AFR-4
Arc Flash Protection Relay

User Manual

Version: 1.15

Revision: 2025.06

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Read me

When you use AFR-4, be sure to read this user manual carefully, and be able to fully understand the implications, the correct guidance of operations in accordance with user manual, which will help you make better use of arc protection device, and help to solve the various problems at the scene.

1. This product must be earthed reliably.

2. Do not drop this product during installation to avoid damage to this product.

3. The terminal blocks must be connected firmly to avoid serious consequences caused by dropping.

4. Please do not plug or unplug the circuit board during the normal operation of this product; otherwise, the data of this product will be lost and the product may not operate normally.

5. The rated value is not changed randomly and it can be only changed by relevant professionals.

6. When installing, please install this product according to the terminal definition, and do not wire randomly.

7. After installation and energizing, do not touch the exposed terminals and the bare parts of the power supply and do not place this product in a damp area to avoid leakage and short circuit at the terminals.

- **Please read this user manual carefully**
- **Please save this document**

Directory

1.- SUMMARIZE

AFR-4 is a versatile and independently operating device for bay-based protection. It supports 4-channels arc signal detection and can configuration multiple arc tripping modes, ensuring accurate and fast fault isolation. With a fast relay output speed up to ≤5ms and ARC trip action time speed up to ≤8ms, AFR-4 can minimize or completely eliminate arc flash damage, improving system safety and reliability. It can be used in various arc protection applications in low or medium voltage power distribution systems.

AFR-4 also provides flash warning and dual criteria tripping mechanism (arc detection + current), providing a comprehensive solution for arc flash protection. Integrated RS485/Modbus-RTU communication enables seamless remote monitoring and control, which is ideal for modern power systems.

FEATURES

- ≤5ms fast relay output;
- ≤8ms Arc trip action;
- Regional arc light detection;
- Multiple combined tripping modes;
- Circuit breaker failure protection;
- 4 channels of arc light signals detection;
- Dual criteria for arc detection and overcurrent detection;
- Integrated RS485/ Modbus-RTU communication;
- Support ST visible light and ST ultraviolet sensor access.

APPLICATIONS

- Power substations;
- Box-type substations;
- Water conservancy projects;
- Electrical switchgear for thermal power plants;
- Switchgear for wind farms and photovoltaic stations;
- Large-scale municipal engineering projects.

2.- SPECIFICATION

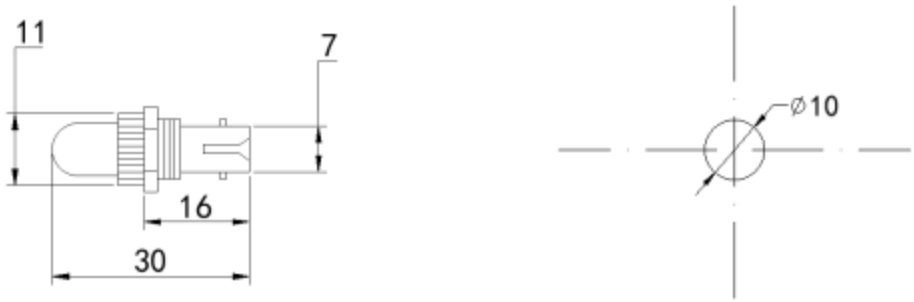
Working power supply	
Power supply	85-265Vac/dc Optional 15-70Vdc (suggestion 24V/48Vdc system volt)
Power consumption	≤8W
Current	
Rated current input	5A, Frequency: 50Hz/60Hz; accuracy: 0.5
Rated current output	2.5mA, CT ratio: 2000:1
Measuring range	Protection current: 0.06~10In
Error	±2.5%
Linear range	0~40A (Impedance: 20Ω)
Arc signal input	
Number of channels	4 channels
Sensor connector type	ST (straight tip) fiber/ screw fixing
Sensor lens type	Passive physical lens
Transmission medium	Plastic optical fiber
Detection light type	Visible light/ UV light optional
Optical fiber length	5m/10m/15m
Action time	
Arc trip (fast trip)	≤5ms
Pure arc trip (relay output)	≤8ms
Current+ arc trip	≤15ms
Digital input (Opto-isolated)	
Quantity	2 DI (For Block/ MT in)
Internal supply voltage	24Vdc (Passive, dry contact; No need external voltage)
Loop current	5-10mA
Max. power consumption	200mW
Action time	Max. 18μs
Digital output	
Trip output signal	Pulse signal, pulse width 120ms
Fast trip relay (IGBT) (1*Relay for Arc trip, NO)	Load capacity: 10A@250Vac. Max. switching current: 10 A. Max. switching voltage: 277Vac.
Standard trip relay (4* Relay for Arc trip, NO. 1* Relay for Arc alarm, NO 1* Relay for MT out)	**In DC power supply, relay spec:** Load capacity: 12A@24Vdc. Max. switching current: 12 A.

SPDT contact (1*Relay for device self-test, NC)	Max. switching voltage: 300Vdc.
Communication	
Communication Interface	1 channel RS485, photoelectric isolation, with lightning protection
Baud rate	4800, 9600bps (default),19200, 38400
Communication protocol	Modbus RTU
Environment	
Working temperature	-10 ~ +55°C
Storage temperature	-25 ~ +70°C, humidity: 5~95%RH
Atmospheric pressure	60kPa~106kPa

3.- ARC SENSOR INTRODUCTION

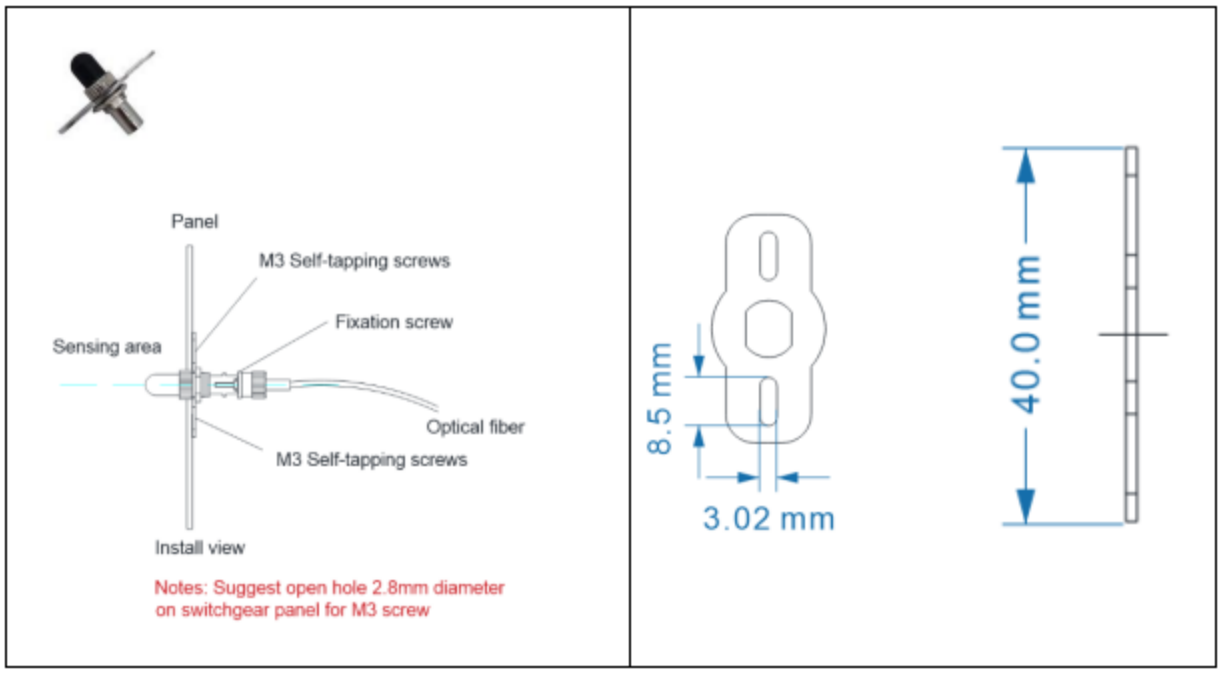
Arc light sensor is specifically designed based on the spectral characteristics of arc light. It utilizes specialized optical materials, polymer blending and doping technology, as well as advanced optical lens technology to effectively filter out interference from visible light. The ultraviolet arc light sensor probe can rapidly detect arc flashes within a coverage area of over 240 degrees. The detected signal is then transmitted to the control equipment via optical fiber, enabling fault isolation at the millisecond level to prevent severe consequences.

3.1.- Sensor dimension and hole size (Unit: mm)

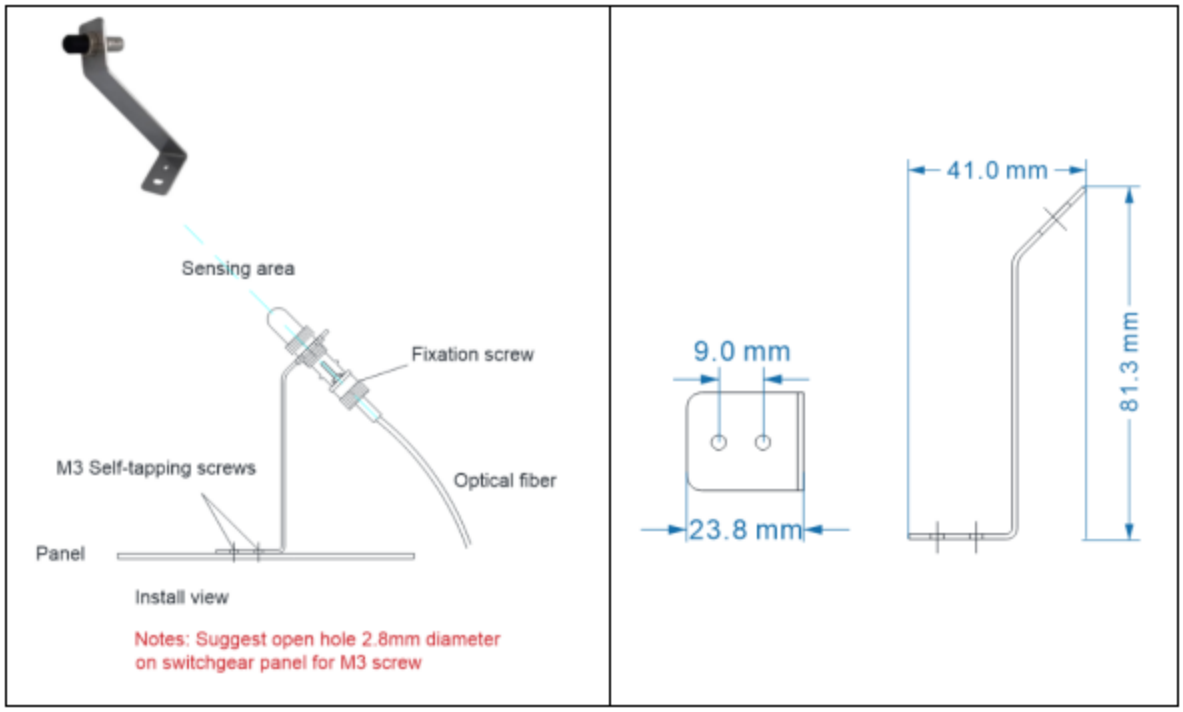


3.2.- Sensor installation diagram and dimension

Method 1:

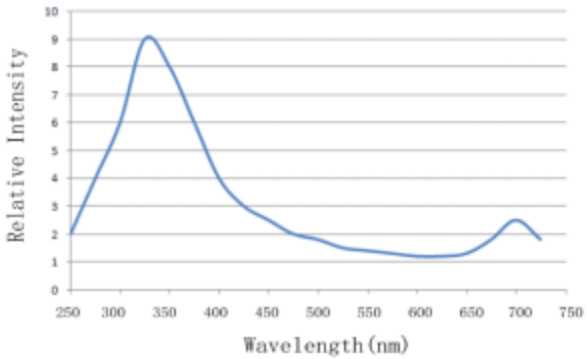


Method 2:

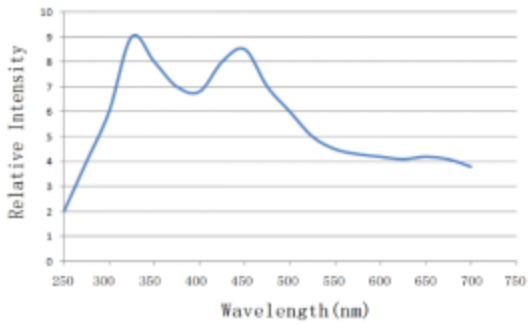


3.3.- Arc sensor specification and response curve

Sensor type	Visible light sensor	UV light sensor
Sensitivity type	Full spectrum	UV spectrum
Spectral response bandwidth	280nm ~ 550nm	280nm ~ 400nm
Optical threshold	8000lux (±20%)	5mw/cm² (±20%)
Monitoring angle	-120°~ 120°	-120°~ 120°
Angle decay rate	≤20%	≤10%
Operating temperature	-30~70°C	-40~85°C
Interface type	ST fiber optic/screw fixing	ST optical fiber
Optical fiber length	5/10/15 meters	5/10/15 meters

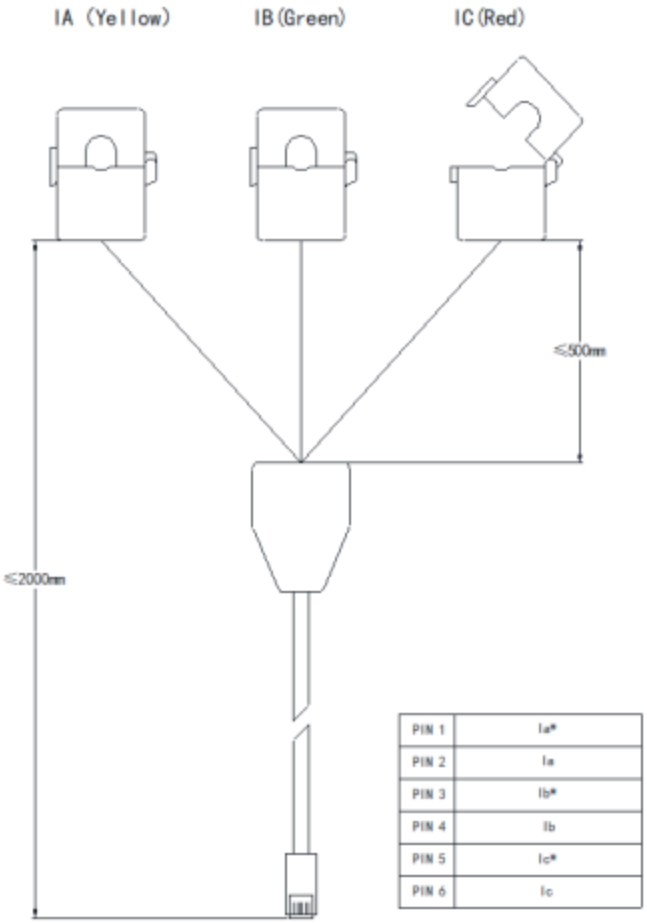


UV spectral response curve

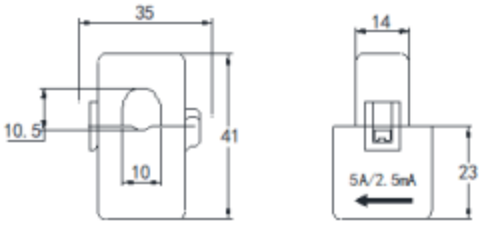


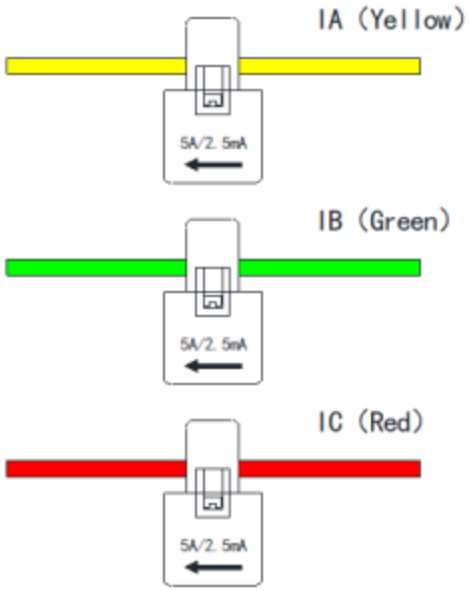
Visible light spectrum response curve

3.4.- Current transformer installation diagram and dimension



PIN 1	Ia*
PIN 2	Ia
PIN 3	Ib*
PIN 4	Ib
PIN 5	Ic*
PIN 6	Ic

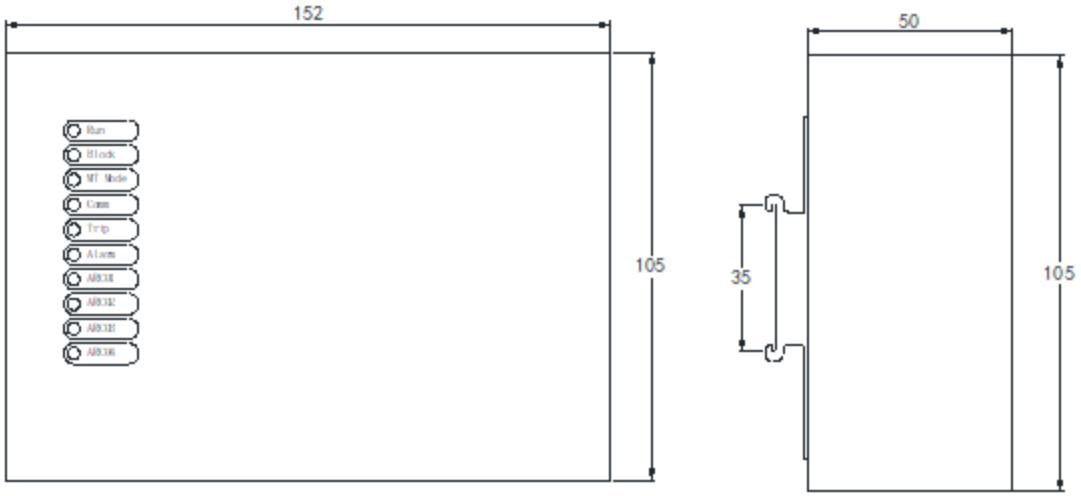




4.- INSTALLATION AND START-UP

4.1.- Din-rail mount dimension

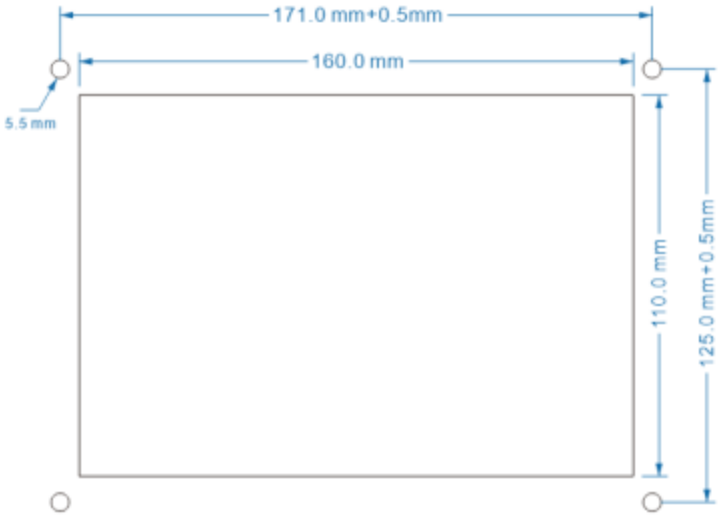
Product dimension：W*H*D: 152*105*50mm, Din-rail mount: 35mm



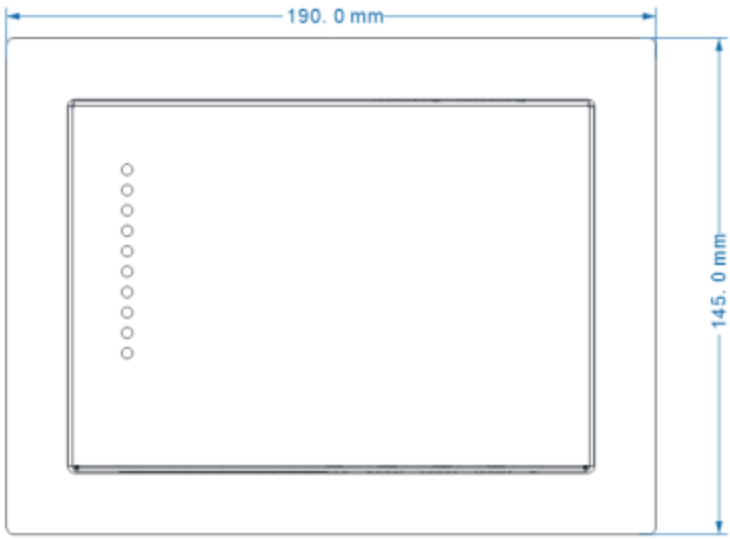
Front view **Side view**

4.2.- Panel mount dimension

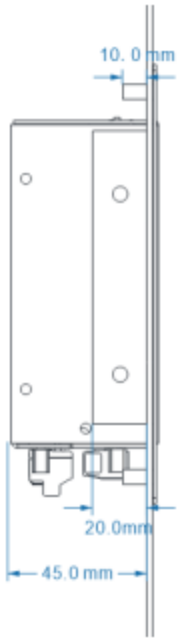
Panel hole size:



Front view

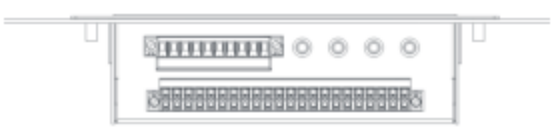


Side view

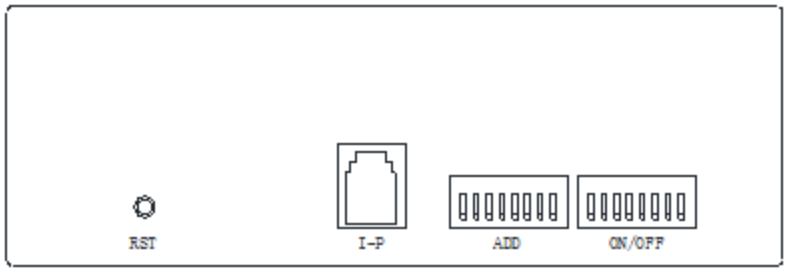


Top view

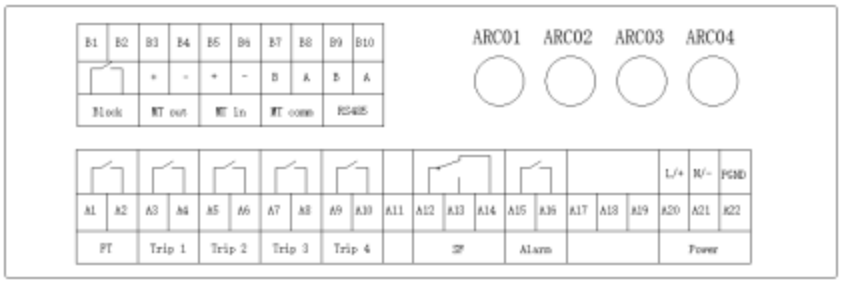
Bottom view



4.3.- Terminal definition



Marked	Notes
RST	Reset DI and DO port (also can remote reset via RS485. Details see chapter 6.2.5.)
I-P	Current transformer input
ADD	Communication setting dip switch
ON/OFF	Arc protection function setting dip switch



No.	Marked	Notes
B1-B2	Block	External block input, for device maintenance. passive, dry contact
B3-B4	MT out	Master trip output +/-; (passive, dry contact, NO)
B5-B6	MT in	External master trip input +/-, passive, dry contact
B7-B8	MT comm	Master trip communication (Reserved for communication between AFR-4 and the company's other products.)
B9-B10	RS485 A, B	Device communication interface
ARC 01-04	ARC 01-04	Channel 01-04 Arc sensor input
A1-A2	FT	Fast trip output (IGBT,NO)
A3-A4 **A5-A6** **A7-A8** **A9-A10**	Trip 1-4	Channel 01-04 Arc trip relay (passive, dry contact, NO)
A11	Reserved	
A12-A14	SF	Device power loss and self-test abnormal signals
A15-A16	Alarm	Arc alarm output relay (passive dry contact, NC)
A17-A19	Reserved	
A20-A22	Power	Power supply +/-, ground wire

4.4.- Indicator description

- RUN — Device runs normally, and flashes once per second.
- BLOCK — When external block input, the arc protection function is disabled.
- MT — Device is in MT (master trip) mode.
- COMM — Device is communicating.
- TRIP — ARC trip signal action.
- ALARM — Device self-test abnormality/ Arc alarm action.
- ARC01 — Arc sensor 01 occurs Arc trip action.
- ARC02 — Arc sensor 02 occurs Arc trip action.
- ARC03 — Arc sensor 03 occurs Arc trip action.
- ARC04 — Arc sensor 04 occurs Arc trip action.

Notes:

-. **"Run"** indicator normally flashes once per second. If the light is constantly on, means that the program is stuck during the operation. user can try shutting down and restarting.

-. **"Alarm"** indicator stays on for the first time, it means that the device has a self-test abnormality. user can through host computer to inquiry the reason for abnormality. If the device set arc alarm output, the indicator light will also light up. user can press the reset button to reset.

-. **"Trip"** indicator light is constantly on, means that the arc protection output a trip signal, and an arc action has occurred. After the action occurs, it is necessary to inspect the switchgear to determine whether there is combustion or damage. After confirming that there are no abnormalities, press reset button to reset the device. After resetting, can close circuit breaker again.

5.- DIP SWITCH FUNCTION DESCRIPTION

ARC protection function ON/OFF setting (Detail see chapter 5.1).

RS485 communication setting (Detail see chapter 5.2).

Note: the direction marked with "ON" represents: 1, and reverse direction marked with number represents: 0.

5.1.- Function ON/OFF setting introduction

By switching the ON/OFF DIP switch, you can set the protection mode, add current criteria, activate the arc sensor, and turn on the alarm function.

SW01	Mode	0-M1/1-M2
SW02	MT Mode	0-OFF/1-ON
SW03	Alarm	0-OFF/1-ON
SW04	I>Iset	0-OFF/1-ON
SW05	ARC01	0-OFF/1-ON
SW06	ARC02	0-OFF/1-ON
SW07	ARC03	0-OFF/1-ON
SW08	ARC04	0-OFF/1-ON

SW01: Switch between ARC protection mode 1/ mode2, detail see **chapter 5.1.1**.

SW02: Turn ON/OFF master trip mode, detail see **chapter 5.1.2**.

SW03: Turn ON/OFF pure Arc alarm and overcurrent alarm function, detail see **chapter 5.1.3**.

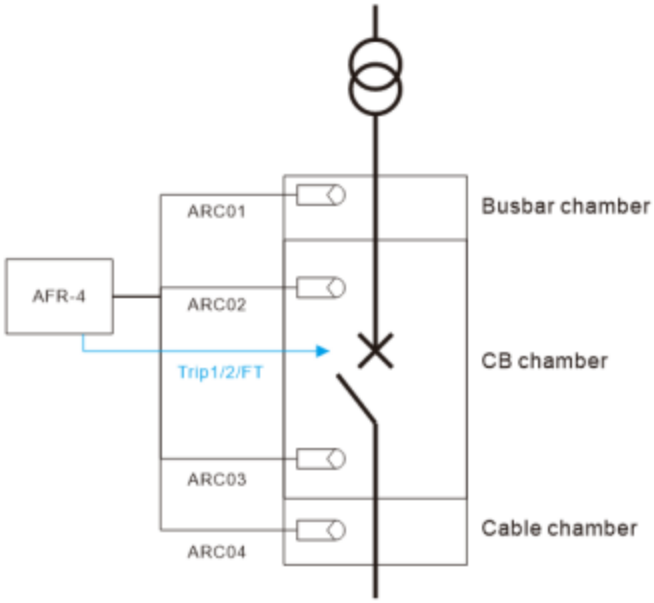
SW04: Turn ON/OFF overcurrent judgment, detail see **chapter 5.1.4**.

SW05-08: Turn ON/OFF ARC01-04 sensor, detail see **chapter 5.1.5**.

5.1.1.- SW01: Switch between ARC protection mode 1/ mode2

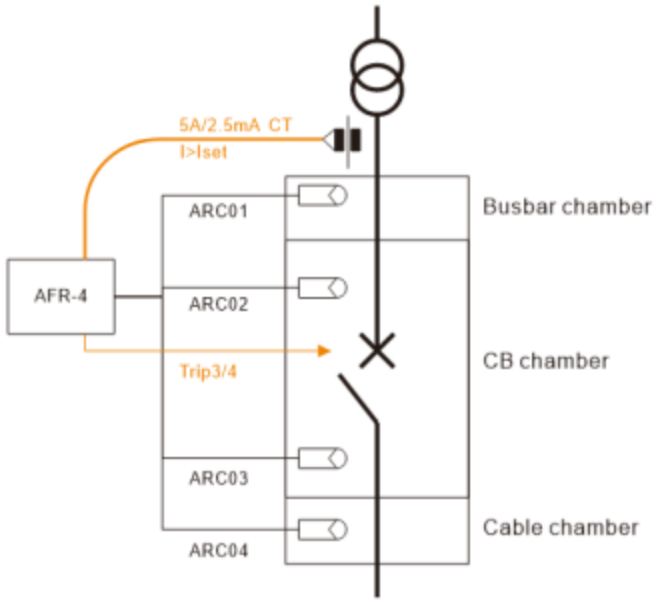
Mode 1: Local trip

When any arc sensor detects arc signal, the device will trip FT, Trip1, Trip2 relay.



Application example 1

If the SW04 current judgment function is turn on, when an arc signal is generated and the overcurrent exceeds the set value, the FT, Trip1, and Trip2 relays will trip. If current is still detected and after a delay, the device will trip Trip3 and Trip4 to disconnect the circuit.

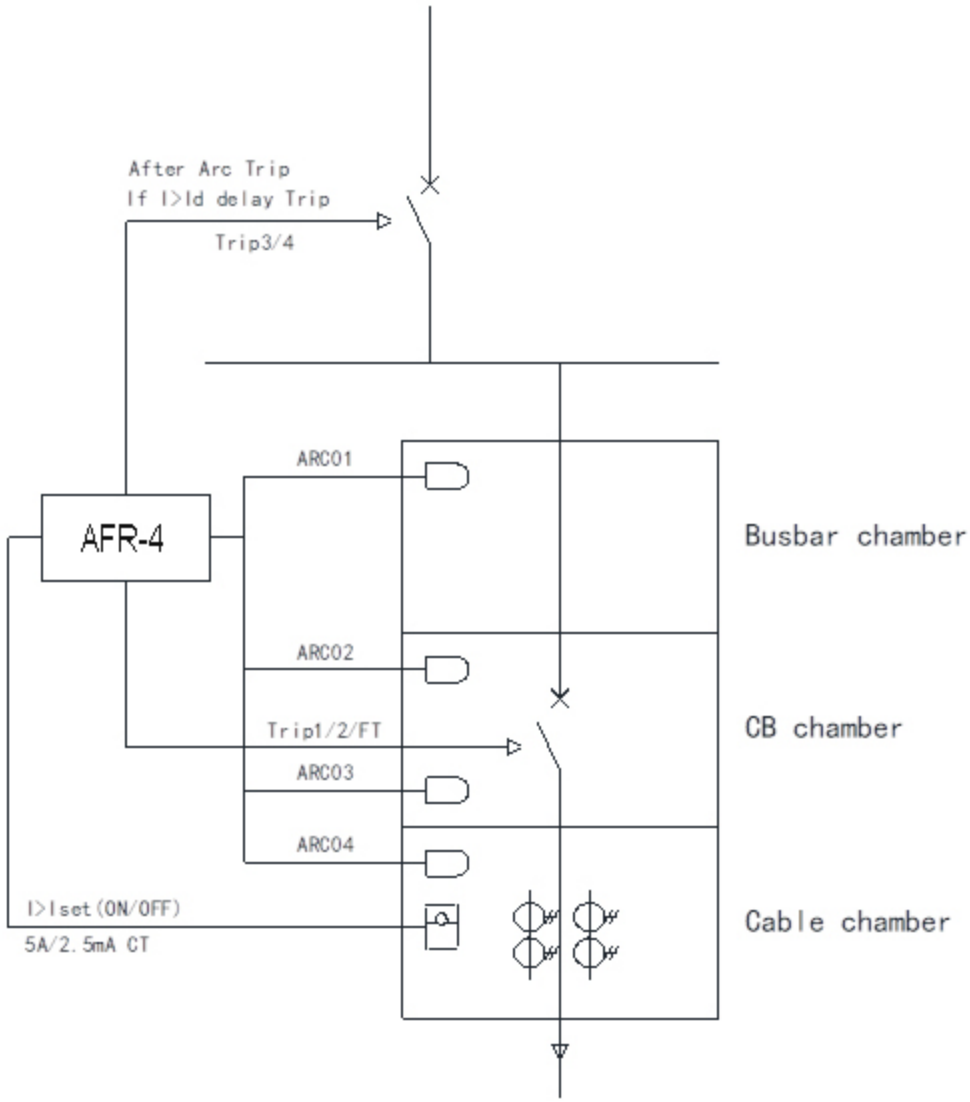


Application example 2

Trip3 and Trip4 can also be connected to external devices. When an arc signal is generated and the overcurrent exceeds the set value, the device will trip FT, Trip1 and Trip2 inside the cabinet.

If current is still detected and after a delay, Trip3 and Trip4 will be tripped to disconnect the circuit via external equipment. This function is typically used when the cabinet's circuit breaker fails to trip due to arc damage, ensuring that the external devices can trip to protect the switchgear.

FT/Trip1/Trip2: Local circuit breaker
Trip3/Trip4: Upstream circuit breaker

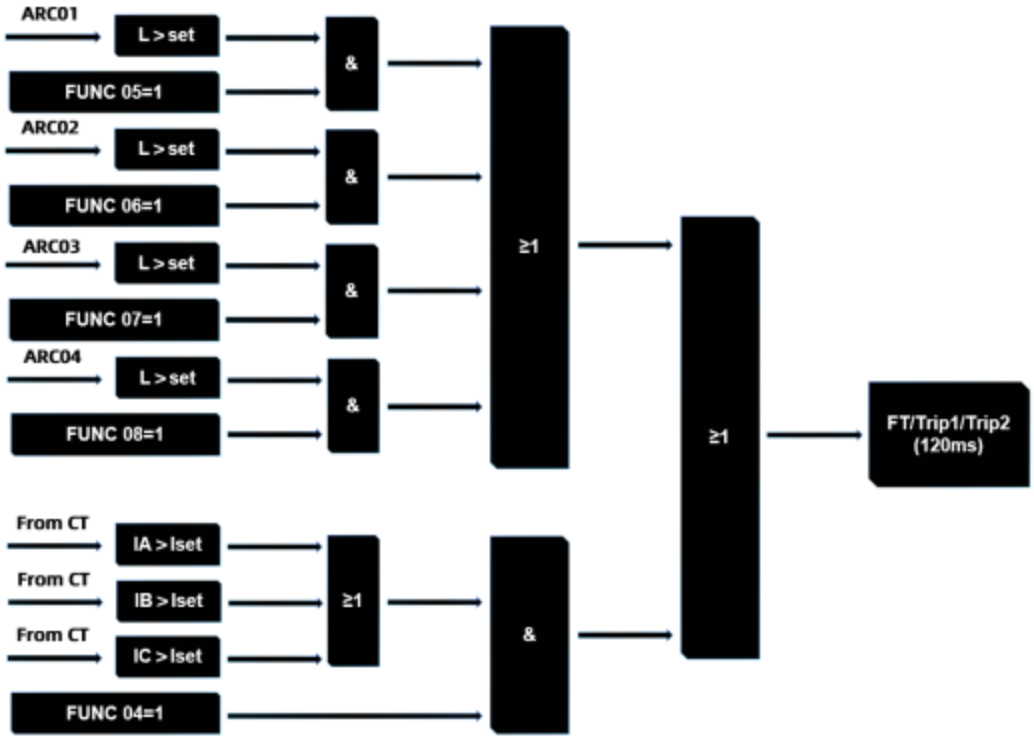


Application example 3

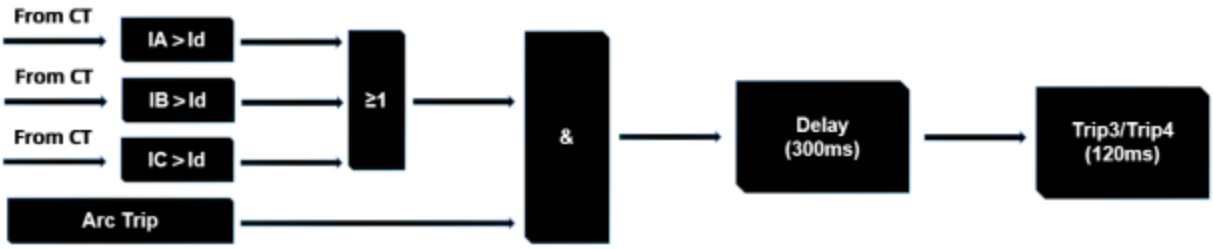
Relay action diagram:

Mode	Sensor	Fast trip	Trip 1	Trip 2	Trip 3	Trip 4
Mode 1	ARC01	Act	Act	Act	Act (after delay)	Act (after delay)
	ARC02	Act	Act	Act	Act (after delay)	Act (after delay)
	ARC03	Act	Act	Act	Act (after delay)	Act (after delay)
	ARC04	Act	Act	Act	Act (after delay)	Act (after delay)

- **ARC&Current dual criteria trip logic diagram**



- **Delay Trip Logic Diagram**

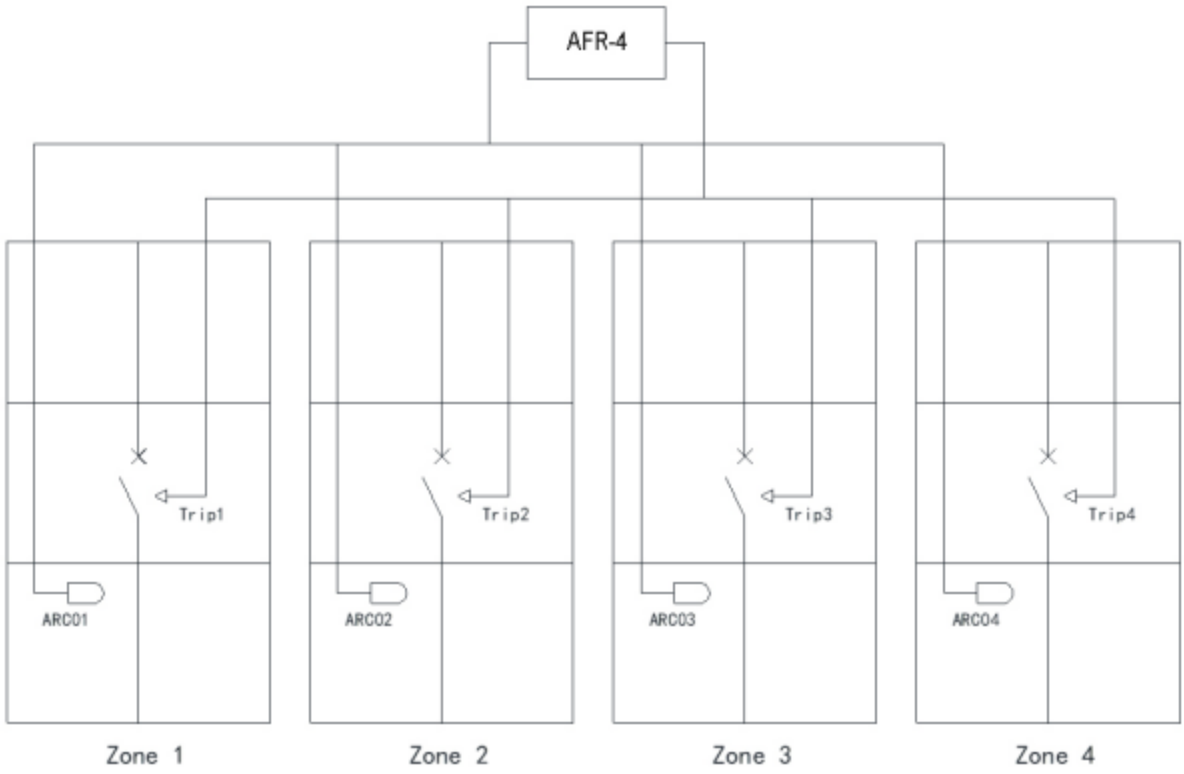


Note: The current value and delay time can be set by referring to chapter 6.2.6.

Mode 2: Zone trip

AFR-4 can control max 4 independent zones, each sensor can be assigned to a specific zone: ARC1 corresponds to Trip1, ARC2 to Trip2, ARC3 to Trip3, and ARC4 to Trip4.

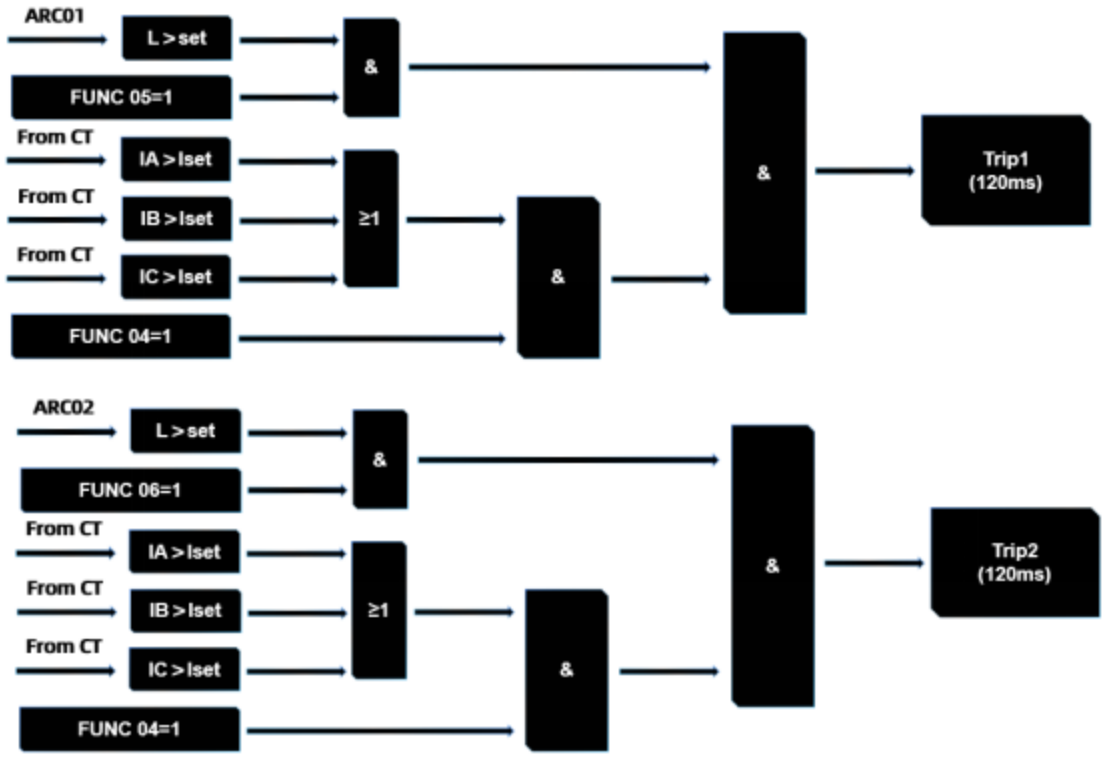
If the SW04 current judgment function is turn on, the device will trip the corresponding trip relay when an arc signal is detected and the overcurrent exceeds the set threshold.



- **Relay action diagram:**

Mode	Sensor	Trip 1	Trip 2	Trip 3	Trip 4
Mode 2	ARC01	Act			
	ARC02		Act		
	ARC03			Act	
	ARC04				Act

- **ARC trip logic diagram**



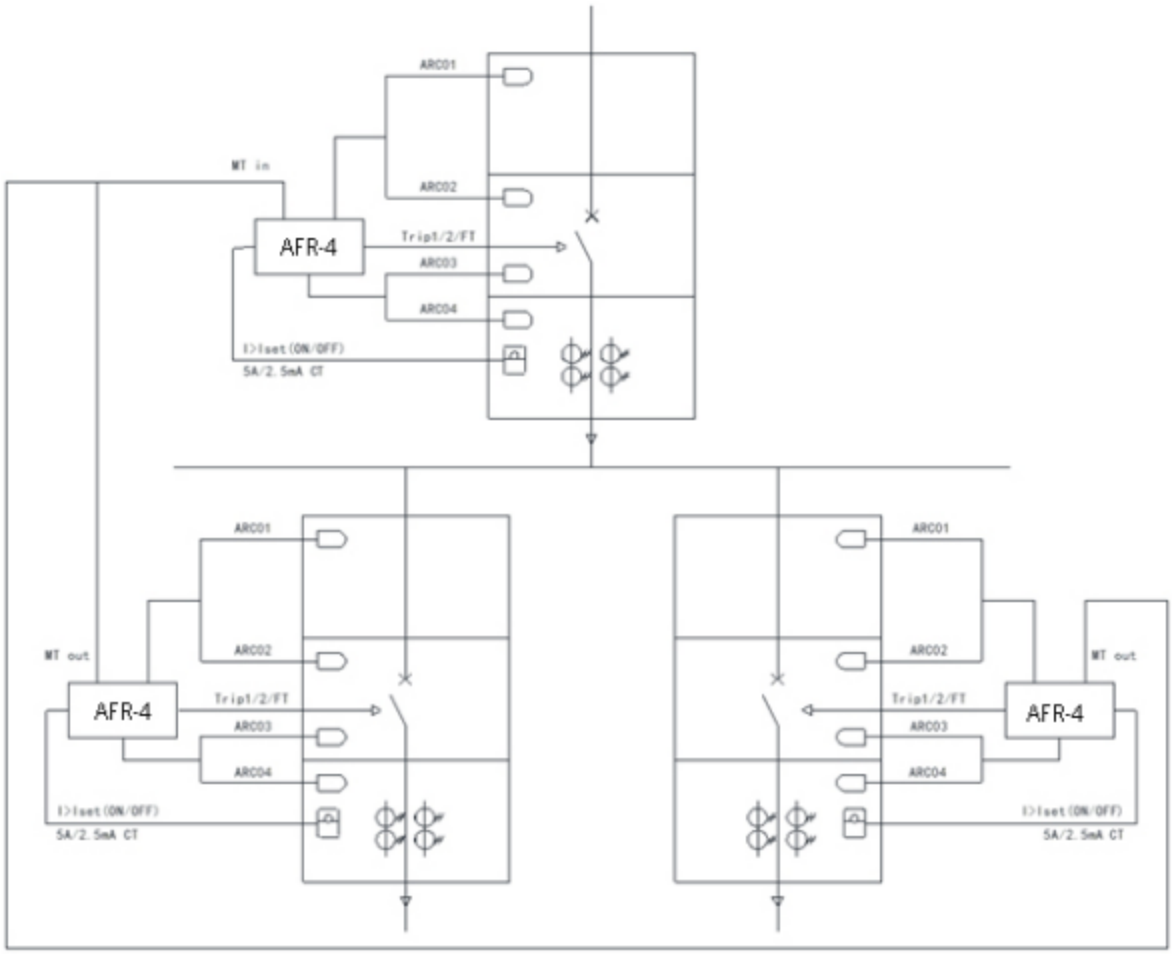
Note: the diagram above only shows the application example of two zones, AFR-4 can be configured to max 4 zones as needed.

5.1.2.- SW02: Turn ON/OFF master trip mode

Master trip mode, also called as upstream breaker tripping, ensures fault clearance when the local circuit breaker fails to trip. In such cases, the device sends a trip command to the upstream breaker to cut off the fault.

When the slave device detects an arc signal from ARC01 /ARC02, it will trip MT out, Trip3 / Trip4 (within 7-8ms). If the slave's Trip3 and Trip4 are not connected or fail to tripping, the slave device will only trip MT out to sending a trip signal to the master device via MT in. Upon receiving this signal, the master device will trip FT, Trip1, and Trip2 to disconnect the fault. (entire MT mode completes the action time within 14-15ms).

When any ARC03 /ARC04 detects an arc signal, FT (within 5ms), Trip1 / Trip2 (within 7-8ms) of the master and slave device will be corresponding trip. If the slave's FT, Trip1, Trip2 is not connected or tripping fails, the slave can trip MT out and send a trip signal to the master device through MT in. After receiving this signal, the master will trip FT, Trip1, Trip2 and disconnect the fault. (entire MT mode completes the action time within 14-15ms).

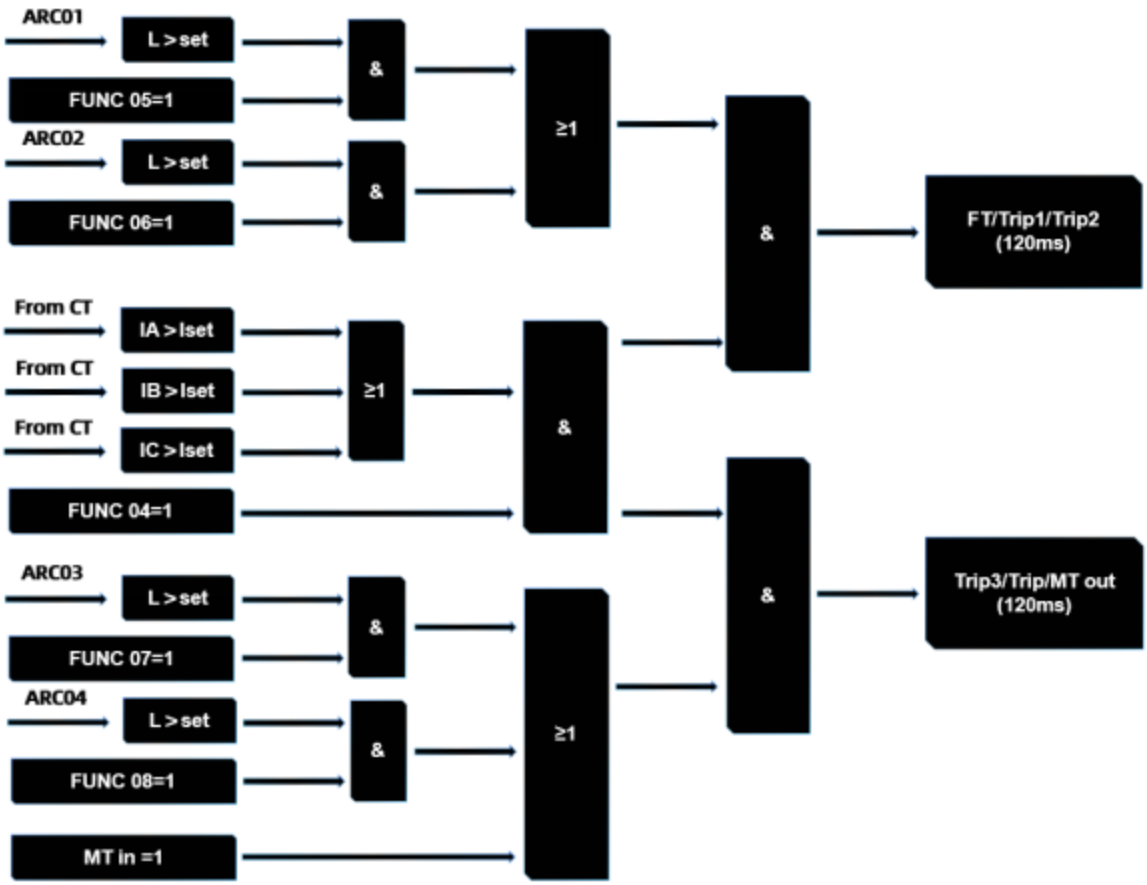


Note: When MT mode is enabled, both mode 1 and mode are invalid.

- **Relay action diagram:**

Mode	Sensor	Fast trip	Trip 1	Trip 2	Trip 3	Trip 4	MT out
MT mode	ARC01				Act	Act	Act
	ARC02				Act	Act	Act
	ARC03	Act	Act	Act			
	ARC04	Act	Act	Act			
	MT in	Act	Act	Act			

- **ARC trip logic diagram**



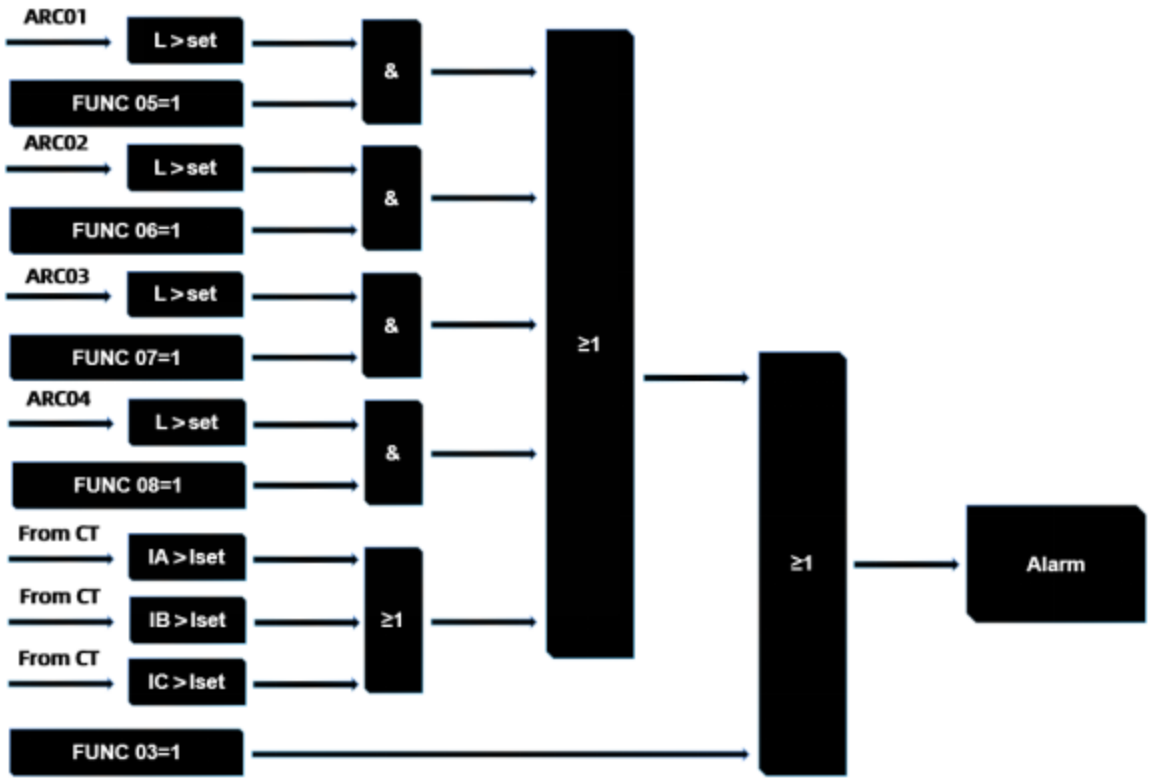
5.1.3.- SW03: Turn ON/OFF alarm function

When the function turns on, the arc signal occurs or the current exceeds the set value, then trip the alarm signal output.

Relay action diagram:

Mode	Sensor	Alarm trip
Alarm mode	ARC01	Act
	ARC02	Act
	ARC03	Act
	ARC04	Act
	I>Iset	Act

- **Alarm logic diagram**

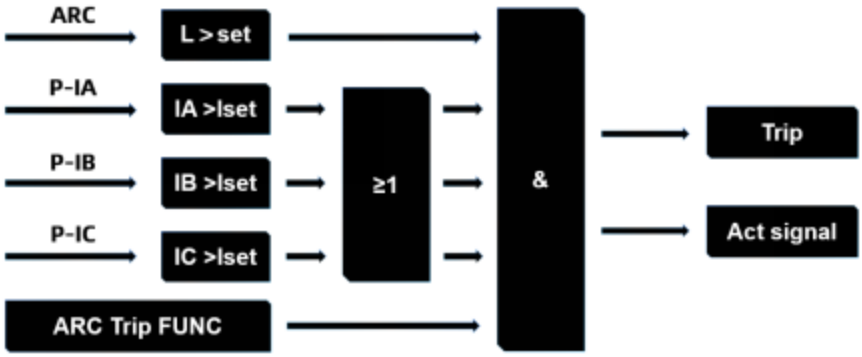


5.1.4.- SW04: Turn ON/OFF overcurrent judgment

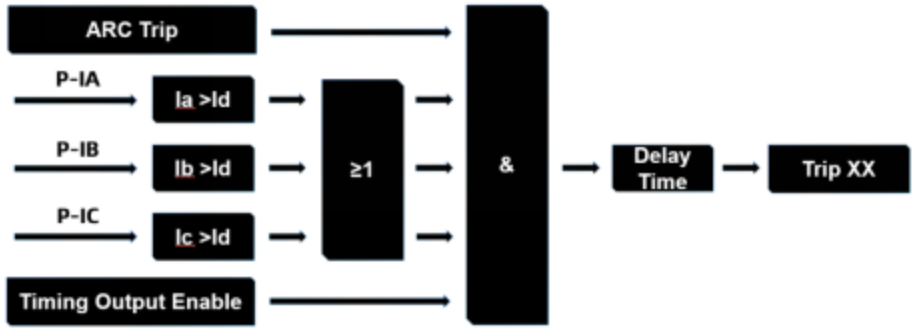
Before turning on the overcurrent criteria, ensure that the CT is properly connected to the **I-P** terminal of the device to ensure normal operation.

Turn on the overcurrent judgment means that the relay trips only when both the arc signal (L>Lset) and the current value (I>Iset) exceeds threshold. User can through RS485 to set the current value and delay time, details see chapter 6.2.6.

- **ARC& Current Dual Criteria Trip Logic Diagram**



- **Delay protection logic diagram**



5.1.5.- SW05-08: Turn ON/OFF ARC01-04 sensor

After connecting the ARC sensor to terminal. DIP switch SW05–08 must be turned on individually to ensure the proper operation of the ARC sensor.

5.2.- DIP switch to set RS485 communication

Pin 1-6: for setting communication address
Pin 7-8: for setting baud rate

Notes:

-. Direction marked "ON" represents: 1.
-. Pin1-Pin6 follow: high bit first, low bit last. That is Pin1 is the highest bit (MSB) and Pin6 is the lowest bit (LSB). Pin7-Pin8 is the same as above, Pin7 is the highest bit (MSB) and Pin8 is the lowest bit (LSB).

Communication address setting examples:

Addr.	Pin 1	Pin 2	Pin 3	Pin 4	Pin 5	Pin 6
01	●					
02		●				
03	●	●				
04			●			
05	●		●			
06		●	●			
07	●	●	●			
08				●		
…						
15	●	●	●	●		
16					●	
…						
31	●	●	●	●	●	
32						●
…						
63	●	●	●	●	●	●

Baud rate setting examples: after switching the baud rate, the device will restart.

Baud rate	Pin 7	Pin 8
9600 (default)		
4800	●	
19200		●
38400	●	●

Note: ● means dial the switch to 1.

6.- COMMUNICATION INTERFACE

6.1.- MODBUS © Protocol

Modbus RTU Frame Format:

Address code	**1 BYTE**	Slave device address **1-63**
Function code	**1 BYTE**	Indicates function codes like read coils / inputs
Data code	**4 BYTES**	Starting address, high byte Starting address, low byte Number of registers, high byte Number of registers, low byte
Error Check code	**2 BYTES**	Cyclical Redundancy Check (**CRC)**

Modbus Functions:

Code	Meaning	Description
FUNCTION 02	Read discrete inputs	Read the digital input status of device bit by bit
FUNCTION 03	Read input registers	Read the analog quantity of the device
FUNCTION 04	Read input registers	Read parameters and settings value of device
FUNCTION 05	Write single coil	Test relay output (pulse signal)
FUNCTION 06	Write single register	Trip and Alarm signal reset
FUNCTION 10	Write multiple register	Modify parameters and set values
FUNCTION 13	Write single register	Restore factory settings

Notes:

-. The transmission mode of the device is RTU (remote terminal unit) mode, and the information transmission is asynchronous.
-. Communication method: support RS485 communication method.
-. Baud rate: 4800/9600/19200/38400. Default is 9600.
-. Start bit=1, data bit=8, stop bit=1, parity bit=none.
-. This protocol adopts the standard calculation method of MODBUS RTU CRC16, and the verification sequence is (low-high).
-. Physical address (Dip switch setting) setting range: 1~63.

6.2.- Register Map

6.2.1.- Read DI status bit by bit, read only, "02H" code to read

Reg.	Bit	Data	Signal Type	Description
00 00	0	Trip signal	Latching signal	General act signal
	1	Alarm signal	Latching signal	General alarm signal
	2	Block	Hold signal	Block DI signal
	3	MT out	Hold signal	Status of the MT out relay
	4	MT in	Hold signal	MT in DI signal
	5	ARC 01	Pulse signal	ARC 01 signal
	6	ARC 02	Pulse signal	ARC 02 signal
	7	ARC 03	Pulse signal	ARC 03 signal
00 01	0	ARC 04	Pulse signal	ARC 04 signal
	1	Fast trip	Hold signal	Status of the fast trip relay
	2	Trip 1	Hold signal	Status of the Trip 1 relay
	3	Trip 2	Hold signal	Status of the Trip 2 relay
	4	Trip 3	Hold signal	Status of the Trip 3 relay
	5	Trip 4	Hold signal	Status of the Trip 4 relay
	6	SF	Hold signal	Status of the Self-check relay
	7	Alarm	Hold signal	Status of the alarm relay
00 02	0	Communication status	Hold signal	Device communication status
	1	Overcurrent alarm	Hold signal	Over current alarm status
	2			
	3			
	4			
	5			
	6			
	7			
00 03	0	Mode 1/ mode 2	Hold signal	FUNC Pin 1 : Mode1/Mode2 enabled
	1	MT mode	Hold signal	FUNC Pin 2: MT Mode3 enabled
	2	Arc alarm ON	Hold signal	FUNC Pin 3 : Alarm Mode enabled
	3	Current criterion	Hold signal	FUNC Pin 4 : Overcurrent enabled
	4	ARC 01 ON	Hold signal	FUNC Pin 5: ARC01 enabled
	5	ARC 02 ON	Hold signal	FUNC Pin 6: ARC02 enabled
	6	ARC 03 ON	Hold signal	FUNC Pin 7: ARC03 enabled
	7	ARC 04 ON	Hold signal	FUNC Pin 8: ARC04 enabled

Notes:

-. Latching signal: Triggers and holds status until reset.
-. Hold signal: Active while the signal is present, released when signal off
-. Pulse Signal: Detects a pulse, triggers once, no hold status, pulse width is 120ms.

-. Command format:

Host inquiry:

Data Format	Data	Description
Address	01H	Device address
Function code	02H	Read DI signal
Starting register H	00H	Starting registers high byte
Starting register L	00H	Starting registers low byte
DI signal quantity	00H XXH	DI signal quantity
CRC L	XXH	CRC check code high byte
CRC H	XXH	CRC check code low byte

Slave response:

Data Format	Data	Description
Address	01H	Device address
Function code	02H	Read DI signal
Data length	N	Total data length
Data range	-	-
CRC_L	XXH	CRC check code low byte
CRC_H	XXH	CRC check code high byte

Note: N = input quantity/8, if the remainder is not equal to 0, then N = N + 1

-. Command example

1. Read DI Signal

Host inquiry:
01 02 00 00 00 20 79 D2

Slave response:
01 02 04 00 00 01 FD 3B F3

6.2.2.- Read parameter, read only, "03H" code to read

Parameter list:

Reg.	Data	Byte Type		Scale Factor	Description
01 00	Arc sensitivity	INT	2	1	Arc sensitivity adjustment, range:1-50, **Default:1**
01 01	Iset	INT	2	0.01	Overcurrent setting value, range: 0.05A-40.00A, **Default:10A**
01 02	Id	INT	2	0.01	Delay trip setting value: 0.05A-40.00A, **Default:1A**
01 03	D-time	INT	2	0.01	Delay trip time: 0.01s-10.00s, **Default:0.01s**
01 04	F	INT	2	1	Frequency switching: 0-50HZ,1-60HZ, **Default: 0-50HZ**

-. Command format:

Host inquiry:

Data Format	Data	Description
Address	01H	Device address
Function code	03H	Read input registers
Starting register H	01H	Starting registers high byte
Starting register L	00H	Starting registers low byte
Data length	N	Inquiry length high byte
CRC_L	XXH	CRC check code low byte
CRC_H	XXH	CRC check code high byte

Slave response:

Data Format	Data	Description
Address	01H	Device address
Function code	03H	Read input registers
Data length	N	Total data length
Data range	N*2	Data range
CRC_L	XXH	CRC check code low byte
CRC_H	XXH	CRC check code high byte

Note: "N" represents register numbers, and the communication address supports FF inquiry.

-. Command example

1. Read parameters

Host inquiry:
01 03 01 00 00 05 84 35

Slave response:
01 03 0A 00 01 03 E8 00 64 00 1E 00 00 10 F3

2. Read broadcast address

Host inquiry
FF 03 01 00 00 01 90 28

Slave response
FF 03 02 00 02 10 51

6.2.3.- Read measured values, read only, "04H" code to read

Reg.	Data	Byte Type		Scale Factor	Description
00 00	Ia	INT	2	0.01	Secondary sample current value, unit: 0.01A
00 01	Ib	INT	2	0.01	
00 02	Ic	INT	2	0.01	

-. Command format:

Host inquiry:

Data Format	Data	Description
Address	01H	Device address
Function code	04H	Read input registers
Starting register H	00H	Starting register high byte
Starting register L	00H	Starting register low byte
Data length	N	Data length
CRC_L	XXH	CRC check code low byte
CRC_H	XXH	CRC check code high byte

Slave response:

Data Format	Data	Description
Address	01H	Device address
Function code	04H	Read input registers
Data length	2*N	Total data length
Byte length	N*2	Number of bytes
CRC_L	XXH	CRC check code low byte
CRC_H	XXH	CRC check code high byte

Note: "N" represents the number of registers

-. Command example:

1. Integer type

Host inquiry:
01 04 00 00 00 03 B0 0B
Slave response:
01 04 06 00 00 00 00 00 00 60 93

Means: IA=0, IB=0, IC=0

6.2.4.- Relay output test, write only, “05H” code to write

-. Command example

1. MT out (Pulse signal)

Host inquiry: 01 05 00 01 FF 00 DD FA
Slave response: 01 05 00 01 FF 00 DD FA

2. Fast trip (Pulse signal)

Host inquiry: 01 05 00 02 FF 00 2D FA
Slave response: 01 05 00 02 FF 00 2D FA

3. Trip output 1 (Pulse signal)

Host inquiry: 01 05 01 01 FF 00 DC 06
Slave response: 01 05 01 01 FF 00 DC 06

4. Trip output 2 (Pulse signal)

Host inquiry: 01 05 01 02 FF 00 2C 06
Slave response: 01 05 01 02 FF 00 2C 06

5. Trip output 3 (Pulse signal)

Host inquiry: 01 05 02 01 FF 00 DC 42
Slave response: 01 05 02 01 FF 00 DC 42

6. Trip output 4 (Pulse signal)

Host inquiry: 01 05 02 02 FF 00 2C 42
Slave response: 01 05 02 02 FF 00 2C 42

7. Self-test output (Pulse signal)

Host inquiry: 01 05 03 01 FF 00 DD BE
Slave response: 01 05 03 01 FF 00 DD BE

8. Arc alarm output (Pulse signal)

Host inquiry: 01 05 03 02 FF 00 2D BE
Slave response: 01 05 03 02 FF 00 2D BE

6.2.5.- Trip and alarm signal reset, write only, "06H" code to write

-. Command format:

Host inquiry:

Data Format	Data	Description
Address	01H	Device address
Function code	06H	DI signal reset
Starting register H	00H	Starting register high byte
Starting register L	00H	Starting register low byte
Data length H	00H	Data length high byte
Data length L	00H	Data length low byte
CRC_L	XXH	CRC check code low byte
CRC_H	XXH	CRC check code high byte

Slave response:

Data Format	Data	Description
Address	01H	Device address
Function code	06H	DI signal reset
Starting register H	00H	Starting registers high byte
Starting register L	00H	Starting registers low byte
Data length H	00H	Data length high byte
Data length L	00H	Data length low byte
CRC_L	XXH	CRC check code low byte
CRC_H	XXH	CRC check code high byte

-. Command example

1. Trip and alarm signal reset

Host inquiry:
01 06 00 00 00 00 89 CA

Slave response:
01 06 00 00 00 00 89 CA

This command is for reset DI and DO port, function also can be executed via the [RST] button on the device. details see **chapter 4.3**.

6.2.6.- Parameter modification, write only, "10H" code to write

Parameter list:

Reg.	Data	Byte Type		Scale Factor	Description
01 00	Arc sensitivity	INT	2	1	Arc sensitivity adjustment, range:1-50, **Default:1**
01 01	Iset	INT	2	0.01	Overcurrent setting value, range: 0.05A-40.00A, **Default:10A**
01 02	Id	INT	2	0.01	Delay trip setting value: 0.05A-40.00A, **Default:1A**
01 03	D-time	INT	2	0.01	Delay trip time: 0.01s-10.00s, **Default:0.01s**
01 04	F	INT	2	1	Frequency switching: 0-50HZ,1-60HZ, **Default: 0-50HZ**

-. Command format:

Host inquiry:

Data Format	Data	Description
Address	01H	Device address: 1-99
Function code	10H	Write multiple register
Starting register H	00H	Starting register high byte
Starting register L	00H	Starting register low byte
Data length H	00H	Data length high byte
Data length L	06H	Data length low byte
Total length	2*N	Total length
Byte length	N*2	Number of bytes
CRC_L	XXH	CRC check code low byte
CRC_H	XXH	CRC check code high byte

No slave response

-. Command example

1. Modify Arc sensitivity = 5

Host inquiry:
01 10 01 00 00 01 02 00 0A 36 97

No slave response, the device restarts and the indicator lights turn on in rotation.

2. Modify Iset=1A

Host inquiry:
01 10 01 01 00 01 02 00 64 B6 AA

No slave response, the device restarts and the indicator lights turn on in rotation.

3. Modify Id=1A

Host inquiry:
01 10 01 02 00 01 02 00 64 B6 99

No slave response, the device restarts and the indicator lights turn on in rotation.

4. Modify D-time=0.3S

Host inquiry:
01 10 01 03 00 01 02 01 2C B6 EE

No slave response, the device restarts and the indicator lights turn on in rotation.

5. Modify F=50Hz

Host inquiry:
01 10 01 04 00 01 02 00 00 B7 14

No slave response, the device restarts and the indicator lights turn on in rotation.

6.2.7.- Restore factory settings, write only, “13H” code to write

-. Command format:

Host inquiry:

Data Format	Data	Description
Address	01H	Device address
Function code	13H	Device time synchronization
Starting register H	00H	Starting register H
Starting register L	00H	Starting register L
Data length H	00H	Data length H
Data length L	00H	Data length L
CRC_L	XXH	CRC check code low byte
CRC_H	XXH	CRC check code high byte

No slave response

-. Command example

Host inquiry:
01 13 00 00 00 00 84 09

No slave response, the device restarts and the indicator lights turn on in rotation.

7.- SAFETY CONSIDERATIONS

All installation specification described at the previous chapters named: **INSTALLATION AND STARTUP, INSTALLATION MODES and SPECIFICATIONS.**

Please note that with the instrument powered on, the terminals could be dangerous to touching and cover opening actions or elements removal may allow accessing dangerous parts. This instrument is factory-shipped at proper operation condition.

- The device must have a professional installation and maintenance.
- Any operation of the device, you must cut off the input signal and power.

8.- MAINTENANCE

The AFR-4 does not require any special maintenance. No adjustment, maintenance or repairing should be done when the instrument is open and powered on, should those actions are essential, high-qualified operators must perform them.

Before any adjustment, replacement, maintenance or repair operation is carried out, the instrument must be disconnected from any power supply source.

When any protection failure is suspected to exist, the instrument must be immediately put out of service. The instrument's design allows a quick replacement in case of any failure.

For any inquiry about the instrument performance or any failure,
contact to Blue Jay's technical service.

Blue Jay - After-sales service

E-mail: tech@cqbluejay.com