

S16

Intrinsic safe SMOKE SENSOR for mining and industrial environment



TECHNICAL REFERENCE GUIDE VOLUME 1.C

FIGURE 1 S16 SMOKE DETECTOR

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1. Introduction

About this manual

This manual was prepared to aid the engineer in the configuration, setup and implementation of the S16 Smoke sensor with easy to understand terms and procedures.

About S16

The S16 smoke sensor is the most advanced smoke sensor on the market to date.

The S16 offers:

- **Robust intrinsic safe smoke detector (Ex ia)**
- **Low power consumption**
- **Microprocessor controlled smoke analysis**
- **Two MOS (metal oxide semiconductor) smoke detectors**
- **One CO sensor to determine fire in the early stage**

- **One voltage free relay contact**
- **RS485communication**

The S16 is locally manufactured to international standards utilizing the best components available. We offer 24/7 toll free technical support, backup service and training.

Warranty

The S16 carries a one year limited warranty on all parts and labour

2. Safety information

- Only a certified electrician is allowed to carry out the electrical installation.
- Breaking the seal on the fixing screws of the device will result in loss of warranty.
- Electrical safety regulations must always be followed.

3. S16 Installation

About the installation

The S16 is installed by hanging from the roof. The 8 way connector is the connection for power and communication to the device.

4. About S16

Serial no. 48AC-B21F

Unique serial number

- NINGI SERVICES Company
- www.ningi.com Web site
- 0800 000 400 24/7 Toll free telephone technical support

5. Communication

About communication

The S16 offers RS485 (Modbus RTU)

About RS485 (Modbus RTU)

RS485 is used for communication distances (1200M) and allows for multiple devices on the same network (32 devices). See [Modbus RTU protocol](#).

Read holding registers from 40000

Below is a list of the available input registers. Any amount of data may be requested by the Modbus RTU protocol

| Holding Register | Position | Min | Max | Default | Unit |
|---------------------|----------|------|--------|------------------|-----------------------|
| CO Sensor | 1 | 0 | 100 | 0 | % |
| MOS Sensor 2 | 2 | 0 | 100 | 0 | % |
| MOS Sensor 1 | 3 | 0 | 100 | 0 | % |
| Ambient temperature | 4 | 0 | 100 | 0 | °C * 10 |
| Battery Voltage | 5 | 3 | 15 | - | VDC * 10 |
| Power Down Delay | 6 | 0 | 250 | 240 | Min |
| Not Used (Internal) | 7 | - | - | - | Not used |
| System Healthy | 8 | 0 | 0xFFFF | 0xFF7F | Note 1 |
| Mode | 9 | 0 | 255 | 0 | Mode |
| Not Used (Internal) | 10 | - | - | - | Not used |
| RS485 address | 11 | 1 | 247 | Manufacture Unit | Address |
| RS485 baud rate | 12 | 9600 | 9600 | 9600 | bps |
| CO Sensor Alarm | 13 | 0 | 100 | 50 | % |
| MOS Sensor 2 Alarm | 14 | 0 | 100 | 50 | % |
| MOS Sensor 1 Alarm | 15 | 0 | 100 | 50 | % |
| Serial no. HH | 16 | 0 | 99 | - | Manufacture Year |
| Serial no. H | 17 | 0 | 12 | - | Manufacture Month |
| Serial no. L | 18 | 0 | 31 | - | Manufacture Day |
| Serial no. LL | 19 | 0 | 99 | - | Manufacture Unit |
| Version | 20 | 0 | 65535 | 54 | Version |
| Not Used | 21 | - | - | - | Not used |
| Communication | 22 | 0 | 255 | 0 | See 1 |
| Hour meter 1 | 23 | 0 | 65535 | 65535 | See 2 |
| CO Alarm Delay | 24 | 0 | 30 | 5 | Sec |
| MOS1 Alarm Delay | 25 | 0 | 30 | 5 | Sec |
| MOS2 Alarm Delay | 26 | 0 | 30 | 5 | Sec |
| Parity | 27 | 0 | 0 | 0 | Off |

1. Communication – This register increment each second
 2. Hour meter 1 – Non reset-able hour meter indicating hours of operation since last calibration
- All input registers are 16 bit in length (high byte and low byte).

Note1

The S16 has a self check system where each sensor is tested on a regular basis (Approximately every second) and if the sensor is healthy the corresponding bit is set. The bit is cleared after a read from the PLC or control room. The register has 16 bits

| | | | | | | | |
|------------------------------------|-----------------|---------------|----------------|---------------|---------------|--------------|--------------|
| Bit 15 | Bit 14 | Bit 13 | Bit 12 | Bit 11 | Bit 10 | Bit 9 | Bit 8 |
| Spare | Spare | Spare | Spare | Spare | Spare | Spare | Spare |
| Bit 7 | Bit 6 | Bit 5 | Bit 4 | Bit 3 | Bit 2 | Bit 1 | Bit 0 |
| STATUS 1=Healthy 0=Unhealthy | Calibration Due | Spare | Supply Voltage | Ambient Temp | MOS 1 | MOS 2 | CO |

Example – To read registers from S16 Smoke sensor

Example - Slave address = 5
Read first 8 registers

Read request

| Slave Address | Function | Start Address Hi | Start Address Lo | No Points Hi | No Points Lo | CRC Lo | CRC Hi |
|---------------|----------|------------------|------------------|--------------|--------------|--------|--------|
| 05 | 03 | 00 | 00 | 00 | 08 | 45 | 88 |

| Slave Address | Function | Byte Count | Data Hi | Data Lo | | Data Hi | Data Lo | CRC Lo | CRC Hi |
|---------------|----------|------------|---------|---------|-------|---------|---------|--------|--------|
| 05 | 03 | 16 | XX | XX | XX | XX | XX | XX | XX |

Example – Write to coils

Example - Slave address = 5

Write request

| Slave Address | Function | Start Address Hi | Start Address Lo | Value Hi | Value Lo | CRC Lo | CRC Hi |
|---------------|----------|------------------|------------------|----------|----------|--------|--------|
| 05 | 05 | 00 | 00 | XX | 00 | XX | XX |

Value High = 0xFF will force the coils

Value High = 0x00 will clear the coils

Write response

| Slave Address | Function | Start Address Hi | Start Address Lo | Value Hi | Value Lo | CRC Lo | CRC Hi |
|---------------|----------|------------------|------------------|----------|----------|--------|--------|
| 05 | 05 | 00 | 00 | XX | 00 | XX | XX |

6. Special functions

MODE description

MODE 0 – Default (Normal operation)

MODE1 – Sensitive mode (Any one of the sensors exceed the trip level CO or MOS1 or MOS2) will trigger the alarm

How to change the RS485 address

Send 0xFE, 0x55, 0xDA, New address, New Address

Receive New Address

Example: To change to address 0x05 **(Note the string must be 11 bytes long)**

Send 0xFE 0x55 0xDA 0x05 0x05 0x00 0x00 0x00 0x00 0x00 0x00

Receive 0x05 CRC CRC

How to request the RS485 address **(Note the string must be 11 bytes long)**

Send 0xFE, 0x66, 0xCF 0x00 0x00 0x00 0x00 0x00 0x00 0x00 0x00

Receive Address CRC CRC

How to power down the S16

Version 5.3 onwards

Power down the S16. Press the STOP button on the IR Remote. The S16 will power up again when the supply is restored.

6. Electrical specifications

| | Min | Typical | Max | Unit |
|--|------------|----------------|------------|-------------|
| Control voltage Ex ia | 8 | 12 | 15 | VDC |
| Control voltage mains | 180 | 230 | 250 | Vac |
| Power consumption | | 1.2 | 2 | W |
| Relay contacts (1 x CO) Ex ia 2A | 0 | | 15 | VDC |
| Relay contacts mains 2A | 0 | | 250 | Vac |
| Communication channel RS485 (MODBUS RTU) | 600 | | 38400 | Bps |

7. Care and Maintenance

To ensure that the S16 is performing optimally at all times some user maintenance is required

1. Unit is only to be cleaned with a damp lint free, cotton cloth.

8. Terms and conditions

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