

USER MANUAL FEATURES

MODBUS / RS-485

NANO

FIRE DETECTION & EXTINGUISHING CONTROL PANEL



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1 DOCUMENT REVISION DETAILS

Issue	Modification Detail	Author	Date
2.0	1 st publishing document	CvT	15 / 03 / 2024
2.1	Add Master Slave option	CvT	01 / 09 / 2024
2.2	Text improvement	CvT	01 / 02 / 2025
2.3	Add the remote/repeater function to NANO	CvT	01 / 03 / 2026

2 IMPORTANT NOTES – READ CAREFULLY

This manual shall be read and fully understood before installing and commissioning the system. This MODBUS Manual forms an integral part of the NANO Manual, Version 2.1 (August 2024). The NANO and all associated connections shall be installed, commissioned, and maintained only by qualified and competent personnel trained for this work. It is assumed that commissioning personnel are familiar with the purpose of the equipment and the associated technical terminology. The NANO system shall not be considered to be used correctly if it is operated without due regard to the information and instructions provided by the supplier. The equipment warranty is valid only if the complete installation is carried out and the system is commissioned in accordance with all applicable local and/or national regulations and standards.

3 INTRODUCTION

The NANO is designed for use in a fully integrated system. Remote devices can read the status and parameters of the NANO via a digital bus system. The communication protocol used is MODBUS, a well-established bus technology that utilizes RS-485 as the underlying physical layer. Through this Modbus interface, the NANO can be programmed for various applications, for example as a remote/repeater panel or within a master/slave configuration. The primary purpose of a master/slave configuration is to increase the number of extinguishing generators that can be activated. The slave performs this activation upon command from the master, which controls the system in this configuration. Please refer to the NANO User Manual before operating the device. This manual describes the use of the data bus, the programming procedure, and the connection method.

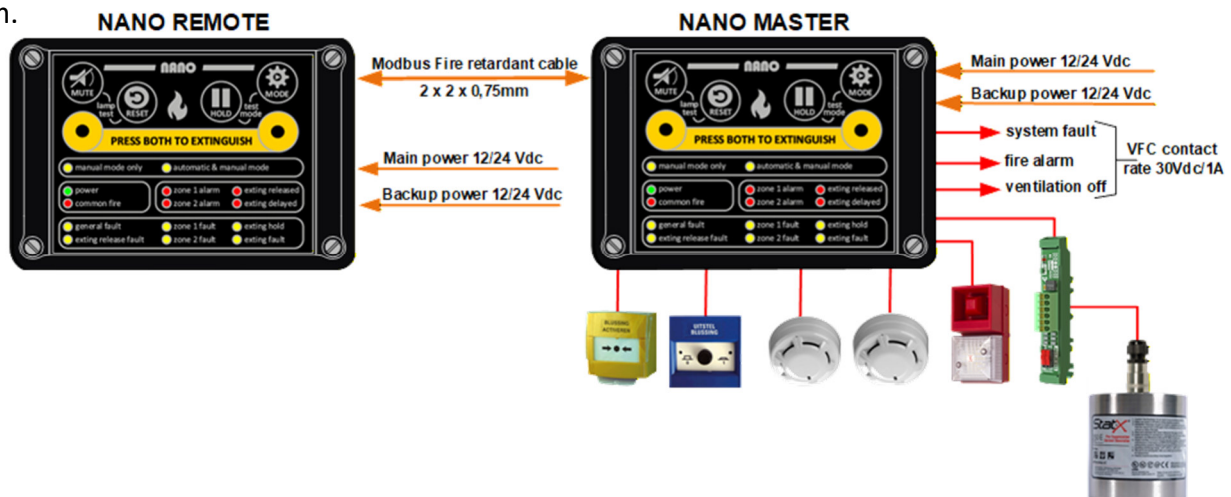
4 NANO OPTIONS

The NANO supports the following system configurations:

- Standalone fire detection and extinguishing control panel.
A standard NANO operates in Default Mode.
- Standalone system with a remote/repeater panel.
The remote/repeater panel operates in Remote Mode.
- Master–slave system for increasing the number of extinguishing generators.
The master panel operates in Master Mode and controls one or more slave panels.
Each slave panel operates in Slave Mode.
- Master–slave system for remote operation and monitoring.
The master panel operates in Master Mode.
Each slave panel operates in Slave Mode.
- Master–slave system with a remote/repeater panel.
The master panel operates in Master Mode.
Each slave panel operates in Slave Mode.
The remote/repeater panel operates in Remote Mode.

5 NANO INCLUDING REMOTE/REPEATER PANEL LAND BASED-APPLICATION

The NANO operating in Remote Mode is designed for connection to the MODBUS RS-485 interface of a NANO operating in Default Mode. As an active remote/repeater panel, it provides full control functionality together with clear and reliable status indication of the fire detection and extinguishing system.

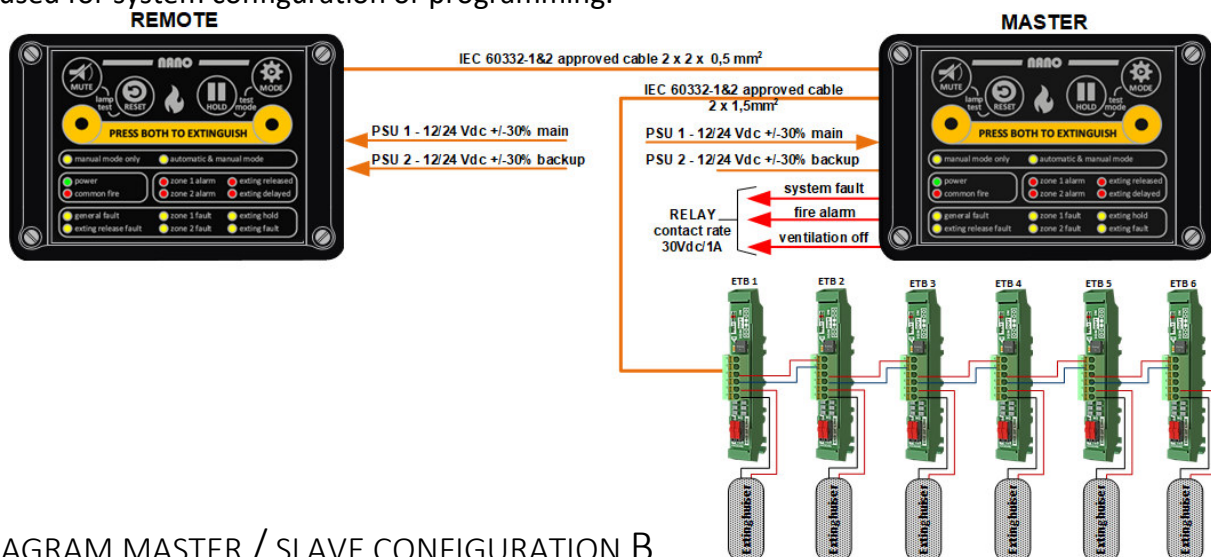


6 NANO MASTER/SLAVE SYSTEM

The purpose of the NANO Master–Slave configuration is to increase the number of extinguishing generators that can be controlled or to provide a remotely operated extinguishing release system. In this configuration, the NANO Master remotely controls a NANO Slave panel, to which the extinguishing generators are connected. Communication between the NANO Master and the NANO Slave is established via the MODBUS RS-485 communication interface. The NANO is designed for use as part of a fully integrated system. Remote devices can monitor the status of the NANO and access its parameters via the MODBUS communication bus. Local operation of the NANO Slave control panel is not permitted. Any fault or abnormal condition detected by the NANO Slave control panel is automatically reported to the NANO Master control panel.

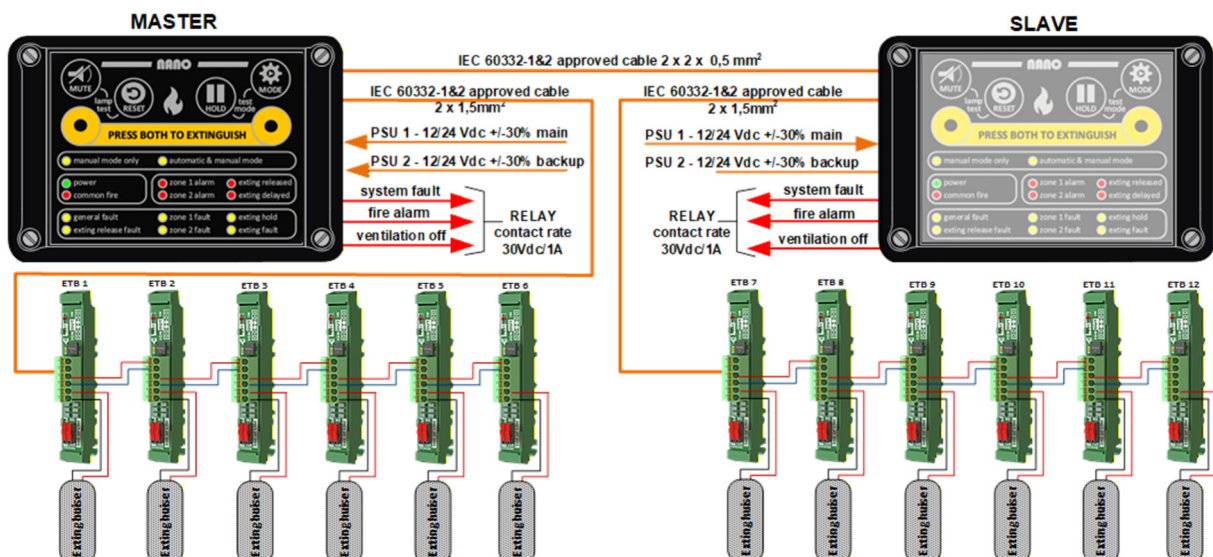
7 DIAGRAM MASTER / REMOTE CONFIGURATION A

A Master–Remote configuration, as shown in Figure A, provides a remote operating station for the extinguishing release system. It is not intended to increase the system capacity. Configure all DIP switch settings only on the NANO Master. The Remote NANO is for monitoring and operation only and must not be used for system configuration or programming.



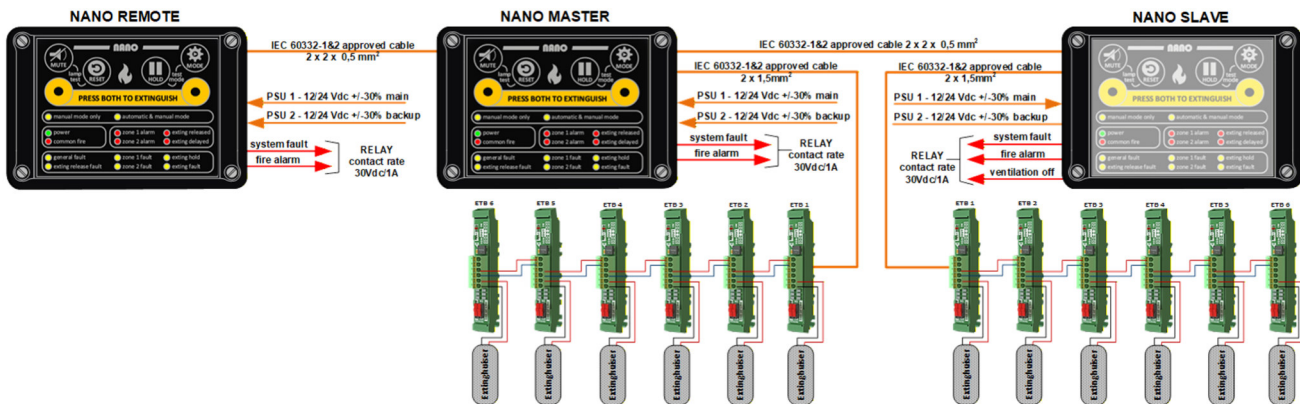
8 DIAGRAM MASTER / SLAVE CONFIGURATION B

A Master–Slave configuration, as shown in Figure B, is intended to increase the number of extinguishing generators that can be controlled, as described in Chapter 6. All system control is performed by the Master. The Slave operates as a passive extension of the Master and is not intended for local operation.



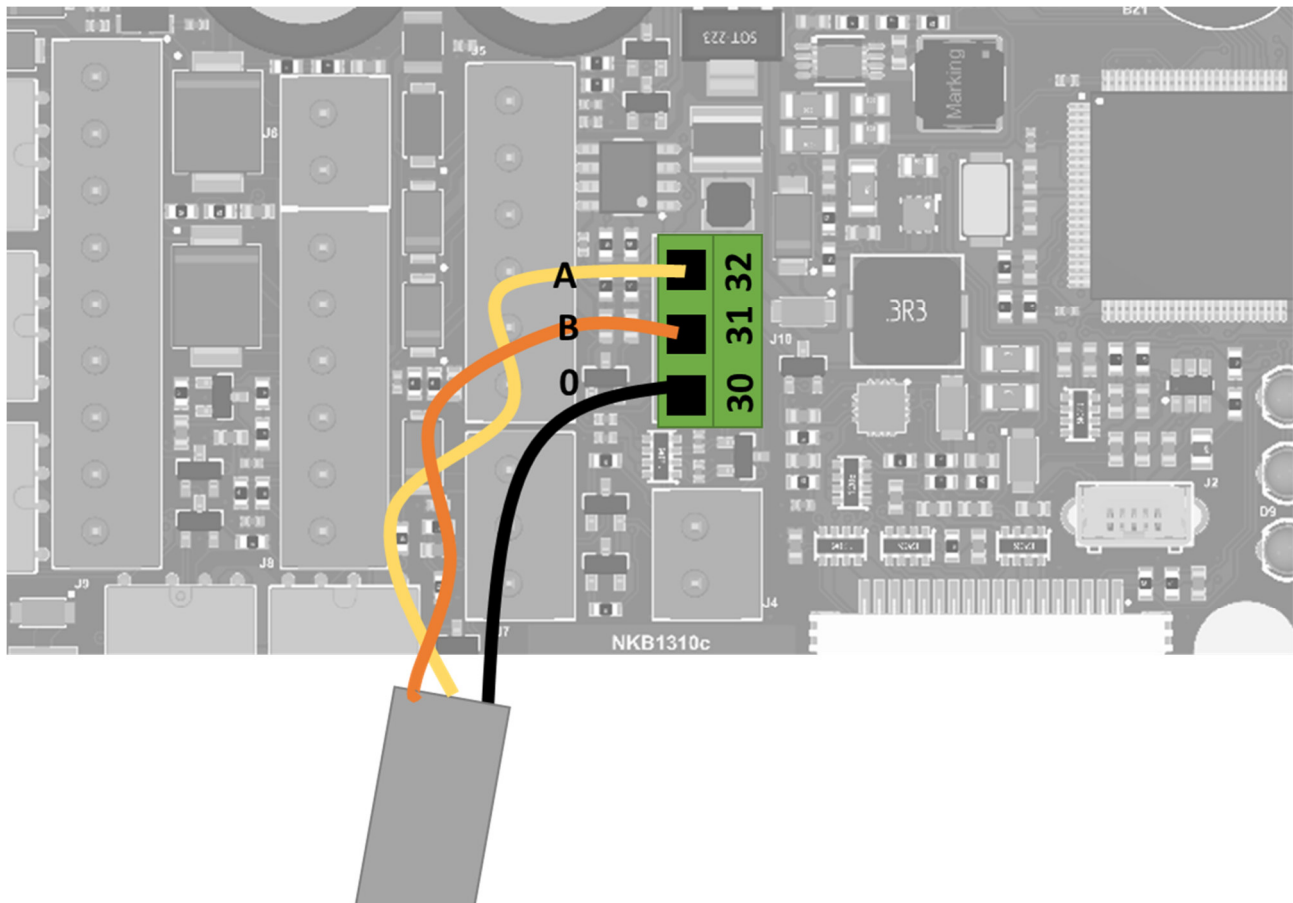
9 DIAGRAM MASTER / SLAVE / REMOTE CONFIGURATION C

A special application arises when a Master-Slave system is required to be monitored and controlled remotely. This can be achieved using the configuration shown below. In this configuration, it is essential that it is always clear which control panel has control of the fire suppression system to prevent conflicting operator actions.



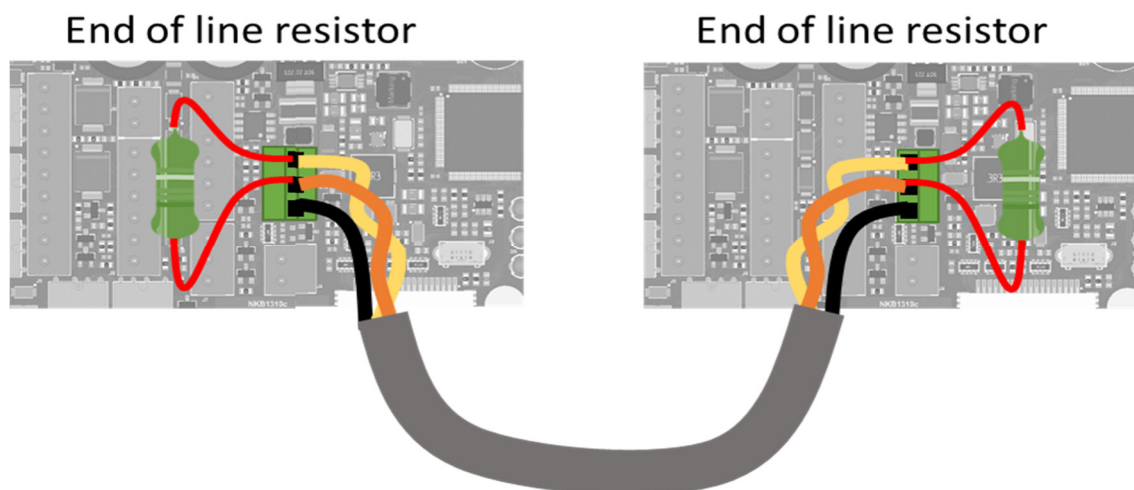
10 CONNECTING THE DATA BUS

RS-485 is a three-wire communication bus consisting of two differential data lines (A and B) and one signal ground conductor. The signal ground conductor shall always be connected and routed together with the two data conductors. Failure to connect the signal ground conductor may result in communication errors or damage to connected devices caused by electrical fast transients (EFT), surge events, or voltage differences between floating ground potentials. Ensure that the A and B data lines are connected correctly and are not reversed. Reversing the A and B connections will not damage the equipment, but communication will not function correctly.



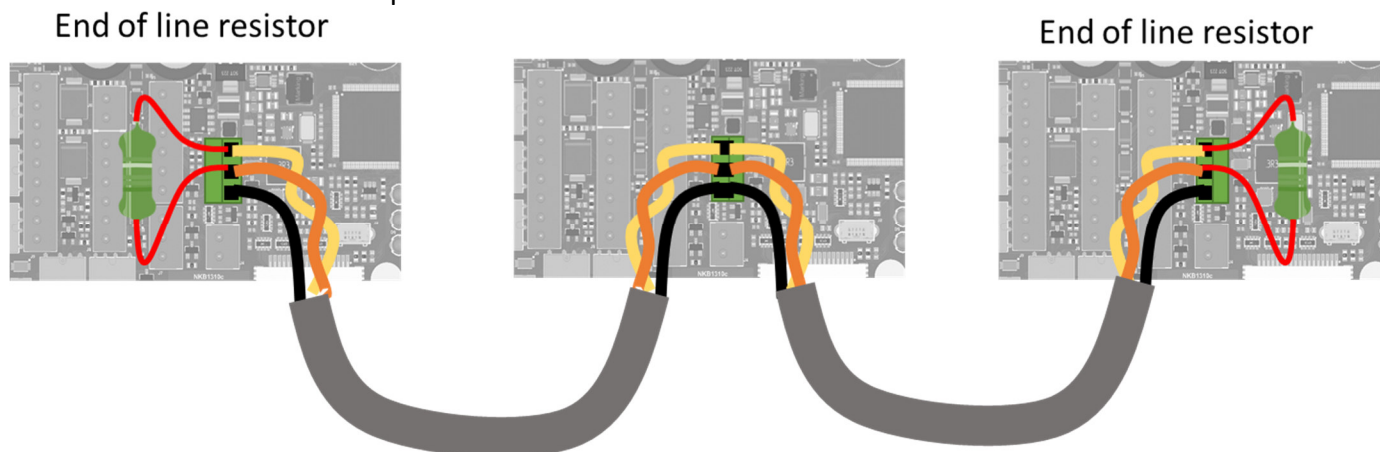
11 MODBUS WIRING

The use of twisted-pair cable is strongly recommended to minimize the risk of communication errors caused by electromagnetic interference (EMI). Where a four-conductor cable is used, all four conductors may be twisted together as a single bundle instead of being arranged as two separate twisted pairs. To ensure reliable communication, a termination resistor shall be installed at each end of the RS-485 communication bus. The resistance value shall match the characteristic impedance of the cable, as specified by the cable manufacturer. For most twisted-pair cables, the characteristic impedance is typically between 100 Ω and 120 Ω .



12 MASTER-SLAVE CONFIGURATION WITH A REMOTE SIGNALING AND CONTROL PANEL

In a Master-Slave configuration with an additional remote signaling and control panel, termination resistors shall be installed at both ends of the RS-485 communication bus. One termination resistor shall be connected at the MODBUS RS-485 interface of the remote panel, and the other at the MODBUS RS-485 interface of the Slave panel.



13 CONNECTION SETTINGS

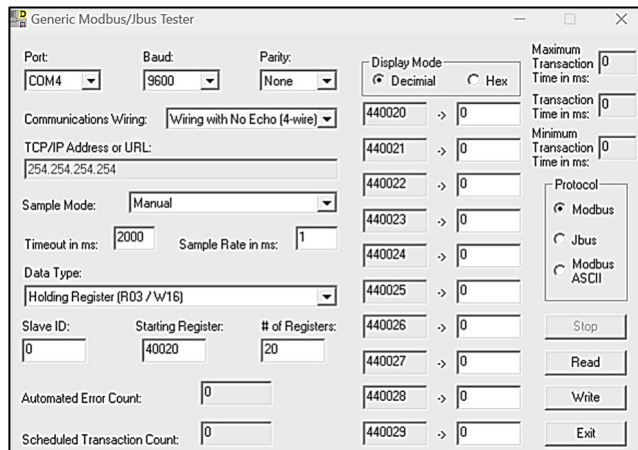
The MODBUS type is RTU and the settings of the communication are 8N1 baudrate 9600.

This means:

- Baudrate 9600 sps
- Startbit
- 8 databits
- No parity bit
- 1 stopbit

14 TESTING THE CONNECTION

Various software and hardware tools are available for testing the RS-485 connection and verifying MODBUS communication. For example, the FTDI USB-RS485-WE-1800-BT interface cable can be used to connect the NANO to a PC. A suitable test application is the Schneider Electric Modbus Tester for Windows. test the connection and the communication.



15 CONFIGURE THE MODBUS ADDRESS AND DEVICE TYPE

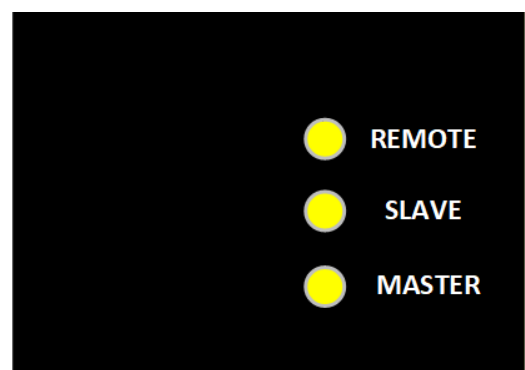
Multiple devices can be connected to a single MODBUS communication bus. Device status and register data can be read by an external system. Devices can also be configured to operate in a coordinated manner. One device on the communication bus can be configured as the Master. The Master provides the following additional functions:

- Generates a general fault indication if no Slave or Default device is detected on the communication bus.
- Generates a general fault indication if one or more Slave or Default devices report a general fault.
- Initiates extinguishing on all Slave devices (but not on Default devices) when the Master's extinguishing output is activated.

Each device connected to the communication bus shall be assigned a unique MODBUS address. The address is configured using the buttons on the NANO. The current operating mode and address are indicated by the three internal LEDs. Instructions for changing the operating mode and MODBUS address are provided in Chapter 16.

The LED indications are as follows:

- If no LED is illuminated, the NANO is configured for **Default Mode**.
- If LED 1 is illuminated, the NANO is configured for **Remote/Repeater Mode**.
- If LED 2 is illuminated, the NANO is configured for **Slave Mode**.
- If LED 3 is illuminated, the NANO is configured for **Master Mode**.



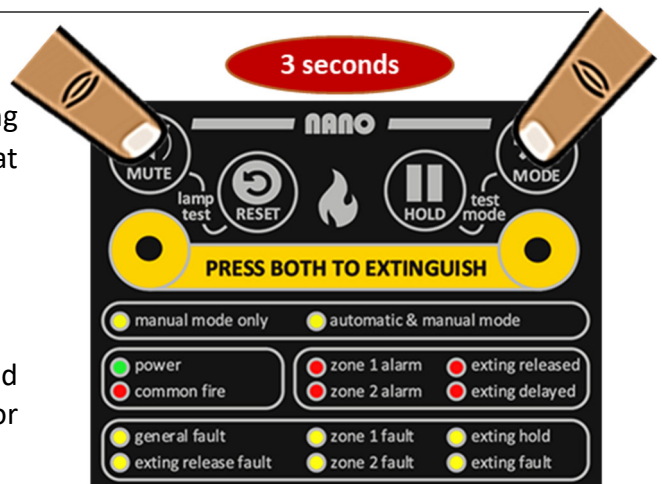
16 CHOOSE FOR DEFAULT, MASTER, SLAVE OR REMOTE/REPEATER PANEL

16.1 MASTER / SLAVE ADDRESS

The configuration process begins by defining the operating mode of the NANO. Next, assign the MODBUS address that the NANO will use on the MODBUS network.

16.2 STEP 1 OPEN DE SELECTION PROCEDURE

To open the function programming mode, press and hold the HOLD  and MUTE  buttons simultaneously for **3 seconds**.



16.3 STEP 2 CHOOSE THE FUNCTIONALITY

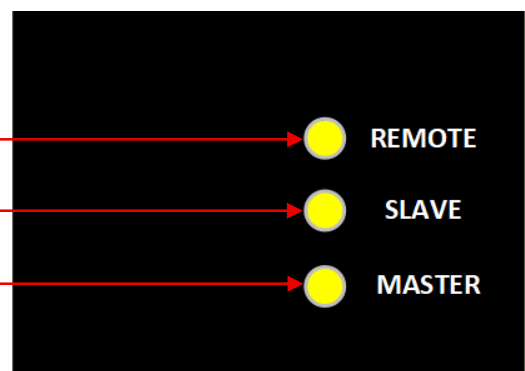
The green power LED will be blinking fast. The three internal LEDs indicate the operating function of the NANO. When **NO** LEDs are active, the NANO operates in its normal default mode. Press the MODE push button  to change NANO's function.



The internal LEDs indicate the selected function. Pressing MODE cycles the functions as follows:

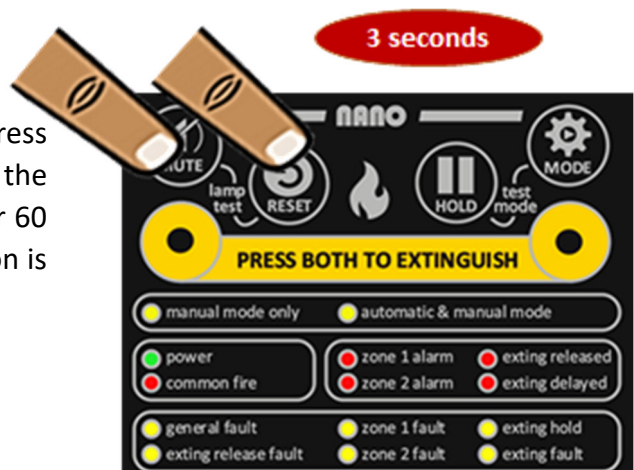
- Remote/Repeat → LED in position 1
- Slave → LED in position 2
- Master → LED in position 3
- NO LED is Default status

See the example for the function assigned to each LED.



16.4 STEP 3 CONFIRM CHOICE

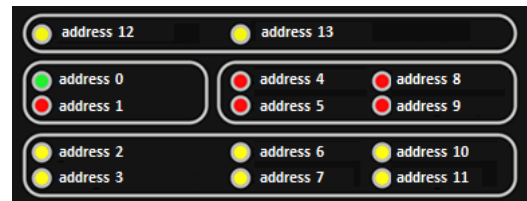
To confirm the REPEATER, SLAVE, or MASTER status, press the MUTE  button for at least **3 seconds**. Or press the RESET  button to cancel. If no button is pressed for 60 seconds during MODBUS selection mode, the operation is automatically canceled.



17 CHOOSE A MODBUS DEVICE ADDRESS

17.1 A MODBUS NETWORK,

Each device has a unique address that allows it to be identified within the network. this address is set using the buttons on the front panel of the nano.



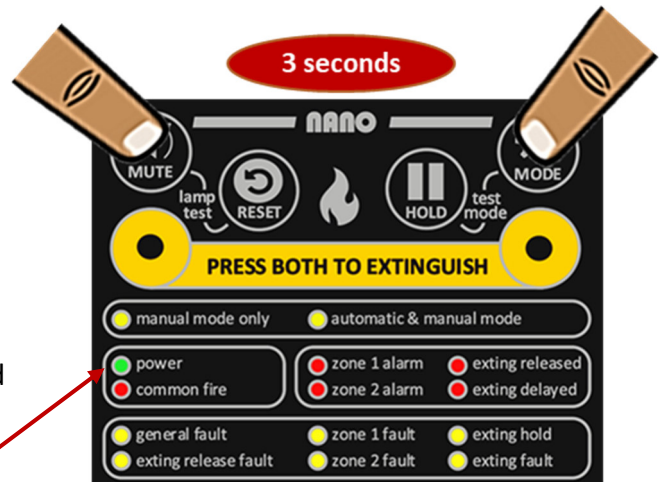
17.2 CONFIGURATION

In a NANO Master–Slave configuration, the Master is assigned address 0 and the Slave address 1.

In a NANO Default – Remote/Repeater configuration the Default NANO is assigned address 0 and the Remote/Repeater panel as address 1.

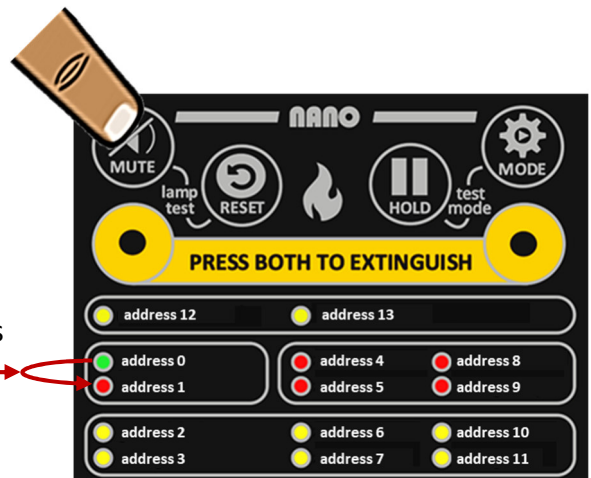
17.3 Step 1 Open de selection procedure

To open the function programming mode, press and hold the **HOLD** ⚙️ and **MUTE** 🔊 buttons simultaneously for **3 seconds**.



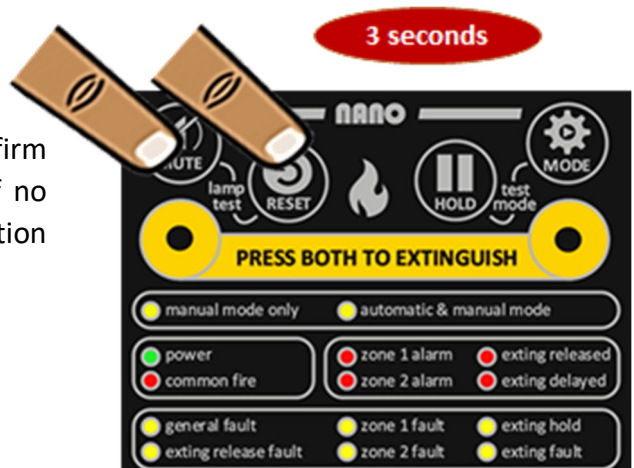
17.4 Step 2 Indication

The green power LED on the front of the NANO flashes rapidly, indicating its Modbus address is in programming mode. The address is 0.



17.5 Step 3 Change Address

Press the Mute 🔊 button shortly to change the address from address 0 to address 1.



17.6 Step 4 Confirm Choice

Press the MUTE 🔊 button for at least **3 seconds** to confirm the chosen address, or press RESET ⏮️ to cancel. If no button is pressed within 60 seconds in MODBUS selection mode, the operation is canceled automatically.



18 MODBUS REGISTER

All parameters are stored in 16-bit holding registers. These registers can be read by an external MODBUS RTU master using the Read Holding Registers function. Multiple consecutive registers can be read in a single request by specifying the required number of registers. All register data is transmitted as 16-bit values, with the most significant byte (MSB) transmitted first, which is the standard byte order for MODBUS RTU. If a read request extends beyond the last available register, the NANO returns all valid registers up to the end of the register map, and the response length is adjusted accordingly. The registers highlighted in red are writable and can be written using the Write Single Register function.

Note: This behavior is specific to the NANO implementation and differs from the standard MODBUS RTU exception handling defined in the MODBUS specification.

Register	Name	Description	Length
40000	Product name	Always replies with the string "NKB1310"	20
40020	Version	Firmware version Major revision in high byte, minor revision in lower byte	1
40021	Reboots	Number of reboots since first started	1
40023	Sounder state	External sounder state: 0 = IDLE, 1 = OPEN, 2 = SHORTED, 3 = ACTIVATED	1
40024	General fault	0 = no fault, 1 = general fault	1
40025	Unlock command extinguish/reset for 5s	Write 0x C001 to unlock the register 40026 and 40027 for 5 seconds	1
40026	Remote extinguish command	Write 0x OFF to initiate extinguish	1
40027	Remote reset command	Write 0x OFF to initiate reset	1
40028	Remote mute command	Write 0x OFF to initiate mute	1
40030	Current event state: fault exting open	1 = Active, 0 = Not active	1
40031	Current event state: fault exting shorted	1 = Active, 0 = Not active	1
40032	Current event state: fault firezone 1 open	1 = Active, 0 = Not active	1
40033	Current event state: fault firezone 1 shorted	1 = Active, 0 = Not active	1
40034	Current event state: fault firezone 2 open	1 = Active, 0 = Not active	1
40035	Current event state: fault firezone 2 shorted	1 = Active, 0 = Not active	1
40036	Current event state: fault sounder open	1 = Active, 0 = Not active	1
40037	Current event state: fault sounder shorted	1 = Active, 0 = Not active	1
40038	Current event state: fault extern hold open	1 = Active, 0 = Not active	1
40039	Current event state: fault extern hold shorted	1 = Active, 0 = Not active	1
40040	Current event state: fault extern hold midrange	1 = Active, 0 = Not active	1
40041	Current event state: fault extern release open	1 = Active, 0 = Not active	1
40042	Current event state: fault extern release shorted	1 = Active, 0 = Not active	1
40043	Current event state: fault extern release midrange	1 = Active, 0 = Not active	1
40044	Current event state: fault power disconnected	1 = Active, 0 = Not active	1
40045	Current event state: external release	1 = Active, 0 = Not active	1
40046	Current event state: external hold	1 = Active, 0 = Not active	1
40047	Current event state: firezone0 fire	1 = Active, 0 = Not active	1
40048	Current event state: firezone1 fire	1 = Active, 0 = Not active	1
40050	Current event state: charged cap	1 = Active, 0 = Not active	1
40053	Current event state: vehicle mode	1 = Active, 0 = Not active	1

Register	Name	Description	Length
40054	Current event state: backup power mode	1 = Active, 0 = Not active	1
40055	Current event state: usb power connected	1 = Active, 0 = Not active	1
40056	Current event state: Extinguish release by modbus	1 = Active, 0 = Not active	1
40057	Current event state: no modbus slaves connect (in master mode)	1 = Active, 0 = Not active	1
40058	Current event state: slave fault detected (in master mode)	1 = Active, 0 = Not active	1
40080	Event count: fault exting open	Nr. Of events occurred since reboot	1
40081	Event count: fault exting shorted	Nr. Of events occurred since reboot	1
40082	Event count: fault firezone 1 open	Nr. Of events occurred since reboot	1
40083	Event count: fault firezone 1 shorted	Nr. Of events occurred since reboot	1
40084	Event count: fault firezone 2 open	Nr. Of events occurred since reboot	1
40085	Event count: fault firezone 2 shorted	Nr. Of events occurred since reboot	1
40086	Event count: fault sounder open	Nr. Of events occurred since reboot	1
40087	Event count: fault sounder shorted	Nr. Of events occurred since reboot	1
40088	Event count: fault external hold open	Nr. Of events occurred since reboot	1
40089	Event count: fault external hold shorted	Nr. Of events occurred since reboot	1
40090	Event count: fault external hold midrange	Nr. Of events occurred since reboot	1
40091	Event count: fault external release open	Nr. Of events occurred since reboot	1
40092	Event count: fault external release shorted	Nr. Of events occurred since reboot	1
40093	Event count: fault external release midrange	Nr. Of events occurred since reboot	1
40094	Event count: fault power disconnected	Nr. Of events occurred since reboot	1
40095	Event count: external release	Nr. Of events occurred since reboot	1
40096	Event count: external hold	Nr. Of events occurred since reboot	1
40097	Event count: fire zone 1 fire	Nr. Of events occurred since reboot	1
40098	Event count: fire zone 2 fire	Nr. Of events occurred since reboot	1
40100	Event count: charged cap	Nr. Of events occurred since reboot	1
40103	Event count: vehicle mode	Nr. Of events occurred since reboot	1
40104	Event count: backup power mode	Nr. Of events occurred since reboot	1
40105	Event count: usb power connected	Nr. Of events occurred since reboot	1
40106	Event count: Extinguish release by Modbus	Nr. Of events occurred since reboot	1
40107	Event count: Current event state: no Modbus	Nr. Of events occurred since reboot	1
40108	Event count: Current event state: slave fault	Nr. Of events occurred since reboot	1
40130	Led state: ext release fault	0 = off, 1 = on, 2 = blink, 3 = blink fast	1
40131	Led state: power	0 = off, 1 = on, 2 = blink, 3 = blink fast	1
40132	Led state: manual mode	0 = off, 1 = on, 2 = blink, 3 = blink fast	1
40133	Led state: zone 1 alarm	0 = off, 1 = on, 2 = blink, 3 = blink fast	1
40134	Led state: zone2 alarm	0 = off, 1 = on, 2 = blink, 3 = blink fast	1
40135	Led state: zone1 fault	0 = off, 1 = on, 2 = blink, 3 = blink fast	1
40136	Led state: zone 2 fault	0 = off, 1 = on, 2 = blink, 3 = blink fast	1
40137	Led state: general fault	0 = off, 1 = on, 2 = blink, 3 = blink fast	1
40138	Led state: fire1	0 = off, 1 = on, 2 = blink, 3 = blink fast	1
40139	Led state: auto mode	0 = off, 1 = on, 2 = blink, 3 = blink fast	1
40140	Led state: released	0 = off, 1 = on, 2 = blink, 3 = blink fast	1
40141	Led state: delay	0 = off, 1 = on, 2 = blink, 3 = blink fast	1
40142	Led state: hold	0 = off, 1 = on, 2 = blink, 3 = blink fast	1



Register	Name	Description	Length
40143	Led state: exting fault	0 = off, 1 = on, 2 = blink, 3 = blink fast	1
40144	Led state: sounder fault	0 = off, 1 = on, 2 = blink, 3 = blink fast	1
40145	Led state: backup power	0 = off, 1 = on, 2 = blink, 3 = blink fast	1
40146	Led state: ext hold fault	0 = off, 1 = on, 2 = blink, 3 = blink fast	1
40147	Led state: fire2	0 = off, 1 = on, 2 = blink, 3 = blink fast	1
40148	Led state: fire3	0 = off, 1 = on, 2 = blink, 3 = blink fast	1
40150	VFC state: Fire	1 = Active, 0 = Not active	1
40151	VFC state: Fault	1 = Active, 0 = Not active	1
40152	VFC state: Fan	1 = Active, 0 = Not active	1
40153	VFC state: Extinguish	1 = Active, 0 = Not active	1
40160	Button state: Reset	0 = not pushed, 1 = pushed, 2 = pushed long, 3 =	1
40161	Button state: Hold	0 = not pushed, 1 = pushed, 2 = pushed long, 3 =	1
40162	Button state: Mode	0 = not pushed, 1 = pushed, 2 = pushed long, 3 =	1
40163	Button state: Mute	0 = not pushed, 1 = pushed, 2 = pushed long, 3 =	1
40164	Button state: Extinguish	0 = not pushed, 1 = pushed, 2 = pushed long, 3 =	1
40170	Button pushed count: Reset	Nr. Of events occurred since reboot	1
40171	Button pushed count: Hold	Nr. Of events occurred since reboot	1
40172	Button pushed count: Mode	Nr. Of events occurred since reboot	1
40173	Button pushed count: Mute	Nr. Of events occurred since reboot	1
40174	Button pushed count: Extinguish	Nr. Of events occurred since reboot	1
40180	Button pushed long count: Reset	Nr. Of events occurred since reboot	1
40181	Button pushed long count: Hold	Nr. Of events occurred since reboot	1
40182	Button pushed long count: Mode	Nr. Of events occurred since reboot	1
40183	Button pushed long count: Mute	Nr. Of events occurred since reboot	1
40184	Button pushed long count: Extinguish	Nr. Of events occurred since reboot	1
40190	Button pushed longer count: Reset	Nr. Of events occurred since reboot	1
40191	Button pushed longer count: Hold	Nr. Of events occurred since reboot	1
40192	Button pushed longer count: Mode	Nr. Of events occurred since reboot	1
40193	Button pushed longer count: Mute	Nr. Of events occurred since reboot	1
40194	Button pushed longer count: Extinguish	Nr. Of events occurred since reboot	1
40220	Main voltage	units: mV	1
40221	Internal voltage	units: mV	1
40222	Backup power voltage	units: mV	1
40224	Extinguish power capacitor voltage	units: mV	1
40225	Board temperature	units: degrees Celsius * 10	1
40226	Extinguish sense voltage	units: mV	1
40227	Sounder port voltage positive pole	units: mV	1
40228	Sounder port voltage negative pole	units: mV	1
40229	Fire zone 1 Voltage	units: mV	1
40230	Fire zone 2 Voltage	units: mV	1
40231	Fire zone 1 Current	units: uA	1
40232	Fire zone 2 Current	units: uA	1
40233	Fire zone 1 Resistance	units: Ohm	1
40234	Fire zone 2 Resistance	units: Ohm	1
40235	External release button resistance	units: Ohm	1
40236	External hold button resistance	units: Ohm	1
40237	Vehicle input Voltage	units: mV	1
40250		Reading this register or higher will return no	

Disclaimer

The operating principle diagrams of the NANO fire detection and extinguishing system included in this manual are provided for illustrative purposes only. They are intended solely to support the explanations contained in this manual and shall not be used for system design, installation, or technical implementation. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, whether electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of N2KB BV. N2KB BV pursues a policy of continuous product improvement and therefore reserves the right to modify product specifications without prior notice.

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