

AFR-3S

Arc Flash Protection Relay

User Manual



Version:1.0

Revision: 2024.1

Read me

When you use AFR-3, 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**

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1. - SUMMARIZE

AFR-3S Arc flash relays are mainly used to detect arc faults in electrical systems and protect equipment and personnel in electrical systems from arc faults. The arc flash protection relay can detect arcs by monitoring parameters such as current, voltage, and electric power, and quickly disconnect the power supply before an electrical fire occurs, thereby reducing the risk of fire.

AFR-3S Arc flash relay is usually used in medium and high-voltage power distribution systems, control cabinets, transformers, generators, motors, and other electrical equipment. They adopt the dual-criteria principle of arc light detection and overcurrent detection and have the characteristics of fast protection action and high reliability.

FEATURES

- Dual criteria for arc detection and overcurrent detection;
- Complete exception records, event records, and operation records;
- All information power-off retention;
- Equipped with RS485 communication interface;
- Integrated MODBUS standard communication protocol;
- Small and exquisite appearance, reasonable structure;
- Using high-grade, high-quality components;
- Using multi-layer board technology and SMT process;
- The product has high electrical performance;
- Can collect 3 channels of arc light signals;
- Support ST visible light and ST ultraviolet sensor access.

APPLICATIONS

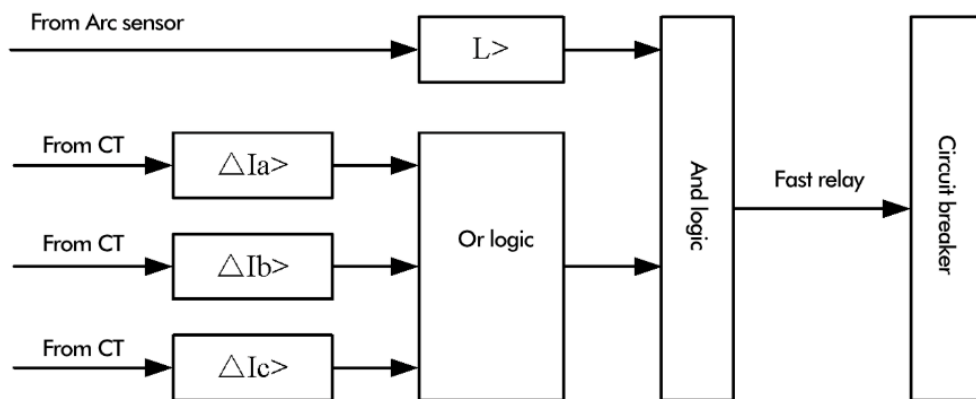
- Reduce the harm of arc light to human body;
- Reduce damage to equipment caused by arc short-circuit faults;
- Avoid transformer damage caused by bus failure;
- Protect the dc system in the station;
- Ensure the stable operation of power substations;
- Thermal power plant electrical section switchgear;
- Wind farm and photovoltaic station switchgear;
- Large municipal engineering project.

2. - Function Introduction

2.1 - Arc protection function

The device is equipped with 3 arc points, which are used to monitor the internal arc faults of the busbar room, circuit breaker room and cable room in the monitoring cabinet, and can choose to configure arc criterion, arc + current dual criterion for protection.

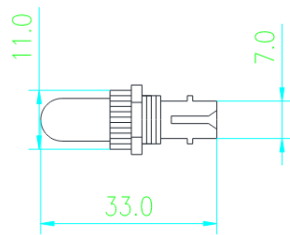
When the optical fiber transmits the light signal from the CT to the host, the host unit will issue an early warning. At the same time, the current sampling element inside the device will determine the real-time current value and the set value. If the real-time protection current is greater than the set value and an arc signal occurs at the same time, the device will send a trip signal to trip the cabinet.



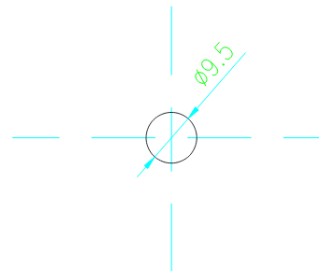
2.1.1 - Sensor introduction

Arc sensors are light sensing elements that detect arcs. When no arc fault occurs, the light intensity increases greatly, and the arc sensor converts the optical signal into an electrical signal and sends it to the arc protection or arc extension unit. Arc sensor wiring has no polarity.

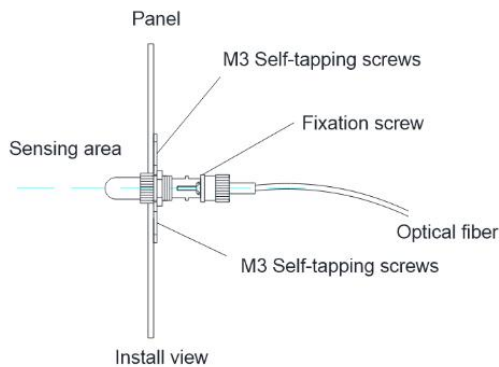
The arc light sensor is installed in the relevant parts of the switchgear to monitor those fragile and important parts. Such as the busbar interval in the switchgear, the CT and PT components in the lower part of the switchgear, the contacts of the circuit breaker, the cable connector, etc.



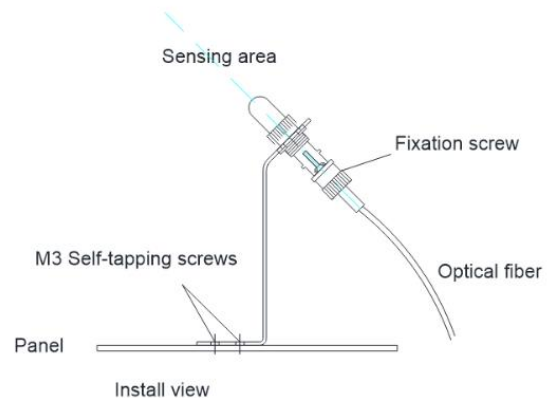
Probe head



Hole size



Notes: Suggest open hole 2.8mm diameter on switchgear panel for M3 screw



Notes: Suggest open hole 2.8mm diameter on switchgear panel for M3 screw

At present, there are three main types of arc light probes in the market: arc light probes, white light arc light sensing probes and ultraviolet arc light sensing probes. Among them, the ultraviolet arc light sensor has the strongest photosensitive ability, and is also the most effective in sensing arc ultraviolet light inside the switchgear. No interference and influence on visible light.

The ultraviolet arc light sensor is designed for arc light spectral characteristics, using special optical materials, polymer blending and doping technology, and optical lens technology. It can filter out the arc light detection sensor probe that interferes with visible light. The ultraviolet arc light probe can quickly detect the arc light that occurs within a range of more than 240 degrees, and transmit it to the control equipment through the optical fiber, so as to quickly cut off the fault at the millisecond level and avoid serious consequences.

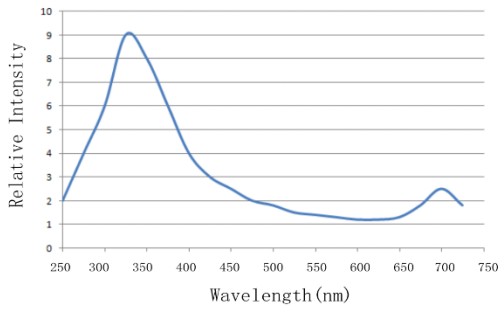


Fig1. UV spectral response curve

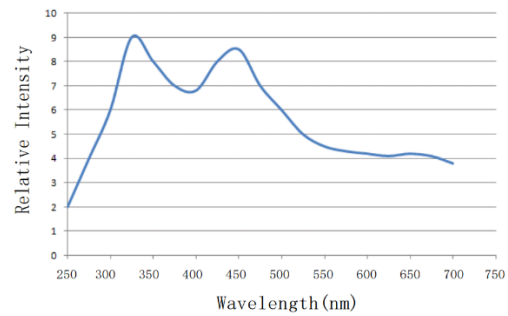


Fig2. Visible light spectrum response curve

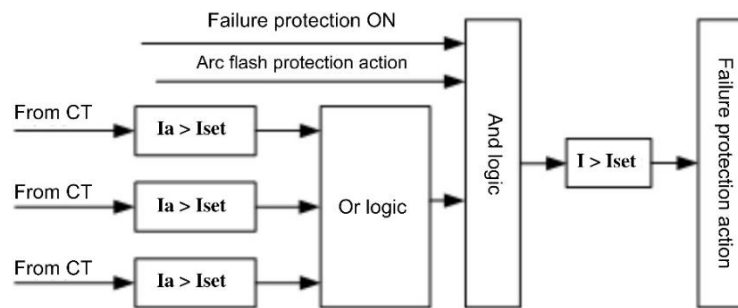
Arc sensor parameter comparison:

| Sensor type | Visible light sensor | UV light sensor |
|------------------------------|-----------------------------|------------------|
| Sensitivity type | Full spectrum | UV spectrum |
| Spectral response bandwidth | 250nm ~ 550nm | 280nm ~ 400nm |
| Monitoring angle | -120°~ 120° | -120°~ 120° |
| Angle decay rate | ≤20% | ≤10% |
| Operating temperature | -30~70°C | -40~85°C |
| Interface type | ST fiber optic/nut fixation | ST optical fiber |
| Optical fiber maximum length | 30 meters | 40 meters |

2.2 - Circuit breaker failure protection function

The device is equipped with circuit breaker failure protection. when the arc trip occurs, the device will judge the real-time value of the protection current. when the current is lower than the set value, the failure protection will not operate.

When delay occurs after the action, the current value is still higher than the set value, the device will activate the failure protection and output an independent trip signal to the upper level switch to cut off the fault.



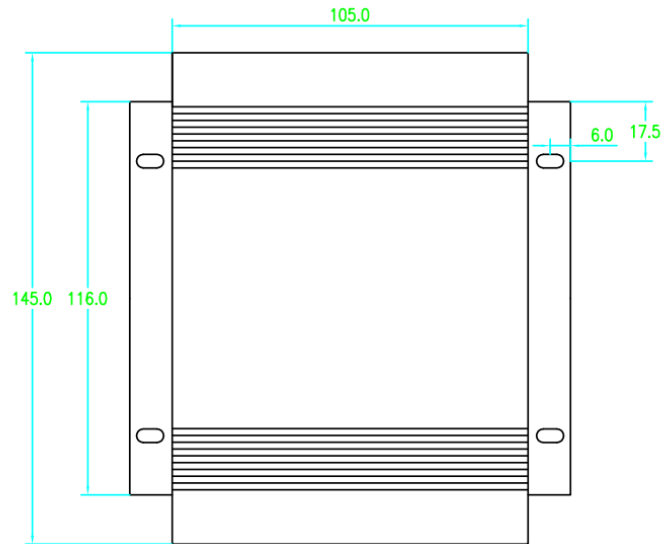
3. - SPECIFICATION

| | |
|--|---|
| Working power supply | |
| Power supply | AC/DC 85~265V |
| | DC24/48V customized |
| Power consumption | Normal operation ≤8W; device action ≤10W |
| Current input | |
| Rated current value | 5A/1A |
| Measuring range | Protection current: 0.06~10In |
| Power consumption | ≤0.5VA |
| Electrical parameter error | |
| Protection current accuracy | ≤±4% |
| Zero sequence current accuracy | ≤±4% |
| Arc signal input | |
| Number of channels | 1-3 channels |
| Sensor type | ST optical fiber type |
| Detection light type | Visible/UV optional |
| Temperature measurement signal input (optional) | |
| Number of channels | 3-12 Channels |
| Sensor type | Passive/Active/Micro |
| Signal acquisition type | 433M |
| Partial discharge signal input (optional) | |
| Channels number | 1 channel |
| Sensor type | Wire transmission |
| Detection light type | Geoelectric wave/Ultrasonic wave/Noise/UHF (optional) |
| Smoke sensor input (optional) | |
| Channels number | 1 way |
| Sensor type | External wired smoke sensor |
| Fire extinguishing sensor (optional) | |
| Injection time | ≤12S |
| Start mode | Electric start & thermal start |
| Protect space | ≤3m ³ |
| Component type | Aerosol fire extinguishing unit |
| Action time error | |
| Pure arc trip | ≤10ms |

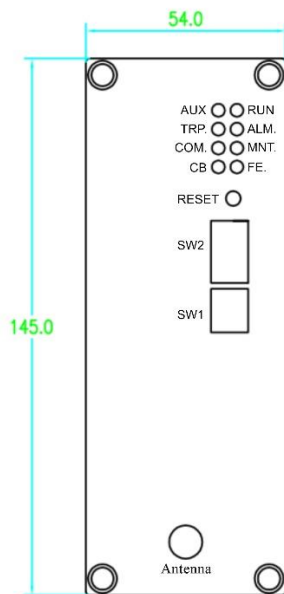
| | |
|--------------------------------------|---|
| Current+arc trip | ≤20ms |
| Alarm action time | ≤40ms |
| Fire extinguishing spray lag time | ≤3s |
| Relay output | |
| Channels number | 4 channels (optional 6 channels) |
| Operating Voltage | AC250V/8A |
| Input | Passive contact, photoelectric isolation, isolation voltage 2500V |
| Communication Interface | |
| Communication Interface | 1 channel, photoelectric isolation, with lightning protection |
| Baud rate | 4800, 9600bps (default 9600) |
| Communication protocol | Modbus RTU |
| Ethernet communication | |
| Communication Interface | 1 channel |
| Network parameters | 10M/100M adaptive |
| Communication protocol | IEC60870-5-103 (NZ103) |
| Environment | |
| Working temperature | -25 ~ 70°C |
| Storage temperature | -40 ~ +85°C |
| Humidity | 5~95%RH |
| Atmospheric pressure | 60kPa~106kPa |
| Electromagnetic compatibility | |
| Electrostatic discharge test | GB/T 14598.14-2010 ,level-4 |
| Fast transient dry resistance test | GB/T 14598.10-2007, level-A |
| 1mhz burst interference test | GB/T 14598.13-2008, level-3 |
| Electrical disturbance test | GB/T 14598.9-2010, level-3 |
| Surge immunity test | GB/T 14598.18-2007 |
| Conducted disturbance test | GB/T 14598.17-2005 ,22-6 |

4.- INSTALLATION

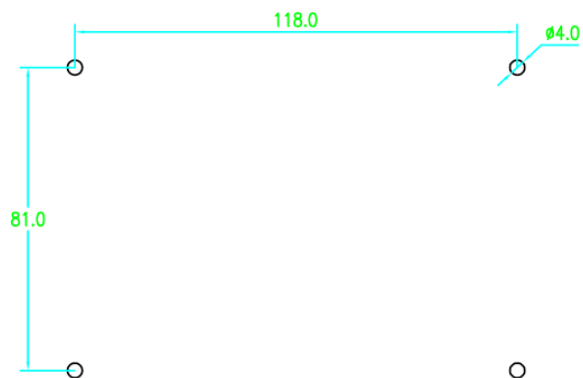
4.1 - Dimension (unit: mm)



Front view

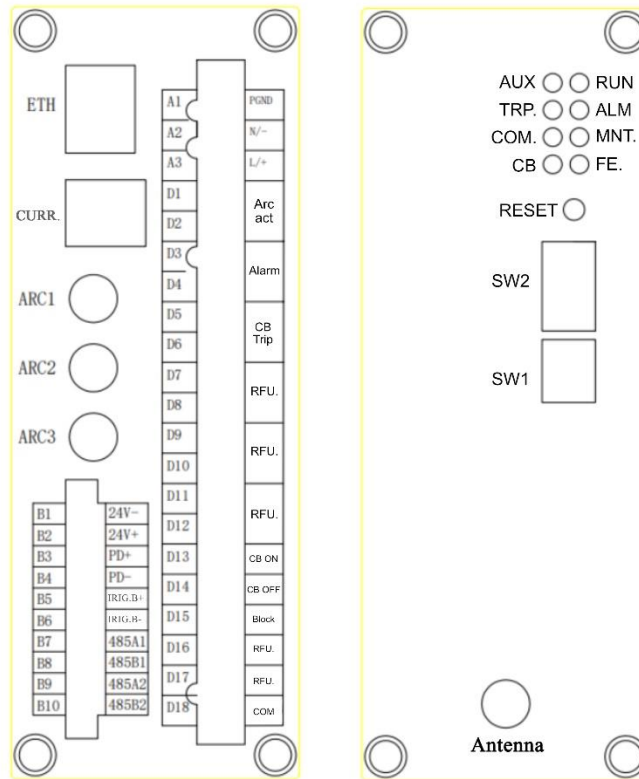


Side view



Hole size

4.2 - Terminal definition



4.3 - Indicator description

| Indicator | Color | Description |
|-----------|-------|---|
| “AUX” | Green | Device powered on. |
| “RUN” | Green | Device operates normally and flashes per second. |
| “TRP.” | Red | Device tripped |
| “ALM.” | Red | Device alarm action |
| “MNT.” | Red | Maintain arc protection function |
| “COMM.” | Green | Device communication status |
| “CB” | Green | CB ON/OFF signal |
| “FE.” | Green | After aerosol fire extinguisher action ,normally light ON |

5. - COMMUNICATION INTERFACE

5.1. - MODBUS © Protocol

Modbus RTU Frame Format:

| | | |
|-------------------------|---------------|--|
| Address code | 1 BYTE | Slave device address 1-254 |
| Function code | 1 BYTE | Indicates the function codes like read coils / inputs |
| Data code | 4 BYTE | Starting address, high byte Starting address, low byte Number of registers, high byte Number of registers, low byte |
| Error Check code | 2 BYTE | Cyclical Redundancy Check (CRC) |

Modbus Functions:

| Code | Meaning | Description |
|-----------------------|-------------------------|--|
| FUNCTION 02 | Read input status | Read the input status of the device bit by bit |
| FUNCTION 03/04 | Read input registers | Read the analog quantity of the device |
| FUNCTION 05 | Write single coil | Control CB ON/OFF and function selection |
| FUNCTION 06 | Write single register | Writes a value into a single holding register. |
| FUNCTION 10 | Write multiple register | Device time synchronization |

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 2400/4800/9600/19200. 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 setting range: 1~254.

5.2.- Register Map

5.2.1 - Basic parameter, Read only, “03/04H” code to read

| Addr. | Data | Type | Byte | Description |
|---------|------------------------------------|-------|------|---------------------------------------|
| 0x00 00 | Ia | Float | 4 | Protection current secondary value |
| 0x00 02 | Ib | Float | 4 | Protection current secondary value |
| 0x00 04 | Ic | Float | 4 | Protection current secondary value |
| 0x00 06 | I0 | Float | 4 | Zero-sequence current secondary value |
| 0x00 08 | T1 | Float | 4 | Wireless temperature sensor |
| 0x00 0A | T2 | Float | 4 | Wireless temperature sensor |
| 0x00 0C | T3 | Float | 4 | Wireless temperature sensor |
| 0x00 0E | T4 | Float | 4 | Wireless temperature sensor |
| 0x00 10 | T5 | Float | 4 | Wireless temperature sensor |
| 0x00 12 | T6 | Float | 4 | Wireless temperature sensor |
| 0x00 14 | T7 | Float | 4 | Wireless temperature sensor |
| 0x00 16 | T8 | Float | 4 | Wireless temperature sensor |
| 0x00 18 | T9 | Float | 4 | Wireless temperature sensor |
| 0x00 1A | T10 | Float | 4 | Wireless temperature sensor |
| 0x00 1C | T11 | Float | 4 | Wireless temperature sensor |
| 0x00 1E | T12 | Float | 4 | Wireless temperature sensor |
| 0x00 20 | Ultrasonic discharge times | Float | 4 | Partial discharge sensor test value |
| 0x00 22 | Ultrasonic discharge amplitude | Float | 4 | Partial discharge sensor test value |
| 0x00 24 | Ultrasonic discharge average times | Float | 4 | Partial discharge sensor test value |
| 0x00 26 | TEV discharge times | Float | 4 | Partial discharge sensor test value |
| 0x00 28 | TEV discharge amplitude | Float | 4 | Partial discharge sensor test value |
| 0x00 2A | TEV discharge average times | Float | 4 | Partial discharge sensor test value |
| 0x00 2C | Noise value | Float | 4 | Partial discharge sensor test value |
| 0x00 2E | Ambient temperature | Float | 4 | Partial discharge sensor test value |
| 0x00 30 | Environment humidity | Float | 4 | Partial discharge sensor test value |

Note: Float sequence is HH HL LH LL.

5.2.2 - Parameter query, Read only, “03H” code to read

| Addr. | Type | Byte | Description |
|-------|------|------|--|
| 01 00 | INT | 2 | Device communication address, Default:1 |
| 01 01 | INT | 2 | Device operation password: Default:0 |
| 01 02 | INT | 2 | Communication serial port 1 baud rate setting:4800,9600, Default:9600 |
| 01 03 | INT | 2 | Backup serial port 2 baud rate setting:4800,9600, Default:9600 |
| 01 04 | INT | 2 | Device name settings: Default:3 0: Arc protection device, 1: Cable head explosion-proof protection, 2: Switchgear explosion-proof protection, 3: Intelligent collection terminal. |

Note: Real value=read value * 1

Example:

Host inquiry:

| Data Format | Data | Description |
|---------------------|------|-----------------------------|
| Address | 01H | Device address: 1-99 |
| Function code | 03H | Read input registers |
| Starting register H | 01H | Starting register high byte |
| Starting register L | 00H | Starting register low byte |
| Inquiry length H | 00H | Inquiry length high byte |
| Inquiry length L | 05H | Inquiry length low byte |
| CRC_H | XXH | CRC check code high byte |
| CRC_L | XXH | CRC check high low byte |

Slave response:

| Data Format | Data | Description |
|---------------|-------|---|
| Address | 01H | Device address |
| Function code | 03H | Read input registers |
| Data length | 0AH | Total data length |
| Data 1 | INT 2 | Device communication address |
| Data 2 | INT 2 | Device operation password |
| Data 3 | INT 2 | Communication serial port 1 baud rate setting |
| Data 4 | INT 2 | Backup serial port 2 baud rate setting |
| Data 5 | INT 2 | Device name settings |
| CRC_L | XXH | CRC check code low byte |
| CRC_H | XXH | CRC check high low byte |

Command example

Host inquiry:

01 03 01 00 00 05 84 35

Slave response:

01 03 0A 00 01 00 00 25 80 25 80 00 03 65 28

5.2.3 - Parameter modification, Write only, “10H” code to write

Example:

Host inquiry:

| Data Format | Data | Description |
|----------------------------|-------------|-----------------------------|
| Address | 01H | Device address: 1-99 |
| Function code | 10H | Device time synchronization |
| Starting <i>register</i> H | 01H | Starting register high byte |
| Starting <i>register</i> L | 00H | Starting register low byte |
| Data length H | 00H | Data length high byte |
| Data length L | 05H | Data length low byte |
| Data total bytes | 0AH | 8 bytes |
| Data 1 | 00 00 | Parameter 1 |
| Data 2 | 00 00 | Parameter 2 |
| Data 3 | 00 00 | Parameter 3 |
| ... | 00 00 | Parameter 4 |
| Data 5 | 00 00 | Parameter 5 |
| CRC_L | XXH | CRC check code high byte |
| CRC_H | XXH | CRC check high low byte |

Slave response:

| Data Format | Data | Description |
|----------------------------|-------------|-----------------------------|
| Address | 01H | Device address:1-99 |
| Function code | 10H | Device time synchronization |
| Starting <i>register</i> H | 01H | Starting register high byte |
| Starting <i>register</i> L | 00H | Starting register low byte |
| Data length H | 00H | Data length high byte |
| Data length L | 05H | Data length low byte |
| CRC_L | XXH | CRC check code low byte |
| CRC_H | XXH | CRC check high low byte |

Command example

Host inquiry:

01 10 01 00 00 05 0A 00 02 00 00 25 80 25 80 00 03 95 96

Slave response:

01 10 01 00 00 05 01 F6

Modify communication address to 2

Modify operation password to 0

Modify communication serial port 1 baud rate setting to 9600

Modify backup serial port 2 baud rate setting to 9600

Modify device name to "Intelligent collection terminal".

5.2.4 - Setting value query, Read only, “03H” code to read.

| Addr. | Type | Byte | Description |
|-------|------|------|--|
| 03 00 | INT | 2 | Arc protection trip control byte, Unit:1. 0-Exit, 1-Pure arc trip, 2-Double criterion trip. Default: 0 |
| 03 01 | INT | 2 | Arc protection current setting value: 0.25A - 99.00A, Unit: 0.01A. Default: 5 |
| 03 02 | INT | 2 | Arc protection delay setting value: 0.00S - 10.00S, Unit: 0.01S. Default: 0 |
| 03 03 | INT | 2 | 1# Arc Trip: 0: OFF; 1: ON, Unit:1. Default: 0 |
| 03 04 | INT | 2 | 2# Arc Trip: 0: OFF; 1: ON, Unit:1. Default: 0 |
| 03 05 | INT | 2 | 3# Arc Trip: 0: OFF; 1: ON, Unit:1. Default: 0 |
| 03 06 | INT | 2 | Arc protection alarm control byte: 0: OFF; 1: ON, Unit:1. Default: 0 |
| 03 07 | INT | 2 | 1# Arc Alarm: 0: OFF; 1: ON, Unit:1. Default: 0 |
| 03 08 | INT | 2 | 2# Arc Alarm: 0: OFF; 1: ON, Unit:1. Default: 0 |
| 03 09 | INT | 2 | 3# Arc Alarm: 0: OFF; 1: ON, Unit:1. Default: 0 |
| 03 0A | INT | 2 | Quick-break overcurrent protection control byte: 0: OFF; 1: ON, Unit:1. Default: 0 |
| 03 0B | INT | 2 | Quick-break overcurrent setting value: 0.25A - 99.00A, Unit:0.01A. Default: 5 |
| 03 0C | INT | 2 | Quick-break overcurrent delay setting value: 0.00S - 10.00S, Unit:0.01S. Default: 0 |
| 03 0D | INT | 2 | Time-limited overcurrent protection control byte: 0: OFF; 1: ON, Unit:1. Default: 0 |
| 03 0E | INT | 2 | Time-limited overcurrent current setting value: 0.25A - 99.00A, Unit: 0.01A. Default: 3 |
| 03 0F | INT | 2 | Time-limited overcurrent delay setting value: 0.00S - 10.00S, Unit: 0.01S. Default: 1 |
| 03 10 | INT | 2 | Overcurrent protection control byte: 0: OFF; 1: ON, Unit: 1. Default: 0 |
| 03 11 | INT | 2 | Overcurrent current setting value: 0.25A - 99.00A, Unit: 0.01A. Default: 3 |
| 03 12 | INT | 2 | Overcurrent delay setting value: 0.00S - 10.00S, Unit: 0.01S. Default: 2 |
| 03 13 | INT | 2 | Zero sequence protection control byte: 0-Exit, 1-Alarm, 2-Trip, Unit: 1. Default: 0 |
| 03 14 | INT | 2 | Zero sequence current setting value: 0.05A -20.00A, Unit: 0.01A. Default: 1 |
| 03 15 | INT | 2 | Zero sequence delay setting value: 0.00S - 10.00S, Unit: 0.01S. Default: 0 |
| 03 16 | INT | 2 | Overload protection control byte: 0-Exit, 1-Alarm, 2-Trip, Unit: 1. Default: 0 |
| 03 17 | INT | 2 | Overload protection current setting value: 0.5A -20.00A, Unit: 1A. Default: 2 |
| 03 18 | INT | 2 | Overload protection delay setting value: 0.00S - 999.9S, Unit: 1S. Default: 5 |
| 03 19 | INT | 2 | Failure protection trip control byte: 0: OFF; 1: ON, Unit: 1. Default: 0 |
| 03 1A | INT | 2 | Failure protection current setting value: 0.25A -99.00A, Unit: 1A. Default: 1 |
| 03 1B | INT | 2 | Failure protection delay setting value: 0.00S - 10.00S, Unit: 1S. Default: 0.3 |

| | | | |
|-------|-----|---|---|
| 03 1C | INT | 2 | Smoke warning control byte: 0-Exit, 1-Alarm, 2-Trip, Unit: 1. Default: 0 |
| 03 1D | INT | 2 | Smoke alarm delay: 0.00S - 99.99S, Unit: 1S. Default: 2 |
| 03 1E | INT | 2 | Temperature warning control byte: 0: OFF; 1: ON, Unit: 1. Default: 0 |
| 03 1F | INT | 2 | Temperature warning setting value: 0 – 100°C, Unit: 1°C. Default: 55°C |
| 8 02 | INT | 2 | Temperature warning delay: 00.0S – 999.9S, Unit: 1S. Default: 30 |
| 8 03 | INT | 2 | Temperature alarm control byte: 0: OFF; 1: ON, Unit: 1. Default: 0 |
| 8 04 | INT | 2 | Temperature alarm setting value: 0 – 100°C, Unit: 1°C. Default: 75°C |
| 8 05 | INT | 2 | Temperature alarm delay: 00.0S – 999.9S, Unit: 1. Default: 60 |
| 8 06 | INT | 2 | Ultrasonic alarm control byte: 0: OFF; 1: ON, Unit: 1. Default: 0 |
| 9 01 | INT | 2 | Ultrasonic alarm setting value: 10 – 60dBuV, Unit: 1 dBuV. Default: 45 dBuV |
| 9 02 | INT | 2 | Ultrasonic discharge times: 10-99, Unit: 1. Default: 30 |
| 9 03 | INT | 2 | TEV alarm control byte: 0: OFF; 1: ON, Unit: 1. Default: 0 |
| 9 04 | INT | 2 | TEV alarm setting value: 10 – 60dBuV, Unit: 1 dBuV. Default: 45 dBuV |
| 9 05 | INT | 2 | TEV discharge times: 10-99, Unit: 1. Default: 30 |
| 9 06 | INT | 2 | Fire extinguishing control byte: 0: OFF; 1: ON, Unit: 1. Default: 0 |
| 10 01 | INT | 2 | Ambient temperature setting value: 0 – 100°C, Unit: 1°C. Default: 55°C |
| 10 02 | INT | 2 | Fire extinguishing control delay: 0.00S - 999.9S, Unit: 1S. Default: 30S |

5.2.5 - Setting value modification, Write only, "10H" code to write

Example:

Host inquiry:

| Data Format | Data | Description |
|---------------------|-------|-----------------------------|
| Address | 01H | Device address: 1-99 |
| Function code | 10H | Device time synchronization |
| Starting register H | 03H | Starting register high byte |
| Starting register L | 00H | Starting register low byte |
| Data length H | 00H | Data length high byte |
| Data length L | 03H | Data length low byte |
| Data total bytes | 06H | 8 bytes |
| Data 1 | 00 00 | Parameter 1 |
| Data 2 | 00 00 | Parameter 2 |
| Data 3 | 00 00 | Parameter 3 |
| CRC_L | XXH | CRC check code high byte |
| CRC_H | XXH | CRC check high low byte |

Slave response:

| Data Format | Data | Description |
|----------------------------|------|-----------------------------|
| Address | 01H | Device address:1-99 |
| Function code | 10H | Device time synchronization |
| Starting <i>register</i> H | 03H | Starting register high byte |
| Starting <i>register</i> L | 00H | Starting register low byte |
| Data length H | 00H | Data length high byte |
| Data length L | 03H | Data length low byte |
| CRC_L | XXH | CRC check code low byte |
| CRC_H | XXH | CRC check high low byte |

Command example

Host inquiry:

01 10 03 00 00 03 06 00 02 01 90 00 C8 90 43

Slave response:

01 10 03 00 00 03 80 4C

Modify data 1-3 setting values from: 1; 5.00; 1.00; to 2; 4.00; 2.00

5.2.6 - Function modification, Write only, “05H custom protocol” code to write

| Addr. | Data | Default |
|-------|--|---------|
| 0AH | Phase overcurrent: 01:OFF ; 02:ON | OFF |
| 0BH | Arc flash trip: 01:OFF ; 02:ON | OFF |
| 0CH | Arc flash alarm: 01:OFF ; 02:ON | OFF |
| 0DH | Zero-sequence overcurrent: 01:OFF ; 02:ON | OFF |
| 0EH | Overload protection: 01:OFF ; 02:ON | OFF |
| 0FH | Smoke alarm: 01:OFF ; 02:ON | OFF |
| 10H | Circuit breaker failure: 01:OFF ; 02:ON | OFF |
| 11H | Temperature alarm: 01:OFF ; 02:ON | OFF |
| 12H | Ultrasonic alarm: 01:OFF ; 02:ON | OFF |
| 13H | TEV alarm: 01:OFF ; 02:ON | OFF |
| 14H | Fire extinguishing control actions: 01:OFF ; 02:ON | OFF |

Example:

Host inquiry:

| Data Format | Data | Description |
|---------------------|------|-----------------------------|
| Address | 01H | Device address |
| Function code | 05H | Device time synchronization |
| Function ID | 0AH | Function 1 |
| Modification method | 02H | Turn ON/OFF |
| | FFH | |
| | 00H | |
| CRC_L | XXH | CRC check code high byte |
| CRC_H | XXH | CRC check high low byte |

Slave response:

| Data Format | Data | Description |
|---------------------|------|-----------------------------|
| Address | 01H | Device address |
| Function code | 05H | Device time synchronization |
| Function ID | 0AH | Function 1 |
| Modification method | 02H | Turn ON/OFF |
| | FFH | |
| | 00H | |
| CRC_L | XXH | CRC check code high byte |
| CRC_H | XXH | CRC check high low byte |

Command example

Host inquiry:

01 05 0A 02 FF 00 2E 22

Slave response:

01 05 0A 02 FF 00 2E 22

Turn ON 1#Function

Host inquiry:

01 05 14 01 FF 00 D8 0A

Slave response:

01 05 14 01 FF 00 D8 0A

Turn OFF 11#Function

5.2.7 - Read DI Signal, Read only, “02H” code to read

| Addr. | Bit | Data | Description |
|-------|-----|--|----------------------|
| 00 | 0 | General act signal | 0:Opened ; 1:Closed |
| | 1 | General alarm signal | 0:Opened ; 1:Closed |
| | 2 | 1DL OFF | 0:Opened ; 1:Closed |
| | 3 | 1DL ON | 0:Opened ; 1:Closed |
| | 4 | Maintain arc | 0:Opened ; 1:Closed |
| | 5 | Smoke 1 | 0:Opened ; 1:Closed |
| | 6 | Fire extinguishing elements | 0:Opened ; 1:Closed |
| | 7 | Reserve | 0:Opened ; 1:Closed |
| 01 | 0 | ARC1 | 0:Opened ; 1:Closed |
| | 1 | ARC2 | 0:Opened ; 1:Closed |
| | 2 | ARC3 | 0:Opened ; 1:Closed |
| | 3 | | 0:Opened ; 1:Closed |
| | 4 | | 0:Opened ; 1:Closed |
| | 5 | | 0:Opened ; 1:Closed |
| | 6 | | 0:Opened ; 1:Closed |
| | 7 | | 0:Opened ; 1:Closed |
| 02 | 0 | Phase overcurrent | 0:OFF ; 1:ON |
| | 1 | Arc trip | 0:OFF ; 1:ON |
| | 2 | Arc alarm | 0:OFF ; 1:ON |
| | 3 | Zero sequence overcurrent | 0:OFF ; 1:ON |
| | 4 | Overburden protection | 0:OFF ; 1:ON |
| | 5 | Smoke alarm | 0:OFF ; 1:ON |
| | 6 | CB trip failure | 0:OFF ; 1:ON |
| | 7 | Temperature alarm | 0:OFF ; 1:ON |
| 03 | 0 | Ultrasonic alarm | 0:OFF ; 1:ON |
| | 1 | TEV alarm | 0:OFF ; 1:ON |
| | 2 | Fire extinguishing control actions | 0:OFF ; 1:ON |
| | 3 | | |
| | 4 | | |
| | 5 | | |
| | 6 | | |
| | 7 | | |
| 04 | 0 | Protection start | 0: Return; 1: Action |
| | 1 | Arc trip | 0: Return; 1: Action |
| | 2 | Quick-break overcurrent protection | 0: Return; 1: Action |
| | 3 | Limited time overcurrent protection action | 0: Return; 1: Action |

| | | | |
|-----------|---|------------------------------------|----------------------|
| | 4 | Overcurrent protection action | 0: Return; 1: Action |
| | 5 | Zero sequence overcurrent action | 0: Return; 1: Action |
| | 6 | Overload protection action | 0: Return; 1: Action |
| | 7 | Failure protection action | 0: Return; 1: Action |
| 05 | 0 | Smoke action | 0: Return; 1: Action |
| | 1 | Fire extinguishing control actions | 0: Return; 1: Action |
| | 2 | Reserve | |
| | 3 | Reserve | |
| | 4 | Reserve | |
| | 5 | Reserve | |
| | 6 | Reserve | |
| | 7 | Reserve | |
| 06 | 0 | Rated value fails | 0: Return; 1: Alarm |
| | 1 | Parameter fail | 0: Return; 1: Alarm |
| | 2 | Device parameter fail | 0: Return; 1: Alarm |
| | 3 | FLASH fail | 0: Return; 1: Alarm |
| | 4 | AD fail | 0: Return; 1: Alarm |
| | 5 | Zero drift limit | 0: Return; 1: Alarm |
| | 6 | Communication initialization fail | 0: Return; 1: Alarm |
| | 7 | output break down | 0: Return; 1: Alarm |
| 07 | 0 | Control loop disconnection | 0: Return; 1: Alarm |
| | 1 | Spring discharged | 0: Return; 1: Alarm |
| | 2 | Arc protection alarm | 0: Return; 1: Alarm |
| | 3 | Zero sequence overcurrent alarm | 0: Return; 1: Alarm |
| | 4 | Overload alarm | 0: Return; 1: Alarm |
| | 5 | Smoke alarm | 0: Return; 1: Alarm |
| | 6 | | 0: Return; 1: Alarm |
| | 7 | Busbar temperature warning | 0: Return; 1: Alarm |
| 08 | 0 | Cable head temperature warning | 0: Return; 1: Alarm |
| | 1 | Upper contact temperature warning | 0: Return; 1: Alarm |
| | 2 | Lower contact temperature warning | 0: Return; 1: Alarm |
| | 3 | Busbar temperature alarm | 0: Return; 1: Alarm |
| | 4 | Cable head temperature alarm | 0: Return; 1: Alarm |
| | 5 | Upper contact temperature alarm | 0: Return; 1: Alarm |
| | 6 | Lower contact temperature alarm | 0: Return; 1: Alarm |
| | 7 | Ultrasonic alarm | 0: Return; 1: Alarm |
| 09 | 0 | TEV alarm | 0: Return; 1: Alarm |
| | 1 | | |
| | 2 | | |

| | | | |
|--|---|--|--|
| | 3 | | |
| | 4 | | |
| | 5 | | |
| | 6 | | |
| | 7 | | |

Example:

Host inquiry:

| Data Format | Data | Description |
|----------------------------|------|-----------------------------|
| Address | 01H | Device address: 1-99 |
| Function code | 02H | Read DI signal |
| Starting <i>register</i> H | 00H | Starting register high byte |
| Starting <i>register</i> L | 00H | Starting register low byte |
| Inquiry length H | 00H | Inquiry length high byte |
| Inquiry length L | 50H | Inquiry length low byte |
| CRC_L | XXH | CRC check code high byte |
| CRC_H | XXH | CRC check high low byte |

Slave response:

| Data Format | Data | Description |
|---------------|------|-------------------------|
| Address | 01H | Device address:1-99 |
| Function code | 02H | Read DI signal |
| Data length | 0EH | Total data length |
| Data 1 | 00H | ID: 00 Bit:0-7 |
| Data 2 | 00H | ID: 01 Bit:0-7 |
| Data 3 | 00H | ID: 02 Bit:0-7 |
| ... | 00H | ... |
| Data 9 | 00H | ID: 09 Bit:0-7 |
| CRC_L | XXH | CRC check code low byte |
| CRC_H | XXH | CRC check high low byte |

Command example

Host inquiry:

01 02 00 00 00 50 78 36

Slave response:

01 02 0A 00 00 23 06 00 00 00 00 00 1B BD 73

5.2.8 - Clock query, Read only, “03H” code to read

Example:

Host inquiry:

| Data Format | Data | Description |
|---------------------|-------------|-----------------------------|
| Address | 01H | Device address: 1-99 |
| Function code | 03H | Read input registers |
| Starting register H | 05H | Starting register high byte |
| Starting register L | 00H | Starting register low byte |
| Inquiry length H | 00H | Inquiry length high byte |
| Inquiry length L | 08H | Inquiry length low byte |
| CRC_H | XXH | CRC check code high byte |
| CRC_L | XXH | CRC check high low byte |

Slave response:

| Data Format | Data | Description |
|--------------------|-------------|----------------------|
| Address | 01H | Device address |
| Function code | 03H | Read input registers |
| Data length | 08H | Total data length |
| Year | 07 E7 | 2023 |
| Month | 04H | April |
| Day | 14H | 20th |
| Hour | 0FH | 15 o'clock |
| Minute | 11H | 17min |
| Second | 2F B8 | 12s 216ms |

Example:

Command example

Host inquiry:

01 03 05 00 00 08 44 C0

Slave response:

01 03 08 07 E7 04 14 0F 11 2F B8 3D EB

5.2.9 - Clock modification, Write only, “10H” code to write

Example:

Host inquiry:

| Data Format | Data | Description |
|---------------------|-------------|-----------------------------|
| Address | 01H | Device address: 1-99 |
| Function code | 10H | Device time synchronization |
| Starting register H | 00H | Starting register high byte |
| Starting register L | 00H | Starting register low byte |
| Data length H | 08H | Data length H |
| Data length L | 00H | Data length L |
| Data total bytes | 08H | 8 bytes |
| Year H | 07H | 2021 |
| Year L | E5H | |
| Month | 0AH | October |
| Day | 09H | 9th |
| Hour | 0BH | 11 o'clock |
| Minute | 05H | 5 min |
| Second H | 3EH | 15s 877ms |
| Second L | 05H | |
| CRC_L | XXH | CRC check code high byte |
| CRC_H | XXH | CRC check high low byte |

Slave response:

| Data Format | Data | Description |
|----------------------------|-------------|-----------------------------|
| Address | 01H | Device address: 1-99 |
| Function code | 10H | Device time synchronization |
| Starting <i>register</i> H | 00H | Starting register high byte |
| Starting <i>register</i> L | 00H | Starting register low byte |
| Data length H | 00H | Data length H |
| Data length L | 00H | Data length L |
| Data total bytes | 08H | 8 bytes |
| Year H | 07H | 2021 |
| Year L | E5H | |
| Month | 0AH | October |
| Day | 09H | 9th |
| Hour | 0BH | 11 o'clock |
| Minute | 05H | 5 min |
| Second H | 3EH | 15s 877ms |
| Second L | 05H | |
| CRC_L | XXH | CRC check code high byte |
| CRC_H | XXH | CRC check high low byte |

Command example

Host inquiry:

01 10 00 00 08 00 08 07 E7 04 14 0B 1B 00 00 48 83

Slave response:

01 10 00 00 08 00 08 07 E7 04 14 0B 1B 00 00 48 83

Modify device time to: April 20, 2023 11:27

5.2.10 - Ethernet IP address query, Read only, “03H” code to read

Example:

Host inquiry:

| Data Format | Data | Description |
|---------------------|------|-----------------------------|
| Address | 01H | Device address:1-99 |
| Function code | 03H | Read input registers |
| Starting register H | 06H | Starting register high byte |
| Starting register L | 00H | Starting register low byte |
| Inquiry length H | 00H | Inquiry length high byte |
| Inquiry length L | 08H | Inquiry length low byte |
| CRC_L | XXH | CRC check code low byte |
| CRC_H | XXH | CRC check high low byte |

Slave response:

| Data Format | Data | Description |
|---------------|------|-------------------------|
| Address | 01H | Device address:1-99 |
| Function code | 03H | Read input registers |
| Data length | 08H | Total data length |
| | C0H | 192 |
| IP address | A8H | 168 |
| | 0BH | 11 |
| | 02H | 2 |
| | FFH | 255 |
| Sub-net mask | FFH | 255 |
| | 00H | 0 |
| | 00H | 0 |
| CRC_L | XXH | CRC check code low byte |
| CRC_H | XXH | CRC check high low byte |

Command example

Host inquiry:

01 03 06 00 00 08 44 84

Slave response:

01 03 08 C0 A8 0B 02 FF FF 00 00 C8 D2

C0 A8 0B 02 Ethernet IP address is 192.168.11.2,
 FF FF 00 00 Ethernet Sub-net mask is 255.255.0.0.

5.2.11 - Ethernet IP address modification, Write only, “10H” code to write

Example:

Host inquiry:

| Data Format | Data | Description |
|----------------------------|-------------|----------------------------|
| Address | 01H | Device address:1-99 |
| Function code | 10H | Read input registers |
| Starting <i>register</i> H | 06H | Starting <i>register</i> H |
| Starting <i>register</i> L | 00H | Starting <i>register</i> L |
| Data length H | 00H | Data length H |
| Data length L | 04H | Data length L |
| Total data bytes | 04H | 8 bytes |
| Data 1 | C0H | 192 |
| Data 2 | A8H | 168 |
| Data 3 | 0CH | 11 |
| Data 4 | 02H | 2 |
| CRC_L | XXH | CRC check code low byte |
| CRC_H | XXH | CRC check high low byte |

Command example

Host inquiry:

01 10 06 00 00 04 04 C0 A8 0C 02 E1 48

No slave response

After modification is successful, device will automatically restart, so no reply to this message. If there is a reply message, it means the IP address modification failed

5.2.12 - Communication address query, Read only, "03H" code to read

Example:

Host inquiry:

| Data Format | Data | Description |
|---------------------|------|-----------------------------|
| Address | FFH | Default |
| Function code | 03H | Read input registers |
| Starting register H | 01H | Starting register high byte |
| Starting register L | 00H | Starting register low byte |
| Inquiry length H | 00H | Inquiry length high byte |
| Inquiry length L | 01H | Inquiry length low byte |
| CRC_L | XXH | CRC check code low byte |
| CRC_H | XXH | CRC check high low byte |

Slave response:

| Data Format | Data | Description |
|---------------|-------|-------------------------|
| Address | 01H | Device address |
| Function code | 03H | Read input registers |
| Data length | 5AH | Total data length |
| Data 1 | 00 02 | Device address 2 |
| CRC_L | XXH | CRC check code low byte |
| CRC_H | XXH | CRC check high low byte |

Command example

Host inquiry:

FF 03 01 00 00 01 90 28

Slave response:

FF 03 02 00 02 10 51

5.2.13 -Signal reset, Write only, “06H” code to write

Example:

Host inquiry:

| Data Format | Data | Description |
|---------------------|-------------|-----------------------------|
| Address | 01H | Device address: 1-99 |
| Function code | 06H | Signal return |
| Starting register H | 00H | Starting register high byte |
| Starting register L | 00H | Starting register low byte |
| Inquiry length H | 00H | Inquiry length high byte |
| Inquiry length L | 00H | Inquiry length low byte |
| CRC_L | XXH | CRC check code high byte |
| CRC_H | XXH | CRC check high low byte |

Slave response:

| Data Format | Data | Description |
|---------------------|-------------|-----------------------------|
| Address | 01H | Device address: 1-99 |
| Function code | 06H | Signal return |
| Starting register H | 00H | Starting register high byte |
| Starting register L | 00H | Starting register low byte |
| Inquiry length H | 00H | Inquiry length high byte |
| Inquiry length L | 00H | Inquiry length low byte |
| CRC_L | 89H | CRC check code high byte |
| CRC_H | CAH | CRC check high low byte |

Command example

Host inquiry:

01 06 00 00 00 00 89 CA

Slave response:

01 06 00 00 00 00 89 CA

5.2.14 - SOE protection action query, Read only, “0CH custom protocol” code to read

| Type | Byte | Data | Description |
|------|------|--|------------------------|
| HEX | 1 | Protection start | 01: Return; 02: Action |
| HEX | 1 | Arc trip | 01: Return; 02: Action |
| HEX | 1 | Quick-break overcurrent protection | 01: Return; 02: Action |
| HEX | 1 | Limited time overcurrent protection action | 01: Return; 02: Action |
| HEX | 1 | Overcurrent protection action | 01: Return; 02: Action |
| HEX | 1 | Zero sequence overcurrent action | 01: Return; 02: Action |
| HEX | 1 | Overload protection action | 01: Return; 02: Action |
| HEX | 1 | Failure protection action | 01: Return; 02: Action |
| HEX | 1 | Smoke action | 01: Return; 02: Action |
| HEX | 1 | Fire extinguishing control actions | 01: Return; 02: Action |

Example:

Host inquiry:

| Data Format | Data | Description |
|---------------|------|--------------------------|
| Address | 01H | Device address: 1-99 |
| Function code | 0CH | Read input registers |
| CRC_L | XXH | CRC check code high byte |
| CRC_H | XXH | CRC check high low byte |

Slave response:

| Data Format | Data | Description |
|---------------------------|------|---|
| Address | 01H | Device address: 1-99 |
| Function code | 0CH | Read input registers |
| Data length | 1FH | 1F is protection action length, 0F is protection start length |
| Report attributes | 04H | 04: Action, 05: Alarm, 18: SOE |
| Serial number | 02H | Protection action bit map: NO. (1# Arc trip) |
| Fixed format | 01H | |
| Report type | 17H | |
| Data width of this record | 16H | |
| Fixed format | 01H | |
| Status | 02H | 02: ON; 01: OFF |
| Second L | 35H | 50 s 741ms |
| Second H | C6H | |
| Minute | 1BH | 27 min |
| Hour | 0EH | 14:00 o'clock |
| | 00H | |
| | 20H | Message appears only when arc trip is activated. |
| | 20H | Message appears only when arc trip is activated. |
| | 20H | Message appears only when arc trip is activated. |
| | 20H | Message appears only when arc trip is activated. |
| | 20H | Message appears only when arc trip is activated. |
| | 30H | Message appears only when arc trip is activated. |
| | 30H | Message appears only when arc trip is activated. |
| | 41H | Message appears only when arc trip is activated. |
| | 20H | Message appears only when arc trip is activated. |
| | 20H | Message appears only when arc trip is activated. |
| | 20H | Message appears only when arc trip is activated. |
| | 20H | Message appears only when arc trip is activated. |
| | 20H | Message appears only when arc trip is activated. |
| | 20H | Message appears only when arc trip is activated. |
| CRC_L | XXH | CRC check code high byte |
| CRC_H | XXH | CRC check high low byte |

Command example

Host inquiry:

01 0C 00 25

Slave response:

01 0C 0C 04 02 01 12 06 01 01 F5 B1 3B 0B 00 AF 82

5.2.15 - SOE alarm event query, Read only, “0CH custom protocol” code to read

| Type | Byte | Data | Description |
|------|------|-----------------------------------|-----------------------|
| HEX | 1 | Rated value fails | 01: Return; 02: Alarm |
| HEX | 1 | Parameter fail | 01: Return; 02: Alarm |
| HEX | 1 | Device parameter fail | 01: Return; 02: Alarm |
| HEX | 1 | FLASH fail | 01: Return; 02: Alarm |
| HEX | 1 | AD fail | 01: Return; 02: Alarm |
| HEX | 1 | Zero drift limit | 01: Return; 02: Alarm |
| HEX | 1 | Communication initialization fail | 01: Return; 02: Alarm |
| HEX | 1 | Output break down | 01: Return; 02: Alarm |
| HEX | 1 | Control loop disconnection | 01: Return; 02: Alarm |
| HEX | 1 | Spring discharged | 01: Return; 02: Alarm |
| HEX | 1 | Arc protection alarm | 01: Return; 02: Alarm |
| HEX | 1 | Zero sequence overcurrent alarm | 01: Return; 02: Alarm |
| HEX | 1 | Overload alarm | 01: Return; 02: Alarm |
| HEX | 1 | Smoke alarm | 01: Return; 02: Alarm |
| HEX | 1 | Reserve | 01: Return; 02: Alarm |
| HEX | 1 | Busbar temperature warning | 01: Return; 02: Alarm |
| HEX | 1 | Busbar temperature warning | 01: Return; 02: Alarm |
| HEX | 1 | Cable head temperature warning | 01: Return; 02: Alarm |
| HEX | 1 | Upper contact temperature warning | 01: Return; 02: Alarm |
| HEX | 1 | Lower contact temperature warning | 01: Return; 02: Alarm |
| HEX | 1 | Busbar temperature alarm | 01: Return; 02: Alarm |
| HEX | 1 | Cable head temperature alarm | 01: Return; 02: Alarm |
| HEX | 1 | Upper contact temperature alarm | 01: Return; 02: Alarm |
| HEX | 1 | Ultrasonic alarm | 01: Return; 02: Alarm |
| HEX | 1 | TEV alarm | 01: Return; 02: Alarm |

Example:

Host inquiry:

| Data Format | Data | Description |
|---------------|------|--------------------------|
| Address | 01H | Device address: 1-99 |
| Function code | 0CH | Read input registers |
| CRC_L | XXH | CRC check code high byte |
| CRC_H | XXH | CRC check high low byte |

Slave response:

| Data Format | Data | Description |
|---------------------------|------|--|
| Address | 01H | Device address |
| Function code | 0CH | Read input registers |
| Data length | 0FH | Total data length |
| Report attributes | 05H | 04: Action, 05: Alarm, 18: SOE |
| Serial number | 0BH | Alarm event bit map: NO. (1# arc protection alarm) |
| Fixed format | 01H | |
| Report type | 12H | |
| Data width of this record | 06H | |
| Fixed format | 01H | |
| Status | 02H | 02: ON; 01: OFF |
| Second L | 35H | 50 s 741ms |
| Second H | C6H | |
| Minute | 1BH | 27 min |
| Hour | 0EH | 14:00 o'clock |
| | 00H | |
| | 08H | |
| | 13H | |
| | 01H | |
| CRC_L | XXH | CRC check code high byte |
| CRC_H | XXH | CRC check high low byte |

Command example

Host inquiry:

01 0C 00 25

Slave response:

01 0C 0C 04 02 01 12 06 01 01 F5 B1 3B 0B 00 AF 82

5.2.16 - SOE DI signal query, Read only, "0CH custom protocol" code to read**Example:****Host inquiry:**

| Data Format | Data | Description |
|--------------------|-------------|--------------------------|
| Address | 01H | Device address: 1-99 |
| Function code | 0CH | Read input registers |
| CRC_L | XXH | CRC check code high byte |
| CRC_H | XXH | CRC check high low byte |

Slave response:

| Data Format | Data | Description |
|---------------------------|-------------|---|
| Address | 01H | Device address |
| Function code | 0CH | Read input registers |
| Data length | 16H | Total data length |
| Report attributes | 18H | 04: Action, 05: Alarm, 18: SOE |
| Serial number | 02H | DI signal bit map: NO. (General alarm signal) |
| Fixed format | 01H | |
| Report type | 09H | |
| Data width of this record | 06H | |
| Fixed format | 01H | |
| Status | 02H | 02: ON; 01: OFF |
| Second L | 56H | |
| Second H | B6H | 46s 678ms |
| Minute | 1CH | 27 min |
| Hour | 0FH | 15 o'clock |
| | 00H | |
| | 08H | |
| | 02H | |
| | 01H | |
| | 09H | |
| | 01H | |
| | 01H | |
| | 02H | |
| | 30H | |
| | 30H | |
| | 41H | |
| CRC_L | XXH | CRC check code high byte |
| CRC_H | XXH | CRC check high low byte |

Command example

Host inquiry:

01 0C 00 25

Slave response:

01 0C 13 18 02 01 09 06 01 02 9C BB 01 0C 00 08 02 01 09 01 01 02 93 AB

5.2.17 - SOE query end command, Read only, “0CH custom protocol” code to read

Example:

Host inquiry:

| Data Format | Data | Description |
|--------------------|-------------|--------------------------|
| Address | 01H | Device address: 1-99 |
| Function code | 0CH | Read input registers |
| CRC_L | XXH | CRC check code high byte |
| CRC_H | XXH | CRC check high low byte |

Slave response:

| Data Format | Data | Description |
|--------------------|-------------|--------------------------|
| Address | 01H | Device address: 1-99 |
| Function code | 0CH | Read input registers |
| Data length | 03H | Total data length |
| CRC_L | XXH | CRC check code high byte |
| CRC_H | XXH | CRC check high low byte |

Command example

Host inquiry:

01 0C 00 25

Slave response:

01 0C 03 65 01

5.2.18 - Restore factory settings, Write only, “13H custom protocol” code to write (not recommended for user)

Example:

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 high byte |
| CRC_H | XXH | CRC check high low byte |

Command example

Host inquiry:

01 13 00 00 00 00 84 09

No slave response

After sending, device automatically resets, so this report no slave response.

5.2.19 - Output test function, Write only, “05H custom protocol” code to write (not recommended for user)

Example:

Host inquiry:

| Data Format | Data | Description |
|--------------------|-------------|-----------------------------|
| Address | 01H | Device address |
| Function code | 05H | Device time synchronization |
| Relay address H | 00H | Starting register H |
| Relay address L | 01H | Starting register L |
| | FFH | |
| | 00H | |
| CRC_L | XXH | CRC check code high byte |
| CRC_H | XXH | CRC check high low byte |

Slave response:

| Data Format | Data | Description |
|--------------------|-------------|-----------------------------|
| Address | 01H | Device address |
| Function code | 05H | Device time synchronization |
| Relay address H | 00H | Starting register H |
| Relay address L | 01H | Starting register L |
| | FFH | |
| | 00H | |
| CRC_L | XXH | CRC check code high byte |
| CRC_H | XXH | CRC check high low byte |

Command example**1. DO 1 action: protection action signal**

Host inquiry: 01 05 00 01 FF 00 DD FA

Slave response: 01 05 00 01 FF 00 DD FA

2. DO 2 action: alarm signal

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

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

3. DO 3 action: protection trip

Host inquiry: 01 05 01 01 FF 00 DC 06

Slave response: 01 05 01 01 FF 00 DC 06

4. DO 4 action: failure protection trip

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

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

5. DO 5 action: fire control DO

Host inquiry: 01 05 02 01 FF 00 DC 42

Slave response: 01 05 02 01 FF 00 DC 42

6. DO 6 action: reserve

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

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

6. - 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.

7. - MAINTENANCE

The AFR-3 does not require any special maintenance. No adjustment, maintenance or repairing action 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 repairing 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