PENKO Engineering B.V.

Your Partner for Fully Engineered Factory Solutions

Manual:
1020 FMD
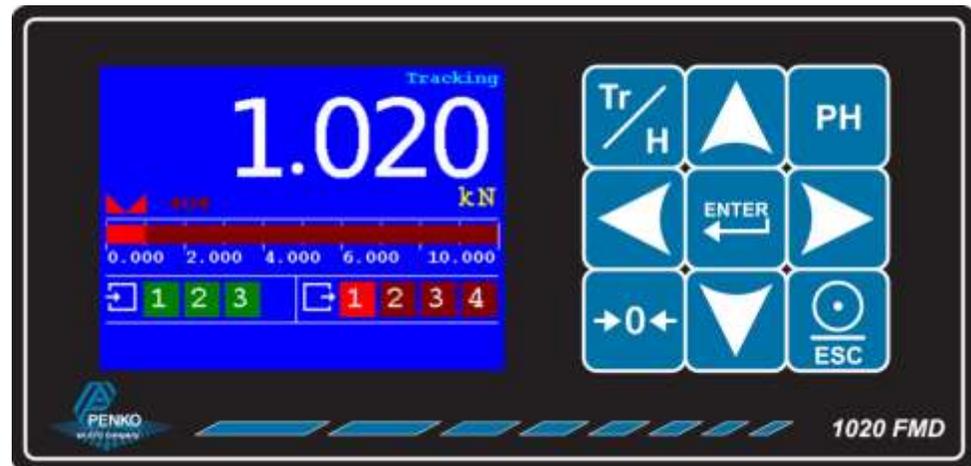
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IMPORTANT SAFETY INFORMATION

READ THIS PAGE FIRST!

PENKO Engineering B.V. manufactures and tests its products to meet all applicable national and international standards. It is vital that this instrument is correctly installed, used, and maintained to ensure it continues to operate to its optimum specification.

The following instructions must be adhered to and incorporated into your safety program when installing, using, and maintaining PENKO products. Failure to follow the recommended instructions can affect the system's safety and may increase the risk of serious personal injury, property damage, damage to this instrument and may invalidate the product's warranty.

• Read the instructions fully prior to installing, operating, or servicing the product. If this Instruction Manual is not the correct manual for the PENKO product you are using, call 0031(0)318-525630 for a replacement copy. Keep this Instruction Manual in a safe place for future reference.

• If you do not fully understand these instructions, contact your PENKO representative for clarification.

• Pay careful attention to all warnings, cautions, and instructions marked on and supplied with the product.

• Inform and educate your personnel about the correct installation, operation, and maintenance procedures for this product.

• Install your equipment as specified in the installation instructions of the appropriate Instruction Manual and as per applicable local and national codes. Connect all products to the proper electrical sources.

• To ensure correct performance, use qualified personnel to install, operate, update, program, and maintain the product.

• When replacement parts are required, ensure that qualified technicians use replacement parts specified by PENKO. Unauthorized components and procedures can affect the product's performance and may affect the continued safe operation of your processes. The use of non-specified 'look-alike' substitution parts may result in the risk of fire, electrical hazards, or improper operation.

• Ensure that all equipment doors are closed and protective covers are in place, except when maintenance is being performed by qualified persons, to prevent electrical shock and personal injury.

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WARNING

ELECTRICAL SHOCK HAZARD

Installing cable connections and servicing this instrument require access to shock hazard level voltages which can cause death or serious injury.

Disconnect separate or external power sources to relay contacts before commencing any maintenance.

The electrical installation must be carried out in accordance with CE directions and/or any other applicable national or local codes.

Unused cable conduit entries must be securely sealed by non-flammable blanking plates or blind grommets to ensure complete enclosure integrity in compliance with personal safety and environmental protection requirements.

To ensure safety and correct performance this instrument must be connected to a properly grounded, three-wire power source.

Proper relay use and configuration is the responsibility of the user.

Do not operate this instrument without the front cover being secured. Refer any installation, operation or servicing issues to qualified personnel.

WWW.PENKO.COM

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Introduction

The PENKO 1020 FMD is a compact comprehensive Force Measurement Device.

In the box

The box contains the following items:

- 1 x 1020 FMD device
- 1 x rubber ring for mounting purpose
- 2 x clip for mounting purpose
- 1 x connector for load cell connection
- 1 x quick start manual

Needed for use

To use the 1020 FMD the following items are needed:

- Class 2 or Limited Power Source, rate 18 - 32 VDC, 0.4A@24VDC
- Load cell / Torque sensor
- USB A-B cable for configuration with PC software

For easy configuration, two PC applications are available as download.

www.penko.com/software

PDI Client

PDI Client is a cross-platform freeware program for easy monitoring and configuration of PENKO devices. PDI Client is compatible with the PENKO FLEX series, FLEX2100 series, 1020 series, SGM700/800 series and RIO/RIA700 series. Only USB communication is supported. The minimum required Java Runtime Environment is version 1.8.0. Installation guide and USB drivers for Windows are included.

DOWNLOAD SOFTWARE

Pi Mach II

Pi Mach II is a comprehensive freeware program for monitoring and configuration of PENKO devices. Available features are firmware update manager, manage tool for all parameters, oscilloscope functionality to explore filters and programming and visualization tooling for the PENKO FLEX and FLEX2100 series. USB drivers are included in the installer.

DOWNLOAD SOFTWARE

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1 Overview
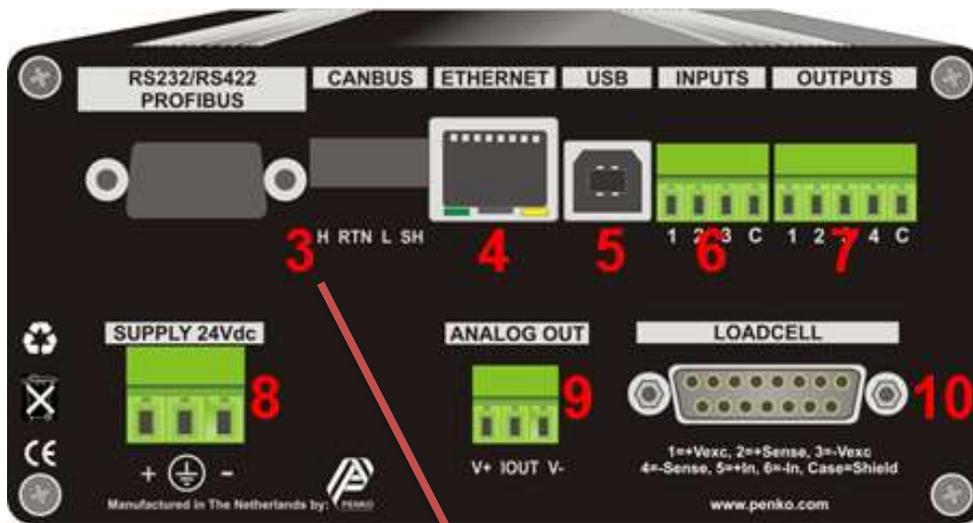
Option 1:   **Option 2:**

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Number	Description
1	TFT display 320 x 240
2	Keypad
3	**OPTION:** None || Serial + CAN bus || Profibus
4	Ethernet connection
5	USB connection
6	Digital inputs (3)
7	Digital outputs (4)
8	24VDC power supply
9	**OPTION:** Analog output
10	Load cell connection
11	RS232/RS422 connection
12	CAN bus connection
13	Profibus connection
14	Bus termination for Profibus

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2   Connections

This chapter describes the connections of the 1020 FMD.

⚠️ Before connecting the device to a computer using USB, make sure the USB driver is installed.

2.1   Power supply

Power the device using a Class 2 or Limited Power Source, rate 18 – 32 VDC, 0.4A@24VDC

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2.2 Load cell

1=+Vexc, 2=+Sense, 3=-Vexc
4=-Sense, 5=+In, 6=-In, Case=Shield
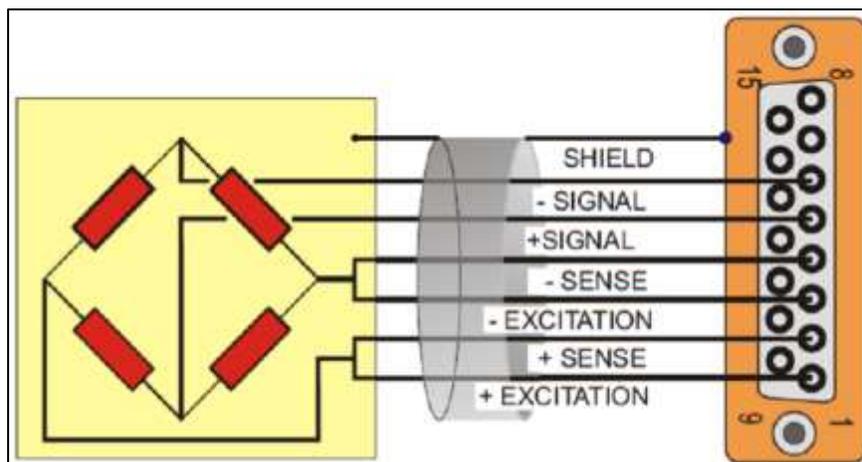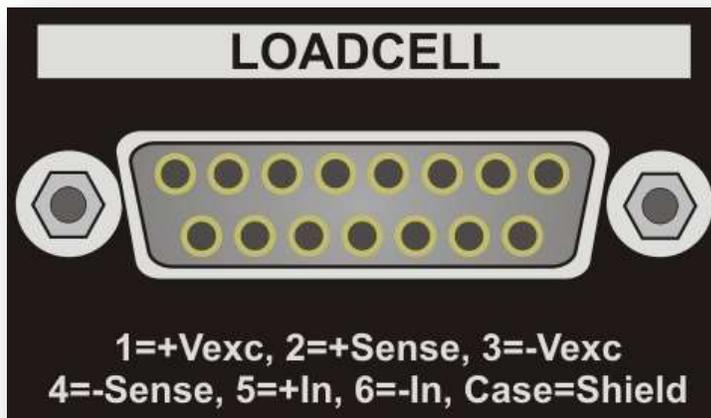
Property	Description
Wiring	With sense
Type of sense	Passive
Excitation voltage	5 VDC
Sensitivity	0,1 µV/d
Selectable ranges	1 mV/V | 1,5 mV/V | 2 mV/V | 2,5 mV/V | 3 mV/V
Input voltage @3mV/V	-16 mV to 16 mV
A/D Conversion speed	1600/s
Max. load cell impedance	1200 Ω
Min. Load cell impedance	43,75 Ω
Max. no. of load cells 350 Ω	8
Max. no. of load cells 1000 Ω	22

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2.3   USB

Connect the device to a computer using an A-B USB cable. The USB interface is used for communication with PENKO configuration software.

Before connecting the device to a computer using USB, make sure the USB driver is installed. The driver is included in the PENKO configuration PC applications, see chapter PC applications.

Only 1 protocol is supported over USB:

| Protocol	Description
Penko TP	PENKO protocol used for configuration software

⚠️ The USB interface cannot be used for printers, memory sticks etc.

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2.4 Analog output
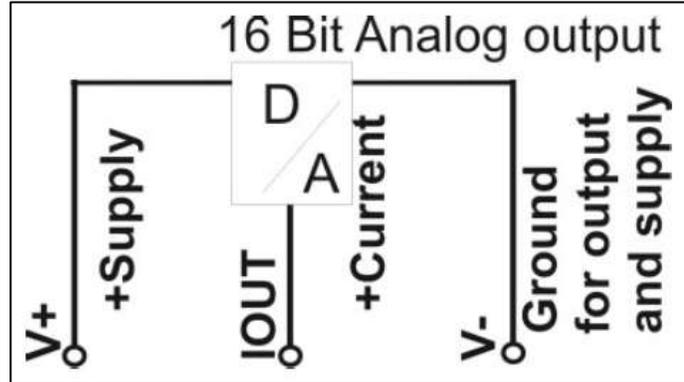
The analog output can be used as mA output in the following ranges and react to an indicator value.

Range	Description
RAW	16 bit DAC value
0 - 20 mA	The minimum and maximum output of the analog output
0 - 24 mA	The minimum and maximum output of the analog output
4 - 20 mA	The minimum and maximum output of the analog output
4 - 24 mA	The minimum and maximum output of the analog output

The analog output can also be used as 0 - 10 V output when a 500 ohm resistor is placed over the output and the range is set to 0-20mA.
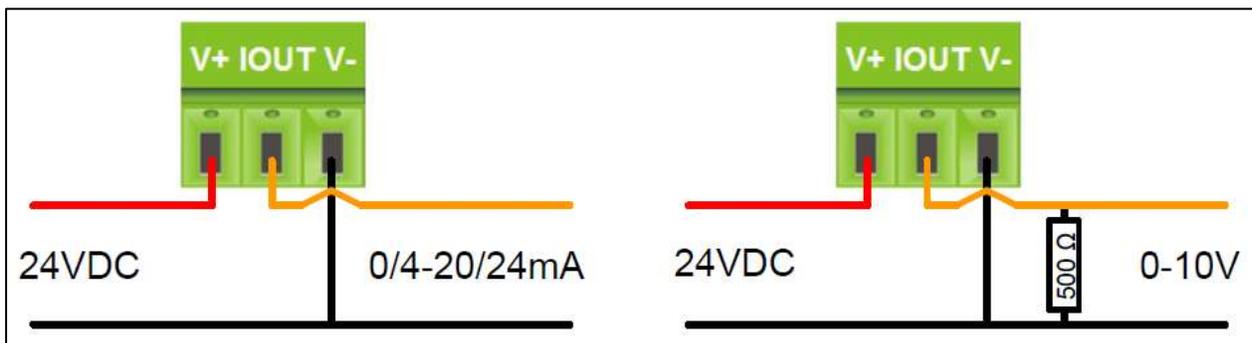
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2.5 Digital inputs
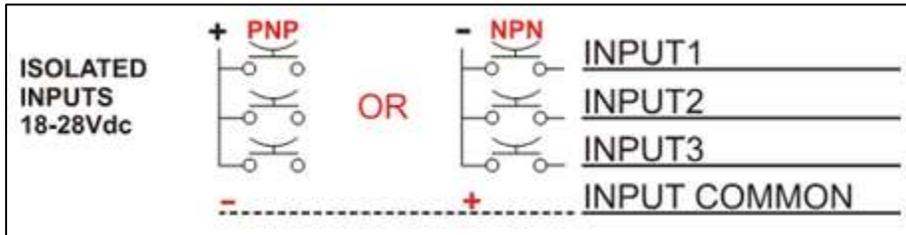
The device has 3 digital. The inputs can be switched PNP or NPN with 18 - 28 VDC.

The inputs can be programmed as Hold, Peak Hold, Key Lock etc.

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2.6 Digital outputs
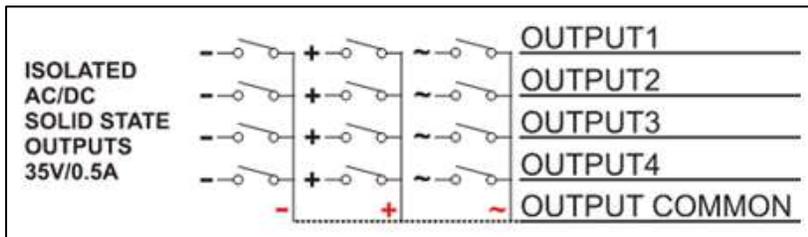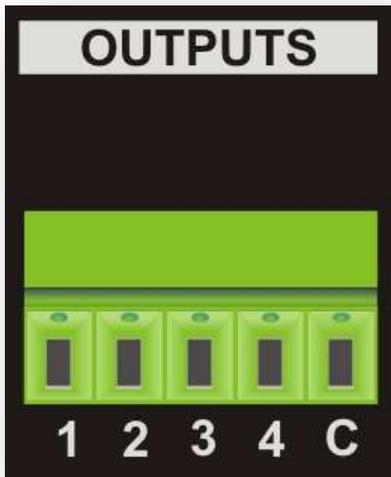
The device has 4 digital outputs that can be used for an AC and DC power circuit up to 35V/0.5A.

The outputs can be programmed as setpoints with a programmable hysteresis and function like Track, Peak, Valley etc.

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2.7 Ethernet
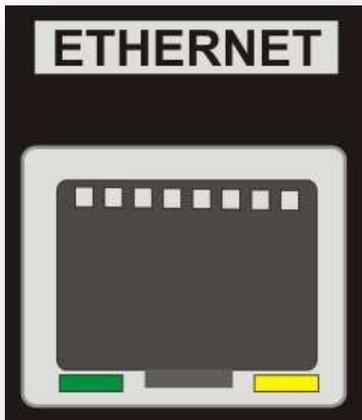
The Ethernet connection can be used for communication with Pi Mach II and for the following protocols:

| Protocol	Description
BusLink	PENKO Protocol to connect the device to a PENKO FLEX controller
EthernetIP	Protocol to connect to SCADA/PLC
Omron FINS	Protocol to connect to SCADA/PLC
Modbus TCP*	Protocol to connect to SCADA/PLC
Penko TP	PENKO protocol used for configuration software
ASCII**	PENKO protocol for ASCII communication

* Automatically enabled when both RS232 and RS422 are not set to Modbus

** Port 23 - automatically enabled when both RS232 and RS422 are not set to ASCII

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2.9 CAN Bus
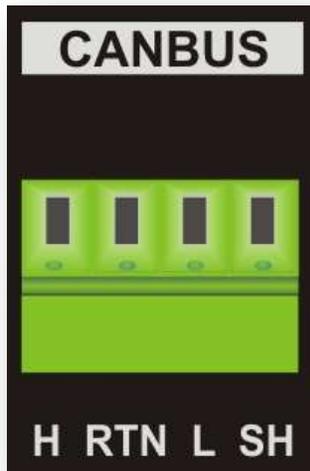
The CAN Bus can be used for the PENKO BusLink protocol, a protocol to connect the 1020 FMD to a PENKO FLEX controller.

Connection	Description
H	CAN High
RTN	Ground
L	CAN Low
SH	Shield
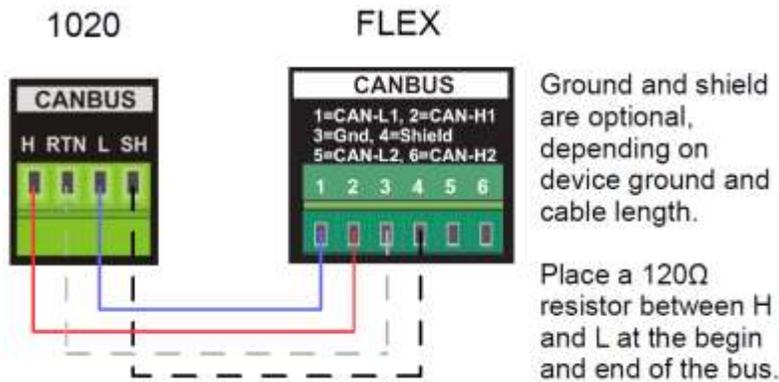
⚠ The CANopen protocol is not available

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2.10 Profibus
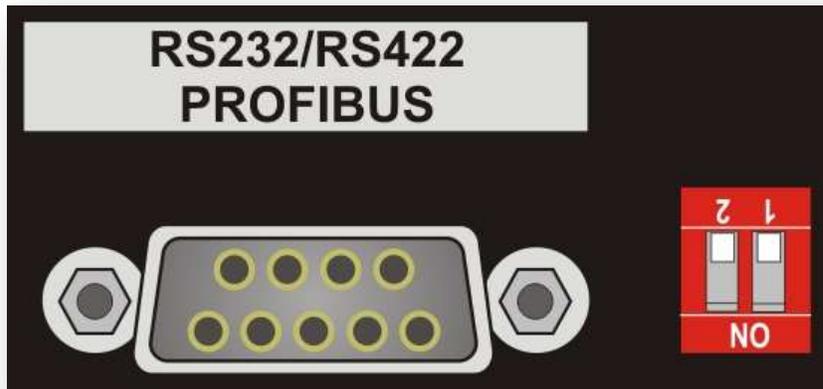
Profibus is available on the option board.
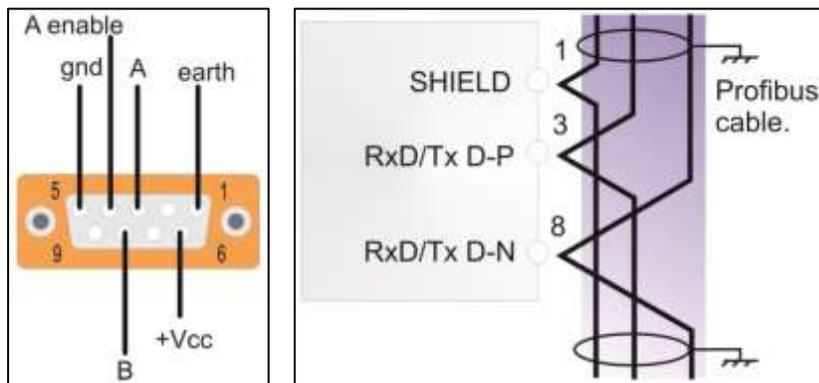
Pin No.	Symbol	Name	Description
1		SHIELD	Shield protective ground
2		RP	Reserved for power
3	B/B	RxD/TxD-P	Receive/Transmit data P
4		CNTR-P	Control P
5	C/C	DGND	Data ground
6		VP	Voltage plus
7		RP	Reserverd for power
8	A/A	RxD/TxD-N	Receive/Transmit data N
9		CNTR-N	Control N

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2.11 RS232/RS422

RS232 and RS422 are available on the option board and can be used for the following protocols:

Protocol	Description
Printer	PENKO protocol to connect a ASCII/plain-text printer
ASCII	PENKO protocol for ASCII communication
NPV Slave	PENKO Protocol used for follow displays
Modbus-RTU	Protocol to connect to SCADA/PLC
Modbus-ASCII	Protocol to connect to SCADA/PLC

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RS232 communication:
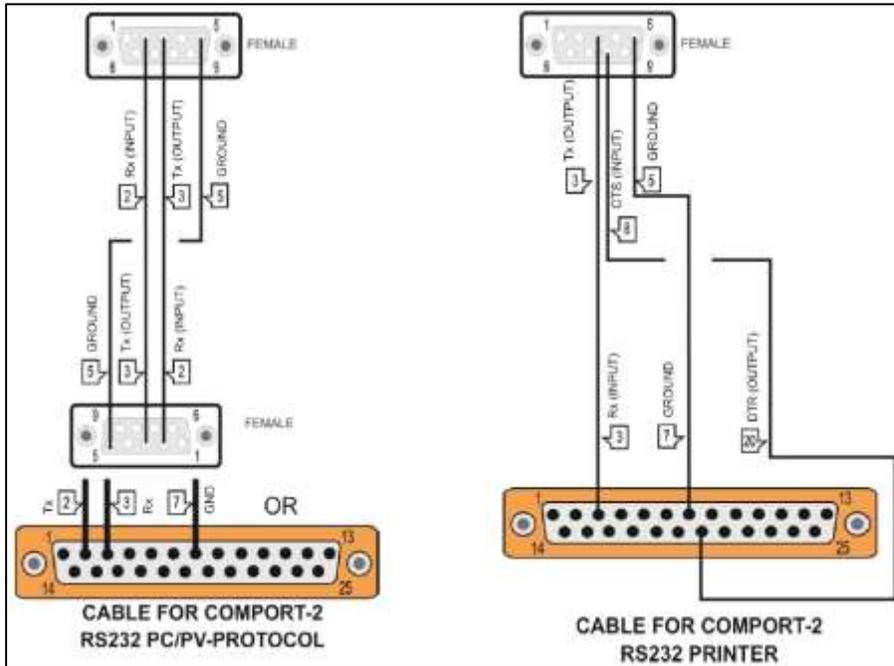
RS422 communication with multiple devices:
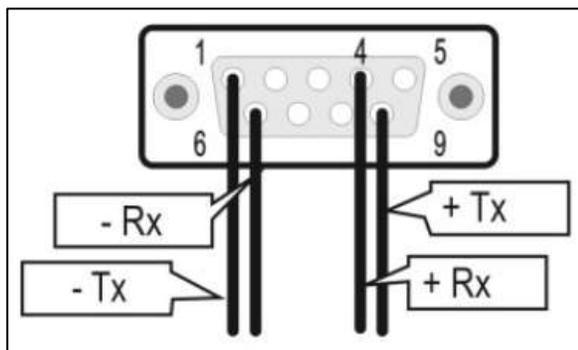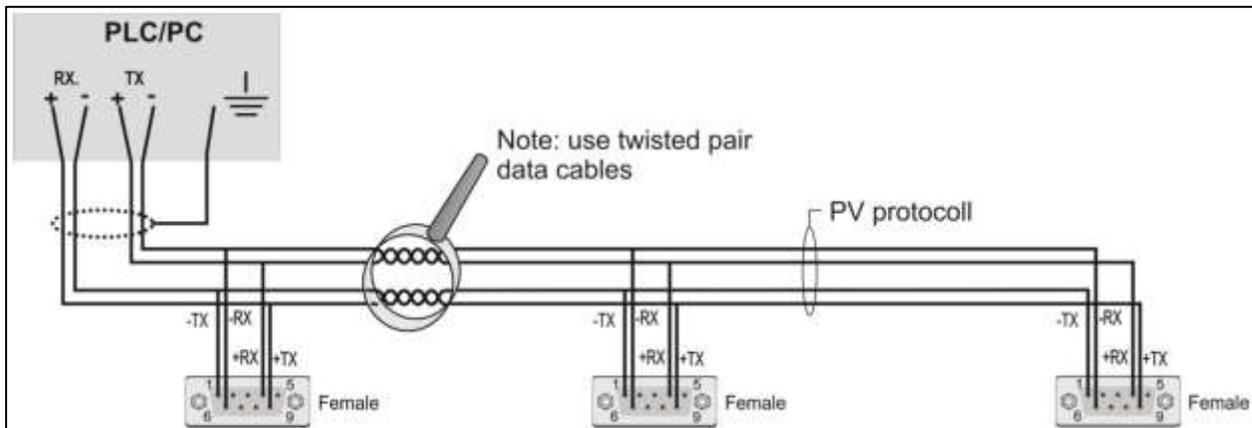
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3   Display and keypad

The display contains the following indications:
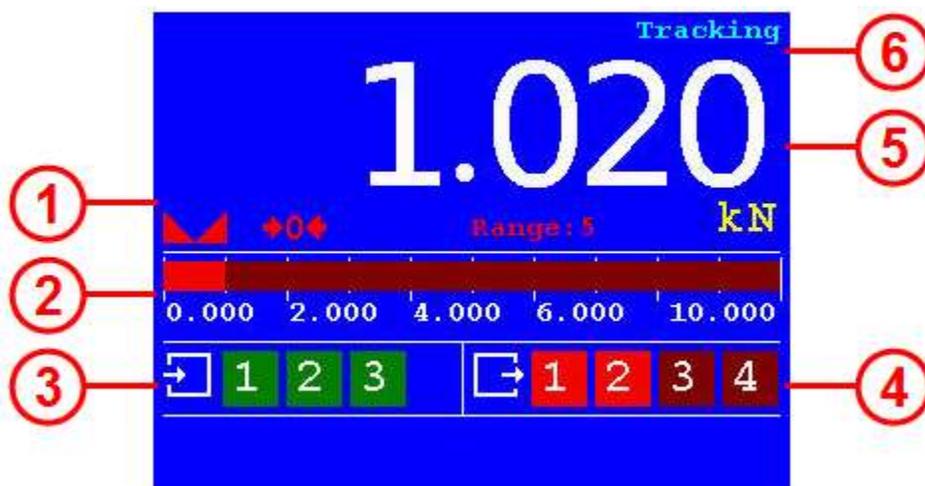
Number	Description
1	Indicator in stable range [] Zero active [] Range/Interval active
2	Bar graph indication
3	Digital input active indication (3 inputs)
4	Digital output active indication (4 outputs)
5	Measured value
6	Type of value shown on the display (Tracking, Hold, T.I.R, Peak, Valley) *

---

* Display value

Tracking	Tracking value. The display follows the input signal.
Hold	Hold value. The hold value is stored every time the zero button is pressed in hold mode, and every time the input, programmed as hold, is high.
Peak	Peak hold value. This is the highest measured value.
Valley	Valley hold value. This is the lowest measured value.
T.I.R.	**T**otal **I**ndicated **R**eadout value. The difference between the peak hold and valley hold value.

See next page for examples.

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Hold function
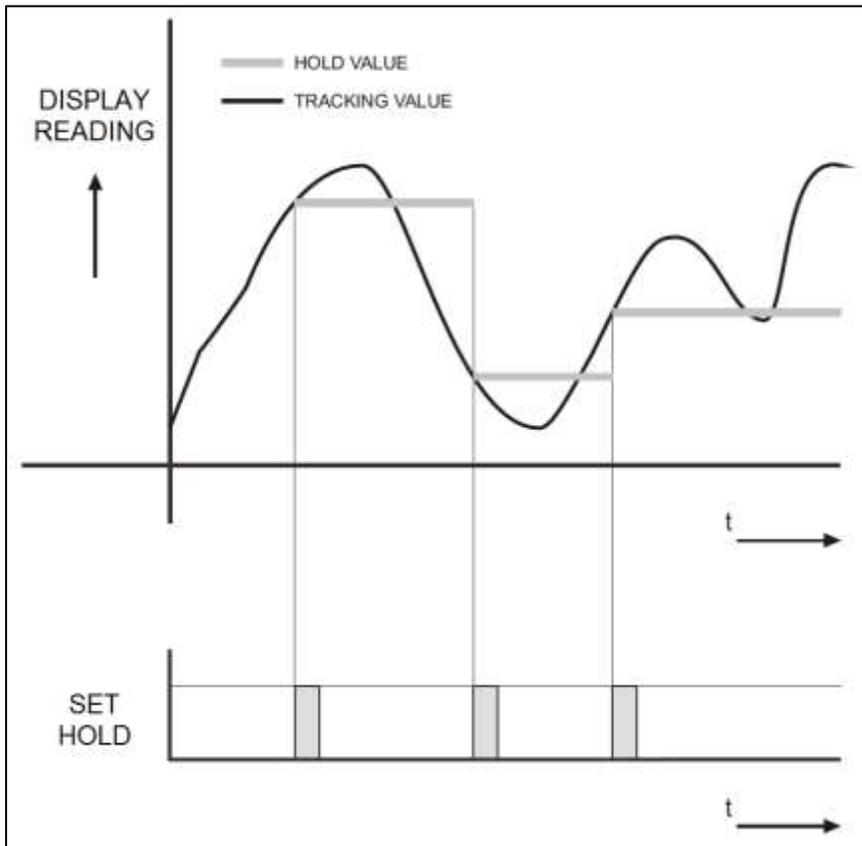
Peak, Valley and T.I.R. function
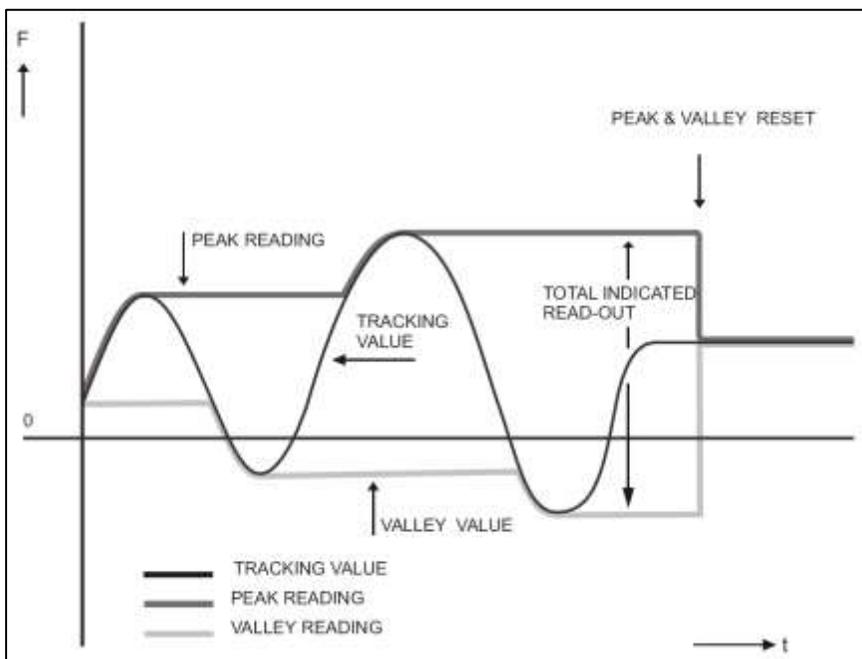
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The display indications in menu mode:
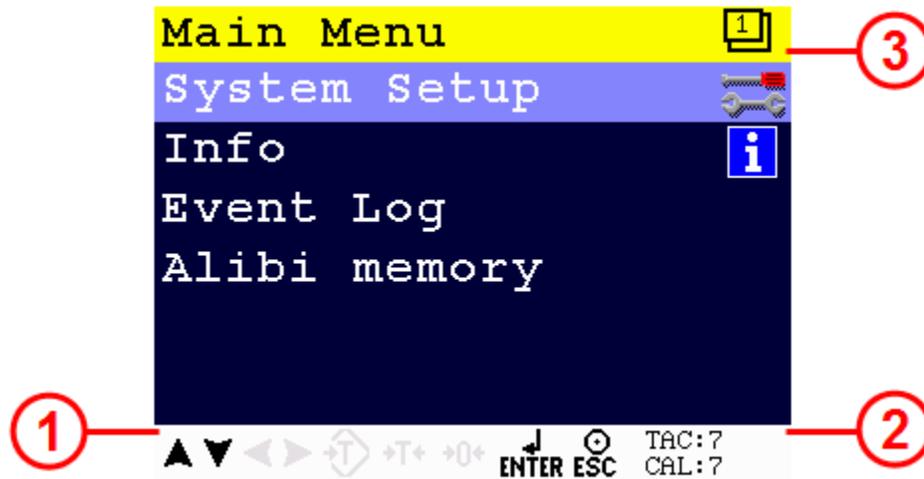
Number	Description
1	Active buttons for current menu item
2	TAC and CAL code*
3	Menu level

* TAC and CAL code

TAC stands for Traceable Access Code. A number of settings are only available after entering this code. When these settings are changed, the TAC is incremented with 1.

CAL stands for CALibration code. The calibration settings are only available after entering this code. When the calibration settings are changed, the CAL is incremented with 1.

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The keys have the following functions:

Tracking / Hold
Toggle between Tracking mode and Hold mode.

Peak Hold
Show Peak Hold mode.

Enter / Menu
Adjust levels. Press > 2 seconds to enter configuration menu. In menu mode, press to confirm setting.

Zero
Press to set tare/zero. Press again to reset tare/zero. In Hold mode, press to set hold value. In Peak/Valley/T.I.R mode, press to clear the stored value.

Print / Escape
Press to cancel or step back one menu item. Press from start screen to print.

Up / Increase value
From start screen, press to show T.I.R. value on the display.

Down / Decrease value
From start screen, press to show valley hold value on the display.

Left / Change position of cursor

Right / Change position of cursor

4 PC applications

For easy configuration and monitoring, two PC applications are available as download. PDI Client and Pi Mach II. In the following chapters, Pi Mach II is used to explain the 1020 FMD functionality.

www.penko.com/software

4.1 PDI Client

PDI client is a small cross-platform application that only works with USB communication. It can run on any operating system that runs Java Runtime Environment (JRE). All device properties are shown in a tree structure and can easily be edited.
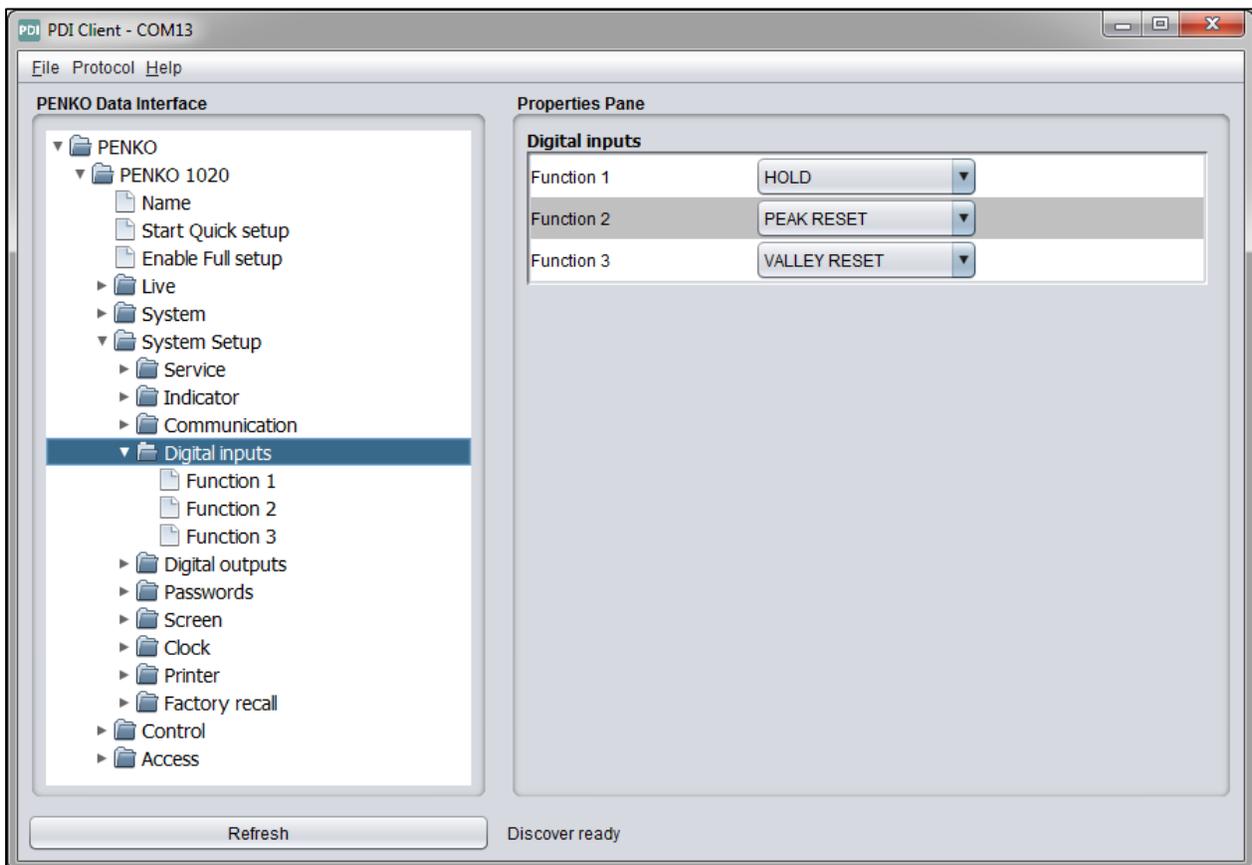
USB driver and user manual are included in the download

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4.2 Pi Mach II

Pi Mach II is a comprehensive Windows application that works with USB and Ethernet communication and has more functionality compared to PDI Client. The tree structure configuration of PDI Client is available in this program. Other features are backup and restore, firmware updates and a build in oscilloscope to analyze signals for different filter settings.
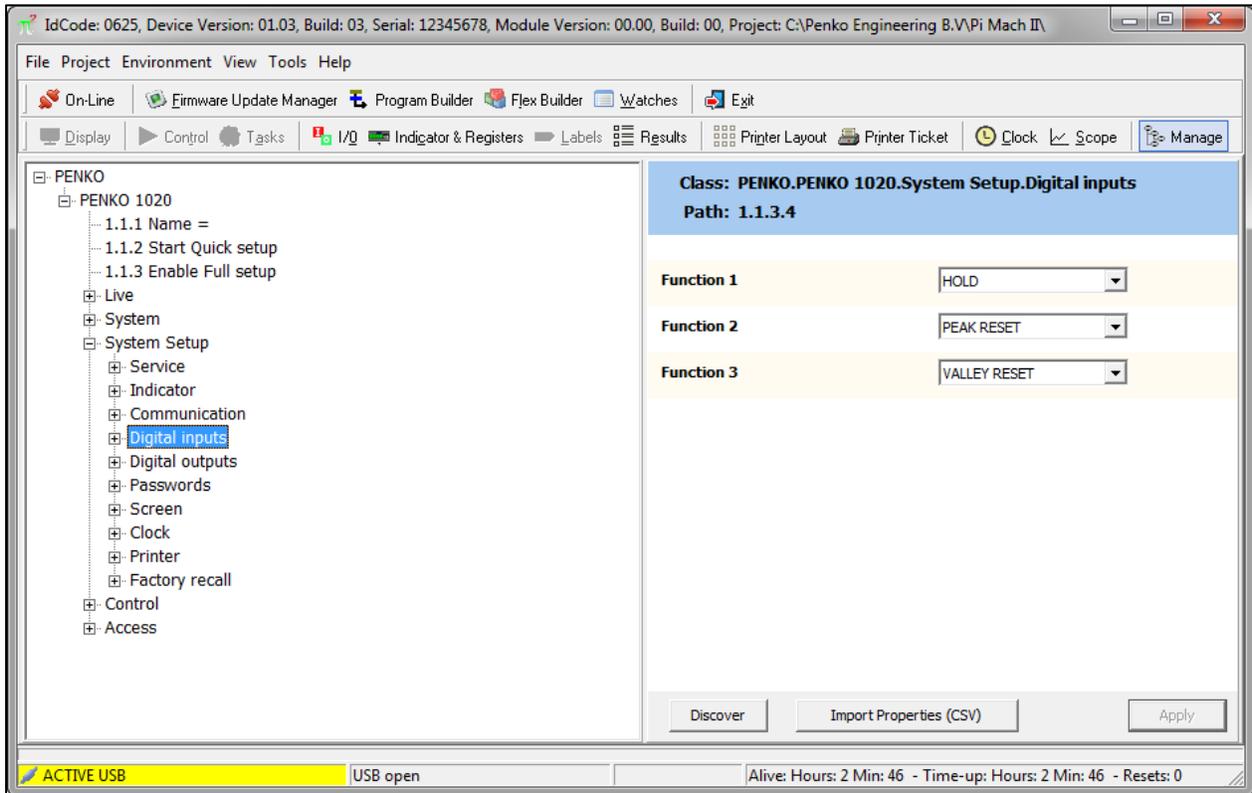
USB driver and user manual are included in the download

5 First use

For first use, the following settings are important:

- Unit indication
- Decimal point position
- Step size
- Maximum load
- Calibration
- Communication

This chapter describes how to adjust these settings with the configuration software and on the device itself.

5.1 Using the configuration software

Make sure Pi Mach II and the USB driver are installed properly according to the Pi Mach II user manual. Open Pi Mach II and open Manage.
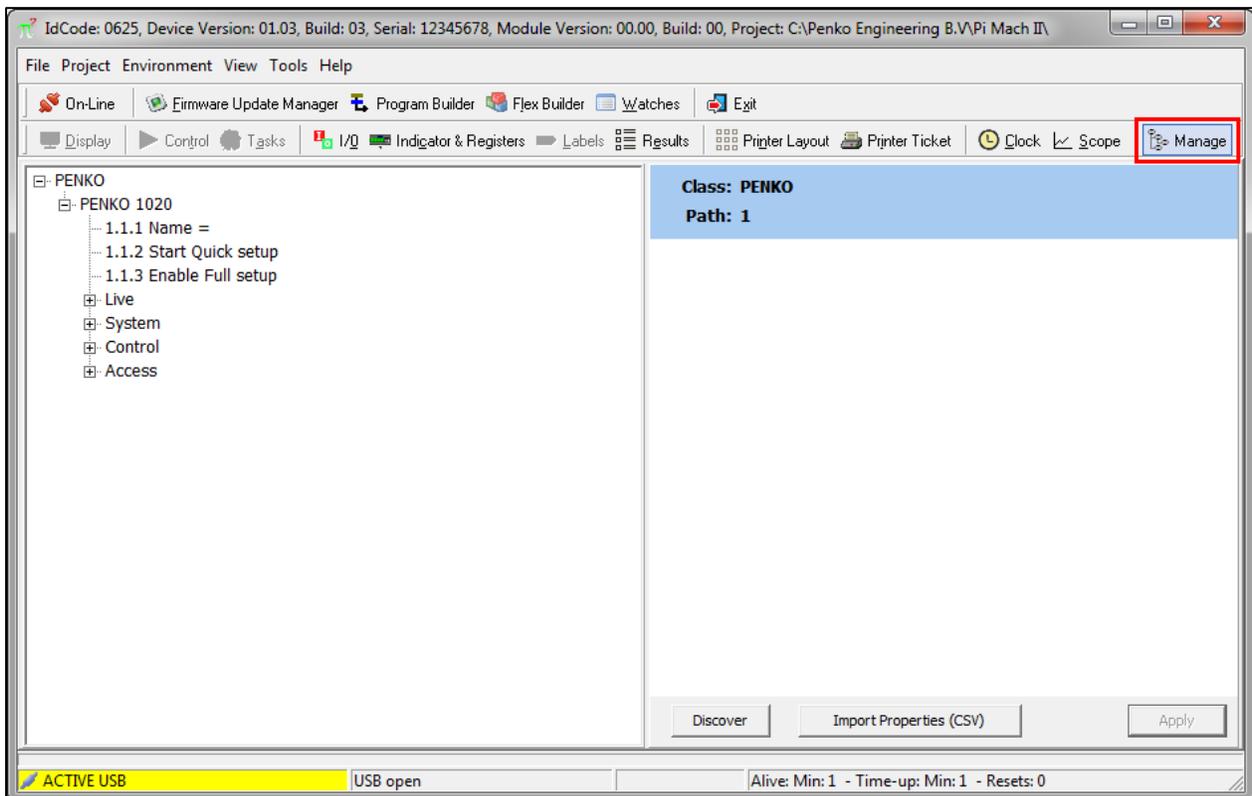
These configurations can also be made with the PDI Client software

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The left screen shows the device configuration in a tree structure. The right screen shows the properties of the selected item in the left screen. For example the live force information:

In the tree, select **PENKO 1020**. The properties of this tree node are shown in the right screen.

The first use settings are available under **Start Quick setup**

ⓘ To confirm a setting press enter or click the Apply button

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Select **Step1, Indicator Parameters**

Unit	kN
Decimal point	000.000 ▼
Step	STEP 1 ▼
Maxload	10,109 kN

Unit
Set the unit of measurement, for example kN or N. This will be shown everywhere the measured force is displayed or printed.

Decimal point
Select the position of the decimal point. This setting will be used everywhere the measured force is displayed or printed.

Available options
000000
00000.0
0000.00
000.000
00.0000
0.00000

Step
Select the step size. This setting defines the scaled parts of the force value. The display value will be rounded to the nearest value with a valid step size. Available options:

Available options
1
2
5
10
20
50
100
200

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→ Example:

Measured value is 2005 kN.

Step size	Displayed value
1	2005
2	2006
5	2005
10	2010
20	2000
50	2000
100	2000
200	2000

Maxload

Set the force the indicator will use as maximum. If the measured force is higher than the maximum load, the display will show ======

ⓘ More weigher parameters are available in the Full setup

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Select **Step2, Indicator setup**

Application	Unknown ▾

Application

A number of predefined configurations with specific filter settings are available. These configurations don't affect the settings made in step 1. They only affect the filter settings.

Available options
Unknown
Standard indicator
Fast indicator

When setting up an installation, select the appropriate configurations and start fine tuning it with the options available in the Full setup.

ⓘ | Filter settings are explained in the Full setup chapter

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Live gross	ccccc kN
Live signal	0,3069 mV
Scale empty	0,000 kN
	[Calibrate scale empty]
Enter load on scale	10,000 kN
	[Calibrate load on scale]

With this step a two-point calibration can be made. The unit indication and decimal point position are a result of the settings in step 1.

Live gross
This shows the gross indicator value. When no calibration is available this will show **ccccc**

Live signal
This shows the voltage generated by the connected load cell or force sensor.

Scale empty
The calibration of the "zero" point.

Make sure the load cell or force sensor is not loaded and is stable.

Click [Calibrate scale empty] and the zero point is saved.

Enter load on scale
The calibration of the "gain" point.

Make sure the load cell or force sensor is loaded with the reference weight and is stable.

Set the reference weight.

Click [Calibrate load on scale] and the gain point is saved.

The device is now calibrated.

(i) | More calibration options are available in the Full setup

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Select **Step 4, Communication**

Every available communication port has its own settings. The available ports depend on the option board.

Ethernet

MAC
This shows the MAC address of the device. This number cannot be changed.

Name
Domain Name System (DNS). A name can be given to the device to access the device in the Ethernet network by name instead of by IP address.

Address
Set the IP address of the device. Make sure the IP address is in the IP range of the network.

Mask
Set the subnet mask of the device.

Gateway
Set the gateway of the network the device is connected to.

DHCP
Dynamic Host Configuration Protocol (DHCP). When this function is enabled, the device gets an IP address, subnet mask and gateway address from the network it is connected to.

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Ethernet BusLink

Address	0
Sub address	0

BusLink is a PENKO protocol to connect the device to a PENKO FLEX series device. The device parameters like indicator values and I/O status become available in the PENKO FLEX. A BusLink network can contain up to 40 PENKO devices (*8 addresses x 5 sub addresses*).

Address
Set the BusLink address.

Available options
0 = off
1
2
3
4
5
6
7
8

Sub address
Set the BusLink sub address.

Available options
0 = off
1
2
3
4
5

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RS232 / RS422

Protocol	Printer ▼
Address	0
Stopbits	1
Parity	None ▼
Baudrate	9600 ▼
Indicator	0

The available options for RS232 and RS422 are the same and therefore described only once.

Protocol
Select the protocol for the serial port.

Available options
None
Printer
ASCII
NPV Slave
MODBUS-RTU
MODBUS-ASCII

Address
Set the address of the port for identification in the network.

Range
0...255

Stopbits
Set the number of stop bits needed for the selected protocol.

Range
1...2

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Parity

Set the parity needed for the selected protocol.

Available options
None
Odd
Even
Mark
Space

Baudrate

Set the baud rate needed for the selected protocol.

Available options
1200
2400
4800
9600
19200
38400
57600
115200

Indicator

This option is only active when ASCII is selected as protocol. The value of the selected indicator will be sent out over the communication port.

Range
1…30

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CAN

Protocol	None ▼
Buslink Address	0
Buslink Subaddress	0
Baudrate	250k ▼

BusLink is a PENKO protocol to connect the device to a PENKO FLEX series device. The device parameters like indicator values and I/O status become available in the PENKO FLEX. A BusLink network can contain up to 40 PENKO devices (*8 addresses x 5 sub addresses*).

Protocol
Enable or disable the BusLink protocol.

Available options
None
Buslink

Buslink Address
Set the BusLink address.

Available options
1
2
3
4
5
6
7
8

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Buslink Subaddress

Set the BusLink sub address.

Available options
1
2
3
4
5

Baudrate

Set the baud rate equal to the baud rate of the connected PENKO FLEX.

Available options
100k
125k
250k
500k

⚠️ The CANopen protocol is not available

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Profibus

Address	1
Format	Floating Point ▾

Address

Set the Profibus address for the device.

Range
0...255

Format

Set the format for the values sent over Profibus.

Available options
Integer
Floating point

Select **Done** and click **End Quick setup**

End Quick setup

This will finish the quick setup.

5.2   Using the device

The menu structure in the device has no quick setup like the configuration software. The first use items can be set along with all other settings.

Main Menu

From the main screen, press the Enter button for 2 seconds to enter the Main Menu.
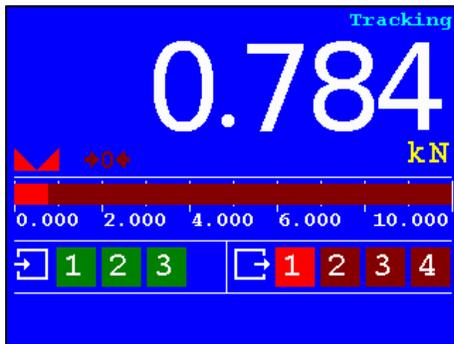
Press 2 seconds
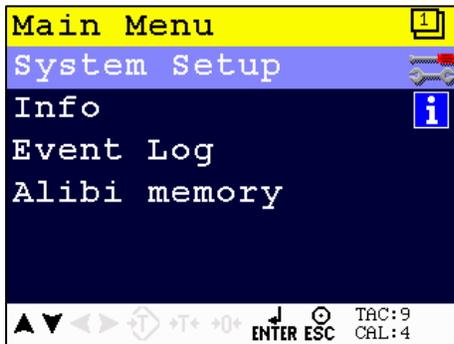
Navigate through menu

Use the Up and Down button to navigate through the menus. Use the Enter button to enter a menu item. Use the Escape button to step back a level.

| Up | Down | Open menu item | Back to previous level |

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Edit a value

```
        20.000  kN
Min:-8388.608  kN
Max:  8388.607  kN
```

Use the arrow buttons to edit a value. Select the digit with the Left and Right button. Increase the value with the Up button. Decrease the value with the Down button. Use the Enter button to confirm the whole value. Use the Zero button to clear the whole value.

Select previous digit	Select next digit	Increase selected digit	Decrease selected digit	Confirm whole value	Clear whole value
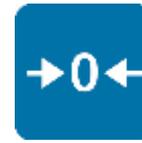
Edit a text

In case a text has to be edited, a keyboard appears on the screen.

```
Name
1020  FMD
1 2 3 4 5 6 7 8 9 0
q w e r t y u i o p
a s d f g h j k l OK
z x c v b n m    ◄ ►
```

Use the arrow buttons to navigate through the keyboard. Use the Enter button to select the character. Use the Zero button for backspace. Use the Peak-hold button to change the character set.

Left	Right	Up	Down	Select character	Backspace

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 → →

Change character set

Indicator parameters

The indicator parameters from the quick setup can be set as follows:
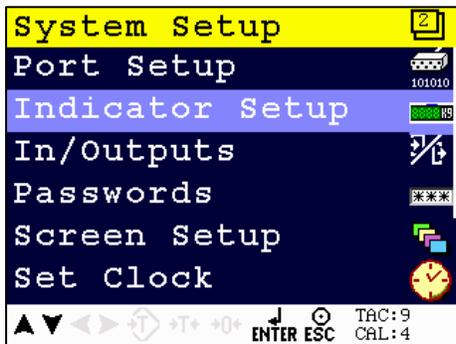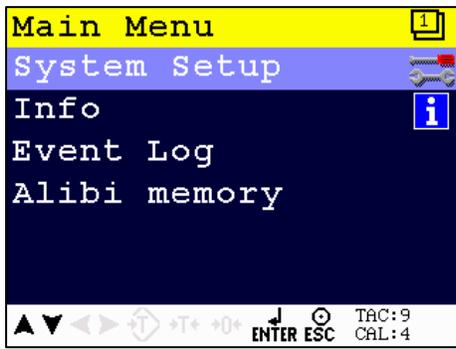
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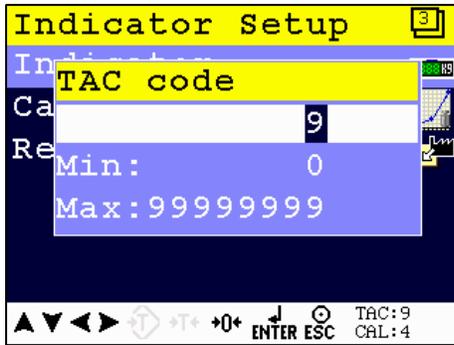
Enter the TAC as shown on the right bottom corner of the screen using the arrow buttons - apply with the Enter button
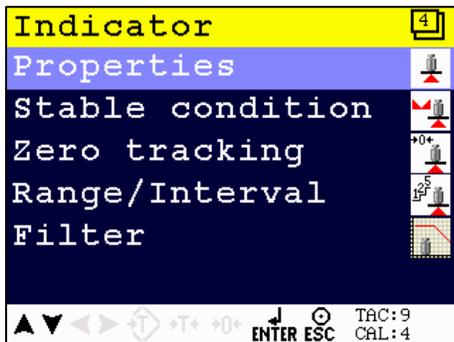
Here the Unit, Step size, Decimal point and Max load can be set

> (i) The predefined settings of step 2 in the quick setup are not available in the configuration menu of the device

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Calibration

The calibration from the quick setup can be performed as follows:
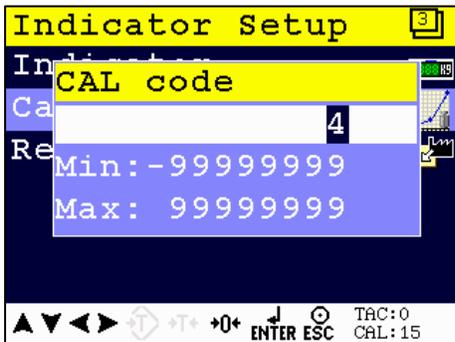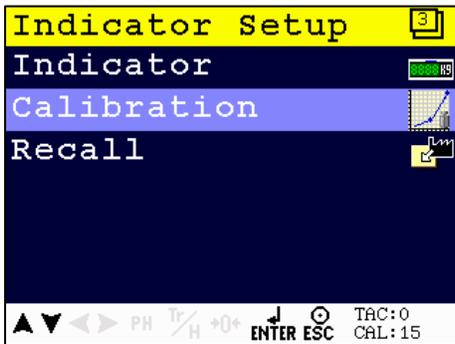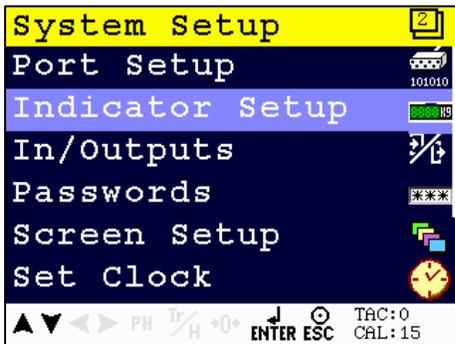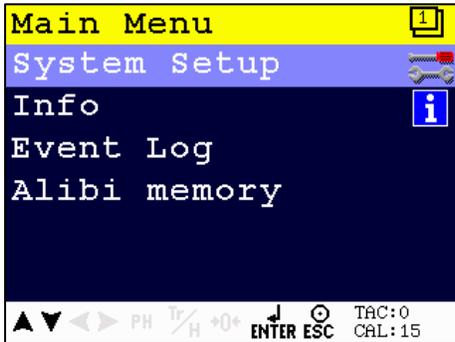
Enter the CAL as shown on the right bottom corner of the screen using the arrow buttons - apply with the Enter button

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```
┌─────────────────────────────┐
│ Calibration            [4]  │
│ Show                    👁   │
│ Calibrate               ⚖   │
│ Deadload                ⊤   │
│ Geo-CAL                 🌐  │
│ Range                   ▤   │
│                             │
│ ▲▼◄► PH Tr/H →0→  ENTER ESC  TAC:0  │
│                             CAL:15 │
└─────────────────────────────┘
```

ENTER

```
┌─────────────────────────────┐
│ Calibrate              [5]  │
│ Dual Point              📈  │
│ MultiPoint              📈  │
│ Transducers             ▤   │
│                             │
│                             │
│                             │
│ ▲▼◄► PH Tr/H →0→  ENTER ESC  TAC:0  │
│                             CAL:15 │
└─────────────────────────────┘
```

ENTER

```
┌─────────────────────────────┐
│ Dual Point             [6]  │
│ Force         │ Sample      │
│   0.000 kN    │        0  ⚖ │
│   0.000 kN    │        0  ⚖ │
│               │             │
│  cccccc kN    │   523909  🔋│
│ ▲▼◄► PH Tr/H →0→  ENTER ESC  TAC:0  │
│                             CAL:15 │
└─────────────────────────────┘
```

ENTER   **Make sure the load cell or force sensor is not loaded and is stable before pressing Enter**

```
┌─────────────────────────────┐
│ Dual Point             [6]  │
│ Force         │ Sample      │
│   0.000 kN    │   523909  ⚖ │
│   0.000 kN    │        0  ⚖ │
│               │             │
│  cccccc kN    │   926880  🔋│
│ ▲▼◄► PH Tr/H →0→  ENTER ESC  TAC:0  │
│                             CAL:16 │
└─────────────────────────────┘
```
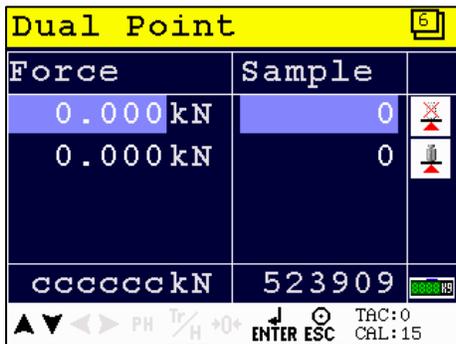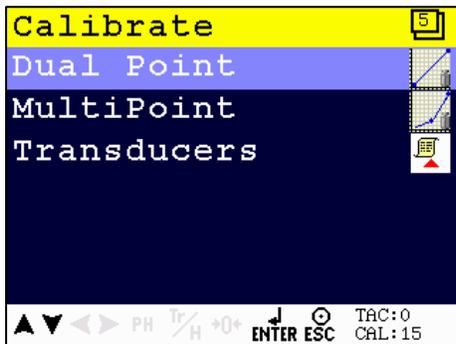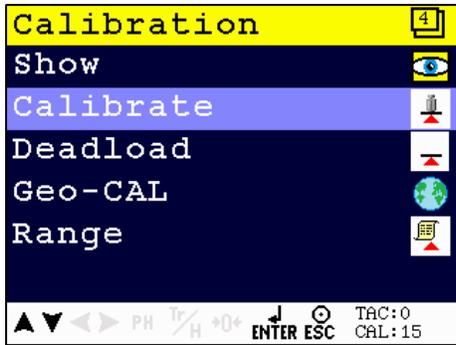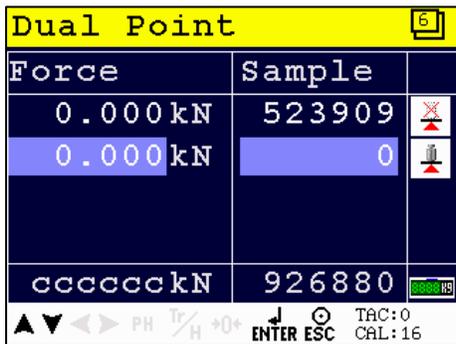
ENTER   **Make sure the load cell or force sensor is loaded with the reference weight and is stable before pressing Enter**

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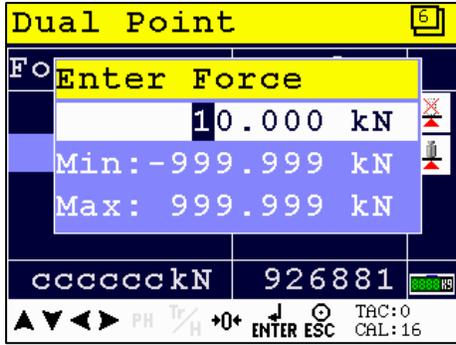
Enter the reference weight - apply with the Enter button
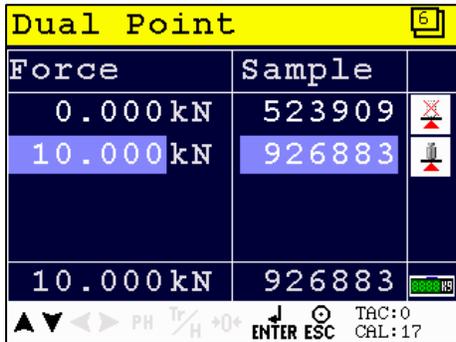
The device is now calibrated

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6 Full setup

The full setup is described with use of the configuration software. All settings are also available in the device menu. A full menu structure can be found in the attachment.

In the tree, select **PENKO 1020**. The properties of this tree node are shown in the right screen.
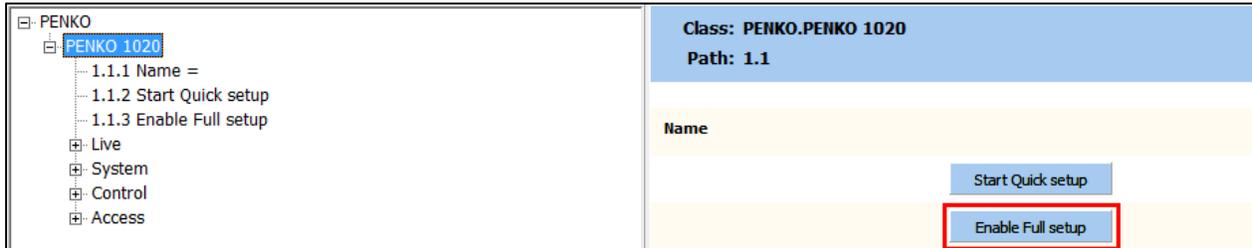
The full settings are available under **Enable Full setup**
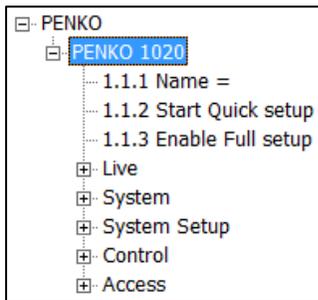
ⓘ   To confirm a setting press enter or click the Apply button

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6.1 Live
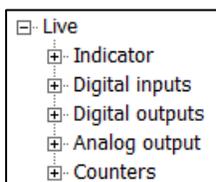
Live shows various live parameters of the device.

Node	Description
Indicator	Live indicator values and indicator status
Digital inputs	Live status of the 3 digital inputs (0 = OFF, 1 = ON)
Digital outputs	Live status of the 4 digital outputs (0 = OFF, 1 = ON)
Analog output	Live output percentage of the analog output
Counters	Live counter status of the 3 digital inputs

6.2 System
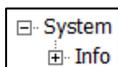
System shows the system information.

Node	Description
ID	Hardware ID of the device
Version	Version number of the firmware
Serial	Serial number of the device
Boot version	Version number of the boot loader

6.3   System Setup

```
□ System Setup
    ⊞ Service
    ⊞ Indicator
    ⊞ Communication
    ⊞ Digital inputs
    ⊞ Digital outputs
    ⊞ Analog output
    ⊞ Passwords
    ⊞ Screen
    ⊞ Clock
    ⊞ Printer
    ⊞ Factory recall
```
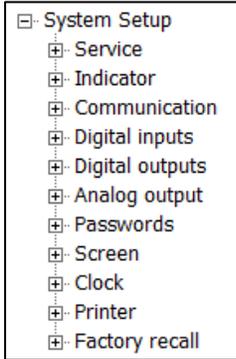
System Setup contains the full device configuration.

6.3.1   Service

Service is for PENKO employees only.

6.3.2   Indicator

Indicator contains the indicator parameters and calibration.

```
□ Indicator
    ⊞ Parameters
    ⊞ Calibration
```
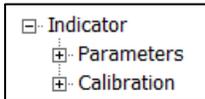
PARAMETERS

To enter the parameters, enter the shown TAC and confirm with Enter or the Apply button:

TAC	[0028]
Enter TAC	28

The parameters are now shown in the tree:

```
□ Indicator
    □ Parameters
        ⋯ 1.1.3.2.1.1 TAC = [0028]
        ⋯ 1.1.3.2.1.2 Enter TAC
        ⊞ Properties
        ⊞ Stable
        ⊞ Zero tracking
        ⊞ Range/Interval
        ⊞ Filter
        ⊞ Display
    ⊞ Calibration
```
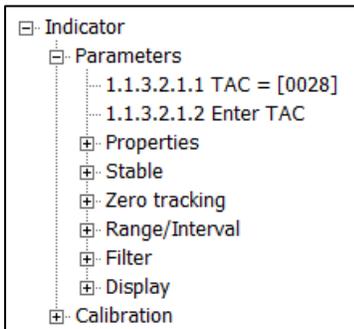
1020 FMD

Properties

Properties contain the basic weigher parameters.

Name	
Maxload	20,000 kN
Sample rate	1600/s

Step	STEP 1
Decimal point	000.000
Unit	kN

Name
Set a name to identify the device in a multiple device setup (optional).

Maxload
Set the force the indicator will use as maximum. If the measured force is higher than the maximum load, the display will show ======

Sample rate
Select the sample rate for measuring.

Available options
10/s
20/s
25/s
50/s
100/s
200/s
400/s
800/s
1600/s

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Step

Select the step size. This setting defines the scaled parts of the force value. The display value will be rounded to the nearest value with a valid step size. Available options:

Available options
1
2
5
10
20
50
100
200

→ Example:

Measured value is 2005 kN.

Step size	Displayed value
1	2005
2	2006
5	2005
10	2010
20	2000
50	2000

Decimal point

Select the position of the decimal point. This setting will be used everywhere the measured force is displayed or printed.

Available options
000000
00000.0
0000.00
000.000
00.0000
0.00000

Unit

Set the unit of measurement, for example kN or N. This will be shown everywhere the measured force is displayed or printed.

Stable

The stable settings determine when the indicator accepts the current value as stable.

Stable range	0,002 kN
Stable time	1,00 s

Stable range
Set the range the indicator has to be in for the set time to give a stable signal.

Stable time
Set the time the weigher has to be within the range to give the stable signal.

With these values, the indicator has to be within the range of 0,002kN over the time of 1,00 second to indicate stable. When stable, the stable indication on the display will light up.

Zero tracking

Zero tracking is able to tune the zero point back to zero when the scale becomes dirty.

Tracking range	0,100 kN
Tracking step	0,010 kN
Tracking time	1,00 s

Tracking range
Set the maximum offset to tune back to zero.

Tracking step
Set the step size that will be tuned every time the force is within the tracking range.

Tracking time
Set the time that the force has to be within the tracking range to tune 1 step back to zero.

With these values, the indicator will step back 0,010kN towards zero every 1,00 second as soon as the measured force gets below 0,100kN.

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Range/Interval

Set the indicator to change its step size when the measured force reaches a certain value.

Range	100 parts
MaxStep	STEP 50
Mode	MULTI-RANGE

Range

Set the number of divisions when the indicator has to display with the next step size. Auto ranging is disabled when range is set to 0.

MaxStep

Select the biggest allowed step size.

Available options
Step 1
Step 2
Step 5
Step 10
Step 20
Step 50
Step 100
Step 200

Mode

Select the mode. In multi-range mode the step size is reset when the indicator has been lower or equal to zero. In multi-interval mode the step size is reset when the value reached the previous range.

Available options
Multi-Range
Multi-Interval

→ Example:

With the shown values, the ranges are as follows:

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Range No.	Displayed range	Step size
Range: 1	0 - 100	1
Range: 2	100 - 200	2
Range: 3	200 - 500	5
Range: 4	500 - 1000	10
Range: 5	1000 - 2000	20
Range: 6	2000 - 5000+	50

The number of ranges depends on the selected max step size. In this case there are 6 possible ranges. The current range number is indicated in the display.
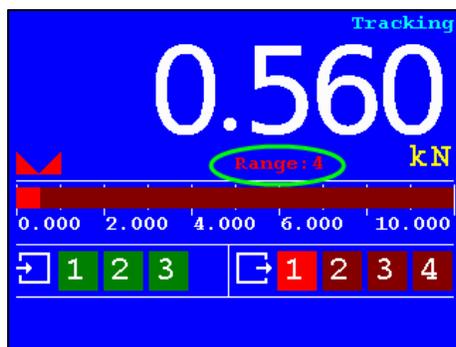
In multi-range mode, the range will only get back to range 1 when the indicator has been lower or equal to zero. In this case, when the value goes down, range 4 will remain active until the indicator reaches zero.

In multi-interval mode, the range number will follow the table above. In this case, when the value gets lower than 500, range 3 will become active, etc.

Filter

Filters are used to filter vibrations present in an industrial environment.

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Overall filter

Select an overall filter. This will affect all indicator signals in the device. 0dB is no filtering. -48dB gives the strongest damping.

Available options
0 dB
-6 dB
-12 dB
-18 dB
-24 dB
-30 dB
-36 dB
-42 dB
-48 dB

To prevent a loss of information or accuracy, don't set the overall filter higher than 24dB. When no accuracy is needed, a higher filter setting is allowed to enable extreme filtering.

Filter type

Select the type of filtering. This is a 2nd order filter. This filter affects all signals up to and including the cutoff frequency.

Available options	Description
None	No filter
Dynamic	Used when the signal is changing fast
Static	Used when the signal is changing slow

Cut Off

Select the cutoff frequency for the selected filter type.

Available options
1,0 Hz
1,4 Hz
2,5 Hz
5,0 Hz
10 Hz
20 Hz
40Hz

Moving Average

Set the moving average frequency for the selected filter.

Range
0...50

Display

The display filter will damp the indicator signal to the display to get a calm display view.

Rate	25/s
Display Tracking:Filter range	0,000 kN
Display Tracking:Filter damping	0 dB
Display Tracking:Zero suppress	0,000 kN

Rate

Select the refreshment speed of the display.

Available options
1/s
2/s
3/s
5/s
10/s
25/s
50/s

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Display Tracking: Filter range

Set the range where the filter is active.

Display Tracking: Filter damping

Select the strength of the filter. 0dB is no filtering. -48dB gives the strongest damping.

Available options
0 dB
-6 dB
-12 dB
-18 dB
-24 dB
-30 dB
-36 dB
-42 dB
-48 dB

Display Tracking: Zero suppress

Set the band within the indicator will show 0.

CALIBRATION

To enter the calibration, enter the shown CAL and confirm with Enter or the Apply button:

CAL	[0024]
Enter CAL	24

The parameters are now shown in the tree:

```
⊟ Indicator
   ⊞ Parameters
   ⊟ Calibration
       ┈ 1.1.3.2.2.1 CAL = [0024]
       ┈ 1.1.3.2.2.2 Enter CAL
   ⊞ Force calibration
   ⊞ Transducers calibration
   ⊞ Input range
```
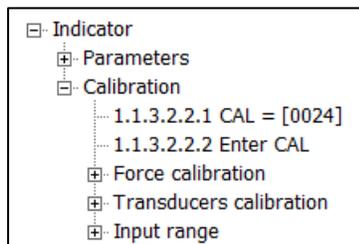
Force calibration

Force calibration contains the calibration settings.

```
⊟ Force calibration
   ⊞ Display
   ⊞ Points
   ⊞ Add/Replace
   ⊞ Delete
   ⊞ Deadload
```
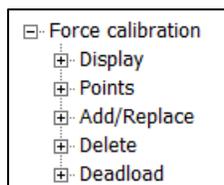
→ **Display** shows the current display values.

Tracking	2,499 kN
Tracking x10	2,4989 kN
Signal	7,2070 mV
ADC	624890 ADC

Tracking
The current displayed tracking value.

Tracking x 10
The current displayed tracking value with extra digit for more accuracy.

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Signal
The current voltage, from the load cell or force sensor, in millivolts.

ADC
The current ADC value.

→ **Points** show the stored calibration points.

Point 1	927717 ADC, 10,000 kN
Point 2	524006 ADC, 0,000 kN
Point 3	not used
Point 4	not used
Point 5	not used
Point 6	not used
Point 7	not used
Point 8	not used
Point 9	not used
Point 10	not used

Up to 10 calibration points can be stored to realize a multi-point calibration.

→ **Add/Replace** point is used to add a calibration point.

Add/Replace point	0,000 kN

When a point is added with a value that already exists, the existing point will be replaced. When a point is added with a new value, it will be stored as a new point.

→ **Delete point** is used to delete a calibration point.

Delete point	1 ▼

Select the number of the calibration point (see Points) and confirm with Enter or the Apply button. The calibration point will be deleted.

→ **Deadload** can be set to pull the whole measuring line back to zero. The zero point could be different because of some modification on the scale or dirt.

Deadload	0,000 kN

Normally, the dead load is zero, but it's possible to change the line position if there's weight on the scale. To do so, edit the actual weigh value to the new known value.
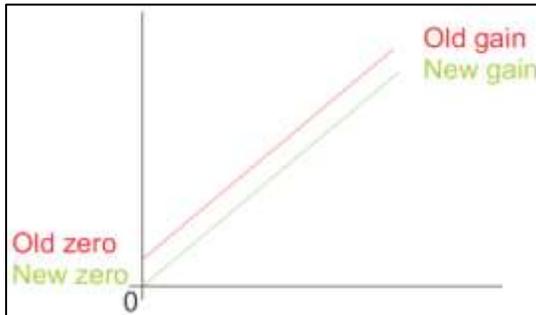
Transducers calibration

Transducer calibration is used for a theoretic calibration, using the datasheet of the load cell or force sensor. Up to 8 transducers can be set.

For each load cell or force sensor the following data can be set.

Output	0,00000 mV/V
Zero balance	0,00000 mV/V
Type	None
Max load	10,000 kN

Output

Set the output value as mentioned on the datasheet.

Zero balance

Set the zero balance value as mentioned on the datasheet.

Type

Set a name for the load cell or force sensor.

Max load

Set the maximum load as mentioned on the datasheet.

Input range

Input range is used to set the range for the connected load cell or force sensor.

| Range | 2 mV/V |
| Offset | 0 |

Range
Select the input range.

Available options	Description
1mV/V	
1,5 mV/V	
2 mV/V	Calibrated range*
2,5 mV/V	
3 mV/V	Calibrated range*

* When using a theoretic calibration, note that these two ranges are officially calibrated

Offset
Set an ADC value offset. This can be used when the indicator gets out of its ADC range.

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6.3.3 Communication

Every available communication port has its own settings. The available ports depend on the option board.

Ethernet

MAC
This shows the MAC address of the device. This number cannot be changed.

Name
Domain Name System (DNS). A name can be given to the device to access the device in the Ethernet network by name instead of by IP address.

Address
Set the IP address of the device. Make sure the IP address is in the IP range of the network.

Mask
Set the subnet mask of the device.

Gateway
Set the gateway of the network the device is connected to.

DHCP
Dynamic Host Configuration Protocol (DHCP). When this function is enabled, the device gets an IP address, subnet mask and gateway address from the network it is connected to.

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Ethernet BusLink

Address	0
Sub address	0

BusLink is a PENKO protocol to connect the device to a PENKO FLEX series device. The device parameters like indicator values and I/O status become available in the PENKO FLEX. A BusLink network can contain up to 40 PENKO devices (*8 addresses x 5 sub addresses*).

Address
Set the BusLink address.

Available options
0 = off
1
2
3
4
5
6
7
8

Sub address
Set the BusLink sub address.

Available options
0 = off
1
2
3
4
5

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RS232 / RS422

Protocol	Printer	▼
Address	0	
Stopbits	1	
Parity	None	▼
Baudrate	9600	▼
Indicator	0	

The available options for RS232 and RS422 are the same and therefore described only once.

Protocol
Select the protocol for the serial port.

Available options
None
Printer
ASCII
NPV Slave
MODBUS-RTU
MODBUS-ASCII

Address
Set the address of the port for identification in the network.

Range
0…255

Stopbits
Set the number of stop bits needed for the selected protocol.

Range
1…2

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Parity

Set the parity needed for the selected protocol.

Available options
None
Odd
Even
Mark
Space

Baudrate

Set the baud rate needed for the selected protocol.

Available options
1200
2400
4800
9600
19200
38400
57600
115200

Indicator

This option is only active when ASCII is selected as protocol. The value of the selected indicator will be sent out over the communication port.

Range
1…30

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CAN	

Protocol	None ▼
Buslink Address	0
Buslink Subaddress	0
Baudrate	250k ▼

BusLink is a PENKO protocol to connect the device to a PENKO FLEX series device. The device parameters like indicator values and I/O status become available in the PENKO FLEX. A BusLink network can contain up to 40 PENKO devices (*8 addresses x 5 sub addresses*).

Protocol
Enable or disable the BusLink protocol.

Available options
None
Buslink

Buslink Address
Set the BusLink address.

Available options
1
2
3
4
5
6
7
8

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Buslink Subaddress
Set the BusLink sub address.

Available options
1
2
3
4
5

Baudrate
Set the baud rate equal to the baud rate of the connected PENKO FLEX.

Available options
100k
125k
250k
500k

⚠️ The CANopen protocol is not available

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Profibus

Address	1
Format	Floating Point ▾

Address

Set the Profibus address for the device.

Range
0…255

Format

Set the format for the values sent over Profibus.

Available options
Integer
Floating point

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6.3.4 Digital inputs

The digital inputs can execute a function.

Function 1	HOLD
Function 2	NONE
Function 3	NONE

Function
Select a function for the input.

Available options	Description
None	No function
Zero Set	Set indicator to zero
Zero Reset	Reset indicator from zero
Hold	Store current value as hold value
Peak Reset	Reset the peak hold value
Valley Reset	Reset the valley hold value
T.I.R.	Reset both peak and valley value
Keyboard Lock	Disable the device keyboard

6.3.5 Digital outputs

The digital outputs can respond to the value of an indicator.

```
⊟ Digital outputs
   ⊞ Setpoint
   ⊞ Action
   ⊞ Function
```

Setpoint

Level 1	0,000 kN
Level 2	1,000 kN
Level 3	2,000 kN
Level 4	3,000 kN

Level
Set the level for each output when it has to turn on.

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Action

Hysteresis 1	0,010	kN
Hysteresis 2	0,010	kN
Hysteresis 3	0,010	kN
Hysteresis 4	0,010	kN

Hysteresis
Set the hysteresis for each output. The hysteresis can be positive or negative.
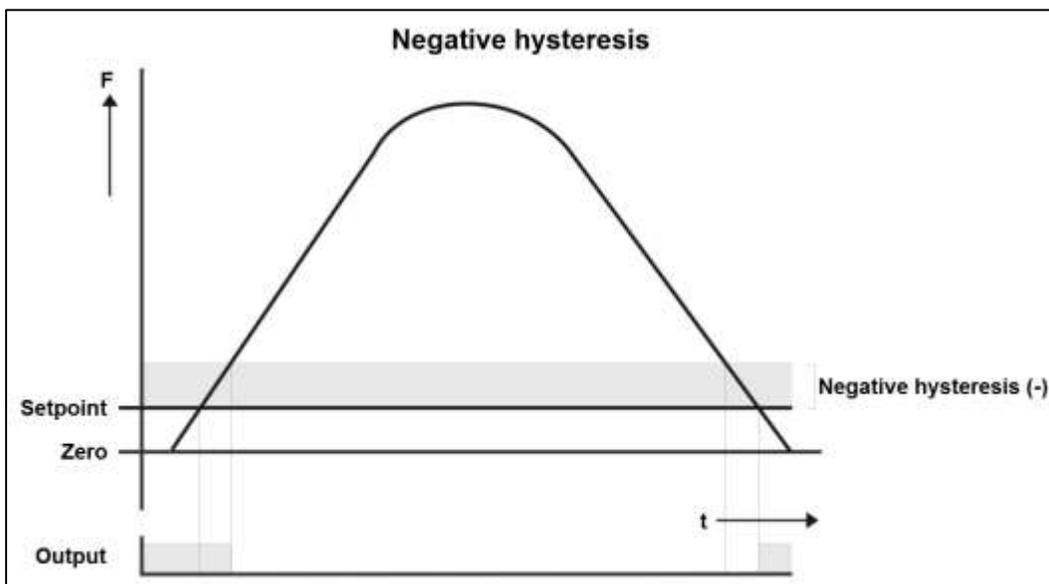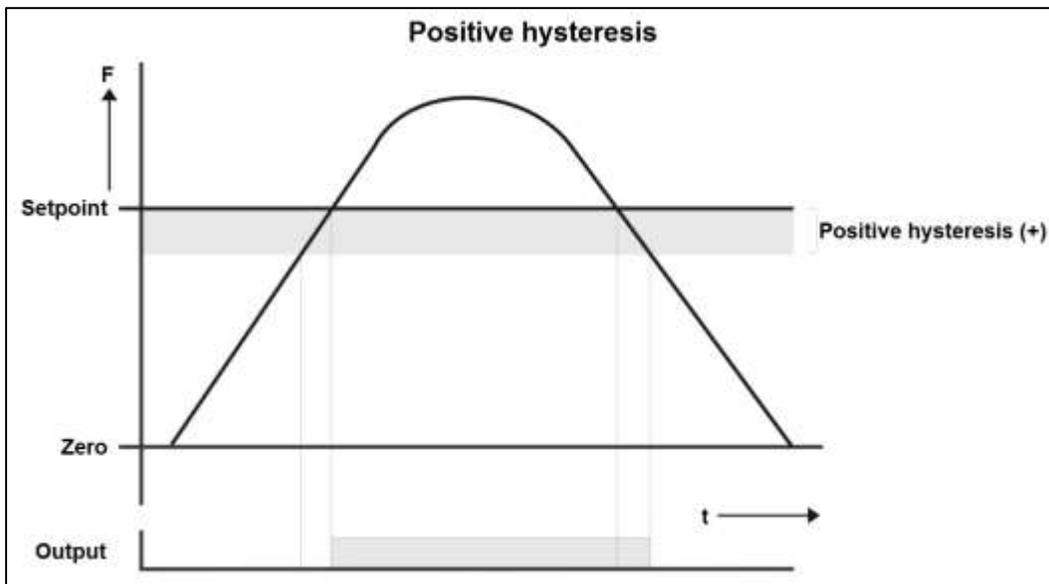
1020 FMD

Function

Function

Select the indicator the output has to react on.

Available options	Description
Fast Tracking	Unfiltered tracking value
Tracking	Filtered tracking value
Peak	Peak hold value - the highest measured value
Valley	Valley hold value - the lowest measured value
Hold	Hold value - stored with zero button in hold mode, or with hold input
T.I.R.	Total Indicated Readout value - the difference between the peak hold and valley hold value
Fast Tracking x10	Fast tracking with extra decimal for more accuracy
Tracking x10	Tracking with extra decimal for more accuracy
Peak x10	Peak with extra decimal for more accuracy
Valley x10	Valley with extra decimal for more accuracy
Hold x10	Hold with extra decimal for more accuracy
T.I.R. x10	T.I.R. with extra decimal for more accuracy
Sample	ADC sample value

→ Example:

Output	Setpoint	Action	Function	Description
1	1,000 kN	0,100 kN	Tracking	*Positive hysteresis - output will turn on at setpoint*
2	1,000 kN	-0,100 kN	Tracking	*Negative hysteresis - output will turn off at setpoint*

- Output **1** will turn **on** when the tracking value reaches **1,000 kN**
- It will turn **off** again when the tracking value drops below **0,900 kN** (1,000 - 0,100)
- Output **2** will turn **off** when the tracking value reaches **1,100 kN** (1,000 + 0,100).
- It will turn **on** again when the tracking value drops below **1,000 kN**

6.3.6 Analog output

The analog output is an option. The settings are only available when the DAC module is placed.

```
□ Analog output
  ⊞ Manual
  ⊞ Configuration
```
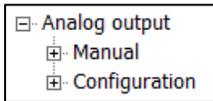
Manual

Manual output level	0,00 %
	Manual control
	Manual 0.00%
	Manual 100.00%
	Manual off

Manual output level
Set the percentage for the output when manual control is enabled.

Manual control
Enable manual control of the output.

Manual 0.00%
Set the output to 0%

Manual 100.00%
Set the output to 100%

Manual off
Disable manual control of the output.

Configuration

Minimum Level	0,000 kN
Maximum Level	10,000 kN
Function	PEAK
Range	4-20mA

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Minimum level

Set the indicator value the analog output will set as 0.00% output.

Maximum level

Set the indicator value the analog output will set as 100.00% output.

Function

Select the indicator the output has to react on.

| Available options	Description
Fast Tracking	Unfiltered tracking value
Tracking	Filtered tracking value
Peak	Peak hold value - the highest measured value
Valley	Valley hold value - the lowest measured value
Hold	Hold value - stored with zero button in hold mode, or with hold input
T.I.R.	Total Indicated Readout value - the difference between the peak hold and valley hold value
Fast Tracking x10	Fast tracking with extra decimal for more accuracy
Tracking x10	Tracking with extra decimal for more accuracy
Peak x10	Peak with extra decimal for more accuracy
Valley x10	Valley with extra decimal for more accuracy
Hold x10	Hold with extra decimal for more accuracy
T.I.R. x10	T.I.R. with extra decimal for more accuracy
Sample	ADC sample value

Range

Select the range for the output.

| Available options	Description
RAW	16 bit DAC value
0 - 20 mA	The minimum and maximum output of the analog output
0 - 24 mA	The minimum and maximum output of the analog output
4 - 20 mA	The minimum and maximum output of the analog output
4 - 24 mA	The minimum and maximum output of the analog output

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➔ Example:

Minimum level	Maximum level	Function	Range
0,000 kN	10,000 kN	Tracking	4-20 mA

- If the tracking value is **0,000 kN**, the analog output will send out **4 mA** (0%)
- If the tracking value is **5,000 kN**, the analog output will send out **12 mA** (50%)
- If the tracking value is **10,000 kN**, the analog output will send out **20 mA** (100%)

6.3.7 Passwords

The access to some menu items can be protected with a password. This only applies when accessing the menu on the device itself. With the configuration software the menus can always be accessed.

System Setup	
Set Time/Date	

System Setup
Set a password for protecting the items within the system setup menu.

Set Time/Date
Set a password for protecting the Set Clock menu item.

➔ Example:

Enter a password for System Setup, for example 'abc'.

On the device, go to the System Setup menu:


Press 2 seconds

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```
Main Menu                    [1]
System Setup        🔧🔴
Info                  ℹ️
Event Log
Alibi memory



▲▼◄► PH Tr/H +0+  ⏎  ⊙  TAC:38
                ENTER ESC  CAL:31
```

ENTER

```
System Setup                 [2]
Port Setup           🖨️
                      101010
Indicator Setup      ▤▤kg
In/Outputs           ⅗⅄
Passwords            ***
Screen Setup         🗂️
Set Clock            🕐
▲▼◄► PH Tr/H +0+  ⏎  ⊙  TAC:38
                ENTER ESC  CAL:31
```
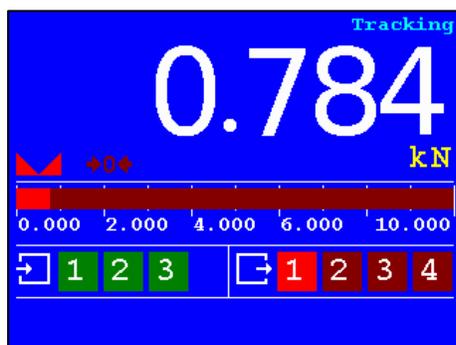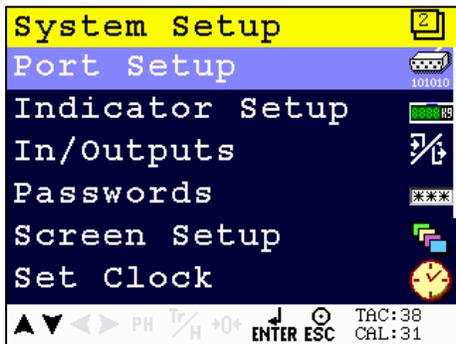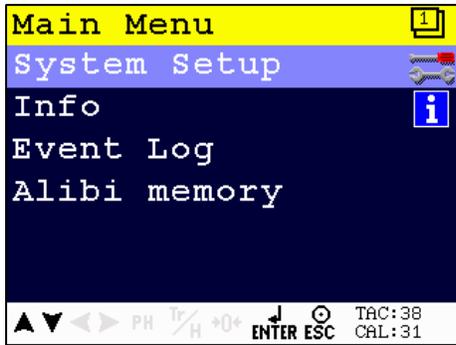
ENTER **Try to enter a menu item in the system setup menu**

```
System Setup                 [2]
Port Setup
  ┌─Password──────────┐
In│abc│               │1010
In│                   │kg
  │ 1 2 3 4 5 6 7 8 9 0│
Pa│ q w e r t y u i o p│**
Sc│ a s d f g h j k l OK│
Se│ z x c v b n m  ◄ ► │
  └───────────────────┘
▲▼◄► PH /H +0+ ENTER ESC  CAL:31
```
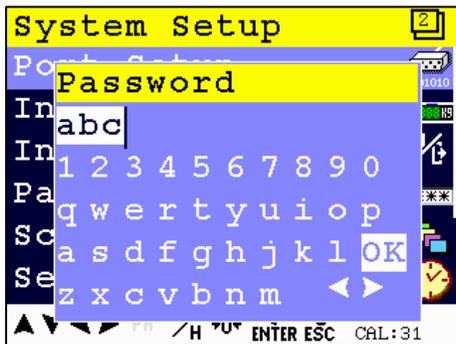
The password screen appears - enter the password to gain access to the menu item

```
Port Setup                   [3]
Ethernet Setup       ⤵
RS232 Port           🖨️
                      101010
RS422 Port           🖨️
                      101010
CAN Port             🖨️
                      101010
Profibus Setup       ▥▥
▲▼◄► PH Tr/H +0+  ⏎  ⊙  TAC:38
                ENTER ESC  CAL:31
```
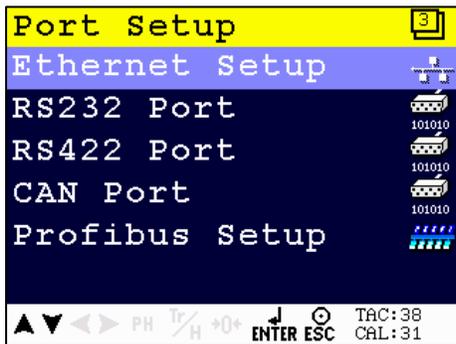
The menu item is now available - when no actions are performed the access is blocked again after 60 seconds

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6.3.8   Screen

In Screen all screen options can be set.

```
□ Screen
   ⊞ Buttons
   ⊞ Led Bar
   ⊞ Screen Options
```
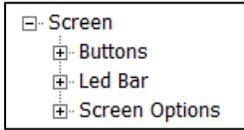
Buttons

Up	T.I.R.
Down	Valley Hold
Left	None
Right	None
Enter	None
Zero	On
Track/Hold	On
Peak Hold	On
Esc/Print	On

The Zero, Track/Hold, Peak Hold and Esc/Print button can be enabled or disabled.

To the other buttons a function can be assigned. By default, T.I.R. is assigned to the Up button and Valley Hold is assigned to the Down button.

Available options	Description
None	No function
Zero Set	Set indicator to zero
Track/Hold	Toggle between tracking and hold display
Track	Show the tracking value on the display
Peak Hold	Show the peak hold value on the display
Valley Hold	Show the valley hold value on the display
T.I.R.	Show the T.I.R. value on the display
Hold	Show the hold value on the display
Set Levels	Open the setpoint screen
Print	Print, see printer settings menu

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Led Bar

Bar Style	Bar ▼
Minimum	0,000
Lower Margin	2,000
Upper Margin	8,000
Maximum	10,000
Step	1,000

Bar Style

Select the style of the led bar. Bar Peak and Dot Peak show a peak value indication for a second when the value drops.

Available options	Description
Bar	0.000 2.000 4.000 6.000 10.000
Dot	0.000 2.000 4.000 6.000 10.000
Bar Peak	0.000 2.000 4.000 6.000 10.000
Dot Peak	0.000 2.000 4.000 6.000 10.000
Bar Reverse	10.000 8.000 6.000 4.000 0.000
Dot Reverse	10.000 8.000 6.000 4.000 0.000
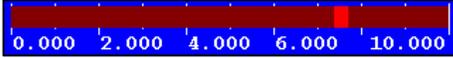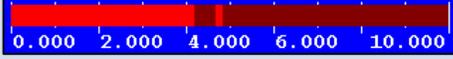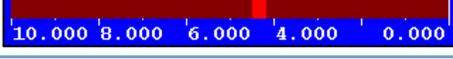
Minimum

Set the minimum value for the led bar.

Lower Margin

Set a lower margin. This setting works together with the Upper Margin setting.

Upper Margin

Set an upper margin. This setting works together with the Lower Margin setting.

The margin indication only works when both lower and upper margin are set.

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→ Example:

Bar Style	Minimum	Lower Margin	Upper Margin	Maximum	Step
Bar	0,000	2,000	8,000	10,000	1,000

Value below the margin is yellow:
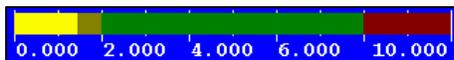
Value within the margin is green:
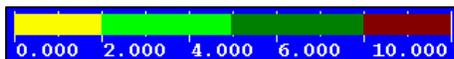
Value above the margin is red:
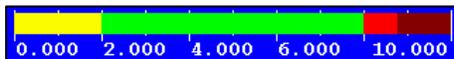

Maximum
Set the maximum value for the led bar.

Step
Set the value of the step size between the minimum and maximum value.

Screen Options

Decimal
Select the decimal character shown on the display

Available options
, (comma)
. (point)

Keybeep

Enable or disable the key beep. When enabled, every key press is confirmed with a beep. When disabled, only entering the main menu (pressing enter for 2 seconds) gives a beep.

Available options
No
Yes

Language

Select the language for the device. This only applies to the device. The configuration software is always in English.

Available options
English
German
French
Dutch

MenuTimer

Set the time (in seconds) for auto escape menu. This only applies to the device. When a menu item is open and no action is performed during the set time, the menu jumps back one level. This is repeated until the device is back on the main screen.

If the value is set to 10 seconds or less, the auto escape function is disabled.

Range
0…240

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Indicator

Select the indicator that is shown on the display. In case any other indicator than Display is selected, the buttons for showing the Tracking, Hold, T.I.R., Peak hold and Valley hold value are disabled.

Available options	Description
Display	Default display
Fast Tracking	Unfiltered tracking value
Tracking	Filtered tracking value
Peak	Peak hold value - the highest measured value
Valley	Valley hold value - the lowest measured value
Hold	Hold value - stored with zero button in hold mode, or with hold input
T.I.R.	Total Indicated Readout value - the difference between the peak hold and valley hold value
Display x10	Default display with extra decimal for more accuracy
Fast Tracking x10	Fast tracking with extra decimal for more accuracy
Tracking x10	Tracking with extra decimal for more accuracy
Peak x10	Peak with extra decimal for more accuracy
Valley x10	Valley with extra decimal for more accuracy
Hold x10	Hold with extra decimal for more accuracy
T.I.R. x10	T.I.R. with extra decimal for more accuracy
Sample	ADC sample value

6.3.9   Clock

The device date and time are used for printer tickets and for storing data in the alibi memory and event log. The device is equipped with a backup battery for the real time clock.

Current Time	16:22:44
Current Date	08-08-2014
Set Time (HH:MM:SS)	16:22:40
Set Date (DD:MM:YYYY)	08-08-2014

Current Time
The current device time in HH:MM:SS format.

Current Date
The current device date in DD-MM-YYYY format.

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Set Time

Set the time in the indicated format to correct the device time.

Set Date

Set the date in the indicated format to correct the device date.

An easy way to synchronize time and date is to use the Clock function in Pi Mach II.
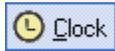
6.3.10 Printer

A printer can be connected to the Ethernet or the serial port. It's also possible to print to the build in alibi memory. Support for Zebra protocol printers is present.
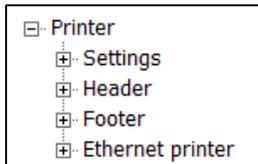
Settings

Layout	Ticket
Columns	40
Rows	24
Margin	2
Newline	CR+LF
Port	RS232 Port

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Layout

Select the layout for printing. The **Ticket** layout is a predefined format. The **Line** layout prints every measurement on a new line. For both layouts a 24 and 40 columns format is present.

	24 columns	**40 columns**
Ticket	 Programmable header ---------------------- DATE 19-07-99 TIME 02:27.40 TICKET: 100 TRACK 0,855 kN PEAK 1,509 kN VALLEY 0,211 kN HOLD 0,000 kN T.I.R. 1,298 kN ---------------------- Programmable footer	 Programmable header -- DATE 19-07-99 TIME 02:30.55 TICKET NUMBER: 101 TRACK 0,855 kN PEAK 1,509 kN VALLEY 0,211 kN HOLD 0,000 kN T.I.R. 1,298 kN -- Programmable footer
Line	 Programmable header ---------------------- NR Peak Valley kN 119 1,509 0,211 120 1,509 0,211 121 1,509 0,211	 Programmable header -- NR Track Peak Valley 131 0,855 kN 1,509 kN 0,211 kN 132 0,855 kN 1,509 kN 0,211 kN 133 0,855 kN 1,509 kN 0,211 kN

Each print action has a number (ticket = ticket number, line = line number). When the device powers up the print counter is set to zero.

Available options
Ticket
Line

Columns

24 and 40 columns printing is supported as shown in the layout examples.

Available options
0…39 = 24 columns
40…80 = 40 columns

Rows

For the ticket layout, the number of rows represents the empty lines after each ticket.

For the line layout, the number of rows represents the total number of rows for the header and the lines. When set to 1 for example, each printed line gets a header. When set to 10 for example, each 6 lines get a header (in case the header is 4 lines).

Range
0...80

Margin

Set the number of empty spaces before printing.

Range
0...80

Newline

Select the end of line sequence. When Zebra ZPL II is selected, a printer with this protocol can be used. The Zebra printer commands are automatically added to the printer ticket.

Available options
CR
LF
CR+LF
CR+00
None
Zebra ZPL II

Port

Select the communication port used for the printer.

Available options	Description
None	No printer
RS232 port	Set the printer parameters in System Setup - Communication - RS232
RS422 port	Set the printer parameters in System Setup - Communication - RS422
IP Number	Set the printer IP address in Ethernet printer - IP number
Alibi Memory	See chapter Alibi Memory and Event Log

Header

Header 1	Programmable header
Header 2	
Header 3	
Header 4	

Header 1…4
Optionally set a header for the printer ticket. Up to 4 lines can be programmed.

Footer

Footer 1	Programmable footer
Footer 2	
Footer 3	
Footer 4	

Footer 1…4
Optionally set a footer for the printer ticket. Up to 4 lines can be programmed.

Ethernet printer

IP number	0 . 0 . 0 . 0

IP number
In case the selected printer port in the settings menu is **IP Number**, enter the IP address of the printer.

6.3.11 Factory recall

A factory recall can be performed. Also the device parameters can be backed up and restored.

```
□ Factory recall
    ⊞ Parameters to factory
    ⊞ Backup
    ⊞ Restore Parameters
    ⊞ Restore Full
```
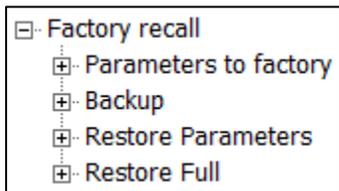
Parameters to factory

Are you sure ?	No ▼

Select yes to set all parameters to factory. The device reboots after this action.

Backup

Are you sure ?	No ▼

A backup of the device configuration can be made within the device. A password is required for the backup. Contact PENKO for this password. When using Pi Mach II manage to make a backup, enter this password in the service code field to enable the backup option.

```
□ System Setup
    □ Service
        1.1.3.1.1 Enter service code
```

Restore parameters

Are you sure ?	No ▼

This option only restores the non-certified parameters.

Restore full

Are you sure ?	No ▼

This option restores all parameters.

6.4 Control

Control has various functions to control the indicator.

Node	Description
Zero Set	Set the indicator value to zero
Zero Reset	Set the indicator value back to its original value
Hold Reset	Reset the stored hold value
Peak Reset	Reset the stored peak hold value
Valley Reset	Reset the stored valley hold value
TIR Reset	Reset the stored Total Indicated Readout value

6.5 Access
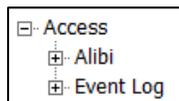
Access contains the Alibi Memory and Event Log.

Node	Description
Alibi	Browse, print or clear the Alibi Memory
Event Log	Browse of print the Event Log

(i) Also see the Alibi Memory and Event Log chapter

7   Alibi Memory and Event Log

The Alibi and Event Log support the following features:

- Automatically store system events
- Create alibi records
- View, search and print alibi records and event logs

7.1   Alibi Memory

Alibi records are generated by a user action. To generate records, go to the Printer Settings menu and set Port to Alibi memory.
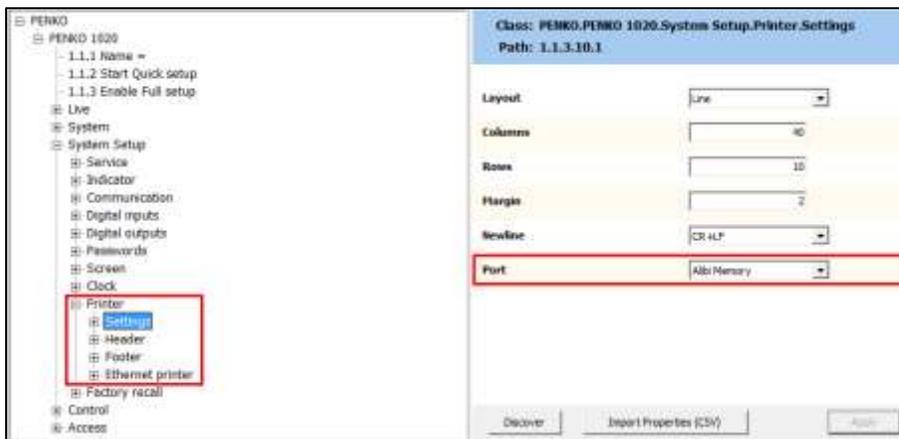
Every time the Print button is pressed, a new alibi record is created. To see the alibi record, go to the Access menu and select Alibi.

Number of entries
The total number of alibi records.

Entry Number

Enter the number of the desired record and conform with Enter or the Apply button. The record is shown.

Record

The type of record. A record can be a **Header** or a **Data** record. A header records is the title of the record and shows a tag, date and time. A header has several data records that show the code, value and unit of the stored value.

Tag/Code

Tag shows a tag the header record belongs to. By default this is "Alibi 001" and cannot be changed. Code shows the type of value stored in the data record.

Date/Value

Date shows the date of the header record. Value shows the stored measurement of the data record.

Time/Unit

Time shows the time of the header record. Unit shows the stored unit of the data record.

UID

Every record has a Unique ID number, the UID.

Print

This will print the total alibi memory to a connected printer. On the device it's possible to print only a part of the alibi memory. This is explained further on.

Clear

This will clear the total alibi memory.

When the print button is pressed, 6 records are added to the alibi memory. This is 1 header record and 5 data records. Example:

Number	Record	Tag/Code	Date/Value	Time/Unit	UID
1	Header	Alibi 001	14-08-14	14:40:58	3298435072
2	Data	Force	0.783	kN	1755848705
3	Data	Peak	0.990	kN	2859737091
4	Data	Valley	0.129	kN	2346983429
5	Data	Hold	0.649	kN	0545136647
6	Data	T.I.R.	0.861	kN	2634031113

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Example of a printer layout of these records:

```
Device: 1020
    Serial Number 14080058
    Date : 14-08-14    Time : 15:02:53
    Alibi Memory
    Number UID          Code                  Date/Value        Time/Unit
            1 3298435072 Alibi 001              14-08-14          14:40:58
            2 1755848705 Force                   0.783            kN
            3 2859737091 Peak                    0.990            kN
            4 2346983429 Valley                  0.129            kN
            5 0545136647 Hold                    0.649            kN
            6 2634031113 T.I.R.                  0.861            kN
```

The alibi records are also available on the device.
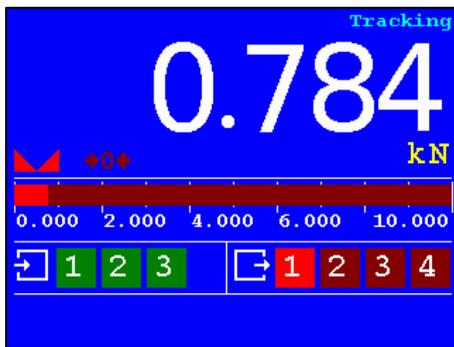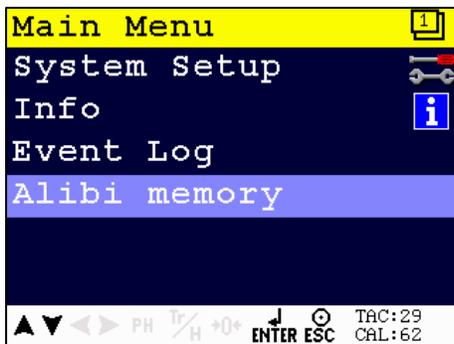
Press 2 seconds

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Use the buttons for the following actions:

PH

Last
Jump to the last entry of the list.

ENTER

Filter
Filter the list on date or UID. Select All to undo the filtering.

→0←

First/Clear
Jump to the first entry of the list.
Press for 2 seconds to clear the alibi memory. A confirmation screen is shown first.

ESC

Escape/Print
Leave the alibi memory.
Press for 2 seconds to print all records to a connected printer. When a filter is active, the filtered range is printed.

Previous
Select the previous record.

Next
Select the next record.

Clearing the alibi memory:

Press the Zero button for 2 seconds. The following screen is shown:
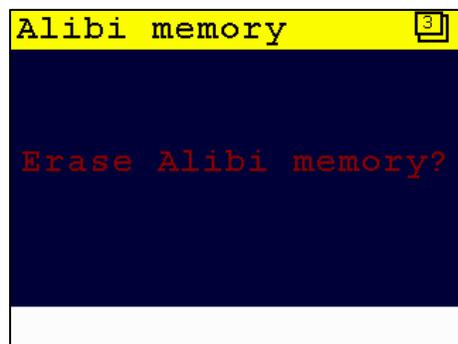
Press the Enter button to confirm or the Escape button to ignore.

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Filtering the alibi memory:

Press the Enter button. The following screen is shown:

Use the "From Date" and "To Date" to set a date filter, or type in a UID to filter on 1 specific record. Leave the filter screen with the Escape button and the filter is applied.

When printing the alibi records, only the filtered range is printed.

To remove the filter, press the Enter button to open the filter screen. Select "All" and confirm with the Enter button.

7.2 Event Log

System events are generated automatically by the system. These events can be seen but cannot be erased. Erasing of the records can only be performed by PENKO. Events are created for logging software updates, calibration changes, parameter changes, clearing the alibi memory, etc.

To see the event log, go to the Access menu and select Event Log.
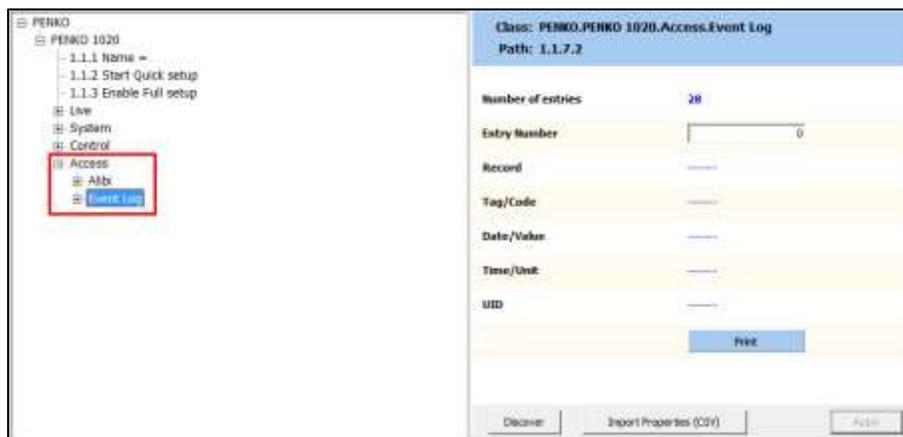
Number of entries
The total number of event logs.

Entry Number
Enter the number of the desired record and conform with Enter or the Apply button. The record is shown.

Record
The type of record. An event log is always a **Header** record.

Tag/Code
This shows the stored event, like Software Update, Set Clock, etc.

Date/Value
This shows the date of the event.

Time/Unit
This shows the time of the event.

**UID**
Every record has a Unique ID number, the UID.

Print

This will print the total event log to a connected printer. On the device it's possible to print only a part of the event log. This is explained further on.

Examples:

| Number	Record	Tag/Code	Date/Value	Time/Unit	UID
1	Header	SoftwareUpdate	31-0-14	09:11:28	3949592585
2	Header	TAC Changed	06-08-14	14:18:48	1045692434
3	Header	CAL Changed	14-08-14	14:40:22	4138074136

Example of a printer layout of these records:

```
Device: 1020
     Serial Number 14080058
     Date : 15-08-14    Time : 08:41:55
     Event Log
     Number UID         Code                Date/Value      Time/Unit
          1 0841613312 TAC Changed            30-06-14       11:43:48
          2 1371668481 TAC Changed            30-06-14       11:43:48
          3 1251344386 System Default         30-06-14       12:08:50
          4 1182662659 SoftwareUpdate         30-06-14       12:10:10
          5 4005953540 Alibi Cleared          30-06-14       13:50:20
```

The event records are also available on the device.
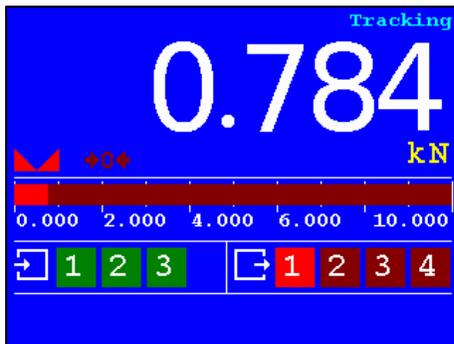
Press 2 seconds
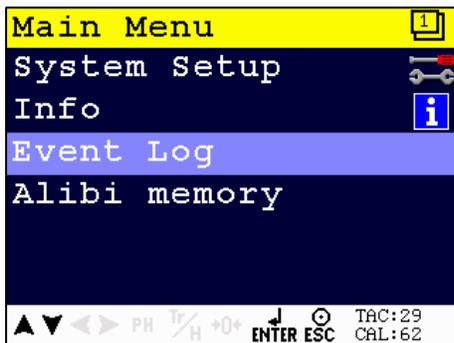
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```
Event Log                    2
All
Entry            00028/00028
Code             Set Clock
Date/Value       14-08-14
Time/Unit        14:40:46
UID              2158362651

▲ ▼ ◄ ►  PH  T/H  →0←  ENTER ESC  TAC:29
                                   CAL:62
```

Use the buttons for the following actions:

Last
Jump to the last entry of the list.

Filter
Filter the list on date or UID. Select All to undo the filtering.

First
Jump to the first entry of the list.

Escape/Print
Leave the event log.
Press for 2 seconds to print all records to a connected printer. When a filter is active, the filtered range is printed.

Previous
Select the previous record.

Next
Select the next record.

Filtering the event log:

Press the Enter button. The following screen is shown:
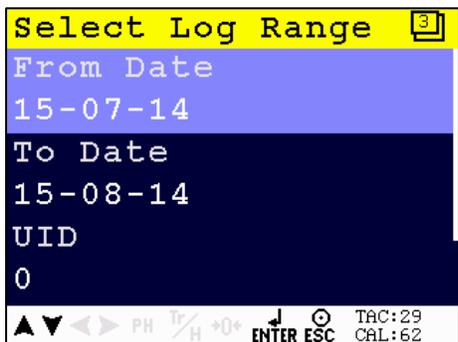
Use the "From Date" and "To Date" to set a date filter, or type in a UID to filter on 1 specific record. Leave the filter screen with the Escape button and the filter is applied.
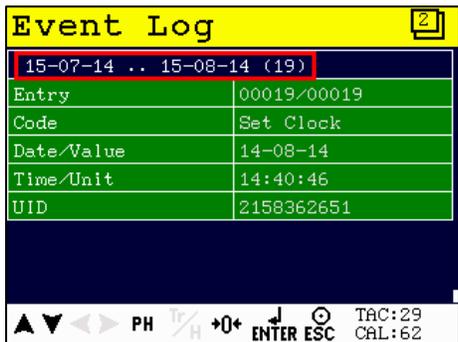
When printing the event log, only the filtered range is printed.

To remove the filter, press the Enter button to open the filter screen. Select "All" and confirm with the Enter button.
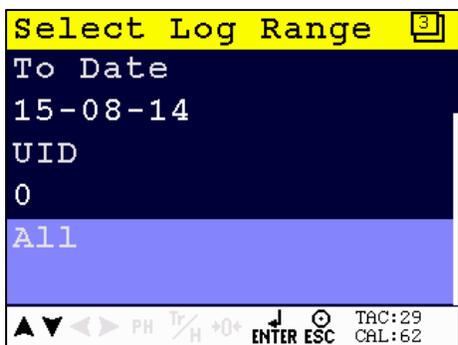
1020 FMD

8 Firmware update

Update the application firmware by Ethernet or USB connection.

8.1 Ethernet

Connect the 1020 FMD to the computer through Ethernet. Start PI Mach II. Set communication to Ethernet. Also see the Pi Mach II manual.
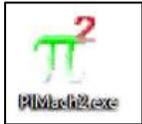
Start the Firmware Update Manager.

Click Open and select the PIP file.
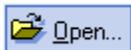
Click Search for devices and select the device IP address for the 1020 FMD.

Use double click or the arrow button to move the device from the Source List to the Destination List and click OK.

1020 FMD

Now click Firmware Update to start the update.

 Firmware update

The 1020 FMD will reboot automatically and the Firmware Update Manager will show Updated.

Device	Id-code	Softw Version	Status
☑ 10.1.2.68 - 0628	0628	0101	Updated

8.2   USB

Connect the 1020 FMD to the computer through USB. Start PI Mach II. Set communication to USB. Also see the Pi Mach II manual.

Start the Firmware Update Manager.

 Firmware Update Manager

Click Open and select the PIP file.

 Open...
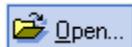
Click Search for devices and select the device with source "0".
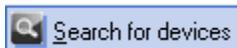
 Search for devices

Use double click or the arrow button to move the device from the Source List to the Destination List and click OK.
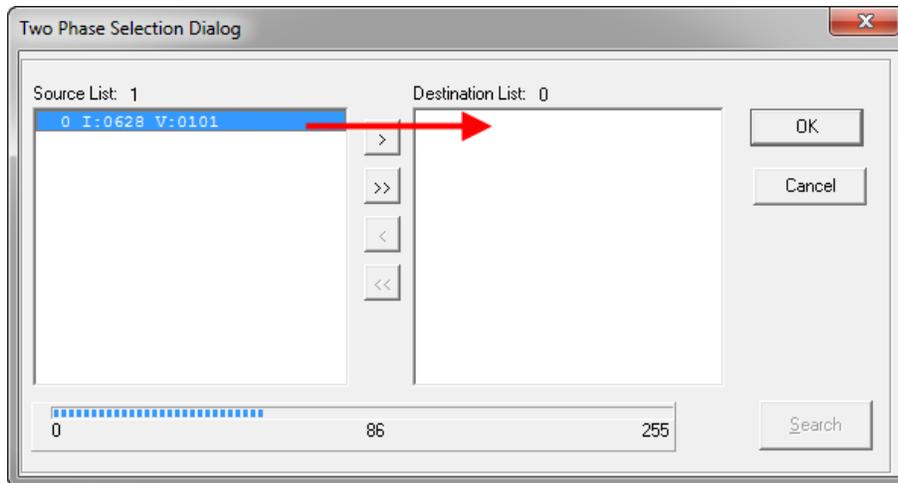
1020 FMD

Now click Firmware Update to start the update.

The 1020 FMD will reboot automatically and the Firmware Update Manager will show Updated.

1020 FMD

9 Backup and restore

With the 1020 FMD it's possible to make a backup of the software as it's installed in the device. The software will be saved as an FDI file which stands for Flex Data Image. The Backup data assures that when the device fails, a replacement device can be programmed as a copy of the original device. In case of multiple devices which have to be configured similarly, one device can be programmed, and a backup of this device can be used to program the other device.

9.1 Backup

To back up the device, open Pi Mach II. Go to MENU → ENVIRONMENT → BACKUP DEVICE.

A save dialog is shown. Choose a destination and filename, and click SAVE. The image will be created and saved to this destination.

9.2 Restore

To restore the device, open Pi Mach II. Go to MENU → ENVIRONMENT → RESTORE DEVICE.

An open dialog is shown. Select the backup file, and click OPEN. The image will be programmed into the device, and the device will restart.

9.3 Progress

The progress of reading and writing is shown in a progress bar. The action can fail by a loss in communication between the PC and the controller. In that case the progress bar will be stuck somewhere between 0 and 100 %. In this case, check the communication and retry.

1020 FMD

Erasing the Flash takes a while.
Do not close the application until ready.

Restore progress 30 %

| Abort | Close |

1020 FMD

10 Standard factory settings

Description	Display	Value	Your setting
Properties	Name	…	
	Unit label	kN	
	Step	1	
	Decimal point	0,000	
	Max Load	10,009 kN	
	Sample Rate	1600/s	
Stable condition	Range	0,002 kN	
	Time	1,00 s	
Zero tracking	Range	0,000 kN	
	Step	0,000 kN	
	Time	0,00 s	
Range / Interval	Range	0 Parts	
	Max Step	1	
	Mode	Multi Range	
Filter - Overall	Overall Filter	0 dB	
Filter - Digital	Digital Filter	Static App.	
	Cutoff Frequency	1,0 Hz	
	Frequency	50 Hz	
Filter- Display	Filter Range	0,000 kN	
	Display Filter	0 dB	
	Display Rate	25 updates/s	
	Disp.Suppress	0,000 kN	

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1020 FMD

11 Error codes

| Error code	Description	Solution
2001	Parameter error	Invalid entry, choose valid value
2005	Input value is not valid	Invalid entry, choose value within range
2101	Weigher not stable	Wait for stable and try again
2102	Parameter exceeds maxload	Remove load / edit max load setting
2103	Parameter below zero	Check if scale is blocked
2104	Not in zero range	Remove load
2105	Arithmetic overflow occurred	Change calibration levels
2106	A/D reads all 1's	Check load cell connection
2107	A/D reads all 0's	Check load cell connection
2108	Gain ref. < zero ref.	Change calibration levels
2109	Gain > 0.99984741211	Change calibration levels
2110	Save error	Contact PENKO
2111	Flash ROM exhausted	Contact PENKO
2112	Error on header creation	Contact PENKO
2113	Error on date write	Contact PENKO
2114	Header validation failed	Contact PENKO
2115	De-active old data fail	Contact PENKO
2116	Load errors	Contact PENKO
2117	Item not found in store	Contact PENKO
2118	Error in stored data	Contact PENKO
2119	Bad calibration	Change calibration levels
2120	Action not enabled	-
2121	Multi-point not found	Add multi-point calibration
2122	Calibration table full	Remove calibration points
2123	Not allowed, tare active	Deactivate tare
2124	Action not allowed	-
2125	ADC no power	Check power supply
CCCCCC	No proper calibration available	Check calibration setting
UUUUUU	Underflow	Check load cell Check platform construction
OOOOOO	Overflow	Check load cell Check platform construction
======	Display overflow; Exceed maximum display value (max. load)	Reduce load on platform

1020 FMD

12 Specifications

Type	Description
Wiring	With sense
Type of sense	Passive
Power supply	18-32 VDC; 7,5 W max.
Excitation voltage	5 VDC
Sensitivity	0,1 µV/d
Selectable ranges	1 mV/V | 1,5 mV/V | 2 mV/V | 2,5 mV/V | 3 mV/V
Input voltage @3mV/V	-16 mV to 16 mV
A/D Conversion speed	1600/s
Max. load cell impedance	1200 Ω
Min. Load cell impedance	43,75 Ω
Max. no. of load cells 350 Ω	8
Max. no. of load cells 1.000 Ω	22
Max. number of d	10.000
Display resolution	100.000
Internal resolution	24 bits
Display steps	1,2,5,10,20,50,100,200
Display size	2,8 inch; 320 x 240 pixels
Digital inputs (3)	18 - 28 VDC, PNP or NPN
Digital outputs (4)	Max. 35V/0,5A, PNP or NPN
Analog output (optional)	0/4 - 20/24 mA, 10.000 d
Operating temperature	-10°C to +40°C
Storage temperature	-20°C to +70°C
Relative Humidity	Max. 85 % non-condensing
Protection class	IP45 or IP65 when built into a cabinet
Weight	700 g

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1020 FMD

150 mm

5 mm

82 mm

137,5 mm

Top view

5 mm

82 mm

78 mm

67 mm

Side view

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Appendix I - Menu structure

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Calibration — Show

Calibrate — Dual Point

Multipoint

Transducers — Transducer 1...8 — Output

Zero Balance

Max Load

Type

Deadload

Range — Range

Offset

Recall — Recall

In/Outputs — Inputs — Input 1

Input 2

Input 3

Outputs/Levels — Output

Mode

Level

Hysteresis

DAC Setup — Indicator

Minimum at

Maximum at

Mode

DAC Calibrate — DAC Calibrate

DAC Test — Minimum

Level

Maximum

Passwords — System Setup

Set Time/Date

Screen Setup — Buttons — Up

Down

Left

Right

Enter

Zero

Track/Hold

Peak Hold

Esc/Print

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Appendix II - Communication protocols

The following communication protocols are available:

Protocol	Available on port	Description
Modbus TCP	Ethernet (TCP)	Modbus protocol over Ethernet TCP used to connect to PLC.
Modbus ASCII/RTU	RS232/422	Modbus protocol over RS232 used to connect to PLC.
Fins	Ethernet (TCP)	Omron FINS protocol over Ethernet TCP used to connect to PLC.
Ethernet/IP	Ethernet (TCP)	Ethernet/IP protocol used to connect to PLC. The EDS file can be downloaded from the website.
Profibus DP	Profibus	Profibus protocol used to connect to PLC. The GSD file can be downloaded from the website.
PENKO Printer	Ethernet (TCP) RS232/422	PENKO printer protocol to connect ASCII/plain-text printers over Ethernet or serial connection. Zebra ZPL II protocol is supported.
PENKO ASCII	RS232/422 Ethernet (TCP)	PENKO protocol over Ethernet or serial connection.
PENKO Buslink	Ethernet (UDP) CAN	PENKO protocol over Ethernet or CAN connection used to connect PENKO devices to a PENKO FLEX controller.
PENKO Web Interface	Ethernet (TCP)	PENKO protocol over Ethernet to monitor and configure the device with a web browser.
PENKO TP / PDI	Ethernet (UDP) RS232/422 USB	PENKO protocol over Ethernet, serial and USB connection used for communication between the device and the configuration software.

Protocol descriptions and needed files can be downloaded from the PENKO website.

www.penko.com

About PENKO

Our design expertise include systems for manufacturing plants, bulk weighing, check weighing, force measuring and process control. For over 35 years, PENKO Engineering B.V. has been at the forefront of development and production of high-accuracy, high-speed weighing systems and our solutions continue to help cut costs, increase ROI and drive profits for some of the largest global brands, such as Cargill, Sara Lee, Heinz, Kraft Foods and Unilever to name but a few.

Whether you are looking for a simple stand-alone weighing system or a high-speed weighing and dosing controller for a complex automated production line, PENKO has a comprehensive range of standard solutions you can rely on.

Certifications

PENKO sets high standards for its products and product performance which are tested, certified and approved by independent expert and government organizations to ensure they meet – and even – exceed metrology industry guidelines. A library of testing certificates is available for reference on:
http://penko.com/nl/publications_certificates.html

PENKO Professional Services

PENKO is committed to ensuring every system is installed, tested, programmed, commissioned and operational to client specifications. Our engineers, at our weighing center in Ede, Netherlands, as well as our distributors around the world, strive to solve most weighing-system issues within the same day. On a monthly basis PENKO offers free training classes to anyone interested in exploring modern, high-speed weighing instruments and solutions. A schedule of training sessions is found on: **www.penko.com/training**

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