

# USER MANUAL: MODBUS / RS-485



## μ-FEP

### FIRE DETECTION & EXTINGUISHING CONTROL PANEL WITH AN INTEGRATED UPS



## Document Revision Details

Issue	Modification Detail	Author	Date
1	1st publishing document	CvT	01/07/2020
2	Add chapter 4 MODBUS / Emergency power	CvT	01/09/2020
3	Text change chapter 4 decrease emergency power	CvT	01/01/2021

## Important Notes – PLEASE READ CAREFULLY

This manual should be thoroughly read and understood before installation and commissioning of the system is undertaken. This MODBUS manual is an integral part of the  $\mu$ -FEP user manual version 1.9 of January 1, 2021.

The  $\mu$ -FEP, with the associated connections, must be installed, commissioned, and maintained by a skilled, knowledgeable, and competent personnel that is trained to perform this work. It is assumed that the personnel who commission the system is familiar with objective of the equipment and the technical terminology associated with this. Except for the backup battery there are no user-serviceable parts in the  $\mu$ -FEP.

Electrostatic Discharge (ESD) precautions when opening the  $\mu$ -FEP.

Always wear a properly grounded anti-static wrist strap. Avoid direct contact with any of the components on the printed circuit board. Never let the electronics come in contact with clothing. The ground strap cannot dissipate static charges from fabrics. Failure to follow accepted ESD handling practices could cause damage to the  $\mu$ -FEP. The warranty may be void if the equipment is damaged by ESD.

## TABLE OF CONTENTS

1	INTRODUCTION	3
2	CONNECTING THE DATA BUS	3
3	CONNECTION SETTINGS	3
4	MODBUS / EMERGENCY POWER	3
5	CHANGING THE MODBUS ADDRESS	4
5.1	STEP 1	4
5.2	STEP 2:	4
5.3	STEP 3 Hold the Mute button for more than 3 seconds.	4
5.4	STEP 4	4
5.5	STEP 5	4
6	TEST CONNECTION	4
7	MODBUS REGISTER	5
8	NOTES	8

## Reservations

The diagrams of operating principles of the  $\mu$ -FEP fire-/extinguisher system, included in this manual, are intended to support this manual and are therefore not intended and suitable for technical implementation or realization. No part of this manual may be reproduced, stored in an automated database or made public in any form or by any means either electronically, mechanically or by photocopying, recording, or in any other way, without prior written permission from K&G Groep BV. The policy of the K&G Groep BV is one of continuous improvement and as such we reserve the right to make changes to product specifications at any time and without prior notice.

Errors and omissions excepted.

# 1 INTRODUCTION

The  $\mu$ -FEP is designed to be used in a fully integrated system. Remote devices can read the status and parameters of the  $\mu$ -FEP by a digital bus system. The technology used is MODBUS. This is a very well-established bus technology that uses RS-485 as the underlying physical layer. Please read the  $\mu$ -FEP User Manual before using the device. This manual only handles the data bus usage.

## 2 CONNECTING THE DATA BUS

RS-485 is a 3-wire bus. Two wires for the communication data and one wire for the ground connection. Be aware that this ground wire must always be connected and physically kept together with the two data signal lines. Not connecting this wire can lead to communication faults and even damaged devices due to EFT or Surge events or Voltage level differences between different floating ground potentials.

Make sure the A and B data lines are not reversed. Although nothing can be damaged, the communication will not work that way.

It is strongly recommended to use a twisted pair cable to reduce the risk of communication failures due to Electro Magnetic Interference (EMI). Twisting all four lines together instead of twisting in pairs of 2 is also a good solution.

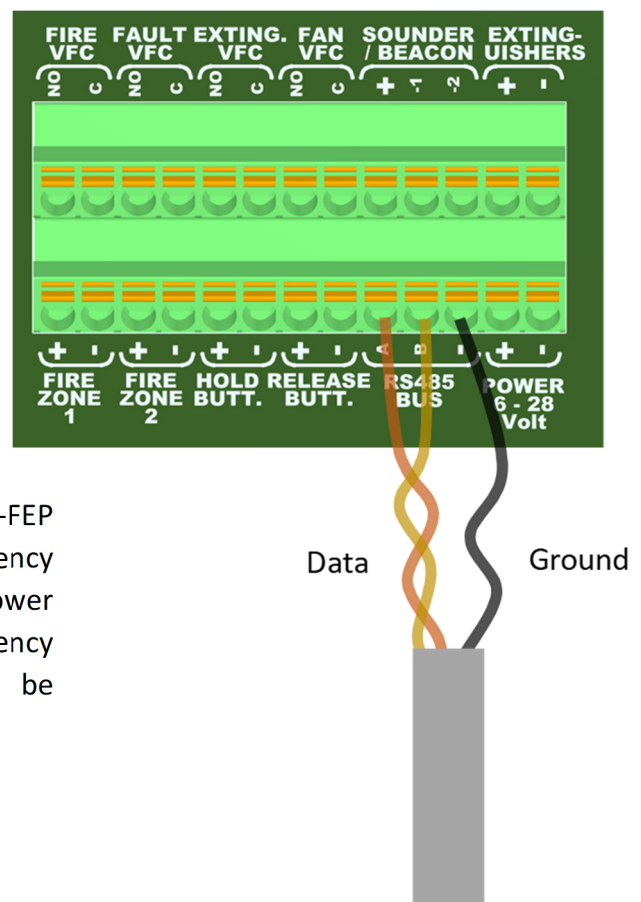
## 3 CONNECTION SETTINGS

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

- Baudrate 9600 bps
- 1 start bit
- 8 data bits
- No parity bit
- 1 stop bit

## 4 MODBUS / EMERGENCY POWER

When using Modbus, the power consumption of the  $\mu$ -FEP increase by approx. 15%. That means in case of emergency power situation a decrease of the emergency power capacity of 15%. To prevent unnecessary use of emergency power capacity, the Modbus communication will be disabled if there is NO communication for 5 minutes.



## 5 CHANGING THE MODBUS ADDRESS

It is possible to connect multiple devices to one data bus. It is very important to give each device in the data bus a unique address. This is done via the buttons on the  $\mu$ -FEP.

### 5.1 STEP1

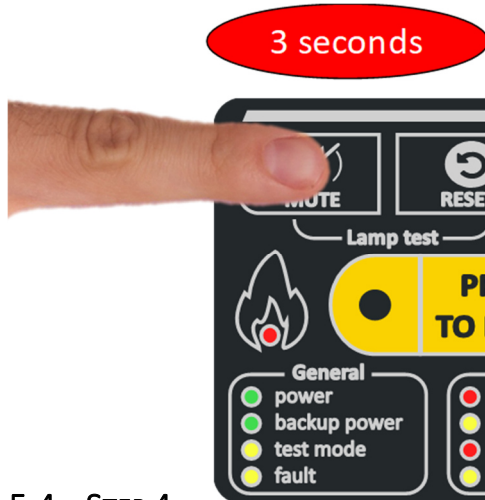
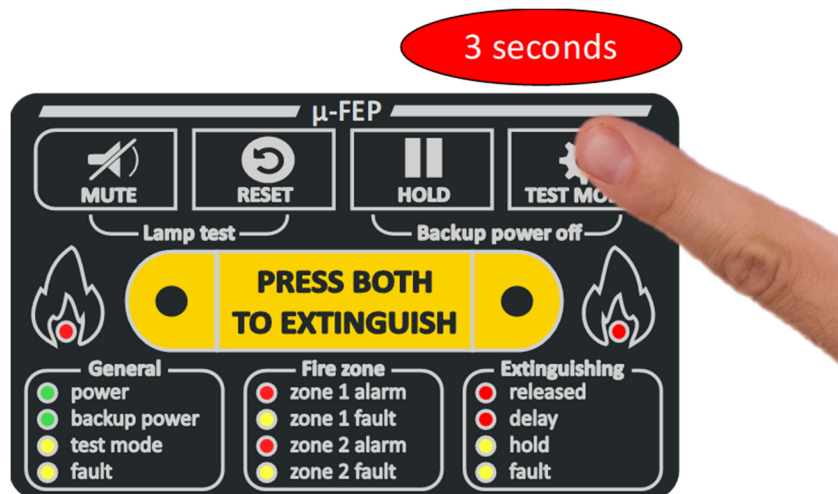
Make sure the  $\mu$ -FEP device is in test mode by holding the test button for more than 3 seconds.

### 5.2 STEP2:

Make sure the Test mode LED is ON.

### 5.3 STEP 3

Hold the Mute button for more than 3 seconds.

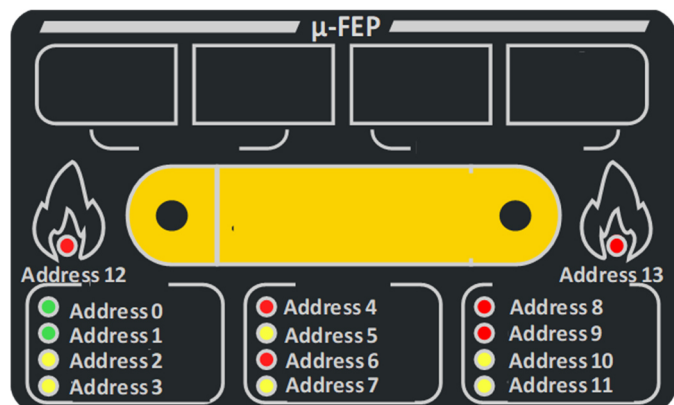


### 5.4 STEP 4

One LED will be blinking fast. The following picture show the MODBUS address that you configured. Press the Mute button **shortly** to change the address.

### 5.5 STEP 5

To confirm the address press the MUTE button for at least 3 seconds or press the Reset button to cancel. If there is no button pressed for 60 seconds during this MODBUS address selection mode. The operation is automatically canceled.



## 6 TEST CONNECTION

To test the connection and the communication, various tools are available in the market. For example, the FTDI USB-RS485-WE-1800-BT cable can be used to connect the hardware to a PC. A simple and easy to use test application, among others, is the Schneider Electric Modbus Tester application for Windows.

## 7 MODBUS REGISTER

All parameters are read only holding registers and can be read by an external MODBUS RTU master device via "Read hold register" commands. It is possible to read multiple registers with one command by changing the requested data length. All register contain 16 bits data. If data is requested beyond the last available register the data is cut-off at the end and the reply will have the corrected data length. The data has the most significant byte first (MSB first) as this is the most common way to format the 16 bits register content in MODBUS RTU.

Register	Name	Description	length
40000	Product name	Always replies with the string "KNG9239-app"	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
40022	Testing	The device is in test state	1
40023	Sounder state	External sounder state: 0 = IDLE, 1 = OPEN, 2 = SHORTED, 3 = ACTIVATED	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 fire zone 1 open	1 = Active, 0 = Not active	1
40033	Current event state: fault fire zone 1 shorted	1 = Active, 0 = Not active	1
40034	Current event state: fault fire zone 2 open	1 = Active, 0 = Not active	1
40035	Current event state: fault fire zone 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 external hold open	1 = Active, 0 = Not active	1
40039	Current event state: fault external hold shorted	1 = Active, 0 = Not active	1
40040	Current event state: fault external hold midrange	1 = Active, 0 = Not active	1
40041	Current event state: fault external release open	1 = Active, 0 = Not active	1
40042	Current event state: fault external release shorted	1 = Active, 0 = Not active	1
40043	Current event state: fault external 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
40049	Current event state: dead battery	1 = Active, 0 = Not active	1
40050	Current event state: charged cap	1 = Active, 0 = Not active	1
40051	Current event state: battery overcurrent	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

Register	Name	Description	length
40082	Event count: fault fire zone 1 open	Nr. Of events occurred since reboot	1
40083	Event count: fault fire zone 1 shorted	Nr. Of events occurred since reboot	1
40084	Event count: fault fire zone 2 open	Nr. Of events occurred since reboot	1
40085	Event count: fault fire zone 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
40099	Event count: dead battery	Nr. Of events occurred since reboot	1
40100	Event count: charged cap	Nr. Of events occurred since reboot	1
40101	Event count: battery overcurrent	Nr. Of events occurred since reboot	1
40130	Led state: zone 1 alarm	0 = off, 1 = on, 2 = blink, 3 = blink fast	1
40131	Led state: zone 2 fault	0 = off, 1 = on, 2 = blink, 3 = blink fast	1
40132	Led state: general fault	0 = off, 1 = on, 2 = blink, 3 = blink fast	1
40133	Led state: power	0 = off, 1 = on, 2 = blink, 3 = blink fast	1
40134	Led state: fire1	0 = off, 1 = on, 2 = blink, 3 = blink fast	1
40135	Led state: delay	0 = off, 1 = on, 2 = blink, 3 = blink fast	1
40136	Led state: hold	0 = off, 1 = on, 2 = blink, 3 = blink fast	1
40137	Led state: zone1 fault	0 = off, 1 = on, 2 = blink, 3 = blink fast	1
40138	Led state: zone2 alarm	0 = off, 1 = on, 2 = blink, 3 = blink fast	1
40139	Led state: test mode	0 = off, 1 = on, 2 = blink, 3 = blink fast	1
40140	Led state: backup power	0 = off, 1 = on, 2 = blink, 3 = blink fast	1
40141	Led state: fire2	0 = off, 1 = on, 2 = blink, 3 = blink fast	1
40142	Led state: released	0 = off, 1 = on, 2 = blink, 3 = blink fast	1
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: Exting release fault	0 = off, 1 = on, 2 = blink, 3 = blink fast	1
40146	Led state: Exting hold fault	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: Extinguish	1 = Active, 0 = Not active	1
40153	VFC state: Fan	1 = Active, 0 = Not active	1
40160	Button state: Reset	0 = not pushed, 1 = pushed, 2 = pushed long, 3 = pushed longer	1



Register	Name	Description	length
40161	Button state: Hold	0 = not pushed, 1 = pushed, 2 = pushed long, 3 = pushed longer	1
40162	Button state: Test	0 = not pushed, 1 = pushed, 2 = pushed long, 3 = pushed longer	1
40163	Button state: Mute	0 = not pushed, 1 = pushed, 2 = pushed long, 3 = pushed longer	1
40164	Button state: Extinguish	0 = not pushed, 1 = pushed, 2 = pushed long, 3 = pushed longer	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: Test	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: Test	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: Test	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	Battery voltage	units: mV	1
40223	Battery current	units: mA	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
40250		Reading this register or higher will return no answer	

