

Intrinsic safe SMOKE SENSOR for mining and industrial environment



TECHNICAL REFERENCE GUIDE

VOLUME 1.1

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 the 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
- One metal oxide semiconductor smoke detector
- Two infra-red optical smoke particle detectors to determine fire in the early stage
- Up to three 4-20mA outputs
- One voltage free relay contact
- RS485 communication

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 the 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
- 082 556 7682 Contact number (Tino)

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](#).

About Profibus DP

Under development

Modbus RTU Protocol

The protocol for Modbus RTU consists of a string of bytes. The string starts with the RS485 address, the function required, addresses, data bytes and ends with CRC (cyclic redundancy check).

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.

REGISTER	NAME	DESCRIPTION
40000	Optic sensor 1	The analog value of the optical sensor
40001	Optic sensor 2	The analog value of the optical sensor
40002	MOS sensor	The analog value of the chemical
40003	Ambient temperature	Temperature /10 in °C (275 = 27.5 °C)
40004	Supply Voltage	Voltage on S16 /10 (123 = 12.3VDC)
40005	CH4	Methane level /10 (12 = 1.2%)
40006	Air Velocity	Wind speed in M/S /10 (45 = 4.5M/S)
40007	System register <i>note1</i>	Register to indicate hardware status(healthy)
40010	Address	Address for S16
40011	Baud	Baud rate
40012	Optic 1 Trip level	Optic 1 trip level 0 – 100%
40013	Optic 2 Trip level	Optic 2 trip level 0 – 100%
40014	MOS Trip level	MOS trip level 0 – 100%
40015	ID digit 4	Example ASCII value P in ID P1023001
40016	ID digit 3	Example HEX 0x0A = 10 in ID P1023001
40017	ID digit 2	Example HEX 0x17 = 23 in ID P1023001
40018	ID digit 1	Example HEX 0x01 = 01 in ID P1023001

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	LOGIC
Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
1=RED 0=BLUE	Air Velocity	CH4	Supply Voltage	Ambient Temp	MOS Sensor	Optic Sensor1	Optic Sensor2

Logic (OR means any one sensor activated will trip the alarm, AND means all three sensors must be activated to trip alarm).

Value 0x07=OR, 0x70=AND

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	F0	48

Read response

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 Low	CRC Low	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 Low	CRC Low	CRC Hi
05	05	00	00	XX	00	XX	XX

WRITE COILS from register 00001

Below is a list of the available coil registers.

REGISTER	NAME	DESCRIPTION
00001	Force RED	Force the S16 to visual RED
00002	Force Buzzer	Force the buzzer to sound
00003	Force sensitive mode	S16 trigger if any one of the 3 sensors activates

All registers are 16 bit in length (high byte and low byte).

6. Electrical specifications

	Min	Typical	Max	Unit
Control voltage	6	12	15	VDC
Power consumption		1.2	2	W
Relay contacts (1 x CO)	0		15	VDC
Communication channel RS485 (MODBUS RTU)	600		38400	Bps

7. Terms and conditions

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