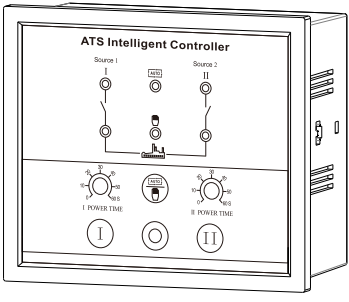
AiSIKAI

Professional manufacture

SKR2-A INTELLIGENT ATS CONTROLLER

USER MANUAL V2.2



INTELLIGENT CONTROLLER

▶OVERVIEW

SKR2-A automatic transfer switch controller is based on the micro-processor core. It can accurately detect the three phases/ single phase voltage of the dual power supplies, make accurate judgement of voltage anomalies (power loss, over voltage, under voltage, phase missing, over frequency, under frequency), and control the switching of ATS after delay.
It is suitable for the ATS with one breaking position or no breaking position. Controllers have the function of sending generator start signal after delay when power 1# becomes abnormal.
Using RS485 communication interface, controllers realize functions of remote measurement, remote communication and remote control.

▶PERFORMANCE FEATURE

1.Collect and display the 3 phases voltage and frequency of dual power supplies:
Power 1#: line voltage Uab, Ubc, Uca; phase voltage: Ua, Ub, Uc; frequency: Hz
Power 2#: line voltage Uab, Ubc, Uca; phase voltage: Ua, Ub, Uc; frequency: Hz
2.Controllers have the function of detecting the over voltage, under voltage, phase missing, over frequency, under frequency.
3.1# or 2# power supply normal delay can be set(0~60 seconds). Generator start delay is 1 second.
4.1# or 2# power supply abnormal delay can be set(0~60 seconds). Generator shutdown delay is 1 second.
5.Through panel keys users can set the parameters like “1# power has transferring priority”, “2# power has transferring priority”, “no priority”, “automatic/manual”, etc.
6.Breaking and closing output is pulse output.
7.Dual N lines are separated in design.
8.Have automatic/manual mode switching function. In manual mode, pressing the keys on panel to control the switching of ATS.
9.Panel LED can display the ATS working status clearly.
10.Have the force open input port. When it's active, ATS is forced to the breaking position (only effective for the ATS with breaking position).
11.Equipped with programmable relays (AUX.OUTPUT1, AUX.OUTPUT2), which can control the switching of the power supply of ATS.
12.1#, 2# power switching relays (1#COLSE, 2#CLOSE, OPEN) output contacts capacity is 5A AC25V. All contacts are passive contacts and can be used to drive the ATS switching.
13.Generator start relay (GENS START) output contact capacity is 7A AC250V / 7A DC28V ant it's passive closing contact.
14.Suitable for various wiring types (3 phases 4 lines, single phase 2 lines, 2 phases 3 lines).
15.Modular structure design. Flame-retardant ABS shell. Pluggable wiring terminal. Embedded installation method. Compact structure. Easy installation.

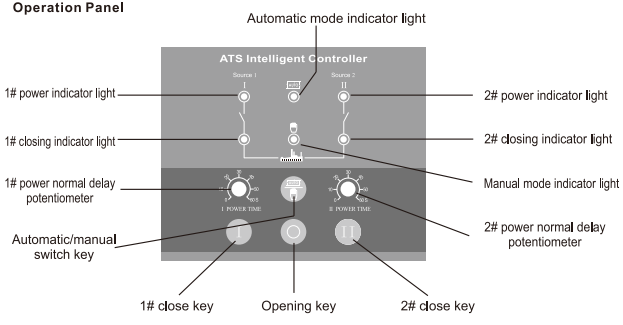
▶SPECIFICATIONS

Product parameters table

Item	Content	
Working voltage	AC power L1N1/L2N2 supply, voltage rangeAC170V~277V.	
Overall power consumption	≤3W (Standby mode: ＜1W)	
AC voltage input	3 phases 4 lines(ph-N)	AC170V~AC277V
	single phase 2 lines(ph-N)	AC170V~AC277V
	2 phases 3lines(ph-N)	AC170V~AC277V
Rated frequency	50/60Hz	
1# closing relay output port	5A AC250V Passive output	
2# closing relay output port	5A AC250V Passive output	
Breaking relay output port	5A AC250V Passive output	
Relay output 1	10A AC250V Passive output	
Relay output 2	10A AC250V Passive output	
Generator start relay	7A AC250V Passive output	
1# closing input port	Effective when connect with COM2	
2# closing input port	Effective when connect with COM2	
Force open input port	Effective when connect with COM2	
Communication	Rs485 interface, MODBUS protocol	
Outline dimensions	139mm × 120mm × 48mm	
Hole dimensions	130mm × 111mm	
Working conditions	Temperature: (-25~+70℃) Relative humidity: (20~93)%RH	
Storage conditions	Temperature: (-25~+70℃)	
Protection level	Ip55 when waterproof rubber ring is mounted between controller and control panel.	
Insulation strength	AC2.2kV voltage is applied between AC high voltage terminal and low voltage terminal, the leakage current is no larger than 3mA in 1 minute.	
Weight	0.51kg	

▶OPERATION

Operation Panel



Indicator lights function description

Item	function description
1# power indicator light	On when 1# power is normal, flash when 1# power is abnormal, off when 1# power has no electricity.
2# power indicator light	On when 2# power is normal, flash when 2# power is abnormal, off when 2# power has no electricity.
1# closing indicator light	On when switch 1# auxiliary contact is effective, off when not effective.
2# closing indicator light	On when switch 2# auxiliary contact is effective, off when not effective.
Automatic mode indicator light	on when controller in automatic mode, off when in manual mode.
Manual mode indicator light	On when controller in manual mode, off when in automatic mode

Note: the detailed indicator lights description in parameters setting mode, please view the "Panel Operation of Parameters Setting".

▶PANEL OPERATION OF PARAMETERS SETTING

1. Entering and exiting parameters setting mode

Press key and hold, after 3s, controller all LED lights are on and controller enters light-test mode. Keep pressing key, after 7s, controller all LED lights flash(500ms one time) and controller enters parameter setting mode.Release key, if you want to cancel the setting, press key, controller all LED lights flash 5 times (200ms one time) and controller returns normal test mode.In light-test mode, release key, controller returns normal test mode. In parameters setting mode, if no parameters are set, controller automatically returns normal test mode after about 1m30s.

2. Transferring priority setting

Firstly enter the parameter setting mode before setting transferring priority.

The procedure of setting "1# power has transferring priority", "2# power has transferring priority" and "no priority":

a.Press and hold I key, M key and II key simultaneously. Release I key, M key and II key when 1# power indicator light, automatic mode indicator light and 2# power indicator light come on simultaneously. Automatic mode indicator light and 2# power indicator light go out, 1# power indicator light is on, then controller enters transferring priority setting mode.

b.Press I key can set controller in 3 power supply modes circularly.
When 1# power indicator light is on and 2# power indicator light is off, 1# power has transferring priority.
When 2# power indicator light is on and 1# power indicator light is off, 2# power has transferring priority.
When both 1# and 2# power indicator lights are on, there's no transferring priority.

c.After setting, press II key, when 1# power indicator light, automatic mode indicator light and 2# power indicator light are on, means the transferring priority setting value is saved successfully. All lights on panel flash 5 times quickly and controller returns normal test mode. The controller will operate according to the just set priority.

Every time turn on the controller power, the current transferring priority setting can be judged according to the 3 conditions below.
——If 1# power indicator light flashes 3 times quickly, 1# power has priority.
——If 2# power indicator light flashes 3 times quickly, 2# power has priority.
——If both 1# and 2# power indicator lights flash 3 times quickly, there's no priority.

3. AC wiring system setting

Firstly enter the parameter setting mode before setting the AC wiring system.

The procedure of setting AC wiring systems (single phase 2 lines, 3 phases 4 lines, 2 phases 3 lines):

a.Press down I M II simultaneously. Release I M II when 1# power indicator light, automatic mode indicator light and 2# power indicator light come on simultaneously. Automatic mode indicator light and 2# power indicator light go out, 1# power indicator light is on.

b.Press M key. Release M key when 1# power indicator light, automatic mode indicator light and 2# power indicator light come on simultaneously. 1# power indicator light, automatic mode indicator light and 2# power indicator light go out simultaneously, then controller enters AC wiring system setting mode.

c.Press I key can set controller in 3 AC wiring systems circularly.
When 1# close indicator light is on, the setting is 2 lines system;
When 1# close indicator light, manual mode indicator light and 2# close indicator light are on, the setting is 3 phases 4 lines system;
When 1# close indicator light and manual mode indicator light are on, the setting is 2 phases and 3 lines system.

d.After setting, press II key, when 1# power indicator light, automatic mode indicator light and 2# power indicator light come simultaneously, means the AC wiring system setting is saved successfully. All lights on panel flash 5 times quickly and controller returns normal test mode. The controller will operate according to the just set wiring system.

Every time turn on the controller power, the current wiring system setting can be judged according to the 3 conditions below.

——If 1# close indicator light is on, it's single phase 2 lines

——If 1# close indicator light, manual mode indicator light and 2# close indicator light are on, it's 3 phases 4 lines.

——If both 1# and manual mode indicator lights are on, it's 2 phases 3 lines.

4. Delay setting

Adjust "1# power normal delay" potentiometer, can set the output delay after 1# power getting normal (potentiometer is at the side of the back-panel terminal).

Adjust "2# power normal delay" potentiometer, can set the output delay after 2# power getting normal (potentiometer is at the side of the back-panel terminal).

Firstly enter the parameter setting mode before setting the delay.

The procedure of setting "1# power abnormal delay", "2# power abnormal delay":

a.Press down I key, II key simultaneously. Release I key, II key when 1# power indicator light, automatic mode indicator light and 2# power indicator light come on simultaneously. 1# power indicator light, automatic mode indicator light and 2# power indicator light go out simultaneously, then controller enters delay setting mode.

1# power abnormal delay: adjust the "1# power normal delay" potentiometer.

2# power abnormal delay: adjust the "2# power normal delay" potentiometer.

b.After setting, press II key, when 1# power indicator light, automatic mode indicator light and 2# power indicator light come on simultaneously, means the value set by potentiometer is saved successfully. All lights on panel flash 5 times quickly and controller returns normal test mode. The controller will operate according to the just set delay value.

Note: 1# power normal delay value should be no less than 1# power abnormal delay value, otherwise 1# power normal delay value will be forced to the value of 1# power abnormal delay. 2# power normal delay value should be no less than 2# power abnormal delay value, otherwise 2# power normal delay value will be forced to the value of 2# power abnormal delay.

5. Restore the factory delay value

Firstly enter the parameter setting mode.

a.Press down I II key simultaneously. Release I II key when 1# power indicator light, automatic mode indicator light, and 2# power indicator light come on simultaneously. 1# power indicator light, automatic mode indicator light and 2# power indicator light go off simultaneously, then controller enters the delay value setting mode.

b.Press key, when 1# power indicator light, automatic mode indicator light and 2# power indicator light come on simultaneously, means delay value is restored to factory setting. All indicators on panel flashes 5 times and controller return to normal test mode. Controller will work according to the factory setting delay value.

Note: 1#, 2# power abnormal delay factory setting value is 5 seconds. Generator shutdown delay factory setting value is 90 seconds.

▶Parameter configuration table

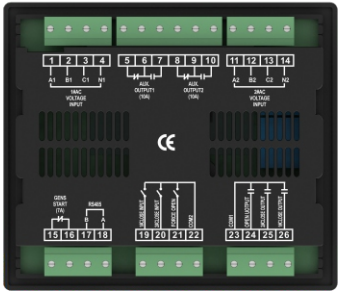
Serial number	Parameter name	Setting range	Default value	Parameter name
1	1# power normal voltage delay	(0~60)s	Set by controller potentiometer	The time to confirm the 1# power voltage from abnormal to normal, generally 10 seconds.
2	1# power abnormal voltage delay	(0~60)s	5	The time to confirm the 1# power voltage from normal to abnormal
3	2# power normal voltage delay	(0~60)s	Set by controller potentiometer	The time to confirm the 2# power voltage from abnormal to normal, generally 10 seconds.
4	2# power abnormal voltage delay	(0~60)s	5	The time to confirm the 2# power voltage from normal to abnormal.
5	Closing delay		5	Closing relay output pulse time. If set to zero, then the relay output is continuous.
6	Opening delay		5	Opening relay output pulse time
7	Switch transferring interval		1	The delay time from 1# opening to 2# closing or 2# opening to 1# closing.
8	Over transferring delay		0.0	The time when the closing relay continue outputting after the closing status signal is detected
9	Generator start delay		1	When the voltage is abnormal, the generator start delay begins. After the delay finishes, generator start signal is sent.
10	Generator shutdown delay		90	When generator is working and main power voltage is normal, the generator shutdown delay begins. After the delay finishes, generator start signal stops.
11	AC power supply system setting	(0~2)	0	0: 3 phases 4 lines, 1: 2 phases 3 lines, 2: single phase
12	Rated voltage		230	AC system rated voltage value
13	Rated frequency		50.0	Provide reference for over frequency and under frequency judgment
14	Over voltage monitor enable		1	0:not enabled; 1:enabled
15	Over voltage threshold value		115%	The upper limit value of voltage, greater than the upper limit is abnormal
16	Over voltage return value		113%	Voltage upper limit return value, less than return value is normal
17	Under voltage threshold value		75%	The lower limit value of voltage, less than the lower limit is abnormal
18	Under voltage return value		77%	Voltage lower limit return value, greater than return value is normal
19	Over frequency monitor enable		0	0: not enabled, 1: enabled
20	Over frequency threshold value		110%	The upper limit value of frequency, greater than the upper limit is abnormal
21	Over frequency return value		104%	Frequency upper limit return value, less than return value is normal
22	Under frequency monitor enable		0	0: not enabled, 1: enabled
23	Under frequency threshold value		90%	The lower limit value of frequency, less than the lower limit is abnormal
24	Under frequency return value		96%	Frequency lower limit return value, greater than return value is normal
25	Phase loss monitor		1	0: not enabled, 1: enabled
26	Transferring priority selection	(0~2)	0	0: 1# power takes priority, 1: 2# power takes priority, 2: no priority

Note: normal voltage delay of 1# power and 2# power can only be set through the potentiometer at the controller terminal side. Abnormal voltage delay of 1# power and 2# power can be set through the potentiometer at the controller terminal side. AC power supply system setting and transferring priority selection can be set through the keys on the controller panel.

▶OPERATION CONTROL

When the controller is working, press key, the controller can be switched between automatic mode and manual mode (indicated by the automatic mode indicator light and manual mode indicator light). In automatic mode, controller can automatically switch load to 1# power or 2# power; in manual mode, press key, load switches to 1# power side, press key, load switches to 2# power side.

▶WIRING



SKR2-A controller input output interface diagram

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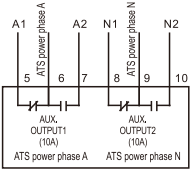
Wiring terminal function description

Terminal number	Item	Function description		Remark
1	A1	1# AC 3 phases 4 lines voltage input		If single phase input, only A1 and N1 are used
2	B1			
3	C1			
4	N1			
5	Output port 1	Normally close	ATS power phase A	Passive relay contact output, rated 10A
6		Common terminal		
7		Normally open		
8	Output port 2	Normally close	ATS power phase N	Passive relay contact output, rated 10A
9		Common terminal		
10		Normally open		
11	A2	2# AC 3 phases 4 lines voltage input		If single phase input, only A2 and N2 are used
12	B2			
13	C2			
14	N2			
15	Start output	Passive relay contact output		Normally close output, rated 7A
16				
17	B	Rs485 communication interface		
18	A			
19	1# close input	Detect 1# closing state,auxiliary contact input		Effective when connect with COM2
20	2# close input	Detect 2# closing state,auxiliary contact input		Effective when connect with COM2
21	Force open	Make ATS transfer to the open position when effective		Effective when connect with COM2
22	Common terminal	Input common terminal		COM2
23	Output common terminal	Close, Opening output common terminal		COM1
24	Opening output	Passive relay contact output		Normally open contact output, rated 5A
25	2# close output	Passive relay contact output		Normally open contact output, rated 5A
26	1# close output	Passive relay contact output		Normally open contact output, rated 5A

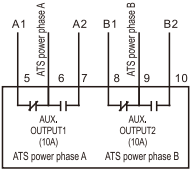
Note: COM1 is output common terminal, COM2 is input common terminal, they cannot be connected with each other.

▶Power supply of ATS

ATS power is controlled by the controller. If there is one of the dual power supplies voltage is normal Users choose supply voltage (phase voltage or line voltage) according to ATS model, If using phase voltage, Connect 1# power supply phase voltage (phase A for example) with normally close point (terminal 5). Connect 2# power supply phase voltage (phase A for example) with normally open point (terminal 7) of output port 1, Connect 1# power N phase with normally close point (terminal 8) of output port 2. Connect 2# power N phase with normally open point (terminal 10) of output port 2, Then connect ATS power supply according to the common point of output port 1 and output port 2.Finally power on



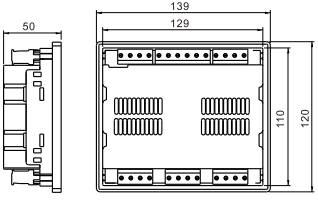
ATS power phase voltage supply

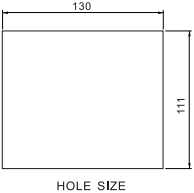


ATS power line voltage supply

Note: If not using controller to control ATS power supply, the above terminals could be not connected, output port 1 and 2 should be set as "unused". When output port 1 and 2 are used for other functions except "ATS power supply", parameter configuration should be set to the corresponding function item.

▶Installation dimensions





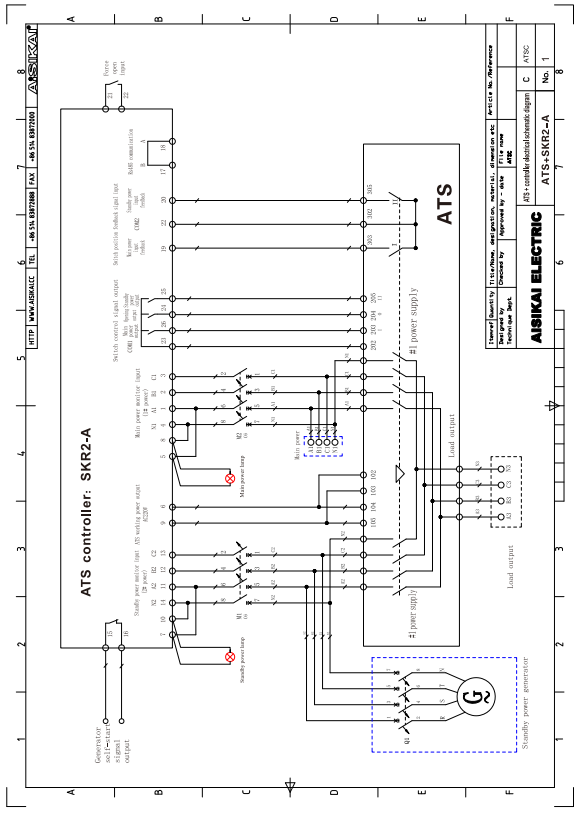
HOLE SIZE

▶Troubleshooting

Common fault table

Fault phenomenon	Possible measures
Controller no reaction when power on	Check the controller connection wire
ATS do not switch	Check ATS; Check the connection wire between controller and ATS
Electric parameter detection inaccurate	Check the controller connection wire, revise electric parameter detection value
Communication error with computer software	Check communication port setting and connection wire

▶ELECTRICAL WIRING DIAGRAM



ASKQ-4000A~6300A Controller wiring diagram: SKR2-A

Standby power monitor input (2# power)

Main power monitor input (1# power)

ATS working power output AC220V

Switch control signal output

Switch position feedback signal input

RS485 Communication

Generator self-start signal output

II POWER

I POWER

ASKQ-4000A~6300A ATS main body wiring

ASKQ-4000A~6300A ATS control wiring

Main power close indication light

Standby power close indication light

Load output

Note:
1.F1~F6 are ASKB1 type miniature circuit breakers, rated current is 10A.
2.F7, F8 are ASKB1 type miniature circuit breakers, rated current is 25A.
3.K1~K3 are AC contactors, current no lower than 20A.
4.A1, A2, B1, B2 wiring no lower than 2.5mm².

Item or Part	Quantity	Title/Name, designation, material, dimension etc	Article No./Reference
Designed by Technique Dept.	Checked by	Approved by — date	File name ATSC / Date 2013 / Scale
AISIKAI ELECTRIC		ATS + controller electrical schematic diagram	C / ATSC
		ATS(ASKQ-4000A-6300A)+SKR2-A	No. 1