



ACU132 ATS CONTROLLER USER MANUAL






NTC TECHNOLOGY CO.,LTD.

Version history

Date	Version	Content
2015-10-10	1.0	Original release

Clarification of notation used within this publication.

Sign	Instruction
 NOTE	Highlights an essential element of a procedure to ensure correctness.
 CAUTION!	Indicates a procedure or practice, which, if not strictly observed, could result in damage or destruction of equipment.
 WARNING!	Indicates error operation may cause death, serious injury and significant property damage.

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1. OVERVIEW

ACU132 ATS Controller is suitable for No Neutral Position 2-Stage ATS. It can accurately detect 2-way-3-phase voltage and judge voltage abnormal (such as over voltage, under voltage, over frequency, under frequency, lack of phase and phase reverse), then control ATS to transfer. When ATS switch abnormally, the controller can detect close failure and alarm on the front panel to ensure the correct action of ATS. After abnormal of 1# power, the controller will send signal to start the genset. The controller has remote communication, remote control and parameter configuration functions via LINK port communication.

2. PERFORMANCE AND CHARACTERISTICS

ACU132 controller can detect 2-way voltage (2-way mains or 1-way mains and 1-way gens) and control ATS.

- 1) Suitable for 3-phase 4-wire, 2-phase 3-wire, single phase and 3-phase 3-wire (requires hardware modification) AC systems;
- 2) "1# in main, 2# for standby" transfer priority;
- 3) Measure and display 2-way 3 phase Voltage and Frequency:

1#	2#
Phase voltage (Ua, Ub, Uc)	Phase voltage (Ua, Ub, Uc)
Line voltage (Uab, Ubc, Uca)	Line voltage (Uab, Ubc, Uca)
Frequency Hz	Frequency Hz

- 4) Over/under voltage, over/under frequency, lack of phase and phase reverse detect function;
- 5) Close failure alarm;
- 6) LED display work status;
- 7) Auto/Manual mode. In manual mode, ATS can be switched by pressing front panel button;
- 8) Manual test and Timing test function;
- 9) Applicable for 2 isolated neutral line.
- 10) Close output can be set to Pulse or Continuous output;
- 11) Outage Again Close and Re-closing;
- 12) Parameter setting: parts of parameters can be adjust from front panel; all can be adjust via LINK port(with M58 adaptor) by using computer software;
- 13) Digitization adjustment of parameters (abandon simulation adjustment, enhanced reliability and stability);
- 14) Strong anti-electromagnetic interference ability, can be used under complex electromagnetic interference environment;
- 15) Modular design, self extinguishing ABS plastic shell, pluggable terminal, compact structure;
- 16) Three installation ways: panel built-in, internal 35mm slideway and internal screw mounting.



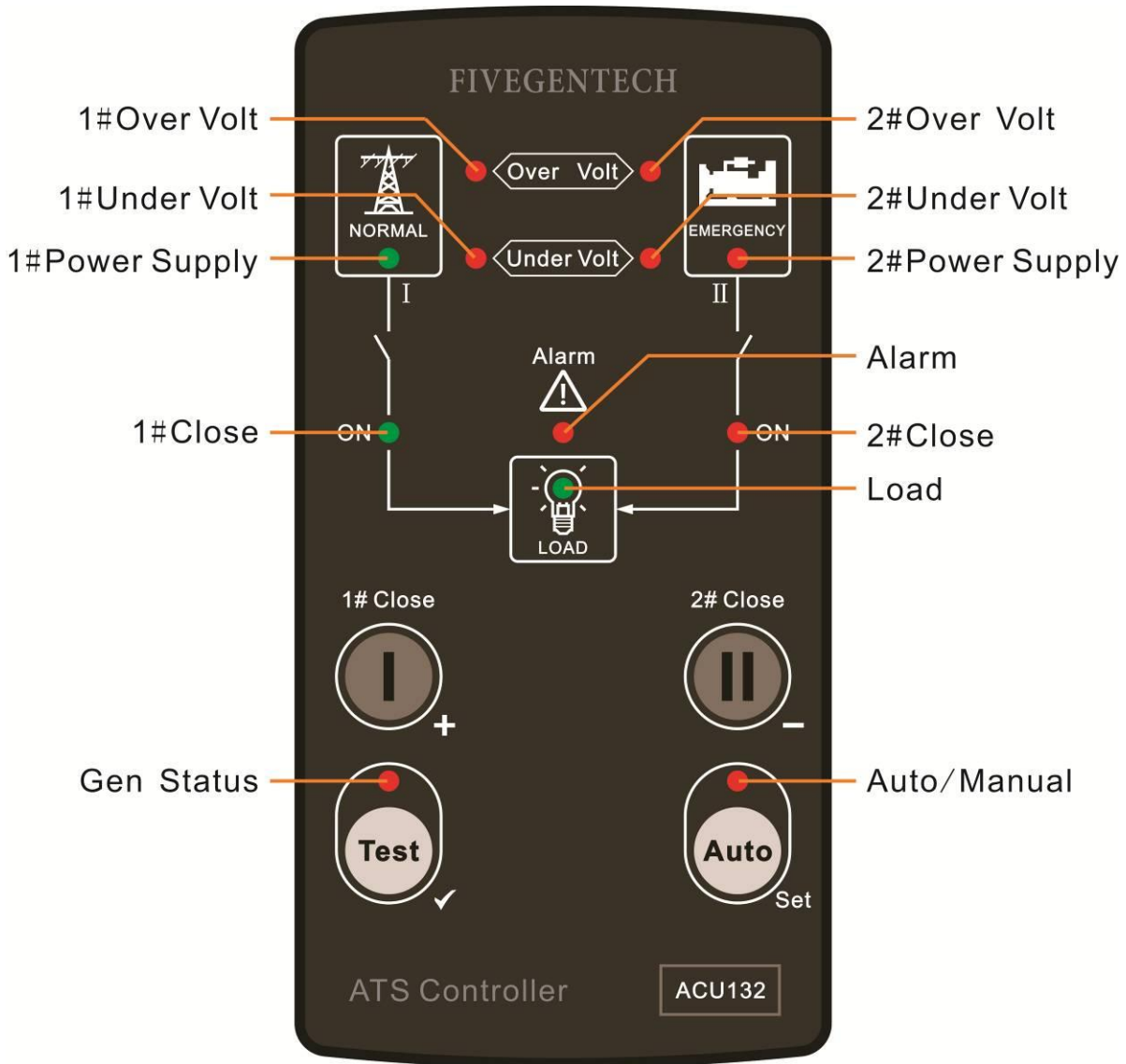
3. SPECIFICATION

Items	Contents
Operating Voltage	AC power A1N1/A2N2 supply. Rated AC240V (range: AC170V~277V)
Power Consumption	Under rated voltage, power consumption is not more than 3VA
AC Voltage Input: 3-phase 4-wire 2-phase 3-wire Single-phase 2-wire 3-phase 3-wire	AC170V – AC277V (ph-N) AC170V – AC277V (ph-N) AC170V – AC277V (ph-N) AC170V – AC277V (ph-ph) (Requires hardware support)
AC Frequency	50/60Hz
1# Close Relay	16A AC250V Volts free output (Normally open)
2# Close Relay	16A AC250V Volts free output (Normally open)
Start Relay	7A AC250V Volts free output (Normally close)
Aux. Output Relay	7A AC250V Volts free output (Normally close)
Communication	LINK interface, MODBUS Protocol
Case Dimensions	86.9mmx158mmx119.5mm
Panel Cutout	73.5mmx144mm
Working Conditions	Temperature: (-25~+70)°C; Humidity: (20~93)%RH
Storage Condition	Temperature: (-25~+70)°C
Protection Level	IP55 Gasket
Insulation Strength	Apply AC2.2kV voltage between high voltage terminal and low voltage terminal; The leakage current is not more than 3mA within 1min.
Weight	0.6kg



4. PANEL DESCRIPTION

4.1. FRONT PANEL



4.2. KEY FUNCTION DESCRIPTION

Icon	Function	Description
	Auto (Setting)	Auto/Manual mode switch; Enter into lamp test status by pressing for 3s; Enter into parameter configuration mode by pressing for 8s.
	1# Close	1# Close in Manual mode; Adjust parameters in parameter configuration mode.
	2# Close	2# Close in Manual mode; Adjust parameters in parameter configuration mode.
	Test (Confirm)	Active in Manual mode; When start signal is outputting, start signal will break by pressing this key; When start signal is broken, start signal will output by pressing this key.





4.3. INDICATOR DESCRIPTION



Indicators	Description
1# Over Volt ●	Lamp on: 1# power voltage exceeds over volt threshold; Lamp off: 1# power voltage is under over volt return value;
2# Over Volt ●	Lamp on: 2# power voltage exceeds over volt threshold; Lamp off: 2# power voltage is under over volt return value;
1# Under Volt ●	Lamp on: 1# power voltage is under under volt threshold; Lamp off: 1# power voltage exceeds under volt return value;
2# Under Volt ●	Lamp on: 2# power voltage is under under volt threshold; Lamp off: 2# power voltage exceeds under volt return value;
1# Power Supply ●	Lamp on: 1# power normal; Lamp flashes: 1# power abnormal (over/under voltage, over/under frequency, lack of phase and phase reverse); Lamp off: 1# loss of power;
2# Power Supply ●	Lamp on: 2# power normal; Lamp flashes: 2# power abnormal (over/under voltage, over/under frequency, lack of phase and phase reverse); Lamp off: 2# loss of power;
1# Close ●	Lamp on: 1# Supply;
2# Close ●	Lamp on: 2# Supply;
Alarm ●	Lamp flashes: 1# or 2# Close/Open fault;
Load ●	Lamp on: 1# or 2# power supply;
Manual/Auto ●	Lamp on: in Auto mode; Lamp off: in Manual mode;
Gen Status ●	Lamp on: start signal output; Lamp off: start signal break.
▲Note: Lamp flash frequency: 1Hz	

4.4. OPERATION

Auto/Manual Switch

When the controller is normally working and Manual/Auto indicator is off in manual mode, it can switch into auto mode by pressing  and Manual/Auto indicator will be on; it can switch back to manual mode by pressing  again.

Manual Operation

In manual mode, 1#Close relay outputs by pressing , if 1#Close status input active is detected, 1#Close indicator is on and 1# is on load; 2#Close relay outputs by pressing , if 2#Close status input active is detected, 2#Close indicator is on and 2# is on load.

Auto Operation

In this mode, the controller can automatically switch to 1-way/2-way.

▲Note: Power On Mode is decided by the last power down mode of the controller. If the controller is in manual mode when power down, it will still in manual mode when power on again.


5. CLOSE FAILURE ALARM

Close Failure Alarm is divided into 1#Close Failure and 2#Close Failure. After close failure alarms, the alarm indicator will flash with 1Hz.

Trigger process of 1#Close Failure Alarm: 1#Volt is normal and 1#Close order is sent; if 1#Close input signal can't be detected, open and re-trip; if 1#Close input signal still can't be detected, 1#Close Failure alarms. At the same time, if 2#Volt is normal and there is no alarm of 2#Close Failure, then 2# start to close.



Trigger process of 2#Close Failure Alarm: 2#Volt is normal and 2#Close order is sent; if 2#Close input signal can't be detected, open and re-trip; if 2#Close input signal still can't be detected, 2#Close Failure alarms. At the same time, if 1#Volt is normal and there is no alarm of 1#Close Failure, then 1# start to close.

Close failure alarm reset: switch the controller to manual mode after alarm, the alarm will reset. At this time, fault check and ATS switch test can start.

 Note: trouble already clearing must be confirmed when reset alarm.

6. TEST

6.1. MANUAL TEST

In manual mode and when genset start signal is outputting, break the signal by pressing ; when genset start signal is stop, make the signal output by pressing .

6.2. TIMMING TEST

Timing test can be set via PC and it is active in auto mode. Setting as below:

1) Load Setting

Load: After Gen volt is normal, no matter mains volt is normal or not, then load will switch to Gen.

No Load: After Gen volt is normal, if mains volt is normal, then load will not switch to Gen; if mains volt is abnormal then load switch to Gen. When mains volt is normal again, load will switch to mains and genset start signal still outputs.

2) Period

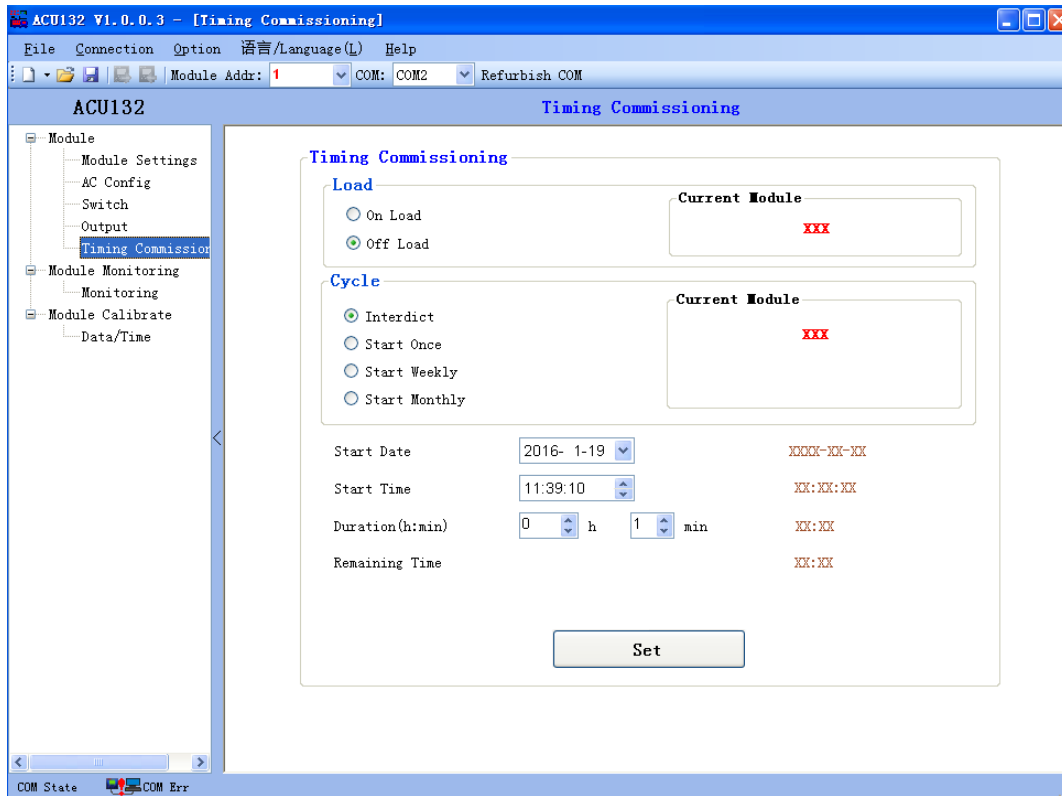
Set genset start period (timing start inhibited, start for one time, start weekly and monthly)

3) Start Date and Time

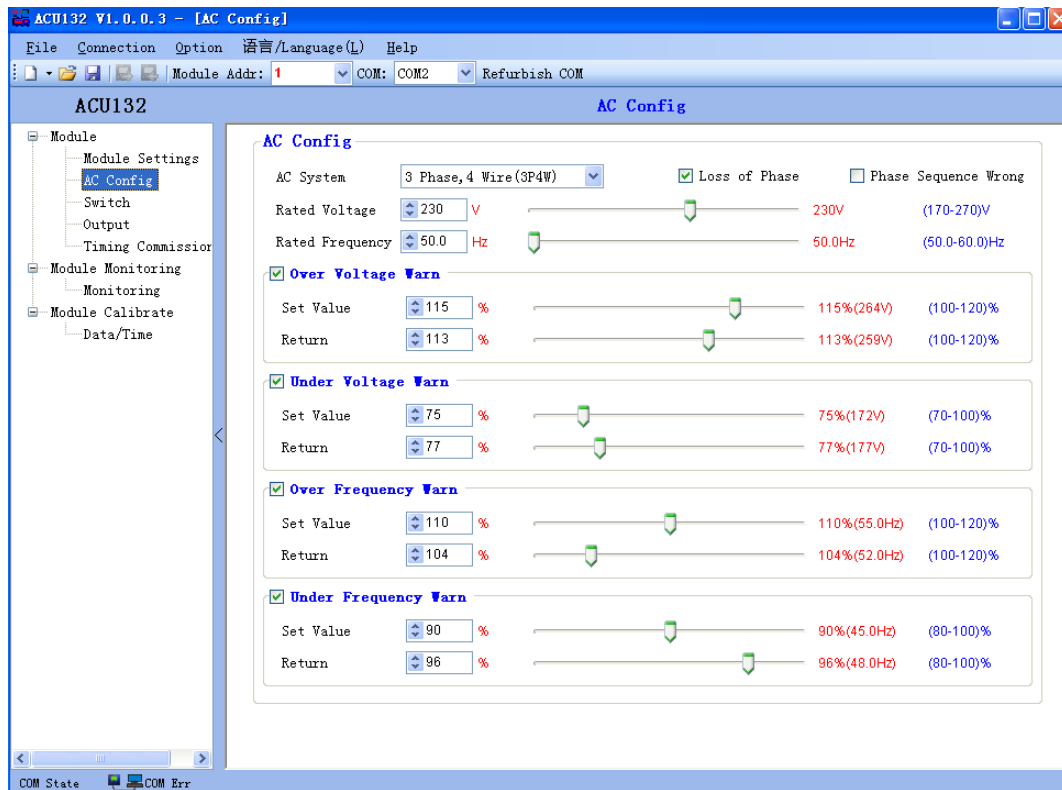
Set genset start date and time.

4) Duration

Set genset start duration (499h 59min max.)



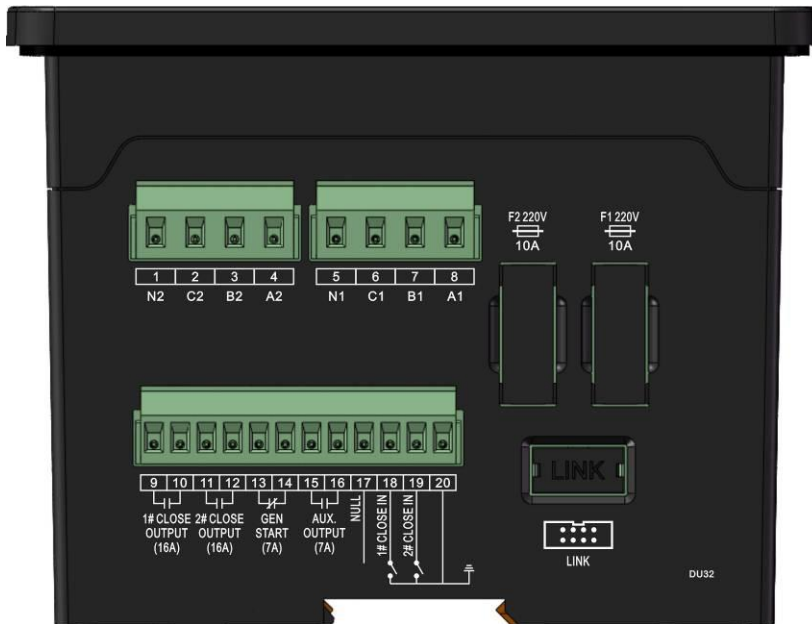
6.3.HIGH/LOW VOLTAGE AND HIGH/LOW FREQUENCY ADJUSTMENT





7. CONNECTION

7.1. TERMINALS



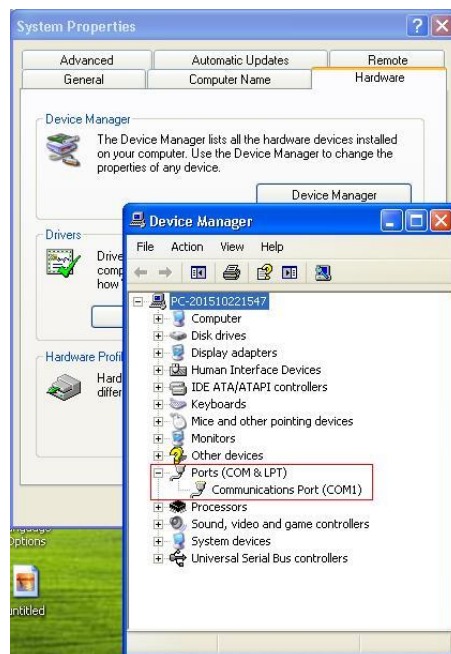
Terminal	Item	Function	Note
1	N2	2# AC 3-phase 4-Wire Input	Single phase: connect to A2, N2; B2 and C2 hang in the air; 2-phase 3-wire: connect to A2, B2, N2; C2 hang in the air; 3-phase 3-wire: connect to A2, B2, C2 after hardware adjusted; N2 hang in the air.
2	C2		
3	B2		
4	A2		
5	N1	1# AC 3-phase 4-Wire Input	Single phase: connect to A1, N1; B1 and C1 hang in the air; 2-phase 3-wire: connect to A1, B1, N1; C1 hang in the air; 3-phase 3-wire: connect to A1, B1, C1 after hardware adjusted; N1 hang in the air.
6	C1		
7	B1		
8	A1		
9	1# Close Output	Free volts contact always open output	Rated capacity 16A
11	2# Close Output	Free volts contact always open output	Rated capacity 16A
13	Gen Start	Free volts contact always close output	Rated capacity 7A
15	Aux. Output	Free volts contact always open output	Rated capacity 7A
17	Null		Hang in the air
18	1# Close Input	Check 1# breaker close status, auxiliary contact input.	GND connected is active
19	2# Close Input	Check 2# breaker close status, auxiliary contact input.	GND connected is active
20	Com.	GND	
LINK	Comm.	For communicate to PC and software update	Need to use M58 adaptor
F1	Fuse		Rated AC 10A/250V
F2	Fuse		Rated AC 10A/250V

7.2. PROGRAMMING AND COMMUNICATION

- 1) Install “M58 Driver Windows.exe” (the driver is suitable for Windows 2000, Windows XP and Windows7 only) before M58 adaptor connecting to PC.



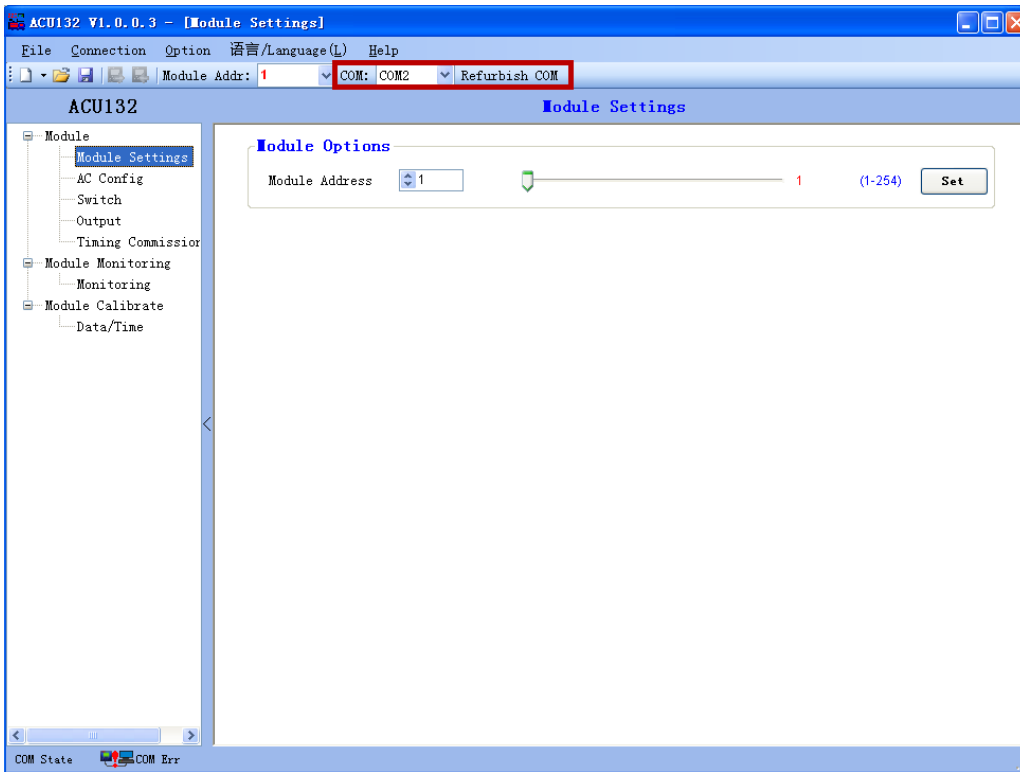
- 2) After drivers have been installed, open “Control Panel”-“Device Manager” to check Ports (COM & LPT).



- 3) After connected to M58 adaptor via USB, check the COM port appears now.



4) Open ACU13X software, it can communicate normally after selected correct COM port.





8. DEFINITION AND RANGE OF PARAMETERS

Form1

No.	Items	Range	Default	Description
1	Power Supply System	(1-4)	1	1: 3-phase 4-wire 2: Single-phase 2-wire 3: 3-phase 3-wire (need to modify circuit board) 4: 2-phase 3-wire
2	1# Volt Normal Delay	(1-7)	2	1: 1s 2: 5s 3: 10s 4: 20s 5: 30s 6: 45s 7: User defined(Default: 5s)
3	2# Volt Normal Delay	(1-7)	2	1: 1s 2: 5s 3: 10s 4: 20s 5: 30s 6: 45s 7: User defined(Default: 5s)
4	1# Volt Abnormal Delay	(1-7)	2	1: 1s 2: 5s 3: 10s 4: 20s 5: 30s 6: 45s 7: User defined(Default: 5s)
5	2# Volt Abnormal Delay	(1-7)	2	1: 1s 2: 5s 3: 10s 4: 20s 5: 30s 6: 45s 7: User defined(Default: 5s)
6	Close Time	(1-7)	4	1: Continuous close enabled 2: 1s 3: 3s 4: 5s 5: 8s 6: 10s 7: User defined(Default: 5s)
7	Again Open Delay	(1-7)	2	1: 1s 2: 3s

No.	Items	Range	Default	Description
				3: 5s 4: 8s 5: 10s 6: 15s 7: User defined(Default: 3s)
8	Transfer Delay Expired	(1-7)	1	1: 0.5s 2: 1s 3: 2s 4: 3s 5: 4s 6: 5s 7: User defined(Default: 0.5s)
9	Start Delay	(1-7)	4	1: 3s 2: 8s 3: 15s 4: 30s 5: 50s 6: 70s 7: User defined(Default: 30s)
10	Stop Delay	(1-7)	6	1: 3s 2: 8s 3: 15s 4: 30s 5: 50s 6: 70s 7: User defined(Default: 90s)

▲Note: The parameters in this form can be set via computers and slave. When delay is “7: User defined”, parameter delay must be set via computer. If parameter is not set via computer, the delay is Default; if parameter has been set via computer, then the delay is the set value.



Form2

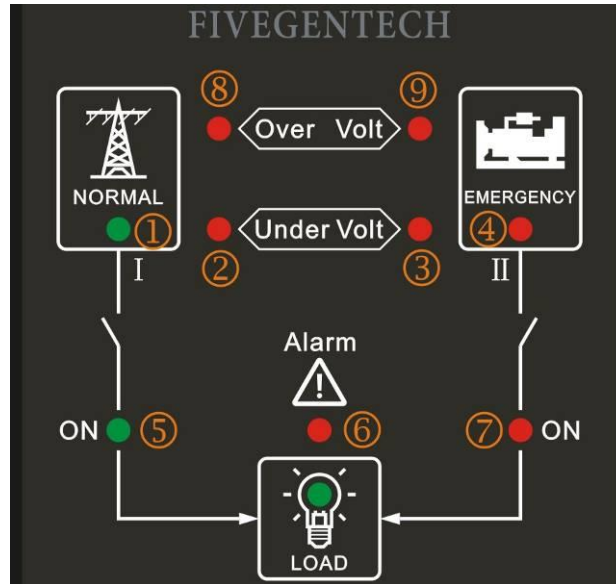
No.	Item	Range	Default	Description
1	Rated Volt	(170-270)V	230	Provide base for over/under volt judge.
2	Rated Freq	(50.0-60.0)Hz	50.0	Provide base for over/under frequency judge.
3	Over Volt Monitor Enabled	(0-1)	1	0: Disabled 1: Enabled
4	Over Volt Threshold	(100-120)%	115	Threshold
5	Over Volt Return	(100-120)%	113	Return
6	Under Volt Monitor Enabled	(0-1)	1	0: Disabled 1: Enabled
7	Under Volt Threshold	(70-100)%	75	Threshold
8	Under Volt Return	(70-100)%	77	Return
9	Over Freq Monitor Enabled	(0-1)	1	0: Disabled 1: Enabled
10	Over Freq Threshold	(100-120)%	110	Threshold
11	Over Freq Return	(100-120)%	104	Return
12	Under Freq Monitor Enabled	(0-1)	1	0: Disabled 1: Enabled
13	Under Freq Threshold	(80-100)%	90	Threshold
14	Under Freq Return	(80-100)%	96	Return
15	Loss of Phase Monitor Enabled	(0-1)	1	0: Disabled 1: Enabled (Settled delay: 3s)
16	Phase Reverse Monitor Enabled	(0-1)	1	0: Disabled 1: Enabled (Settled delay: 3s)
17	Aux. Output	(0-16)	0	0: Not Used 1: 1#Volt Normal Output 2: 1#Volt Abnormal Output 3: 2# Volt Normal Output 4: 2# Volt Abnormal Output 5: Manual Output 6: Auto Output 7: Gen Normally Start Output 8: Gen Normally Stop Output 9: 1# Close Output 10: 2# Close Output 11: 1# Close Status Output 12: 2#Close Status Output 13: Reserved 14: Reserved 15: Reserved 16: Reserved
18	Address	(1-254)	1	Same with PC communication address.

▲Note: The parameters in this form can be set via computers.

9. PARAMETERS SETTING

9.1. PARAMETERS SETTING MODE

In manual mode, enter into parameters setting mode by pressing **Auto** for 8s and Manual/Auto indicator **●** and Gen Status indicator **●** flashes; ①, ②, ③, ④, ⑧, ⑨ indicators illuminate.



▲Note: Press **Auto** this time, it can be back to normal mode after LED flashed.

9.2. PARAMETERS SETTING

When it entered into parameter setting mode, enter into modify mode by pressing **II**, ④, ⑦ indicators illuminate. ①, ②, ③, ④ mean setting items numbers (is 1); ⑤, ⑥, ⑦ indicators mean these parameter value (is 1). See Form1 for parameters list.

Specific setting as below:

Select setting number which needs to adjust by pressing **I** and **II**;

Enter into setting status by pressing **Test** and 2# On indicator flashes;

After set this parameter by pressing **I** and **II**, save the value by pressing **Test**;

Press **Auto** after parameters are all configured, loose **Auto** when all LEDs are flashing, parameters will be saved at this time and it will return to normal mode.

▲Note: See the form below for the values corresponding of LED indicators.

▲Note: Only press **Auto** to return to normal mode after parameters are configured, these parameters can be saved, otherwise the parameters will lose after the controller is power down.

Indicators				Value	Indicators			Value
①	②	③	④		⑤	⑥	⑦	
○	○	○	●	1	○	○	●	1
○	○	●	○	2	○	●	○	2
○	○	●	●	3	○	●	●	3
○	●	○	○	4	●	○	○	4
○	●	○	●	5	●	○	●	5
○	●	●	○	6	●	●	○	6
○	●	●	●	7	●	●	●	7
●	○	○	○	8				
●	○	○	●	9				
●	○	●	○	10				

9.3. RESET TO DEFAULT

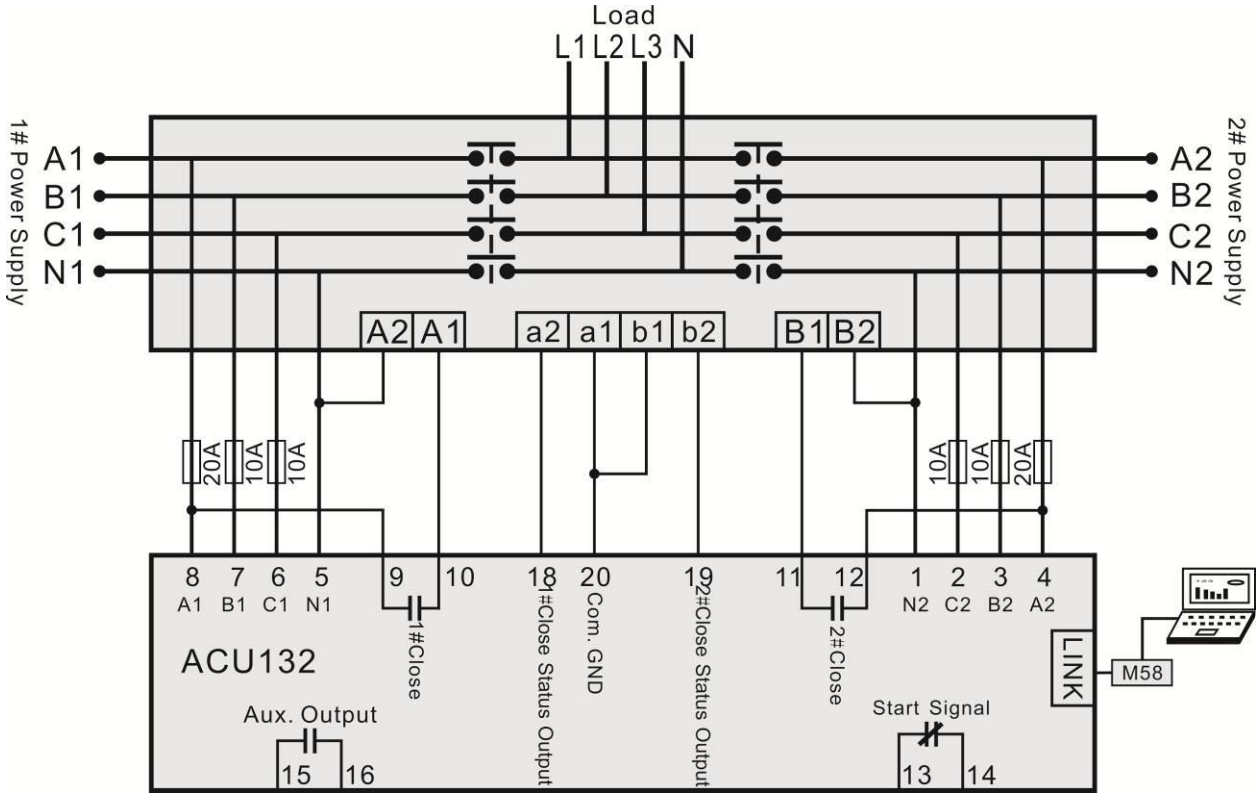
In parameter setting mode, press **I**, ⑧, ⑨ indicators flashes and ①, ②, ③, ④ indicator are off; press **Test**, ⑧, ⑨ indicator will be illuminating for 2s to mean that reset to default successfully. After all LEDs flashes for 3 times it will return to normal mode.



10. TYPICAL APPLICATION

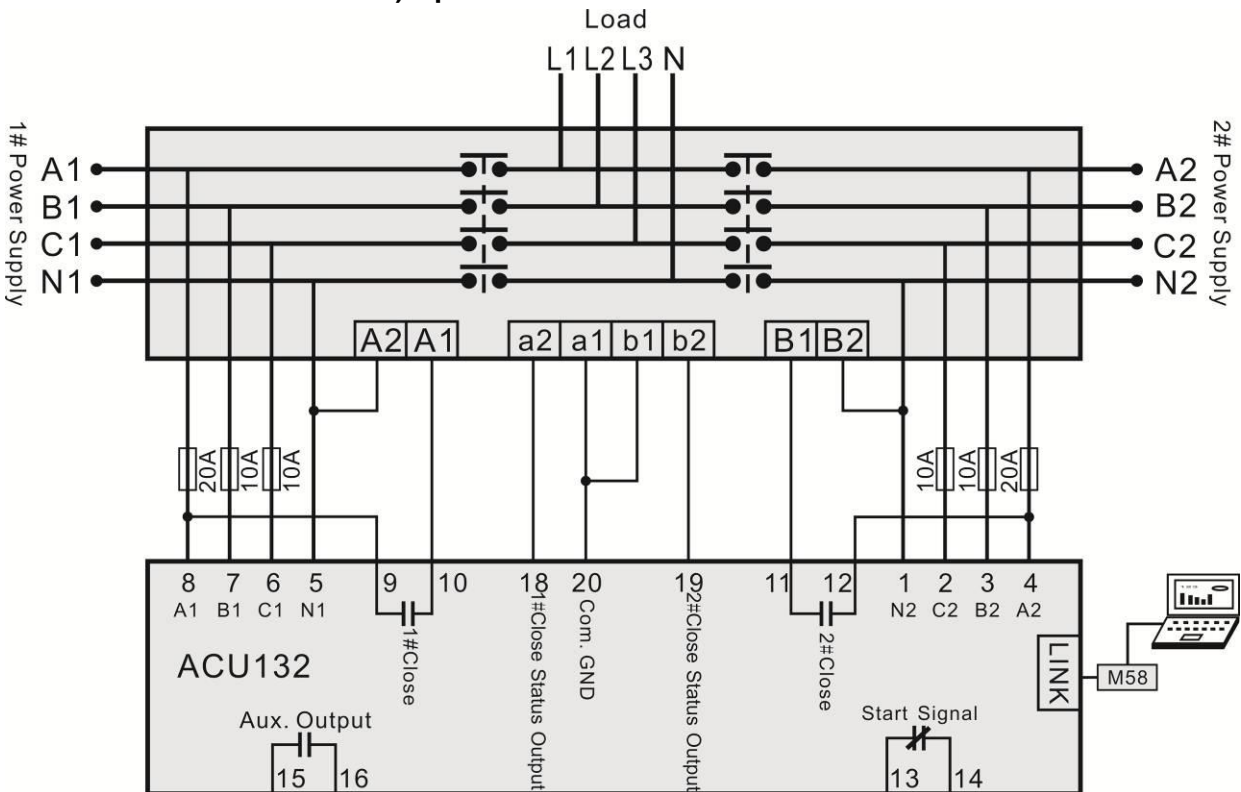
10.1. TYPE A

(4P ATS. 3P4W 380V. 40A-125A) Operate Current 3.5A



10.2. TYPE B

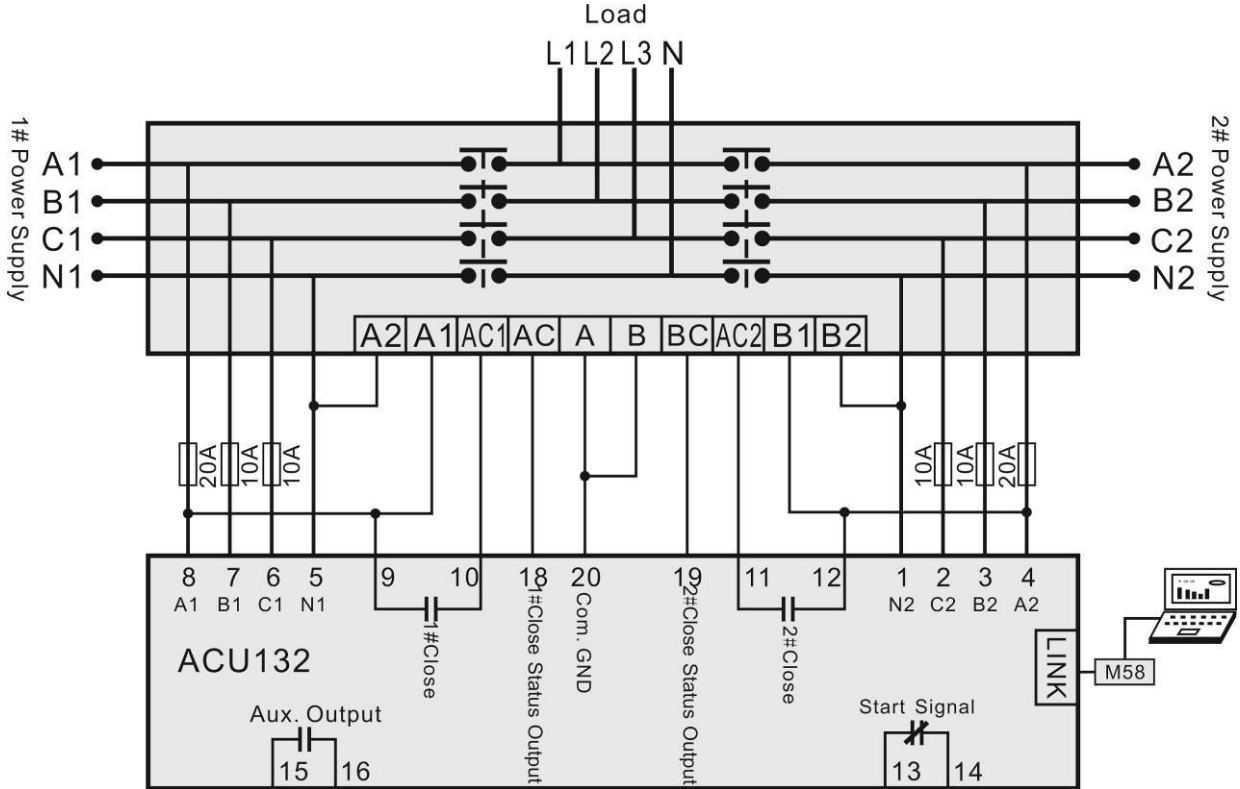
(4P ATS. 3P4W 380V. 160A-400A) Operate Current 16A





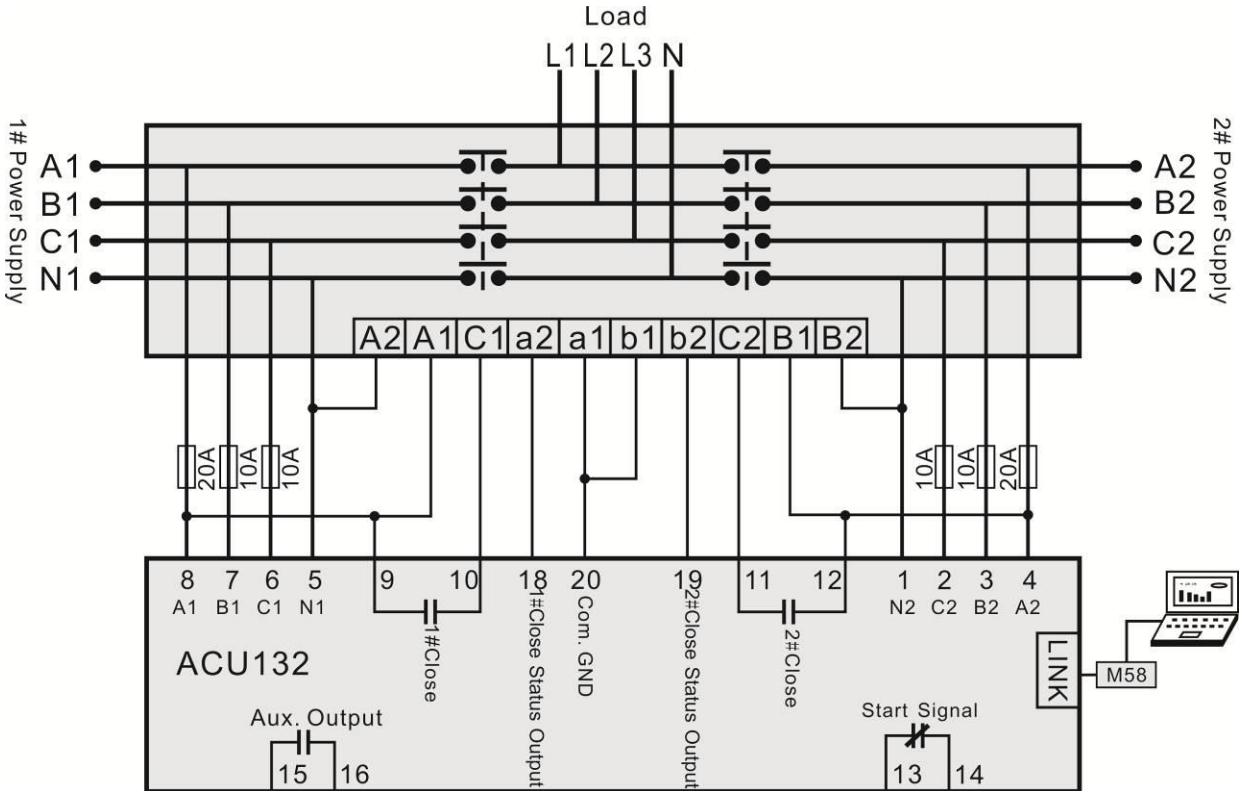
10.3. TYPE C

(4P ATS. 3P4W 380V. 630A-1600A) Operate Current 16A



10.4. TYPE M

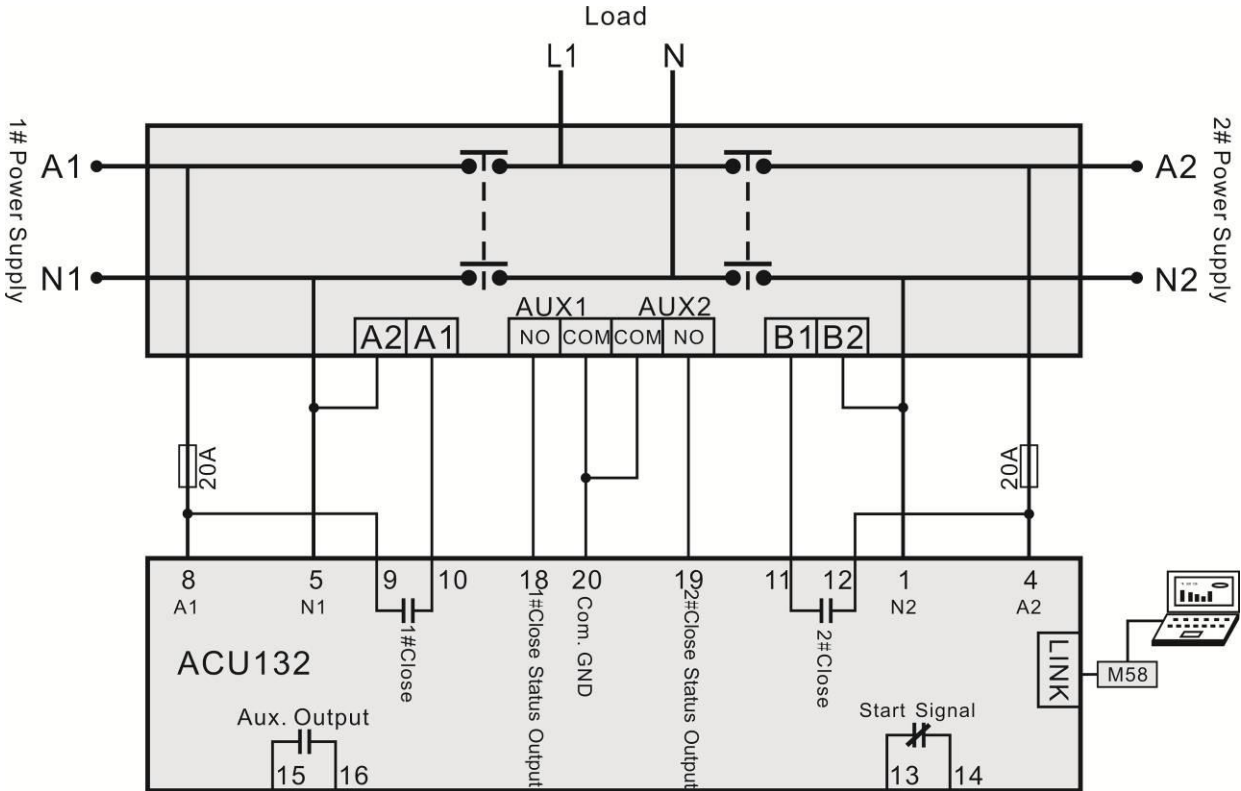
(4P ATS. 3P4W 380V. 630A-1250A) Operate Current 16A





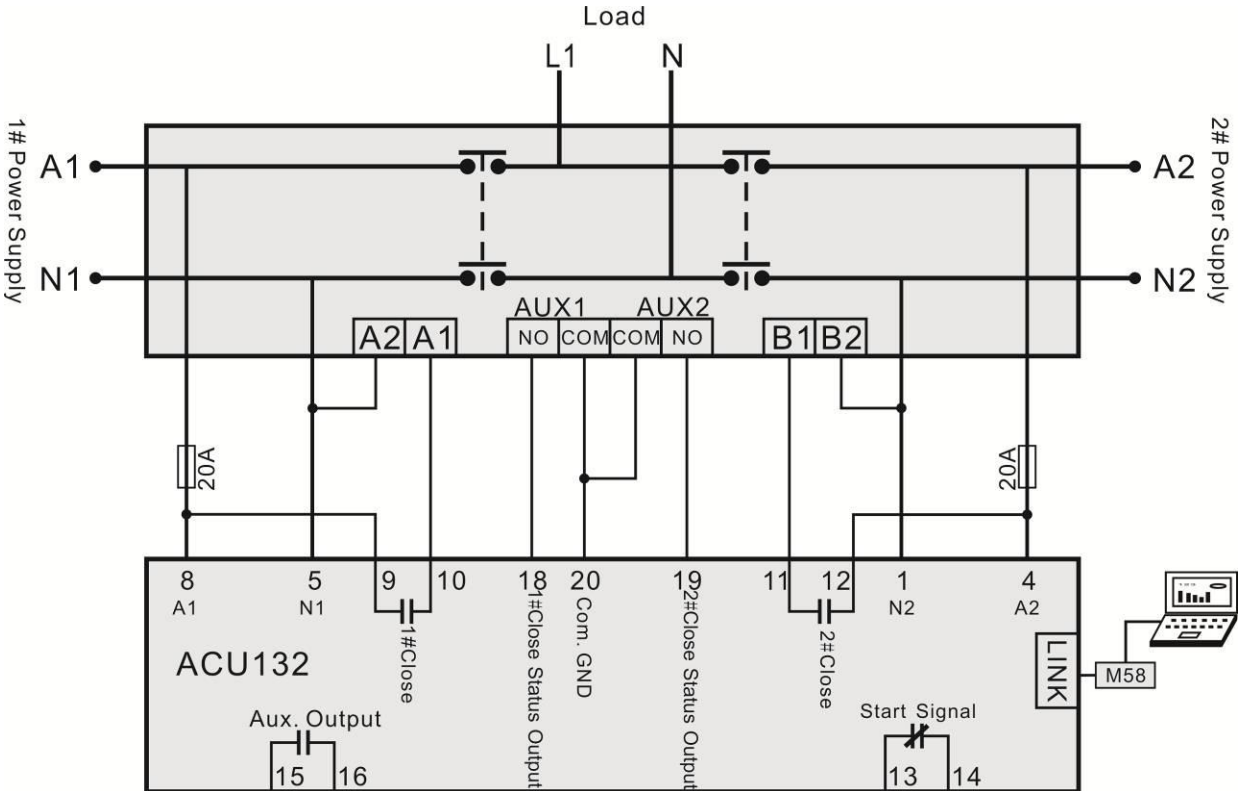
10.5. TYPE HS

(2P 100A ATS. 1P2W 220V) Operate Current 1.6A



10.6. TYPE HS

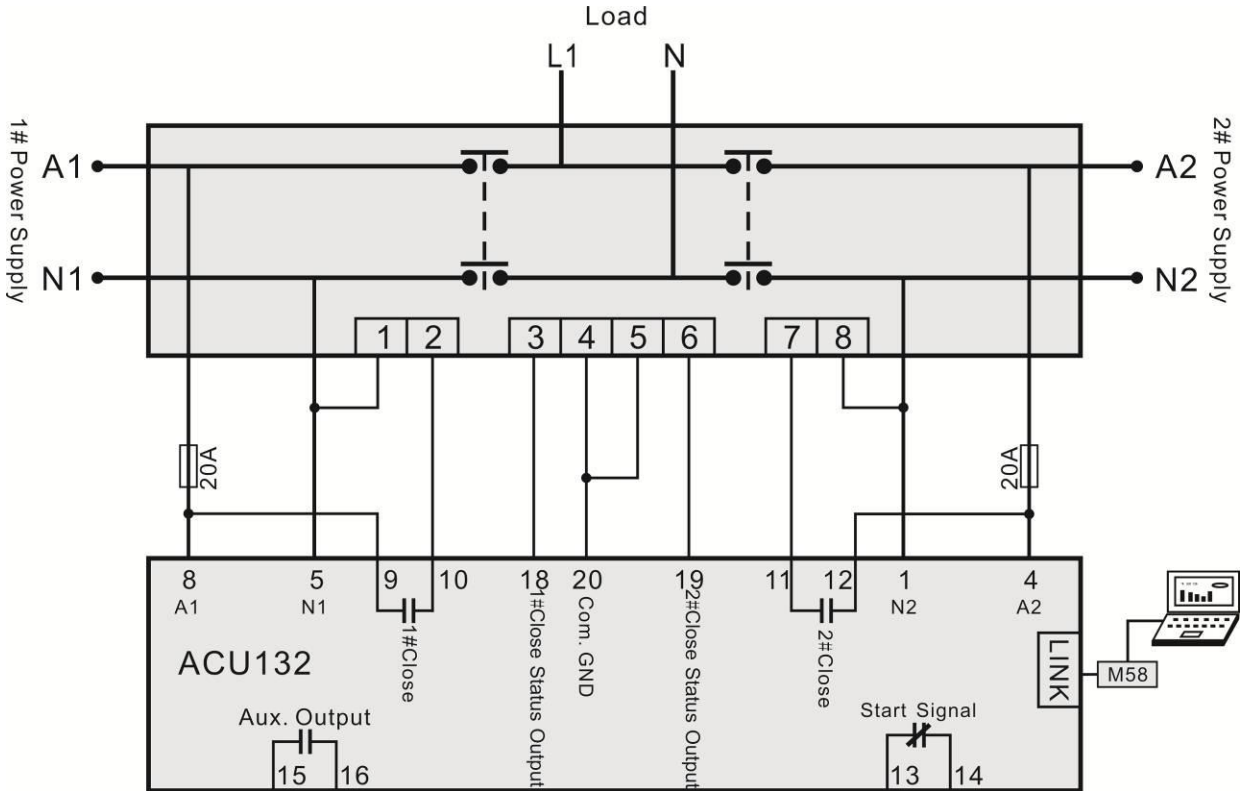
(2P 200A ATS. 1P2W 220V) Operate Current 4.85A





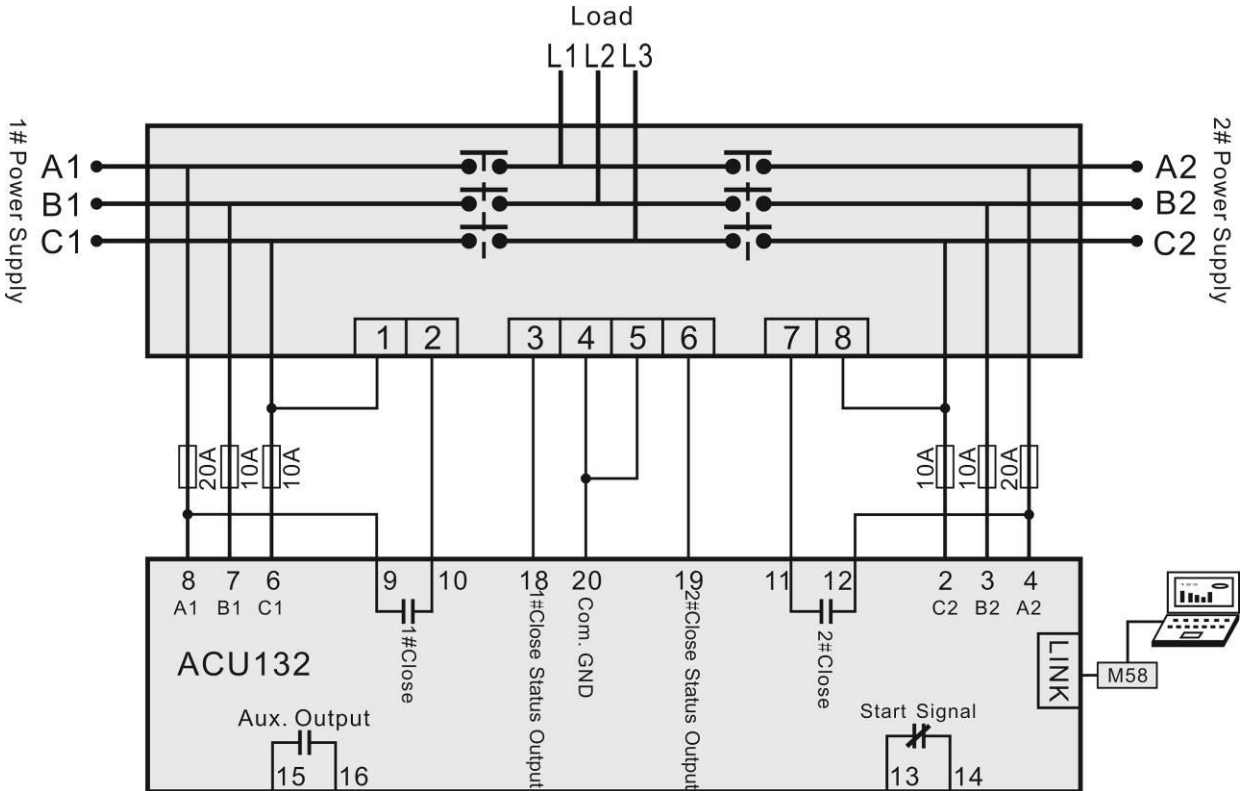
10.7. TYPE TOP3

(2P 125A ATS. 1P2W 220V) Operate Current 3.5A



10.8. TYPE TOP3

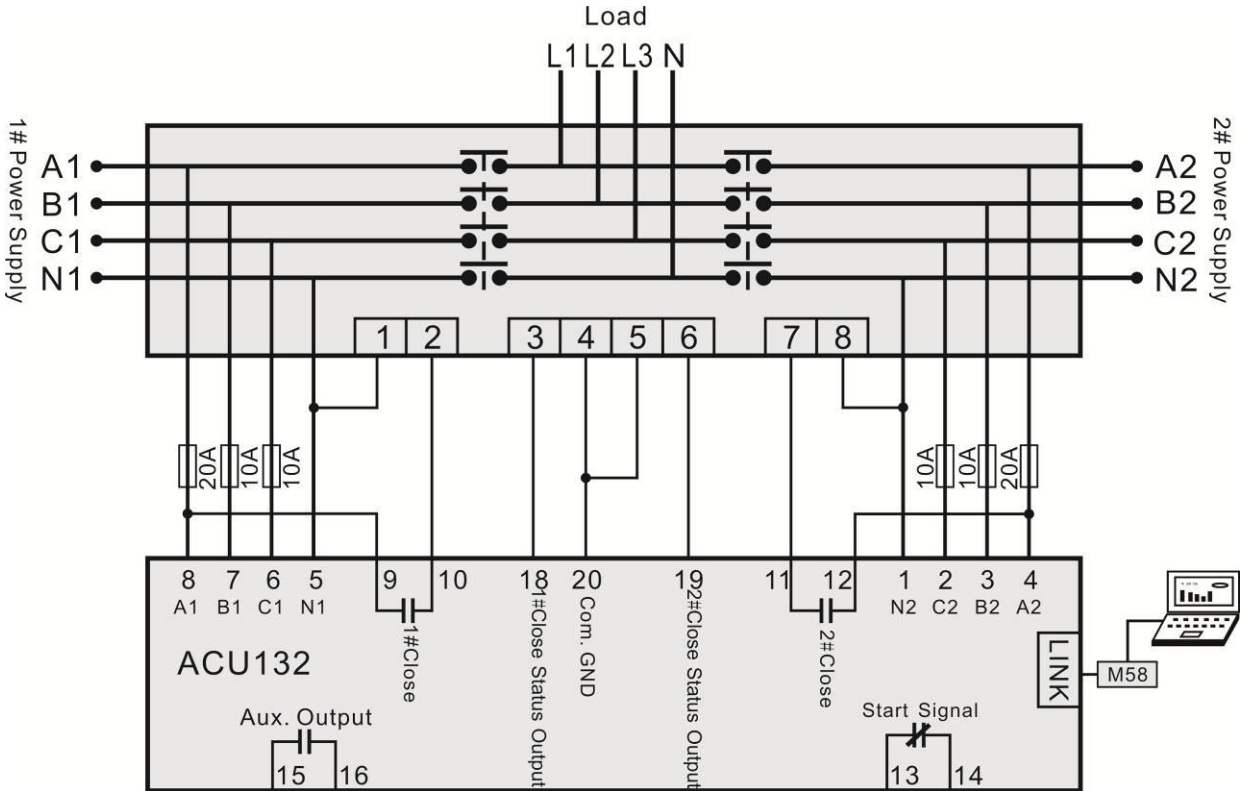
(3P 125A ATS. 3P3W 220V) Operate Current 3.5A





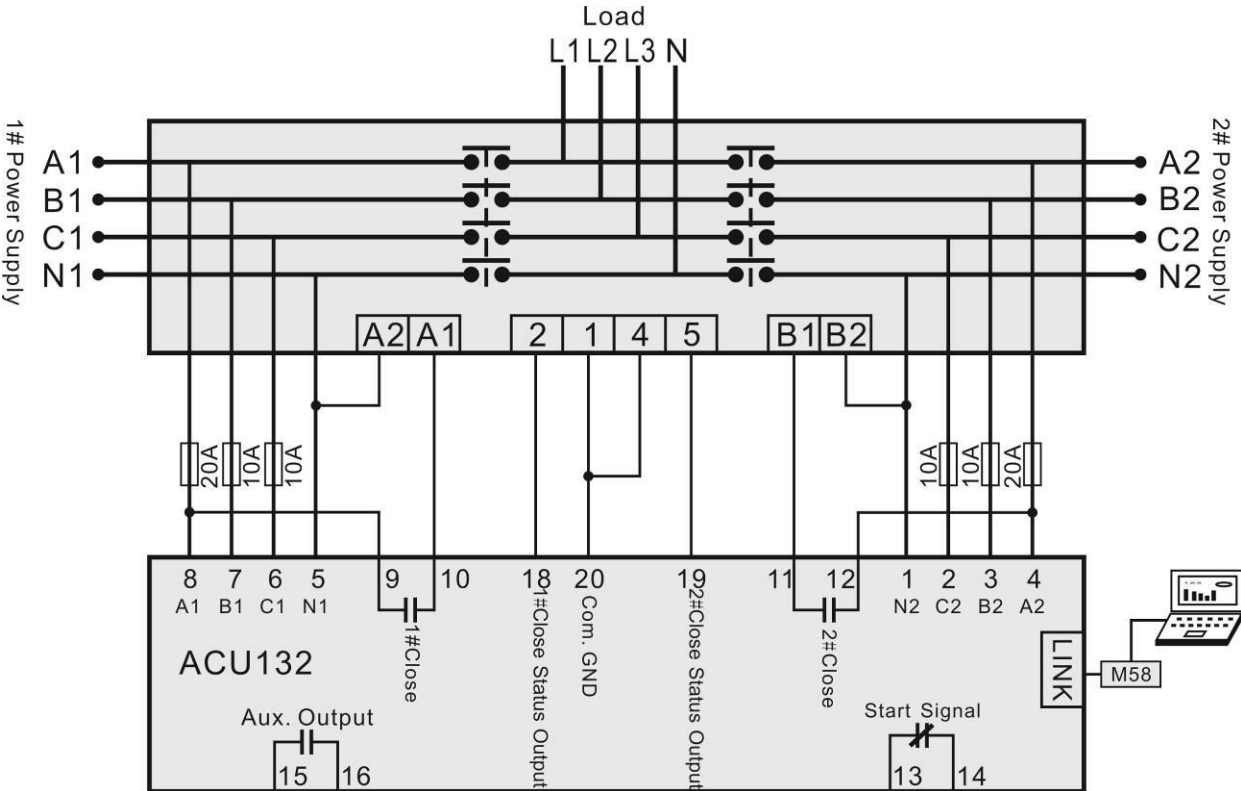
10.9. TYPE TOP3

(4P 125A ATS. 3P4W 380V) Operate Current 3.5A



10.10. TYPE W

(4P ATS. 3P 4W 380V) Operate Current 2.7A~6.4A

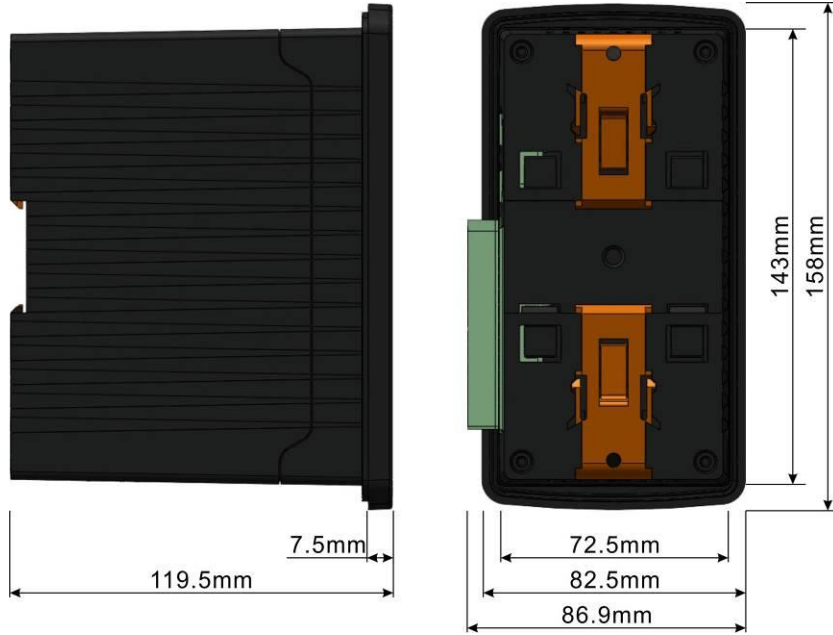




11. VERALL DIMENSION AND PANEL CUTOUT

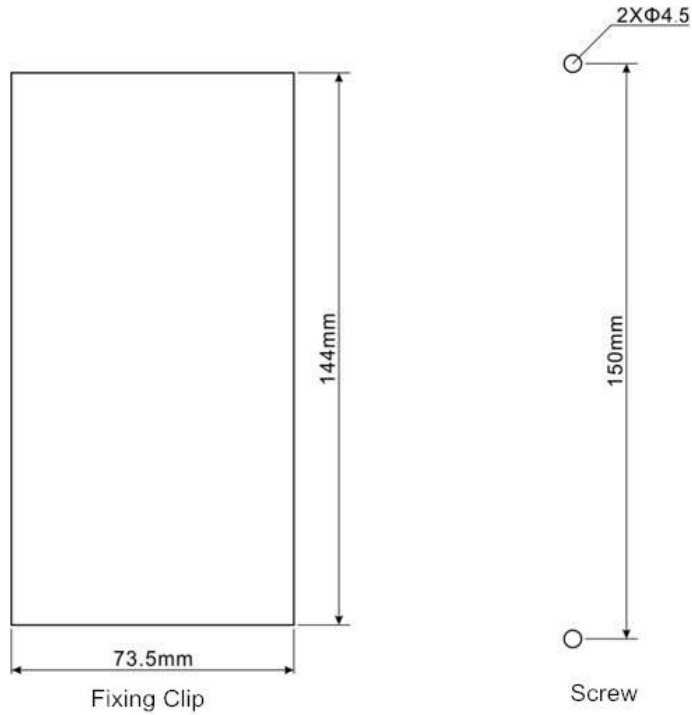
11.1. CASE DIMENSION

Unit: mm



11.2. CUTOUT

The controller has three installation ways: panel built-in, internal 35mm slidaway and internal screw mounting. Panel built-in and internal screw mounting are as below:





11.3. INSTALLATION



A) Fixing Clips



B) 35mm Slideway



C) Screw Mounting

12. TROUBLESHOOTING

Symptom	Possible Remedy
Controller inoperative	Check power connections and voltage of 1# and 2#; Check F1 or F2 fuse
Switch not activate	Check ATS; Check the connections between controller and ATS.
1# or 2# power Lamp flashes	Check whether AC voltage is normal or not.
Alarm lamp flashes	If Close Failure alarms, check the auxiliary contact wirings.