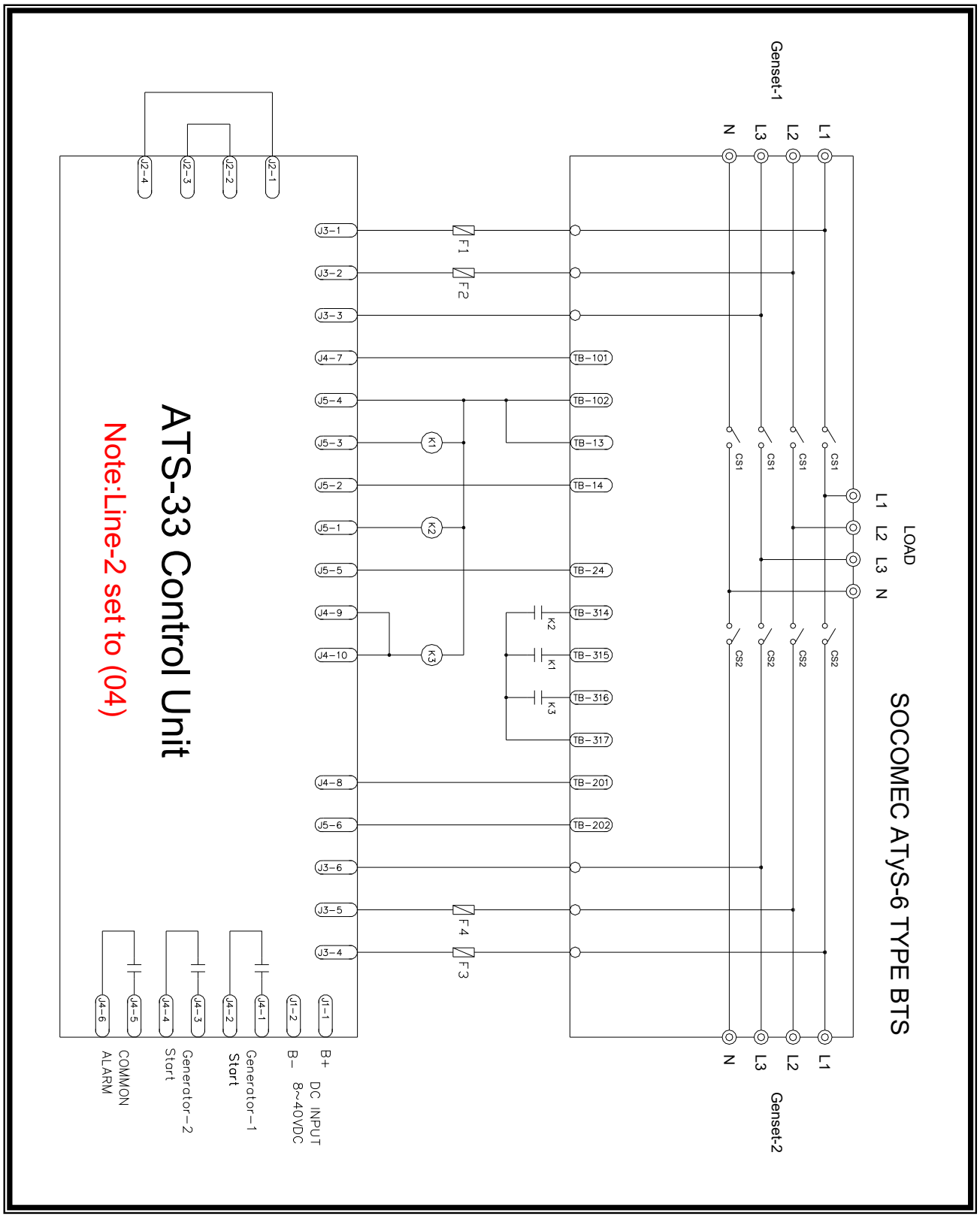
5.17 SOCOMEC ATyS-3e type ATS Wiring Diagram (3P/4P 220 Vac)



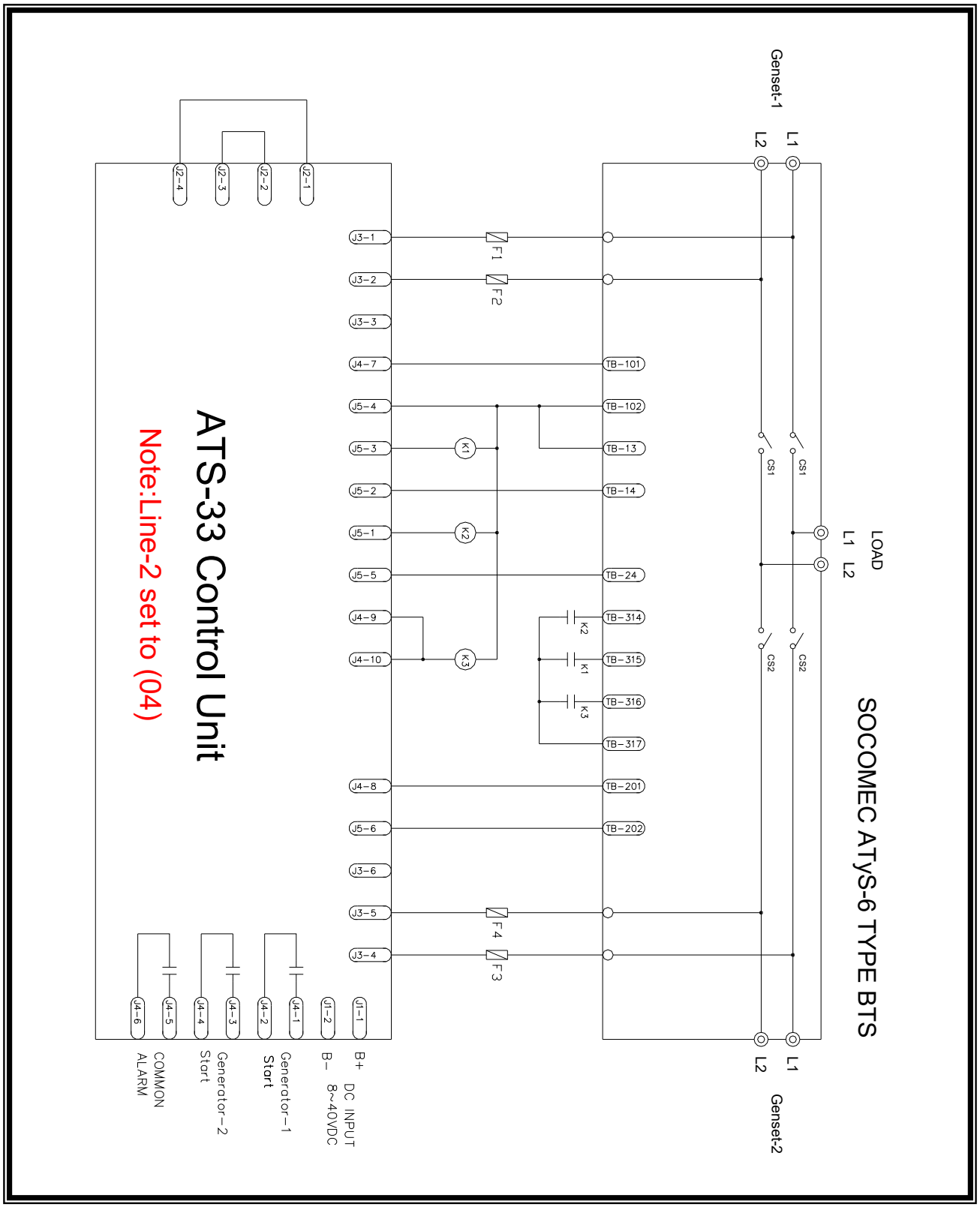
5.18 SOCOMEC ATyS-3e type ATS Wiring Diagram (2P 220 Vac)



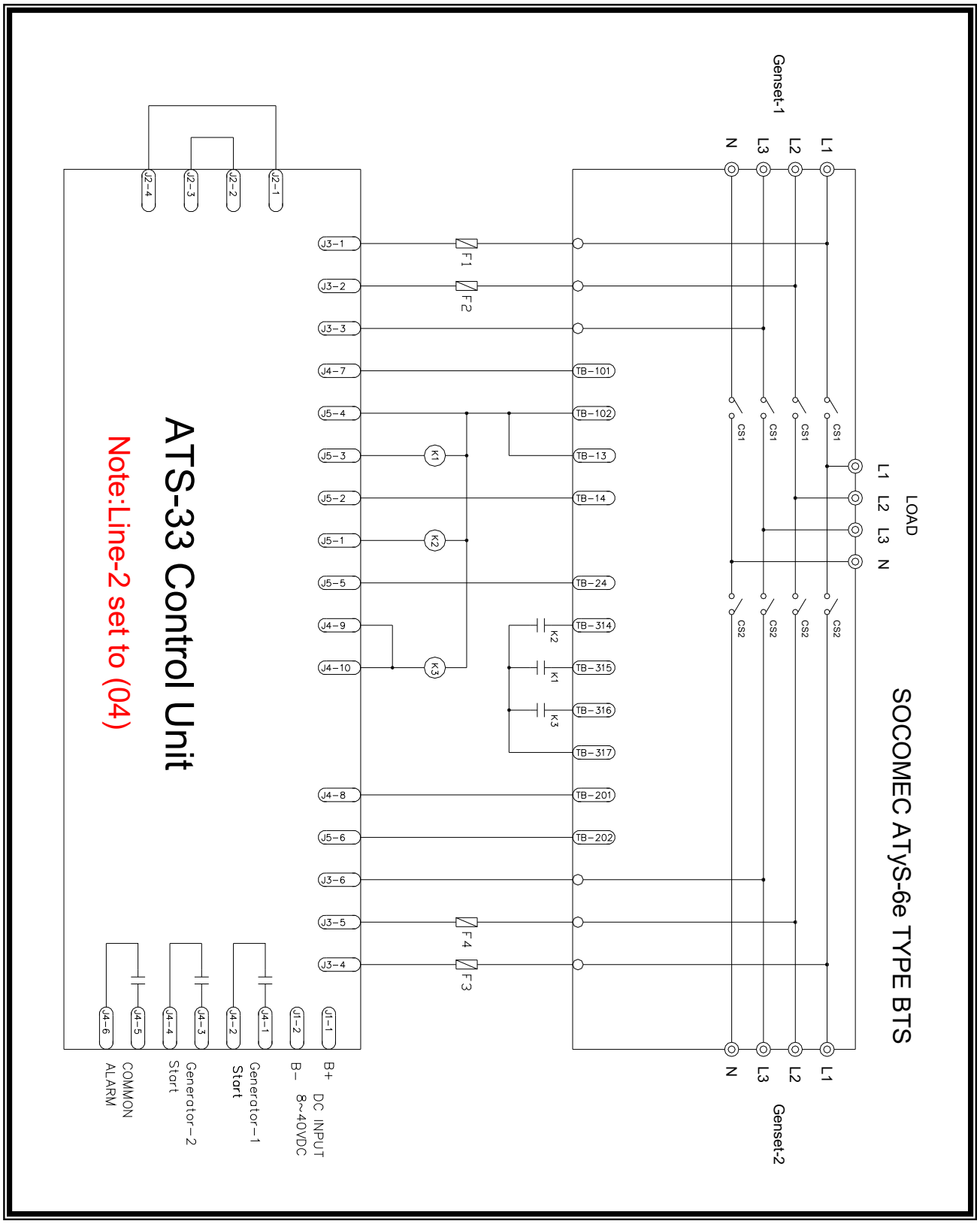
5.19 SOCOMEC ATyS-6 type ATS Wiring Diagram (3P/4P 220 Vac)



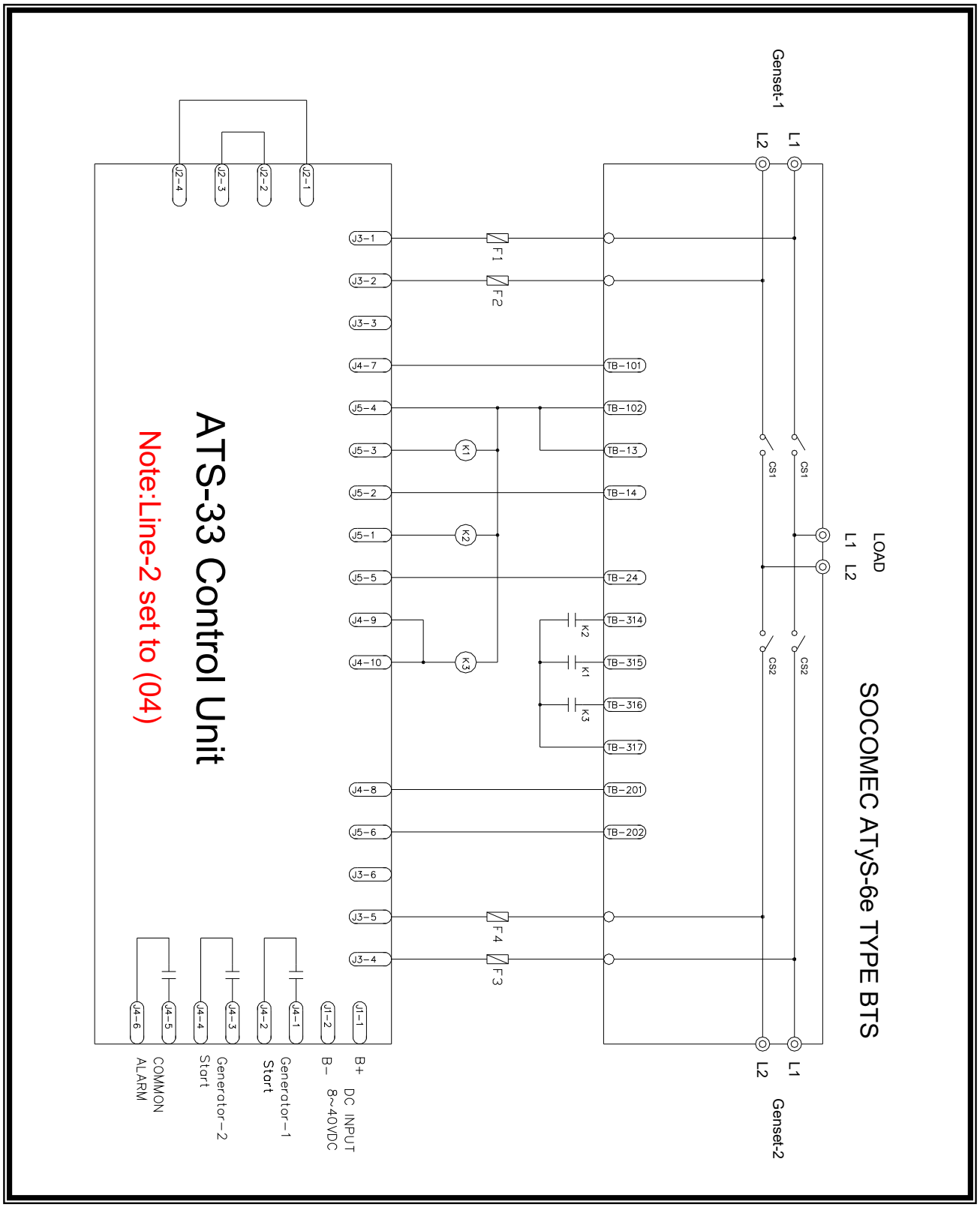
5.20 SOCOMEC ATyS-6 type ATS Wiring Diagram (2P 220 Vac)



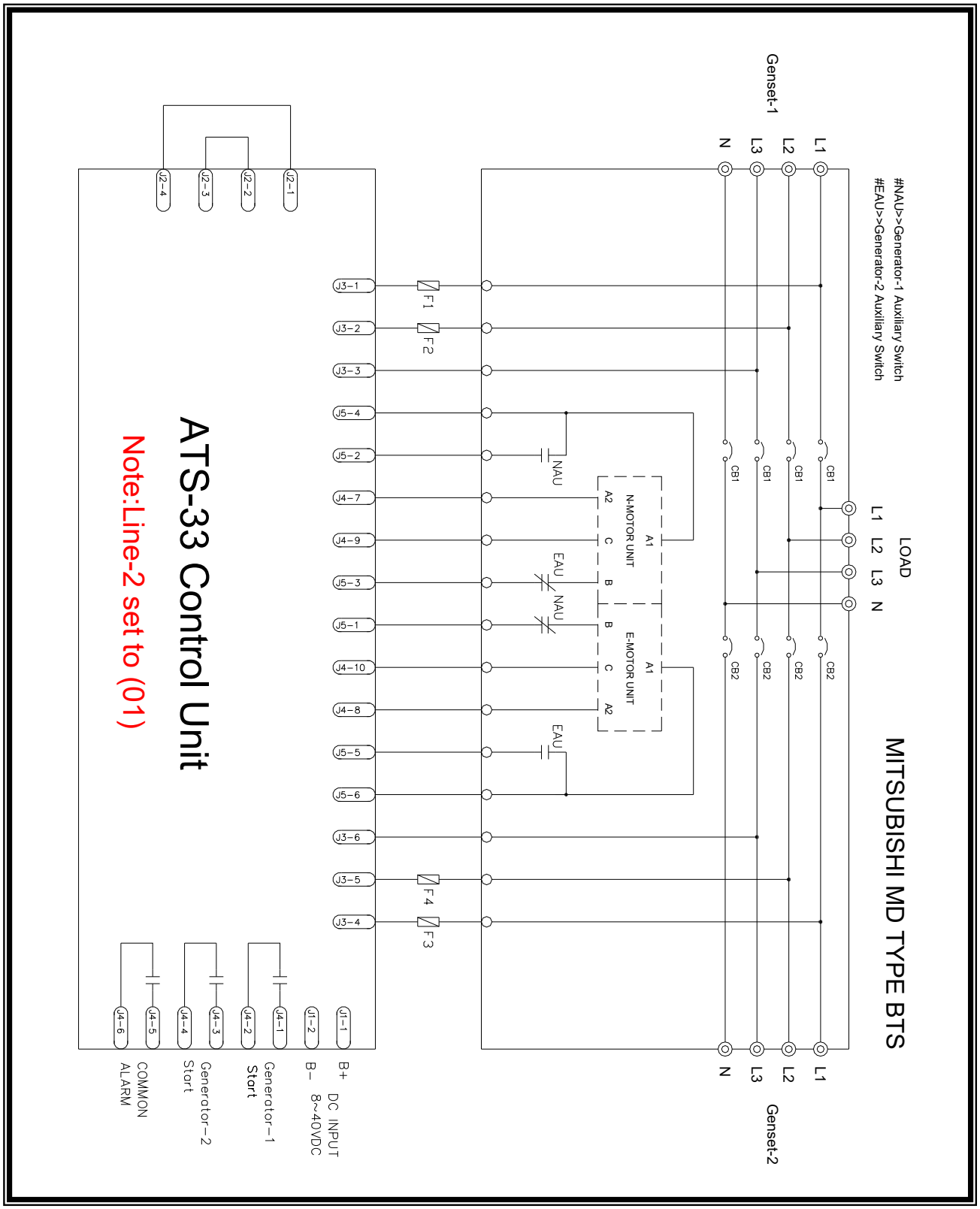
5.21 SOCOMEC ATyS-6e type ATS Wiring Diagram (3P/4P 220 Vac)



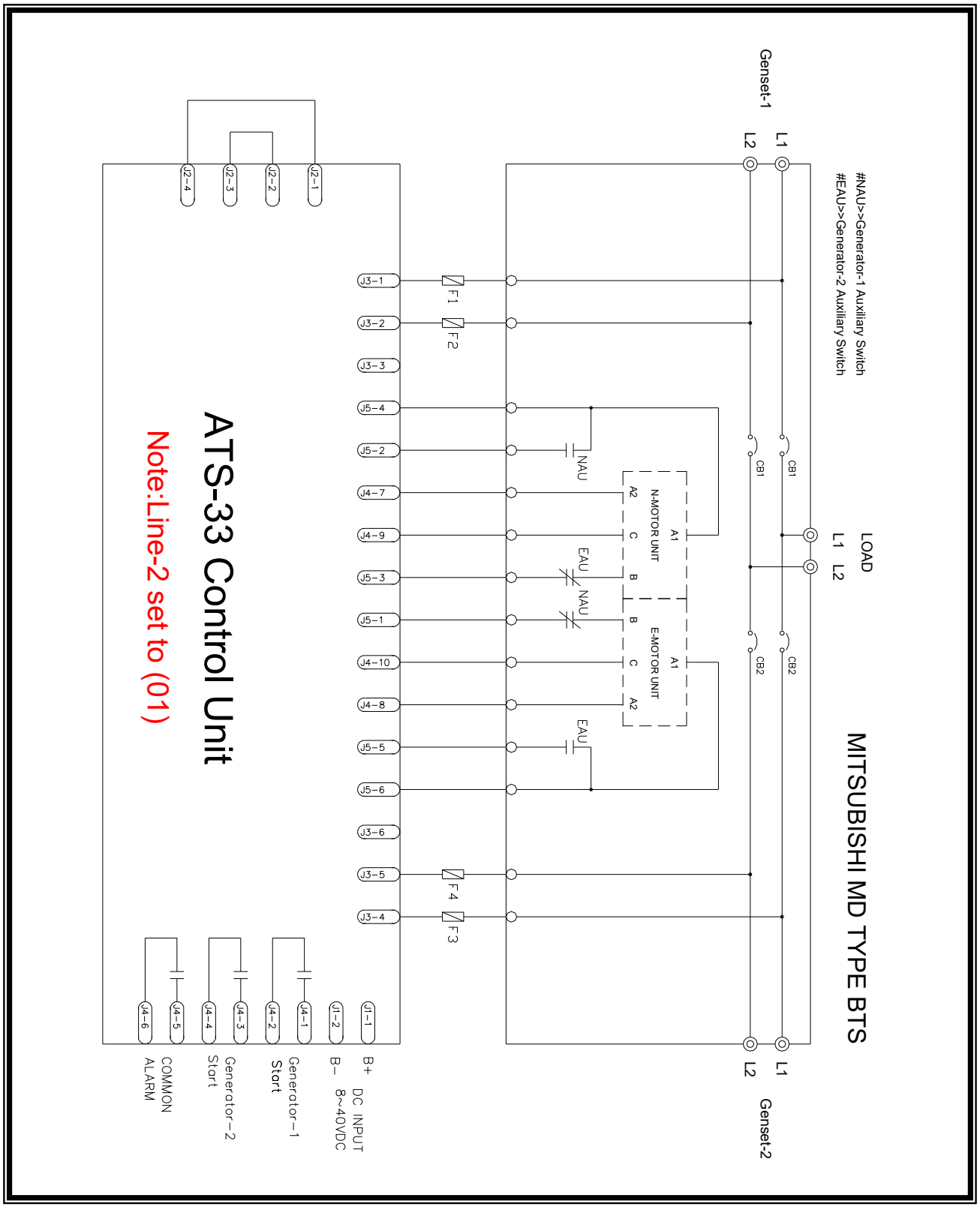
5.22 SOCOMEC ATyS-6e type ATS Wiring Diagram (2P 220 Vac)



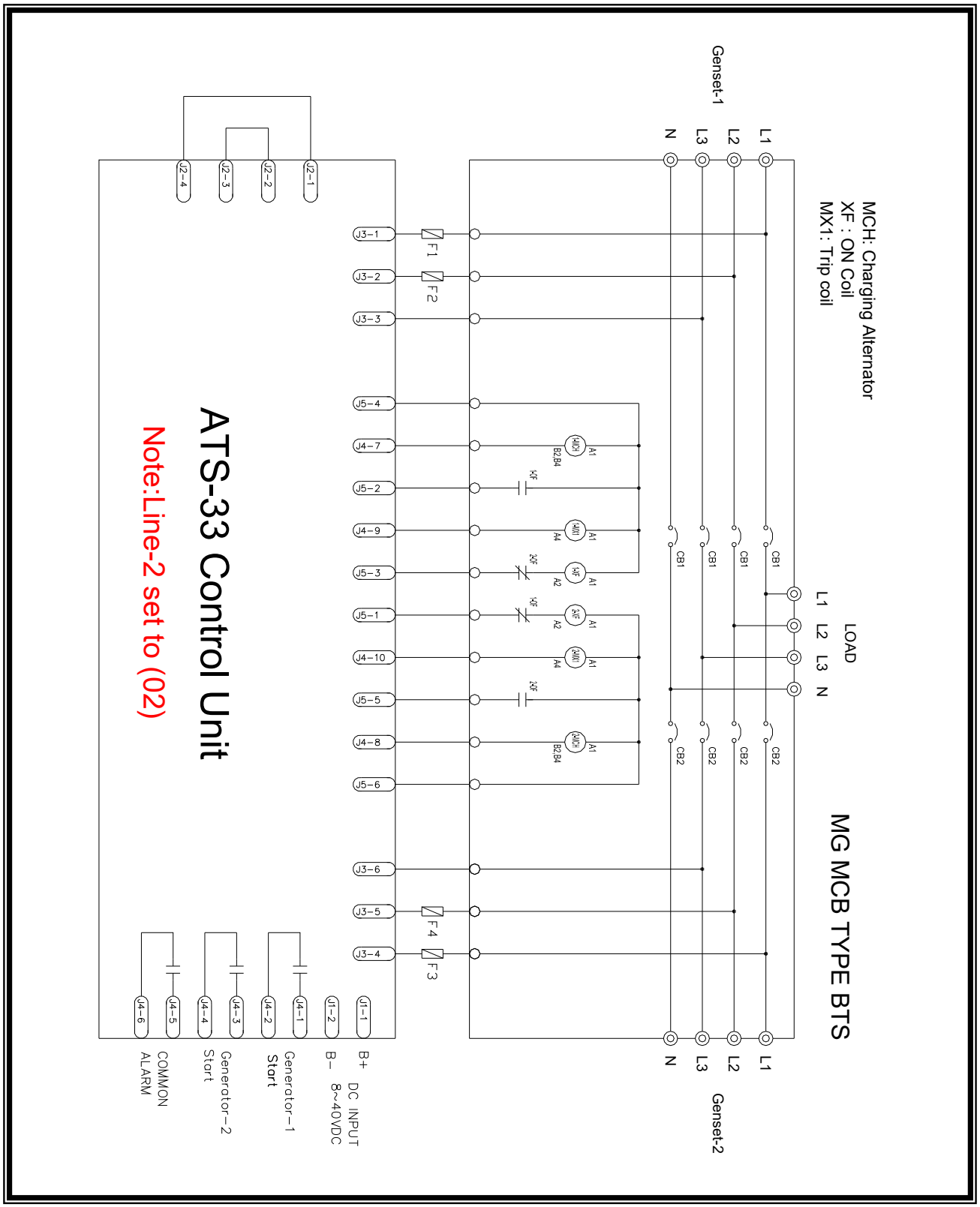
5.23 MITSUBISHI MD type ATS Wiring Diagram (3P/4P 220 Vac)



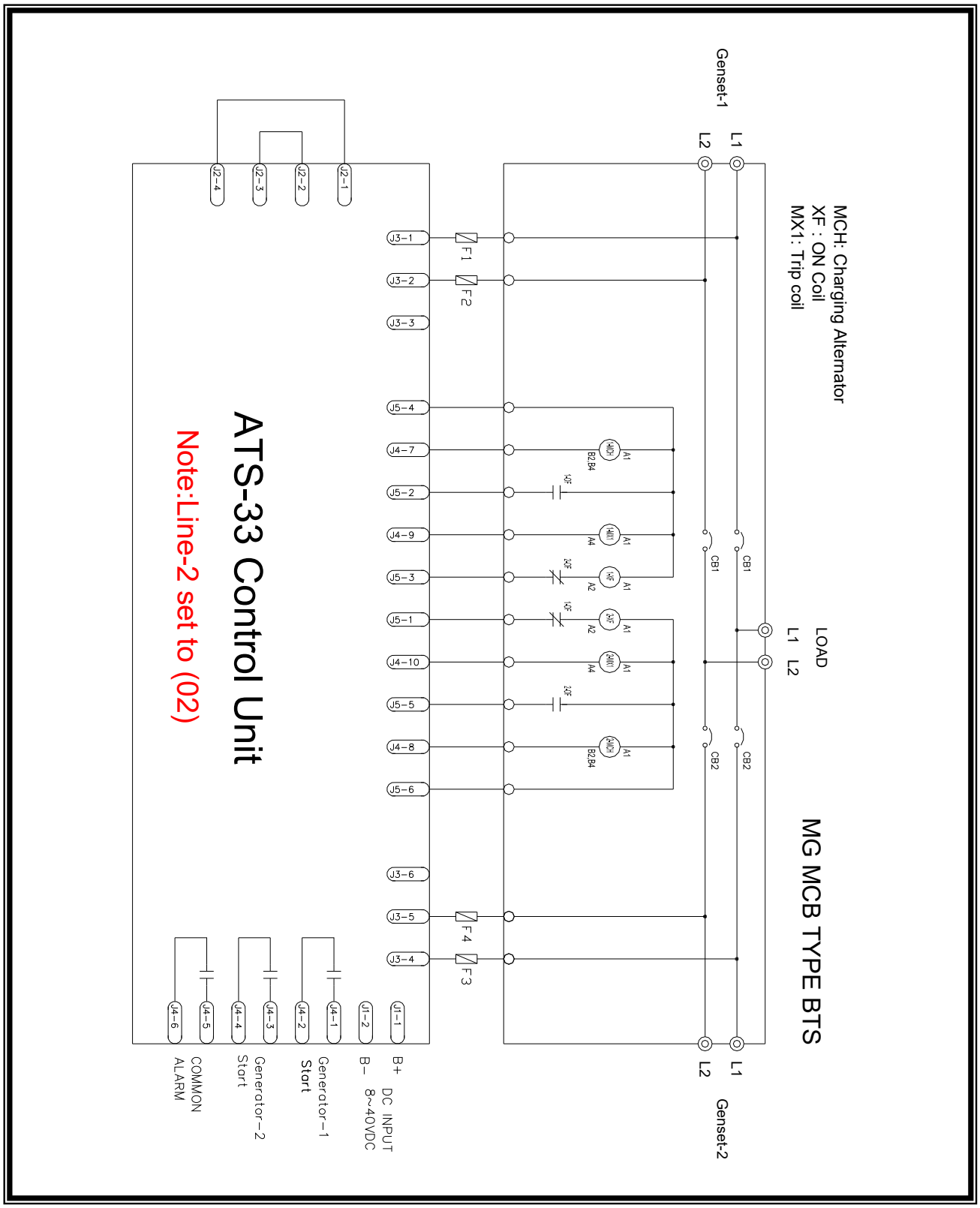
5.24 MITSUBISHI MD type ATS Wiring Diagram (2P 220 Vac)



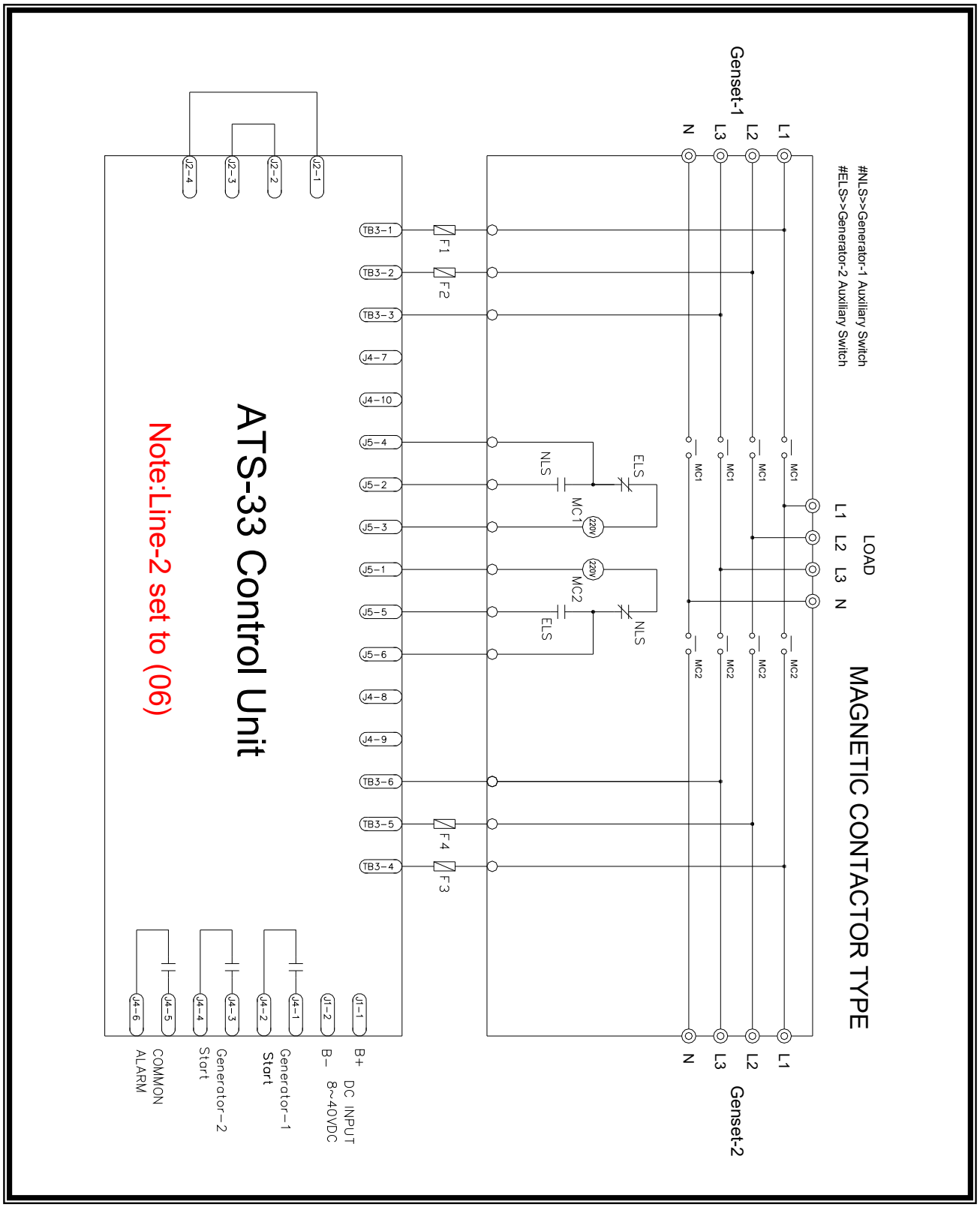
5.25 MERLIN GERIN MCB type ATS Wiring Diagram (3P/4P 220 Vac)



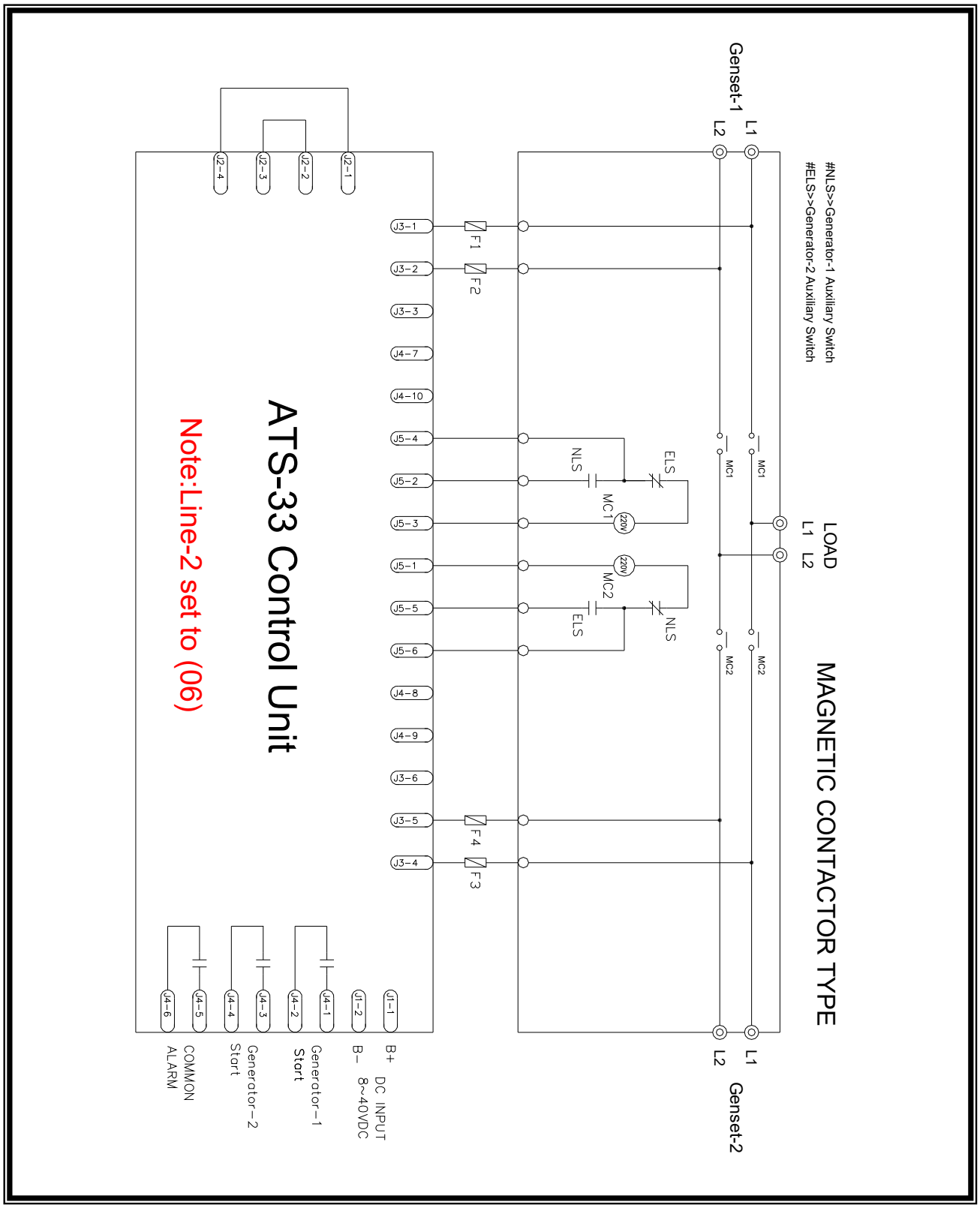
5.26 MERLIN GERIN MCB type ATS Wiring Diagram (2P 220 Vac)



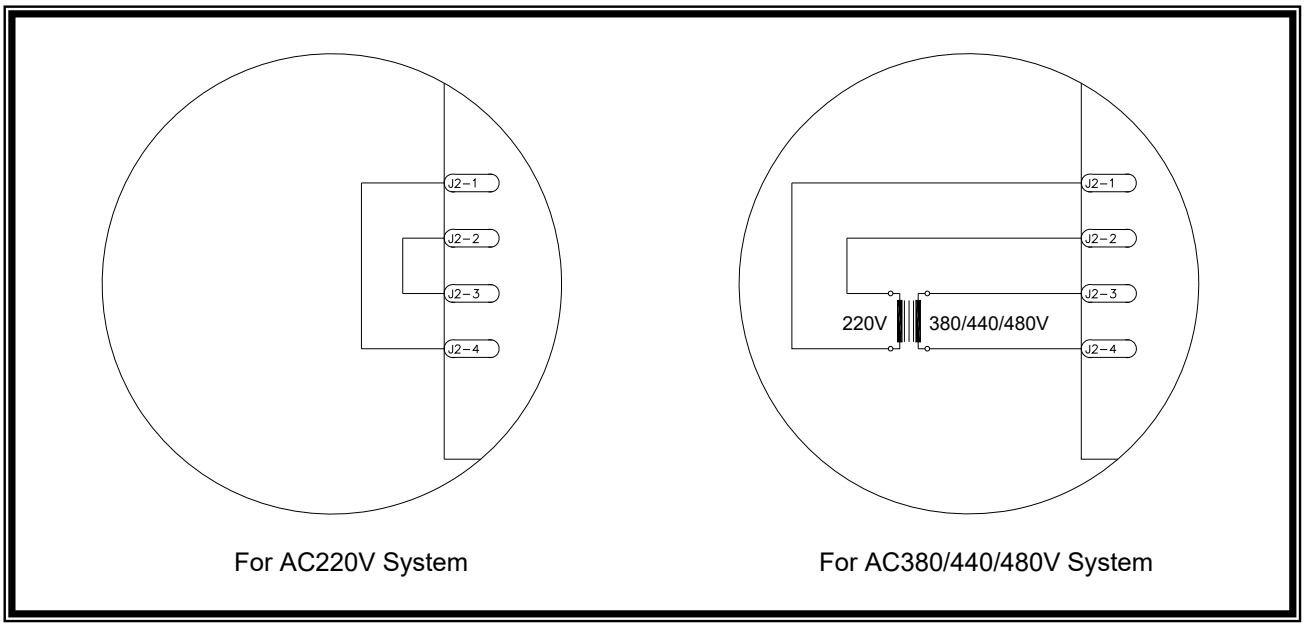
5.27 Magnetic Contact type ATS Wiring Diagram (3P/4P 220 Vac)



5.28 Magnetic Contact type ATS Wiring Diagram (2P 220 Vac)



5.29 System Voltage different From AC220V wiring Diagram



For AC220V System

For AC380/440/480V System