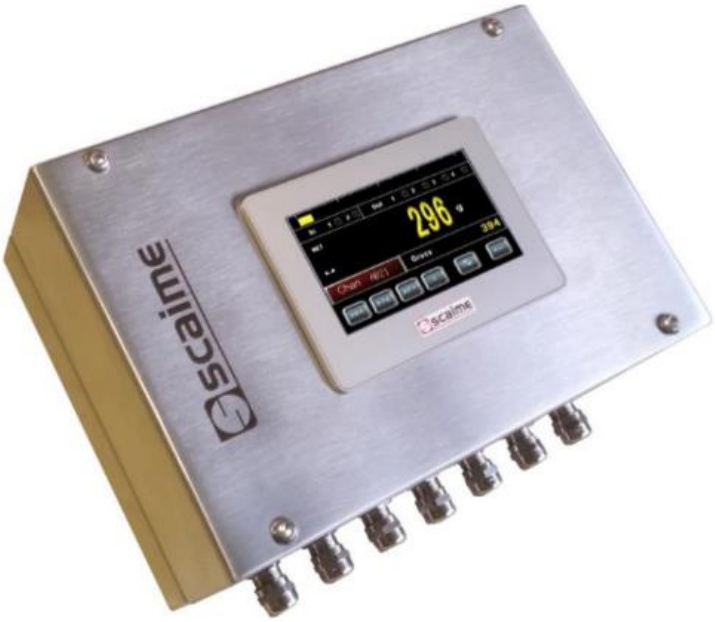
Characteristics and functioning

eNod4-T

Digital Process Transmitter



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1 SAFETY INSTRUCTIONS

Important information

Be sure to read this manual thoroughly before starting the PRODUCT. This manual is part of the PRODUCT and comes with it. Rules for the prevention of risks and accidents as well as safety rules must be observed!

The PRODUCT is manufactured in accordance with the current state of the art and in accordance with safety regulations laws of the Labour Code.

The general safety requirements must be observed during all phases of operation and repair of equipment. Non-compliance of written warnings in this manual is contrary to the requirements of safe operation and normal operation of the PRODUCT.

As a user of this product, it is necessary to strictly follow in your work environment, all warnings and requirements necessary to perform safely any operation on the PRODUCT.

This symbol means that there is a risk of electrisation that can lead to death or serious injuries instructions are not followed.

This symbol means that there is a risk of danger that can lead to injuries if safety instructions are not followed.

Earth protection connection

WEEE 2002/96/CE Waste of electrical and electronic equipment directive imposes to final users the management of electrical and electronic equipment (EEE). For the purpose, it is mandatory for them to selectively collect their EEE depositing them in dedicated places.

DANGER

Danger: dangerous situation that can lead immediately to death or serious injuries.

WARNING

Warning: situation potentially dangerous that could lead to death.

CAUTIOUS

Cautious: situation potentially dangerous that could lead to injuries.

1.1 Getting started

WARNING

Security provided by this product is provided for use for its intended purpose. Maintenance can only be performed by qualified staff.

1.2 Protection

 **WARNING**

The PRODUCT, with 220V option, must be linked to a protection device. This one must comply to the standards in force in the country (NFC 15-100 in France) and must be part of the building in which the PRODUCT has been installed. The circuit breaker must be 16 Amps and should have a response curve of type C.

 **WARNING**

The mains plug of the MDX serves as disconnecting device. Consequently, it must be connected near the device and easily accessible.

1.3 Power supply

 **WARNING**

The PRODUCT, with 24VDC version, must be powered by a power supply in accordance to EN 60950-1. It must be located close to the PRODUCT.

1.4 Grounding

 **DANGER**

To minimize any risk of electric shock, frame and all parts of the equipment must be connected to Earth.

1.5 Installation

The PRODUCT must be fitted on a support by using the mounting brackets at the rear of the box.

1.6 Maintenance

The PRDUCT can be cleaned using a damp slightly cloth.

 **DANGER**

For your safety, before any technical intervention or cleaning, it is imperative that the equipment is turned off and not plugged in. It is forbidden to replace components with power cable connected.

1.7 Caution

When installing, moving, or handling this product or peripherals connected to it, refer to the instructions below to connect and disconnect the various cords.

Connection:	Disconnection:
1. Turn off the units. 2. Start by connecting all cords to the units. 3. Connect the interface cables to the connectors. 4. Connect the power cords into outlet. 5. Turn on the units.	1. Turn off the units. 2. Disconnect the power cords from the outlets. 3. Disconnect the interface cables from the connectors. 4. Disconnect all cabled from the units.

2 ENOD4 PRODUCT RANGE

2.1 General presentation

eNod4 is a high speed digital process transmitter with programmable functions and powerful signal processing capabilities. ***eNod4*** offers operating modes for advanced process control both static and dynamic.
Quick and accurate:

- Analog to digital conversion rate up to 1920 meas/s with maximum scaled resolution of ±500 000 points.
- Digital filtering and measurement scaling.
- Measurement transmission up to 1 000 meas/s.

Easy to integrate into automated system:

- **USB**, **RS485** and **CAN** communication interfaces supporting ***ModBus RTU***, ***CANopen®*** and ***PROFIBUS-DPV1*** (depending on version) communication protocols.
- Digital Inputs/Outputs for process control.
- Setting of node number by rotary switches and communication baud rate by dip switches.
- Integrated selectable network termination resistors.
- Wiring by plug-in terminal blocs.

2.2 Versions

2.2.1 Communication protocol versions

- Strain gauges load-cell conditioner with ***CANopen®*** and ***ModBus RTU*** communication.
- Strain gauges load-cell conditioner with ***Profibus DP-V1*** and ***ModBus RTU*** communication.
- Strain gauges load-cell conditioner with ***Modbus TCP*** and ***ModBus RTU*** communication.
- Strain gauges load-cell conditioner with ***EtherNet/IP*** and ***ModBus RTU*** communication.
- Strain gauges load-cell conditioner with ***Profinet IO*** and ***ModBus RTU*** communication.
- Strain gauges load-cell conditioner with ***EtherCAT*** and ***ModBus RTU*** communication.

EDS, GSD, ESI and GSDML configuration files for above protocols can be downloaded from our web site: http://www.scaime.com

2.2.2 IO+ version

In conjunction with all communication protocol versions, ***eNod4*** can supports an opto-insulated board fitted with:

- 2 additional digital inputs and 1 speed sensor dedicated input.
- 0-5V or 0-10V analog output voltage.
- 4-20mA, 0-24mA, 0-20mA or 4-20mA with alarm at 3.6mA analog output current.

2.3 eNodView Software

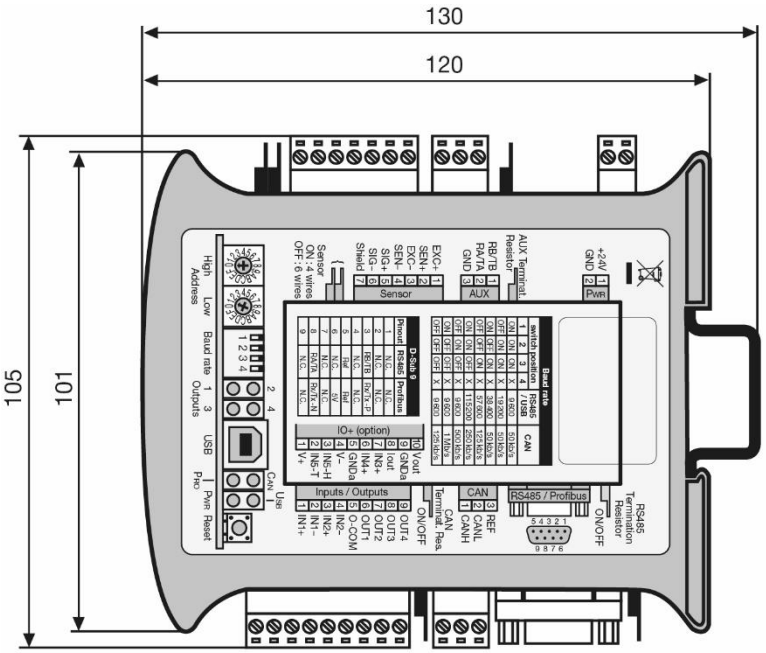
So as to configure ***eNod4***, SCAIME provides eNodView software tool. ***eNodView*** is the software dedicated to eNod devices and digital load cell configuration from a PC. This simple graphical interface allows accessing the whole functionalities of ***eNod4*** for a complete setting according to the application.
eNodView features and functions:

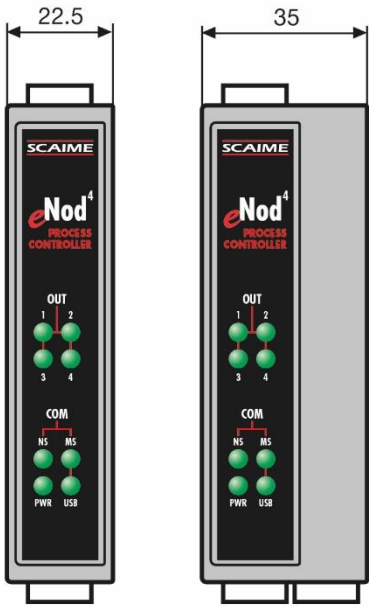
- eNod4 control from a PC
- Calibration system
- Modification/record of all parameters
- Measure acquisition with graphical display
- Numerical filters simulation
- Frequential analysis FFT
- Process control
- Network parameter

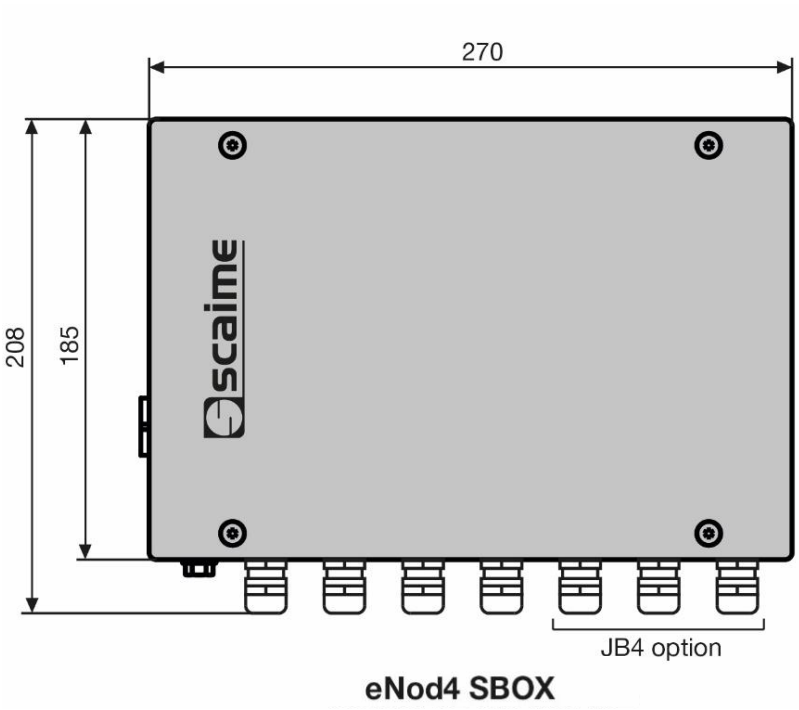
eNodView software is available in English and French version and can be downloaded from our web site: http://www.scaime.com or ordered to our sales department on a CD-ROM support.

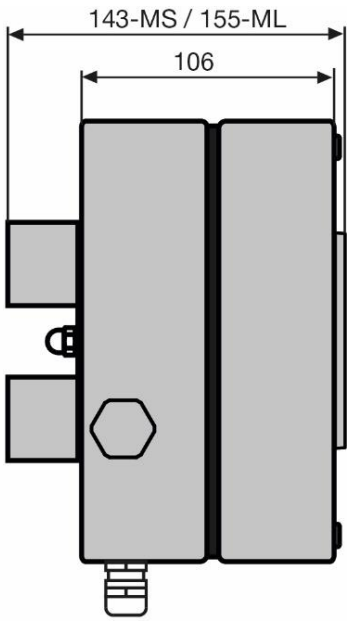
3 GENERAL CHARACTERISTICS

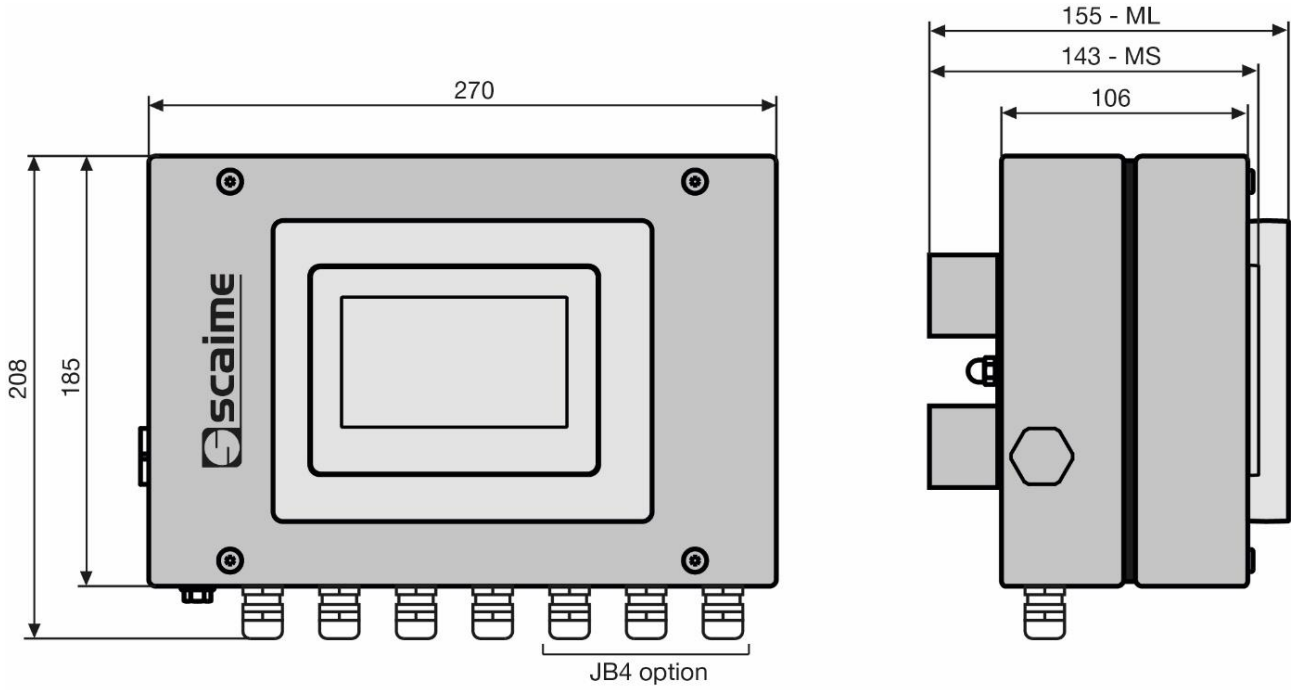
3.1 Dimensions



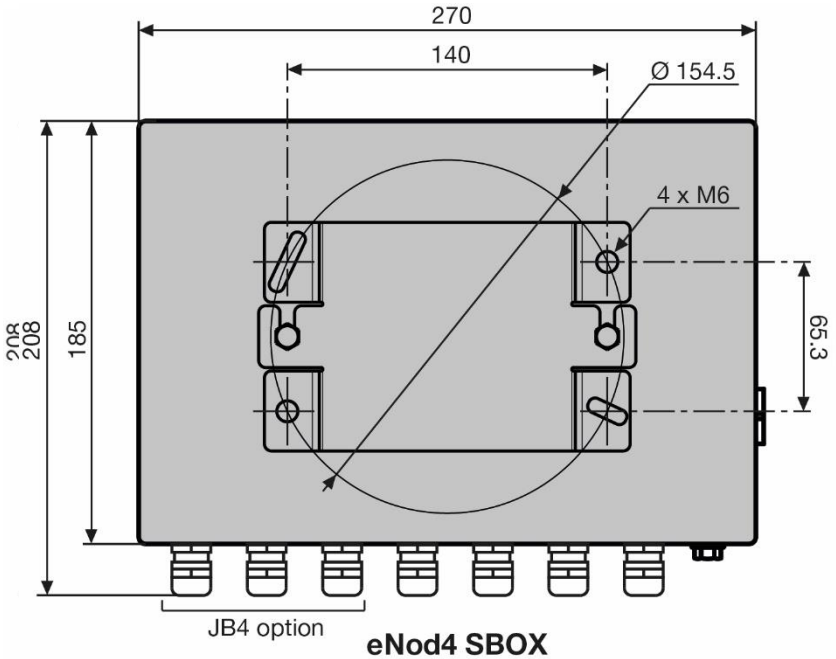


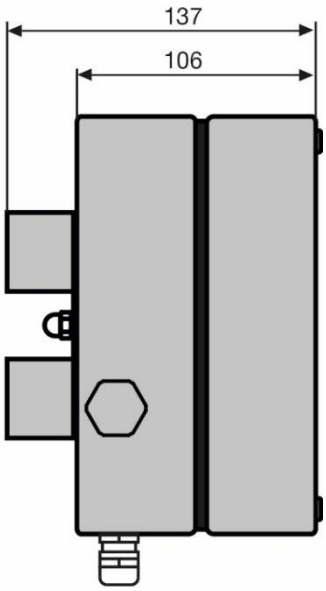






eNod4 SBOX-MS/ML





eNod4 SBOX

3.2 Characteristics

Power supply		*Unit*
Supply voltage	*10.....28*	V_{DC}
	110.....240 (option)	V_{AC}
Max supply power (CAN/ModBus RTU version)	*2.2*	*W*
Additional max supply power (Profibus version)	*1.2*	*W*
Additional max supply power (IO+ version)	*3*	*W*
Temperature range		
Storage temperature range	*-25...+85*	*°C*
Working temperature range	*-10...+40*	*°C*
Load cell sensor		
Minimum input resistance	*> 43*	*Ω*
sensor connection	*4 or 6 wires*	
Bridge excitation voltage	*5*	V_{DC}
Communication		
RS 485	*Half-duplex*	
Rate	*9 600...115 200*	*bauds*
CAN 2.0A	*50....1000*	*kbits/s*
PROFIBUS DP	*9,600...1200*	*kbits/s*

Logical inputs		
Number	*2(+2 with IO+ version)*	
Type	*opto-insulated type 3*	
Low level voltage-current	*0 / 5 VDC – 0 /1.5 mA*	
High level voltage-current	*11 / 30 VDC – 2 / 9 mA* *7 mA @ 24VDC*	
Logical outputs		
Number	*4*	
Type	*solid state relay*	
Max. current @ 40°C	*0,4*	*A*
Max. voltage in open state	*53 V_{DC} or 37 V_{AC}*	
Max resistor in close state	*2*	*Ω*
Metrological specifications on A3 connector input (load-cell type sensor)		
Input sensor range for a load cell sensor	*$\pm$7.8*	*mV/V*
Thermal zero drift typical	*1.5*	*ppm/°C*
Thermal span drift typical	*2*	*ppm/°C*
Linearity deviation	*0.003*	*% FS*
Conversion rate	*6.25 ... 1920*	*meas./s*

Metrological specifications on analog output (IO+ version)		
Output voltage range	*0-5 or 0-10*	*V*
Output current range	*4-20, 0-24 ou 0-20*	*mA*
Max. load on current output	*500*	*Ohm*
Outputs resolution	*16*	*bit*
Max. linearity error	*1*	*LSB*
Total error	*+/- 0.07*	*%FSR*
Thermal zero drift typical	*+/- 2*	*ppm/°C*
Thermal span drift typical	*+/- 3*	*ppm/°C*
Conversion rate	*A/D converter rate value*	*Hz*
Speed sensor power-supply (IO+ version)		
Bridge excitation voltage (V+ …V-)	*12.5 +/- 2*	*V*
Bridge excitation current	*30*	*mA*
Isolation	*1000*	*V*
Speed sensor input (IO+ version)		
IN5 HTL	*0…2.5 / 5…30*	*VDC*
IN5 TTL	*0…0.5 / 2.4…5*	*VDC*
Isolation	*1000*	*V*

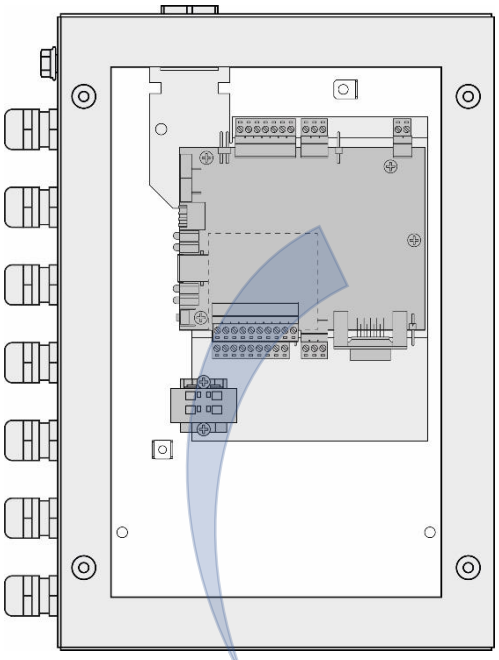
3.3 Legal for trade

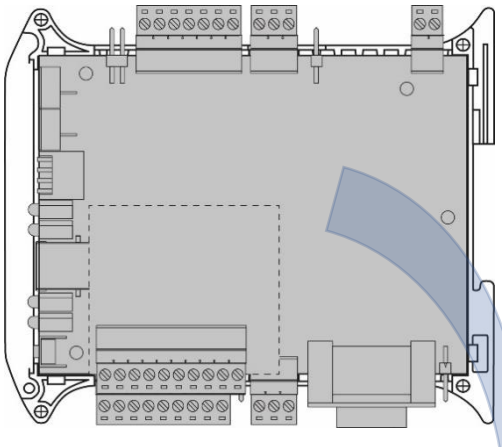
Characteristics		Unit
Accuracy class	*III or IIII*	
Maximum number of weighing ranges	*1*	
Maximum number of verification scale divisions	*6000*	
Load cell(s) excitation voltage	*5*	*V*
Minimum voltage division per verification scale division (ΔUmin)	*0.5*	*µV*
Minimum voltage of the weighing range	*0.5 * n * 10^{-3}*	*mV*
Maximum voltage of the weighing range	*39*	*mV*
Value of factor p_i	*0.5*	
Minimum impedance for the load cell	*47*	*Ohm*
Type of load cell(s) connection system	*4-wire or 6-wire*	
Maximum impedance for the load cell	*1500*	*Ohm*
Maximal length/section measurement cable	*166*	*m/mm^2*

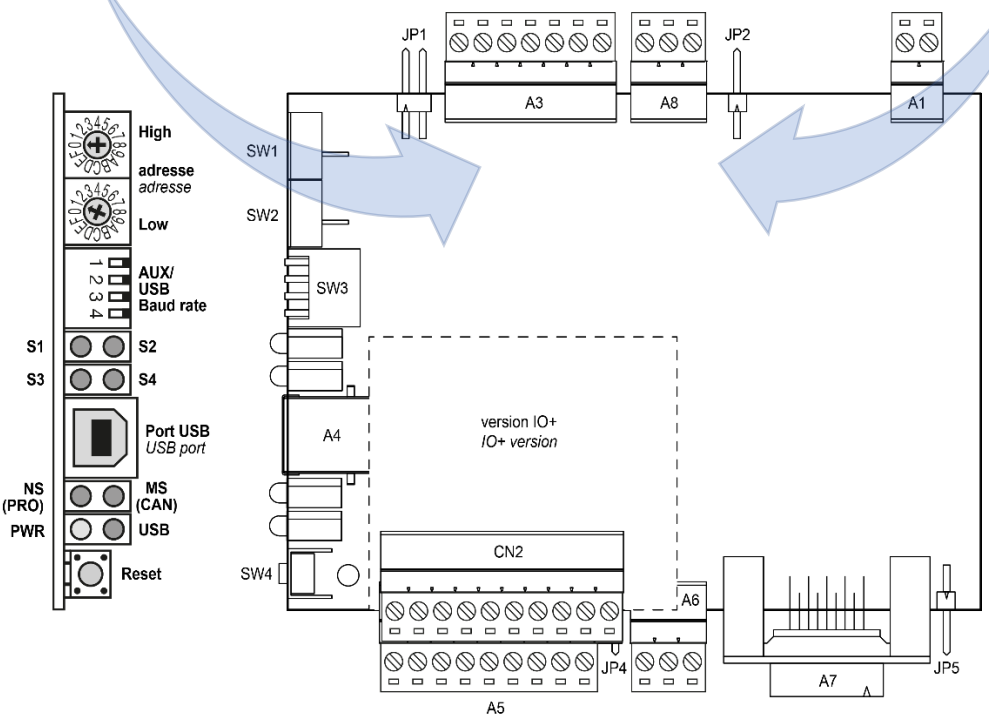
eNod4* is an analog data processing unit evaluated as a part of a non-automatic weighing instrument (NAWI) with applicative software -T or an automatic weighing instrument (AWI) like an automatic gravimetric filling instrument with applicative software -D or a catchweigher with applicative software -C. This instrument is not intended for direct sales to the public. It is suitable for conditioning OIML R60 certified strain gauges load cell(s) with analog output.
Legal for trade mode has to be activated internally in order to respect metrological requirements. All the functionalities will be conformed to the essential requirements for certified weighing instruments.
Sealing will be material on the eNod4 housing and load cell connections. If a junction box is used it will have to be sealed too. eNod4 is fitted with a software sealing for metrological parameters and once activated, is composed of an event counter and a CRC value of specific and adjustment parameters. These values shall be marked on the terminal device connected after the last official verification when putting in service the instrument. Any mismatch between the displayed values on the terminal and those marked will signify a broken sealing.
eNod4 is fitted with a data storage device (DSD) so called alibi memory. Any weighing result (or checkweigher result with applicative software -C, or dosing result with applicative software -D) is stored internally and can be recalled on demand. 130816 records can be stored permanently at maximum. Any record is identified by a unique 32-bit long number. This identifier is incremented each time a weighing result is stored and transmitted.
The minimum time between two DSD recording operations is 50ms.

* legal for trade use does not apply to software applicative for beltweigher (-B) and weigh feeder (-F)

4 CONNECTIONS







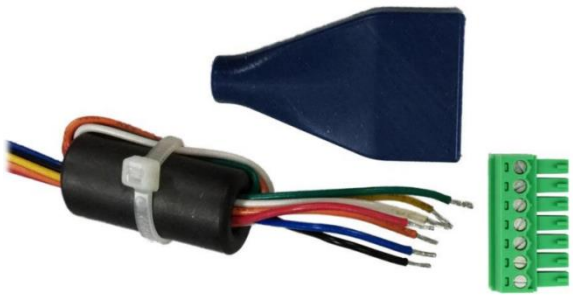
Repère *Mark*	Fonction *Function*		Repère *Mark*	Fonction *Function*	
A1 alimentation *power supply*	*1*	*+V_{DC}*	**A6 connexion bus CAN** *CAN bus connection*	*1*	*CANH*
	2	*GND*		*2*	*CANL*
A3 connexion capteur *load cell connection*	*1*	*Exc+*		*3*	*REF_{COM}*
	2	*Sens+*	**A7**	RS485 Automate (DB9) *RS 485 PLC (DB9)*	
	3	*Exc-*	**A8 connexion AUX** *AUX connection*	*1*	*RB/TB (B-)*
	4	*Sens-*		*2*	*RA/TA (A+)*
	5	*Sig+*		*3*	*GND*
	6	*Sig-*	**CN2 Connexion IO+** *IO+ connection*	*1*	*V+*
	7	*Shield*		*2*	*IN5-TTL*
A4	*USB*			*3*	*IN5-HTL*
A5 entrées/sorties *IN / OUT*	*1*	*IN1+*		*4*	*V-*
	2	*IN1-*		*5*	*GNDA*
	3	*IN2+*		*6*	*IN4+*
	4	*IN2-*		*7*	*IN3+*
	5	*OUT_{COM}*		*8*	*Iout*
	6	*OUT1*		*9*	*GNDA*
	7	*OUT2*		*10*	*Vout*
	8	*OUT3*	**JP1**	Câblage capteur 6 fils / 4 fils *6-wire / 4-wire loadcell wiring*	
	9	*OUT4*			
SW1	Sélecteur Adresse haute (hex) *High Address selector (hex)*		**JP2**	Résistance de terminaison *connexion AUX AUX connection termination resistor*	
SW2	Sélecteur Adresse basse (hex) *Low Address selector (hex)*		**JP4**	Résistance de terminaison *connexion CAN CAN connection termination resistor*	
SW3	Sélecteur Baud rate AUX/USB *Aux/USB Baud rate selector*		**JP5**	Résistance de terminaison *connexion RS485 RS485 connection termination resistor*	
SW4	bouton poussoir Reset *reset push button*		**NS(PRO) / NS(CAN)**	LED RS485 & Profibus / CAN *RS485 & Profibus / CAN LED*	
S1-S2-S3-S4	LED sorties logiques *outputs LED*		**PWR-USB**	LED alimentation & activité USB *power supply & USB activity LED*	

4.1 Cabling basic rules

4.1.1 Prevent Electrostatic Discharges

For ESD protection, cabling for the analog load cell must include a ferrite and a silicone protection sleeve, not included with the transmitter.

Install the ferrite by passing the analog cell connection through the ferrite and wrapping it around once, as shown on the following picture:



4.1.2 Prevent Electromagnetic disturbances

Observe these basic rules to guard against Electromagnetic disturbances.

Rule 1: Large area grounding contact

- When installing the devices, make sure that the surfaces of inactive metal parts are properly bonded to chassis ground (see following sections).
- Bond all inactive metal parts to chassis ground, ensuring large area and low-impedance contact (large cross-sections).
- When using screw connections on varnished or anodized metal parts, support contact with special contact washers or remove the protective insulating finish on the points of contact.
- Wherever possible, avoid the use of aluminium parts for ground bonding. Aluminium oxidizes very easily and is therefore less suitable for ground bonding.
- Provide a central connection between chassis ground and the ground/protective conductor system.

Rule 2: Proper cable routing

- Organize your wiring system into cable groups (high-voltage/power supply/signal/measurement/data cables).
- Always route high-voltage and data cables in separate ducts or in separate bundles.
- Install the measurement cables as close as possible to grounded surfaces (e.g. supporting beans, metal rails, steel cabinet walls).

Rule 3: Fixing the cable shielding

- Ensure proper fixation of the cable shielding.
- Always use shielded data cables. Always connect both ends of the data cable shielding to ground on a large area.
- Keep unshielded cable ends as short as possible.
- Always use metal/metalized connector housings only for shielded data cables.
- Shields of load cells must be connected to the pin 'Shield' of the load cell connector of the eNod4 or, in case of junction box, directly on the body of this one.

Rule 4: Special EMC measures

- For cabinet or enclosure lighting in the immediate range of your controller, use incandescent lamps or interference suppressed fluorescent lamps.

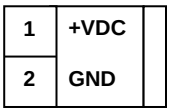
Rule 5: Homogeneous reference potential

- Create a homogeneous reference potential and ground all electrical equipment.

Use sufficiently dimensioned equipotential bonding conductors if potential differences exist or are expected between your system components.

Equipotential bonding is absolutely mandatory for applications in hazardous areas.

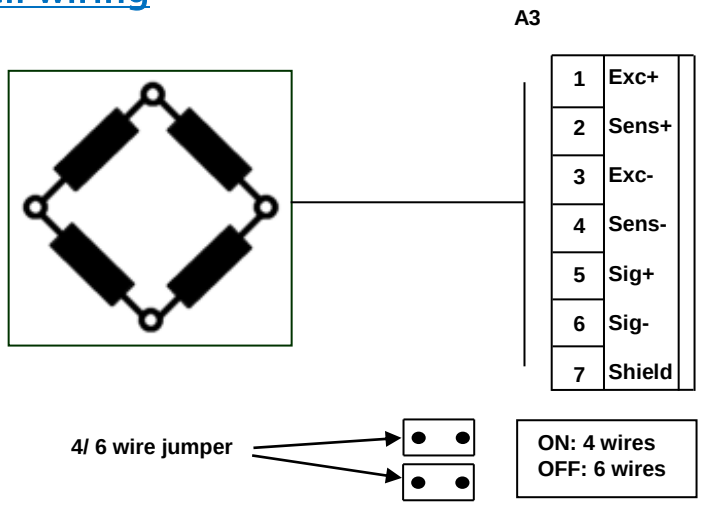
4.2 Power supply connection



A1

On the front panel a green light *'PWR'*, (D7) indicates if power is connected.

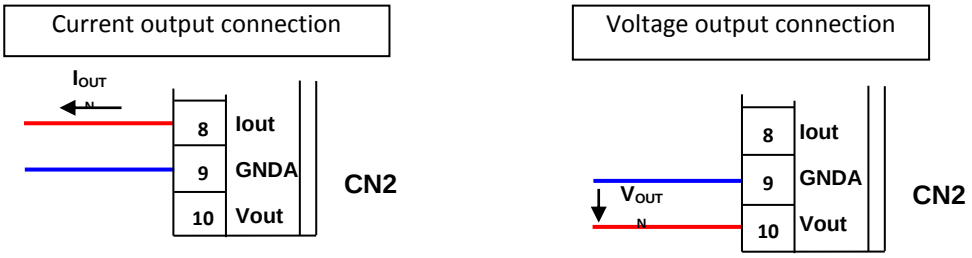
4.3 Load-cell wiring



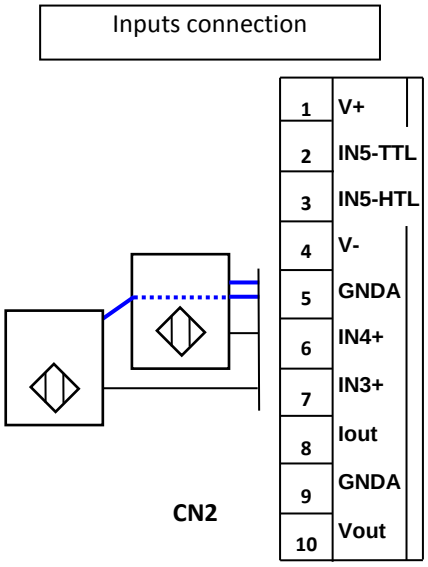
- **4 wires load-cell**: jumpers in place (by default at delivery).
- **6 wires load-cell:** jumpers removed

4.4 IO+ version

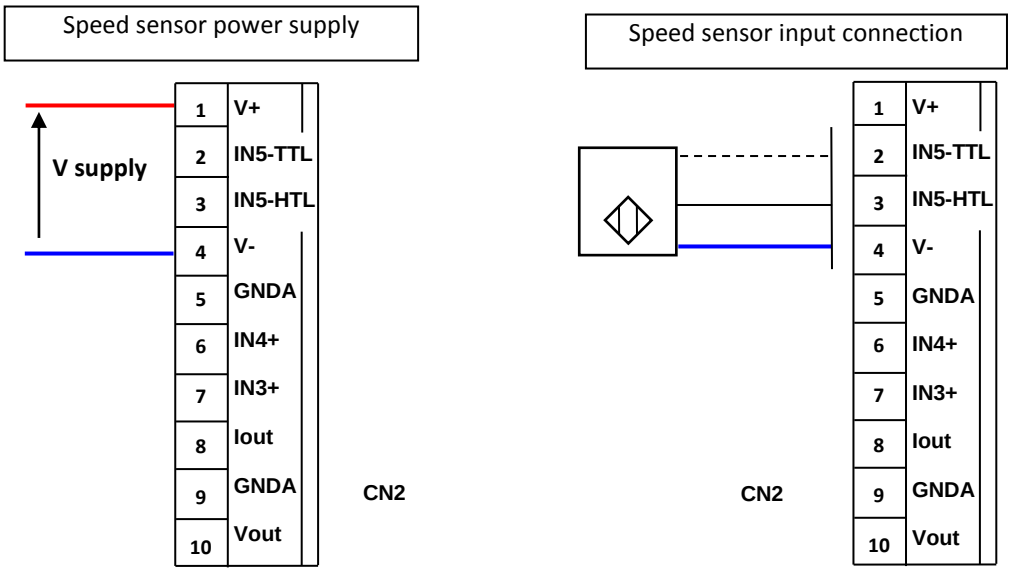
An analog board in current and voltage might be used with ***eNod4*** to provide IO+ version. This has to be requested when ordering ***eNod4*** product. The analog output is both current and voltage galvanically isolated at 1000V. *Voltage output* might be set either 0-5V or 0-10V, and the *current output* to 4-20mA, 0-24mA, 0-20mA or 4-20mA alarm 3.6mA. It is software setting and both output (current and voltage) might separately be enable.



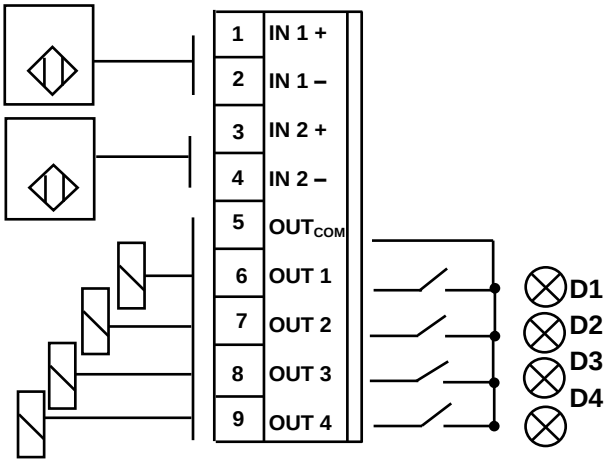
The IO+ version is fitted with two additional inputs IN3 and IN4:



The IO+ version is fitted with a pulse input and a dedicated power supply for a speed sensor (belt weigh feeder, belt weigher). Two input voltage levels are proposed for the pulse input of the speed sensor: TTL logical level or high voltage 30 V maxi level.



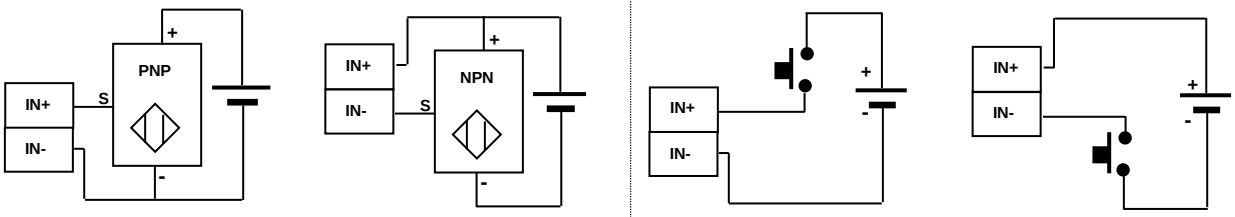
4.5 Inputs / outputs connections



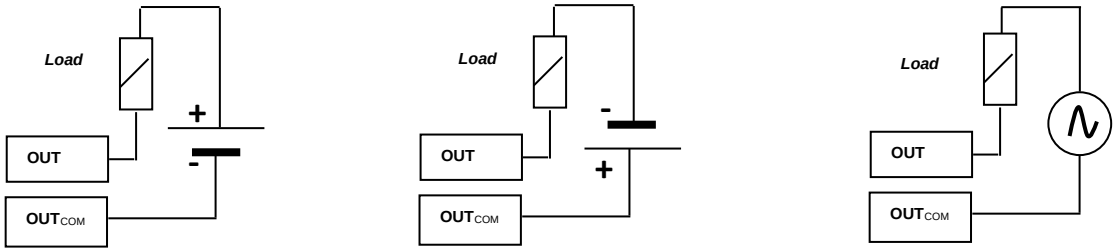
An indicator light in front panel is assigned to each Output.

4.5.1 Typical connections

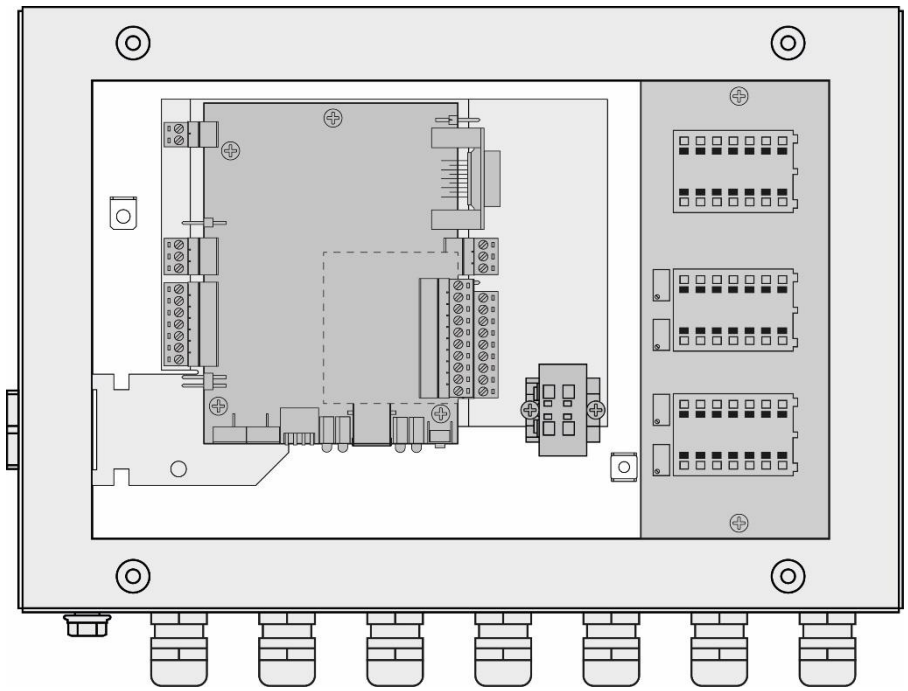
Inputs : Connection to a detector	*Inputs : Connection to a push button*



Outputs : Possible connections

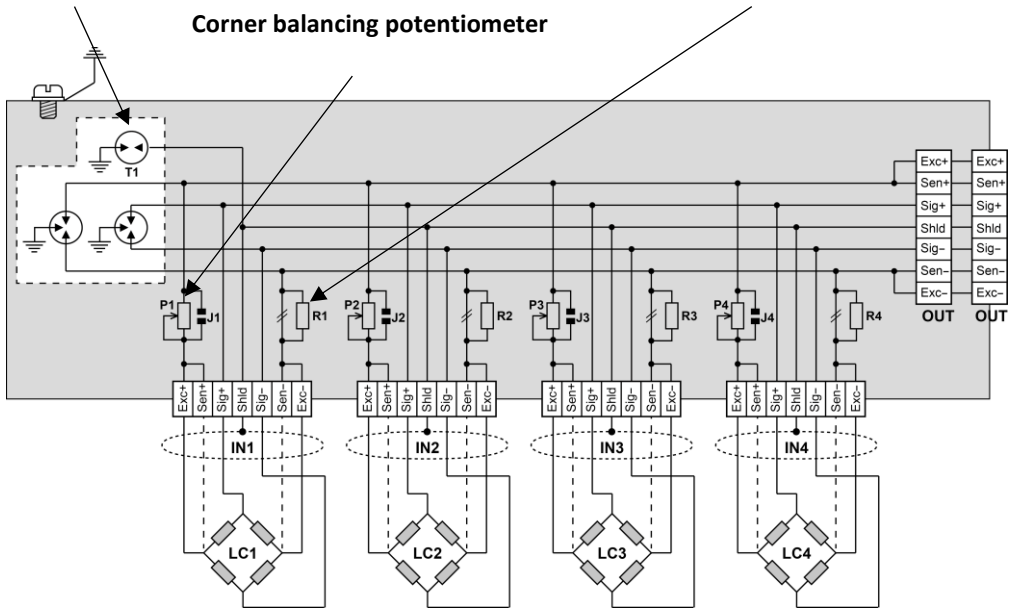


4.6 JB4 option



Optional overvoltage protection

Additional resistor for special use* (not supplied)



* cut strip conductor before insertion

4.6.1 Specifications

	Version Standard	*Version ATEX / IECEx*
Cable diameter (output)	*Ø 6 … Ø 11.5 mm*	*Ø 6 … Ø 10 mm*
Cable diameter (inputs)	*Ø 2.5 … Ø 7 mm*	*Ø 4 … Ø 8 mm*
Wire cross section	*0.14 mm² … 1 mm²*	
Cable stripping length	*7 …10 mm*	

4.6.2 Excitation trimming procedure

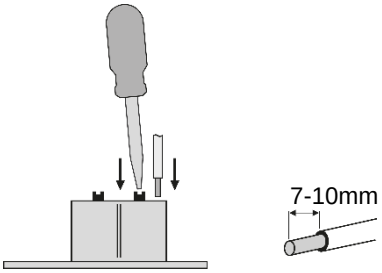
For load cells with matched outputs, shortcut the potentiometers by soldering bridges J1, J2, J3, J4.
First adjustment with reference weight:

1. Turn the potentiometers fully clockwise for each load cell so that the potentiometer resistance is as low as possible.
2. Lay your reference weight at one corner of your weighing system and note the result of the weighing indicator.
   Repeat this operation for each corner.
3. Spot the corner with the lowest output.
   Load successively each corner with the same reference weight and adjust at each step the potentiometer to match the lowest output corner value.
4. The load cells outputs are now matched.
   Then proceed to normal zero and gain adjustment of the weighing indicator.

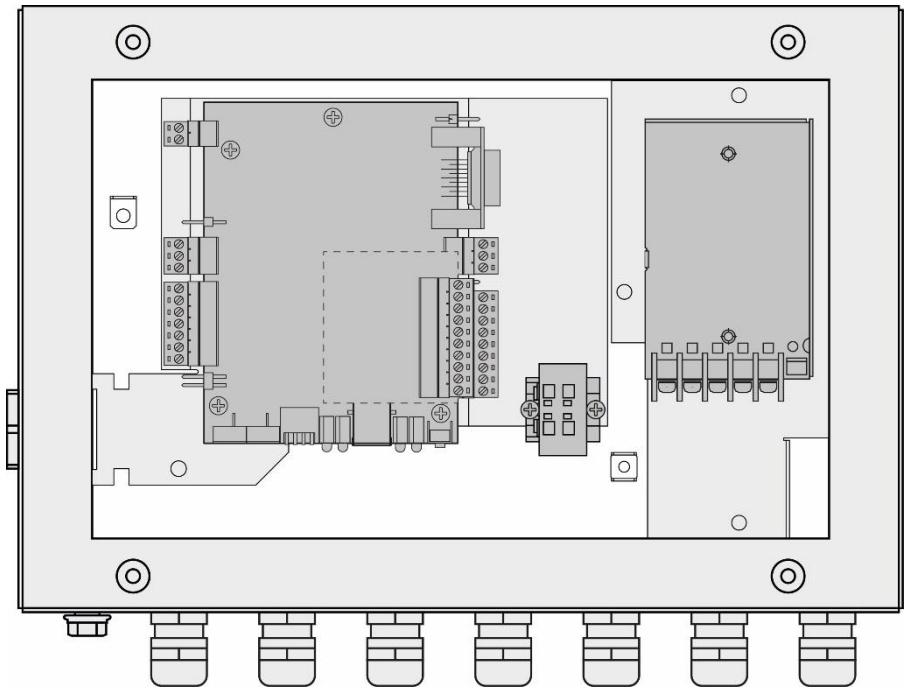
4.6.3 Spring terminal connections

Use a screwdriver with a maximum blade width of 3 mm.

1. Press the black button with the screwdriver.
2. Stick the wire end into the relevant opening.
3. Release the pressure on the screwdriver.
4. Pull slightly the cable to check it is held tight.



4.7 220V option



Plug the supplied power cord into the AC outlet.

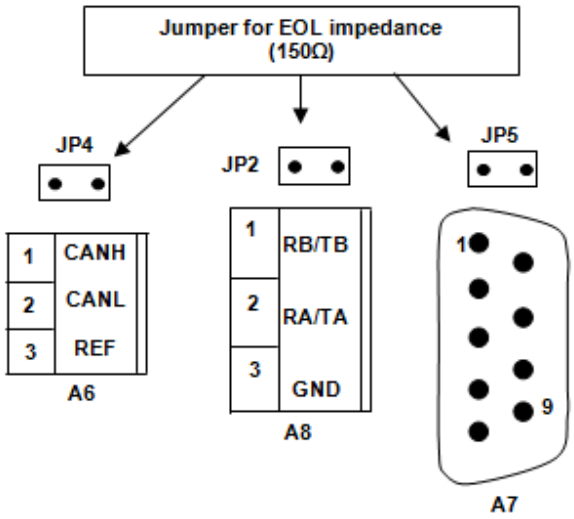
5 COMMUNICATION

5.1 Communication Interface connections

5.1.1 Process control communication

Version	Type of communication	Connector
eNod4 DIN	*RS485 Automate*	*A7*
	CAN	*A6*
eNod4 PRO DIN	*Profibus DP*	*A7*

- **Note:** For a better transmission quality on a RS485 or CAN communication network it must be wired to follow a line topology and must be terminated by an end of line (EOL) impedance at both ends. A 150Ω EOL impedance is available on ***eNod4***. To use this impedance set the corresponding jumper.



A7		
Pin	RS485 ModBus RTU / SCMBus	Profibus * DP-V1
1	N.C	N.C
2	N.C	N.C
3	RB / TB	Rx/Tx - P
4	N.C	N.C
5	Ref	Ref
6	N.C	5V
7	N.C	N.C
8	RA / TA	Rx/Tx - N
9	N.C	N.C

The ***PROFIBUS*** communication terminal is electrically isolated from power supply (isolation voltage: 1000V)
In PROFIBUS communication jumper JP5 must be removed. When ***eNod4*** is positioned at the end of the line, use specific connector DB9 for PROFIBUS with end of line resistor and bias resistors incorporated.
CAN communication is not electrically isolated from power supply. Admitted common voltage on CANBUS is ±27V from 0V power supply. Depending on installation configuration, the usage of opt couplers or other galvanic isolation devices is strongly recommended.

- ***Note****: If multiple elements connected to the CAN bus are using power supplies with different reference levels (0V); the problem mentioned above can occur.*

The data rate that can be transmitted on different buses depends on the length of the bus. The table below shows what are the transmission rates supported by eNod4 and the corresponding maximum bus length:

CAN bus		Profibus bus		
data rate	max bus length	data rate	max bus length	data rate
1 Mbit/s	*25 m*	***12 Mbit/s***	*100m*	-
800 kbit/s	*50 m*	***3 Mbit/s***	*100m*	-
500 kbit/s	*100 m*	***1.500 Mbit/s***	*200m*	*70m*
250 kbit/s	*250 m*	***500 kbit/s***	*400m*	*200m*
125 kbit/s	*500 m*	***187.5 kbit/s***	*1000m*	*600m*
50 kbit/s	*1000 m*[(1)]	***93.75 kbit/s***	*1200m*	*1200m*
		9.6 kbit/s	*1200m*	*1200m*

[(1)] For buses whose length is greater than 5000 m, the use of repeater type systems may be necessary to ensure the quality of transmissions.

[(2)] The network speed is set by the PROFIBUS master. ***eNod4 PRO DIN*** performs self-adjustment.
[(3)] Type A cable: AWG 22, impedance: 135 to 165Ω.
[(3)] Type B cable: AWG 24, impedance 100 to 130Ω.

5.1.2 PC communication

Both models: **eNod4 DIN** and **eNod4 PRO DIN** can communicate with a PC using the protocols **ModBus RTU** or **SCMbus** through the **USB** connector accessible from the front panel.

USB Communication stops AUX communication when used.

The appropriate **USB** driver can be downloaded from our website: http:// www.scaime.com, it is also available on CD to order from our sales department.

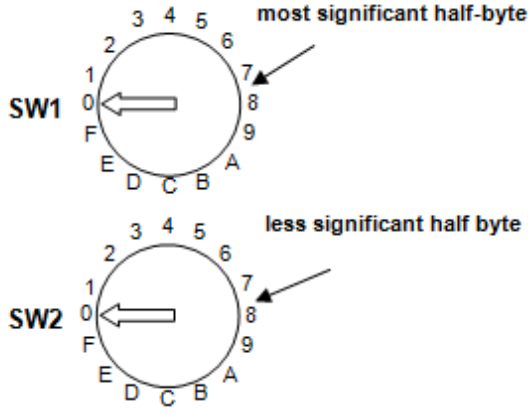
- **Note:** If **eNodView** software has been correctly installed, it is not necessary to re-install the **USB** drivers when connecting another **eNod4** on the same **USB** port (Windows only asks for the driver if the device is connected to another **USB** port).

5.1.3 AUX Communication (for HMI)

AUX ***eNodTouch*** HMI must be connected through connector **AUX** (A4). The common mode voltage admitted is ± 27VDC from GND power supply.
When ***eNod4*** is positioned at the end of the line the 150 Ω integrated resistor can be used (connecting jumper).

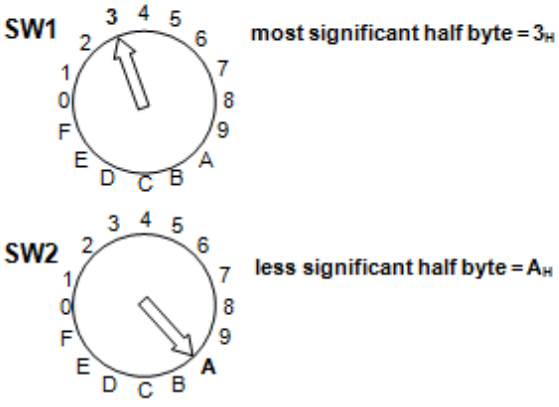
5.2 Communication address selection

Rotary switches selection (SW1 and SW2) accessible from the front panel. **The new address only is taken into account after a reset.**



- **Example**

eNod4 address = $3A_H = 58_d$



5.3 Communication rate selection

Dipswitch selection (SW3) is accessible from the front panel**. The new baud rate only is taken into account after a reset.**

Dipswitch				RS485 and USB Baud rate	CAN Bit rate
1	2	3	4		
ON	ON	ON	X	9600	50 kbit/s
OFF	ON	ON	X	19200	50 kbit/s
ON	OFF	ON	X	38400	50 kbit/s
OFF	OFF	ON	X	57600	125 kbit/s
ON	ON	OFF	X	115200	250 kbit/s
OFF	ON	OFF	X	9600	500 kbit/s
ON	OFF	OFF	X	9600	1 Mbit/s
OFF	OFF	OFF	X	9600	125 kbit/s

5.4 Protocoles de communication

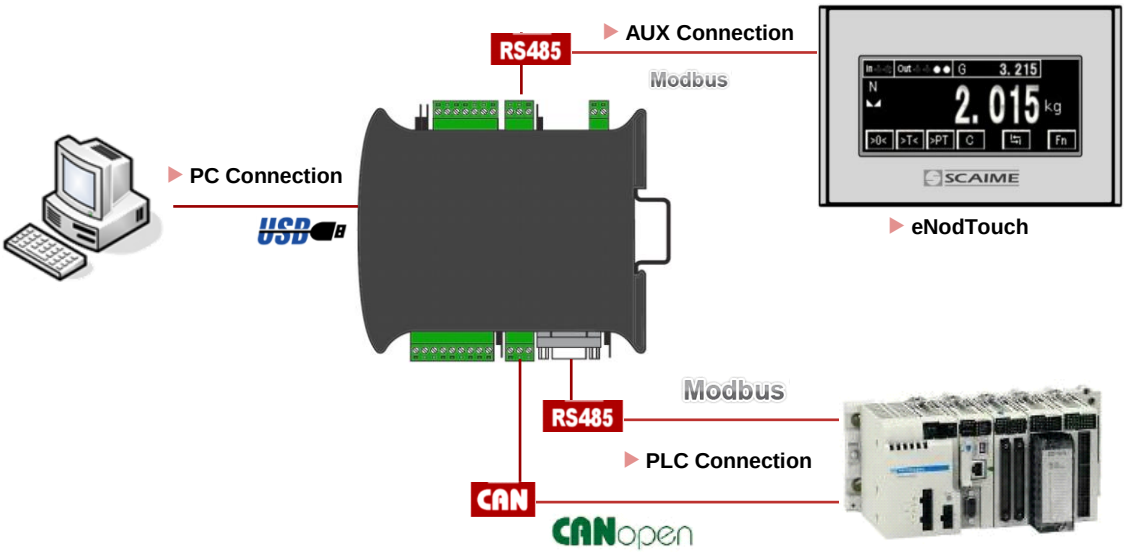
Version	*Communication interface*	*Protocols**	*Connector*	*LED on front panel*
eNod4 DIN	*RS485 PLC*	*ModBus RTU*	*A7*	*/*
	RS485 AUX	*ModBus RTU* *SCMBus*	*A8*	*/*
	USB	*ModBus RTU* *SCMBus*	*USB* *Front panel*	*USB*
	CAN	*CANopen®*	*A6*	*MS*
eNod4 PRO DIN	*Profibus*	*Profibus DP-V1*	*A7*	*NS*
	USB	*ModBus RTU* *SCMBus*	*USB* *Front panel*	*USB*

* See protocols description in document: ***eNod4 software user manual.***

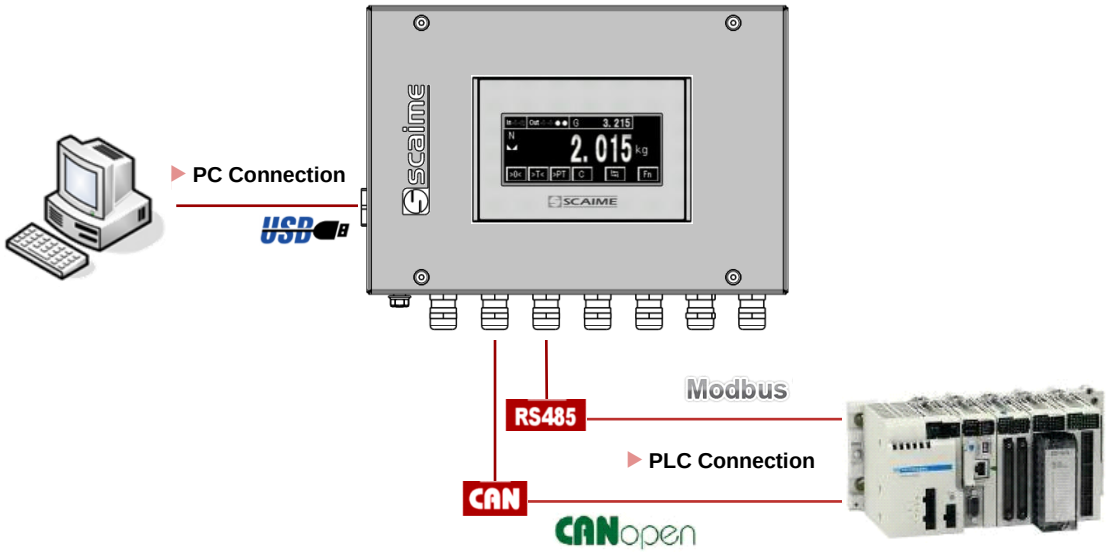
5.5 Simultaneous functioning of communications

5.5.1 Standard version

- **DIN version**



- **Box version**

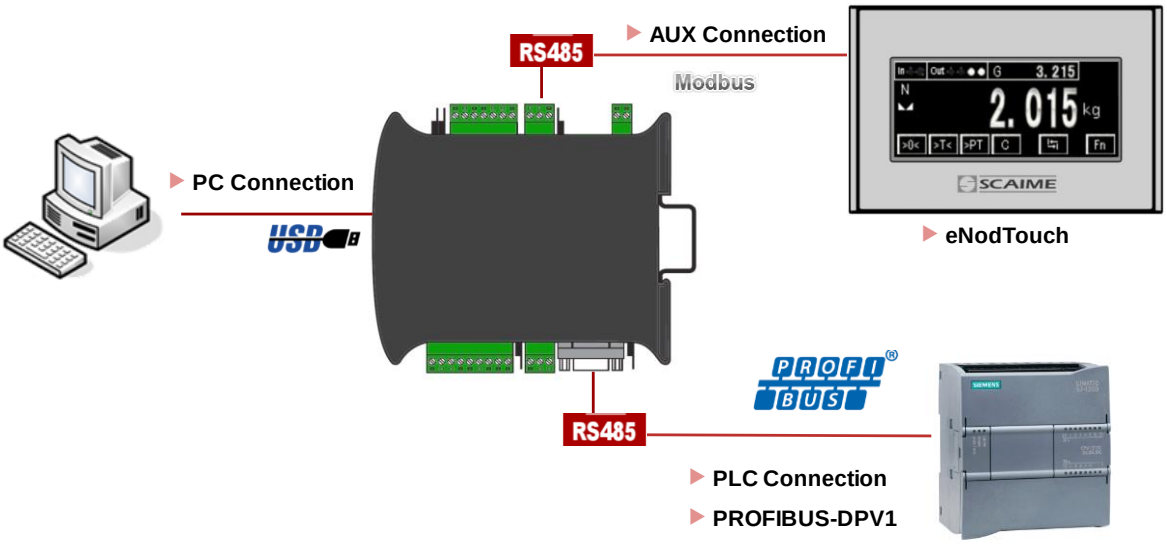


Simultaneous communication	RS 485 PLC	RS485 AUX	CAN
USB	yes*	No	yes*
RS 485 PLC		yes	No
RS485 AUX			yes*

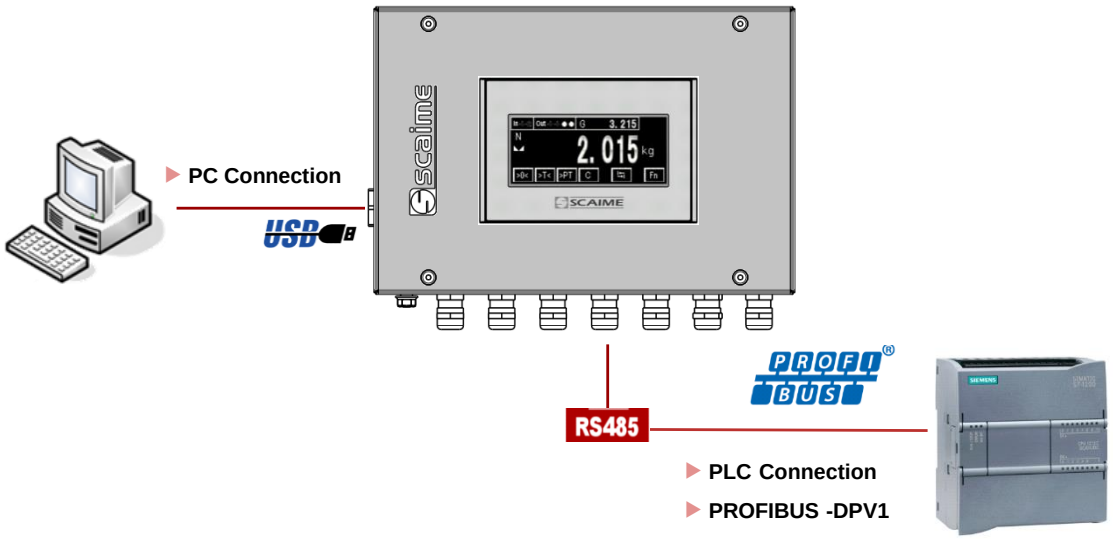
(*) *Simultaneous use of CAN or RS485 PLC with USB port can reduce performance of this interface.*

5.5.2 Profibus version

- **DIN version**



- **Box version**



Simultaneous communication	Profibus	RS485 AUX
USB	yes*	No
Profibus		yes*

(*) *Simultaneous use of Profibus with USB port can reduce performance of this interface.*

6 CALIBRATION AND SCALE ADJUSTMENT

eNod4 is factory calibrated to deliver **500 000 counts for 2mV/V** with a load cell on the **A3** input connector.
Initial calibration can be modified for a better adjustment to the usage or because of characteristics of the sensor. To achieve these various types of adjustments the following options and procedures are available:

- physical calibration
- theoretical calibration
- scale adjustment coefficient
- gravity correction

When using eNod4 for legal for trade purpose, it is imperatively required to activate the legal for trade switch BEFORE any calibration procedure (cf § legal for trade switch).

6.1 Physical calibration

Physical calibration is done by applying to the sensor **from 1 up to 3 known references**.

6.2 Theoretical calibration

The theoretical calibration allows defining ***eNod4*** user span **without using calibration reference**. The information needed to achieve the procedure is **the sensor sensitivity and its rated capacity**.
For example, a 15kg load cell with sensitivity equal to 1.870 mV/V at 15kg; put sensor maximum capacity 15 000 and sensor sensitivity 1,870.

6.3 Scale adjustment coefficient

Initial calibration value can be modified with a scale adjustment coefficient. This coefficient has maximum and minimum values.

6.4 Gravity correction

When ***eNod4*** is used to condition a weighing sensor, it can be necessary to adjust measurement if the place of measurement is different from the place where ***eNod4*** was calibrated. ***eNod4*** automatically adapts its span by storing into its non-volatile memory these 2 parameters: 'Calibration place g value' and 'Place of use g value'. Initial values for these coefficients are identical; they correspond to the g value of a calibration place located in ANNEMASSE FRANCE.

6.5 Scale interval

The scale interval is the difference between 2 consecutives indications. Possible values are: 1, 2, 5, 10, 20, 50, and 100.
Modification of scale interval is taking into account after a new calibration.

7 FILTERS

There are four available filtering levels which can be associated:

- filtering **related to the A/D conversion rate** including rejection of the mains frequency (50 or 60 Hz) harmonics.
- low-pass Bessel filter
- notch filter
- self-adaptive filter

7.1 Filtering related to the A/D conversion rate

The signal resolution is related to the conversion rate. The conversion rate might be chosen as low as possible, particularly for static applications. For dynamic applications, a compromise must be found between the measurement rate and the low-pass filter cut-off frequency. The ***eNodView*** software can be used to determine appropriate filter values. Choose a measurement rate that rejects the mains frequency harmonics according to the place of use, 50 or 60Hz.

7.2 Bessel low pass filter

A low-pass digital filter can be applied as an output of the A/D converter. The filter orders (available values are 2, 3 or 4) and cut-off frequency are adjustable. ***eNodView*** software can be used to determine appropriate filter values.

7.3 Notch filter

A notch filter might be applied as an output of the low-pass filter (if used) or the A/D converter. It allows attenuating the frequencies within a band defined by high and low cut-off frequencies. The ***eNodView*** software can be used to determine appropriate filter values.

7.4 Self-adaptive filter

This filter can be set in cascade after previous filters. It is particularly efficient for static measurements but avoid using it in dynamic or dosing processes. The aim of this filter is to eliminate erratic measurements and to average consistent measurements.

8 MEASUREMENT AND STATUS

The ***eNod4*** transmits measure after signal and data processing through different protocols available. The accessible variables are:

8.1 Gross measurement

The *'gross measurement'* stands for the digital value after measurement scaling. It is affected by all the *'zero'* functions (power-up zero, zero tracking and zero requests). Zero request value can be saved in non-volatile memory (option).

8.2 Net measurement

The *'net measurement'* stands for the digital value after measurement scaling and tare subtraction.

8.3 Tare value

The *'tare value'* stores the calibrated value that is subtracted from the *'gross measurement'* so as to give the *'net measurement'*. This value can be saved in non-volatile memory (option).

8.4 Factory calibrated points

The *'factory calibrated points"* contains the measurement value without the user calibration layer. It is directly linked to the analog input voltage.

8.5 Logical IN/OUT level

The *'logical IN/OUT level'* allows reading any time ***eNod4*** logical inputs and outputs level.

8.6 Preset Tare value

A previous calculated tare can be restored using this variable. This value can be saved in non-volatile memory (option).

8.7 Measurement status

The measurement status contains information on eNod4 measurement parameters.

8.8 Weighing diagnosis

8.8.1 Global weighing diagnosis

An internal alarm flag reflects the integrity of the whole measurement chain. It's used to set logical output active or optional analog output in an error mode in order to warn about any defection on the measurement chain (defective measurement).
This variable is set active when at least one of the followings conditions occurs:

- sensor input control result out of tolerances
- sensor input control command in progress
- sensor input control command failed (timeout)
- sensor input reference command in progress
- gross meas. < (- max capacity)
- gross meas. > (max capacity)
- analog signal out of the A/D converter input range
- EEPROM failure

This internal alarm flag is featured with adjustable specific de-bounced time and minimal activation time.

8.8.2 Sensor input control

eNod4 features a weighing diagnosis system allowing to check the integrity of analog sensor input by electrically simulating a load, resulting to a simulated weight value. This diagnostic system can be used together with the others defects detection systems in order to achieve overall integrity check of the measurement chain. This system involves two phases initiated by the user:

- The first, just after user calibration, allows taking a simulated reference weight value when the measuring chain integrity is OK.
- The second, when the user wants to check the integrity of the system, allows to make the difference between a new simulated weight value and the reference. Then this difference can be compared with a dedicated maximum tolerance value.

9 LOGICAL INPUTS

Each input can work individually in either positive or negative logic. A holding time (de-bounced time) attached to all inputs can be configured.

9.1 Inputs assignment

Inputs can be assigned individually to one of the following functions:

- none
- tare
- zero
- send measurement
- measurement window
- cancel tare
- sensor input control

Function	*Functioning mode*
	transmitter
None	●
Tare	●
Cancel tare	●
Zero	●
Measure transmission (SCMBus/Fast SCMBus only)	●
Continuous measure transmission (SCMBus/Fast SCMBus only)	●
Sensor input control	●

9.2 Inputs function description

9.2.1 None

Inputs have no effect.

9.2.2 Tare

Each input can be assigned to the **tare** function. Depending on the chosen logic (positive or negative) for the corresponding input, tare is triggered by a falling or rising edge.

9.2.3 Cancel Tare

Depending on the chosen logic (positive or negative), the tare is cancelled by a falling or rising edge of the corresponding input.

9.2.4 Zero

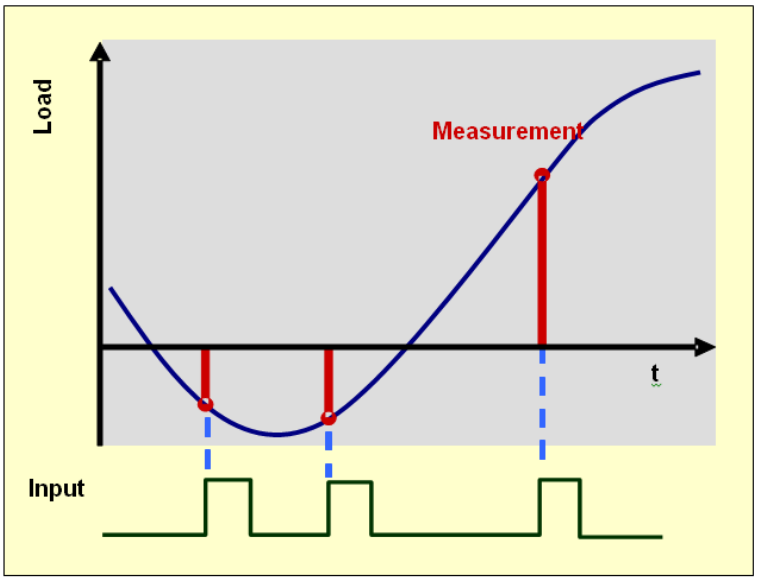
Each input can be assigned to the **zero** function. Depending on the chosen logic (positive or negative) for the corresponding input, zero acquisition is triggered by a falling or rising edge.
A new zero is acquired only if its value is within a range ± 10% of maximum capacity or ± 2% if ***eNod4*** is in legal for trade functioning mode. This new value is the useful zero value, a reset cancels it.

9.2.5 Measure transmission (SCMBus/fast SCMBus only)

The request can apply to:

- gross measurement
- net measurement
- factory calibrated points

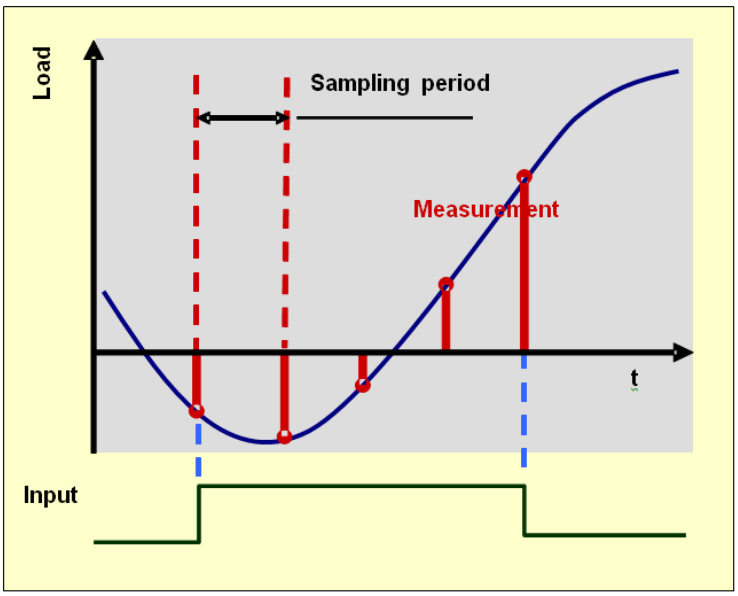
A single measurement is transmitted per rising or falling edge (depending on the configured logic) on the input signal.



9.2.6 Continuous measure transmission (SCMBus/fast SCMBus only)

The request can apply to:

- gross measurement
- net measurement
- factory calibrated points



While the input is kept at the right level, a series of measurements are transmitted at the period defined by the *'sampling period'* setting. If the 2 inputs are assigned to this function, only input 2 is operating.

9.2.7 Sensor input control

The assignment of logical input to sensor input control function allows performing special procedure to diagnose load cell sensor input. Beforehand, user must acquire reference value of the load cell input by sending '*Sensor input control reference'* specific command (e.g. after the device is calibrated).
Note: Load cell sensor input control must be realized if no process cycle is in progress.

10 LOGICAL OUTPUTS

Each output can be individually set to positive or negative logic.

10.1 Outputs assignment

Outputs can be assigned individually to one of the following functions:

Function	*Functioning mode*
	Transmitter
None	●
Set point	●
Motion	●
Defective measurement	●
Input image	●
Level on request	●

10.2 Description

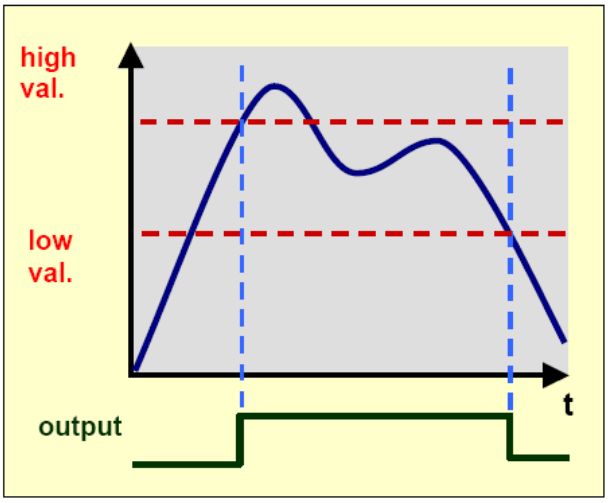
10.2.1 None

The output has no function.

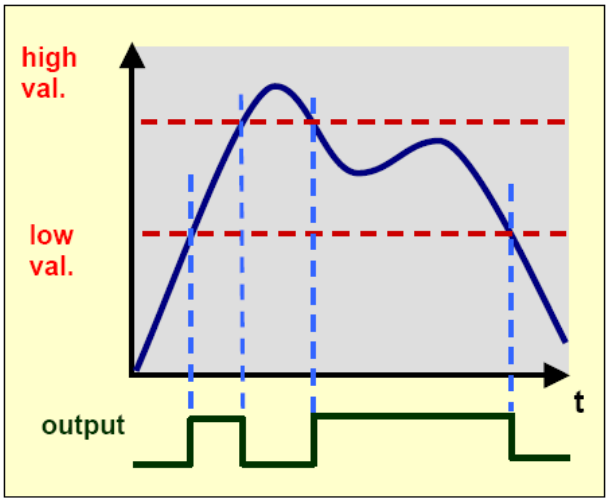
10.2.2 Set point

The outputs can be assigned to configurable set points. Output 1 is assigned to set point 1, output 2 to set point 2 and so on.
Set points can be assigned to gross measurement or net measurement and are defined by a high value, a low value and a functioning mode.
Two functioning modes are possible:

- Hysteresis
- Window



Functioning in hysteresis
Fig. 2



Functioning in window
Fig. 3

10.2.3 Motion:

The outputs can be assigned to measurements stability criteria.

10.2.4 Defective measurement:

The output level is set when the internal alarm flag described in “Weighing diagnosis” § in the MEASUREMENT AND STATUS § is activated. This allows to warn about defection of the measurement chain.

10.2.5 Input image:

Outputs can be assigned to copying inputs state, either using the same logic or inverting the input state (negative logic). Outputs 1 and 3 can be assigned to input 1 and outputs 2 and 4 to input 2.

10.2.6 Level on request:

Activation of outputs is triggered by master requests.

10.3 Analog output (IO+ version)

An optional analog board in *current* and *voltage* might be used with ***eNod4*** to provide IO+ version. This must be asked when ordering ***eNod4*** product.
Voltage output might be set either 0-5V or 0-10V, and the current output to 4-20mA, 0-24mA, 0-20mA or 4-20mA with alarm at 3.6mA. Both output (current and voltage) might separately be enable. Settings are effective after ***eNod4*** reset.
Analog output affectation function is common to both *current* and *voltage* output and might be assigned to followings:

- **None:** analog outputs have no function.
- **Gross measurement:** analog outputs can be assigned to gross measurement copy. Maximal level value is related to ***Maximum Capacity*** parameter and works in mono-quadrant functioning. Bi-quadrant option can only be applied to gross measurement copy. When this option is activated, the lowest value of current and voltage levels corresponds to -***MC*** and the highest value to +***MC***.
- **Net measurement:** analog outputs can be assigned to net measurement copy. Maximal value is related to ***Maximum Capacity*** parameter and works in mono-quadrant functioning only. The highest value of current and voltage levels corresponds to +***MC*** in only one quadrant.
- **Level on request:** analog outputs are driven by master requests through the ***external value to control analog output*** variable (in 0.01% of the full scale of current or voltage analog outputs).

When analog output is assigned to “Gross measurement” or “Net measurement” its value jumps to a special error value when the internal alarm flag described in “Weighing diagnosis” § in the MEASUREMENT AND STATUS § is activated. This allows to warn about defection of the measurement chain.

11 ENODTOUCH – USER INTERFACE (OPTIONAL)

11.1 Online functioning

11.1.1 Startup screens

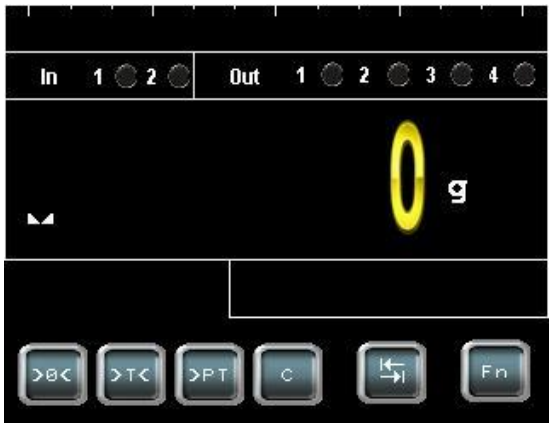
- At first Power-On, eNodTouch is set to manage one eNod4 at the address 1, the connection screen is displayed while eNodTouch try to communicate with connected eNod4 device.
- Then a redirection screen appears during 3 seconds for a redirection to a main screen if the communication is established between eNodTouch and eNod4 communication or an error screen if eNodTouch does not manage to connect to the eNod.
- If there is no eNod4 connected or if the display unit cannot communicate with eNod4 device, a communication error screen appears. In this case, check the wiring between eNodTouch and eNod4 (§ *Electrical Powering*) and check that the communication parameters of eNodTouch and eNod4 are correct (§*Peripheral – Device PLC Settings*).

Connection screen

Communication error screen

Redirection screen

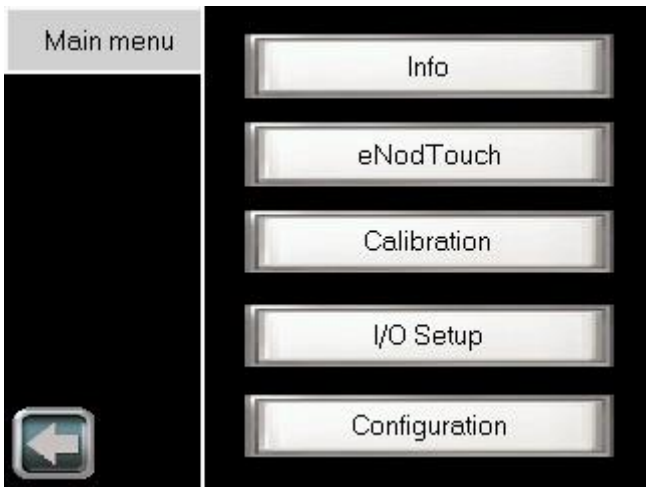
- When communication is established the main screen of eNod4 appears:



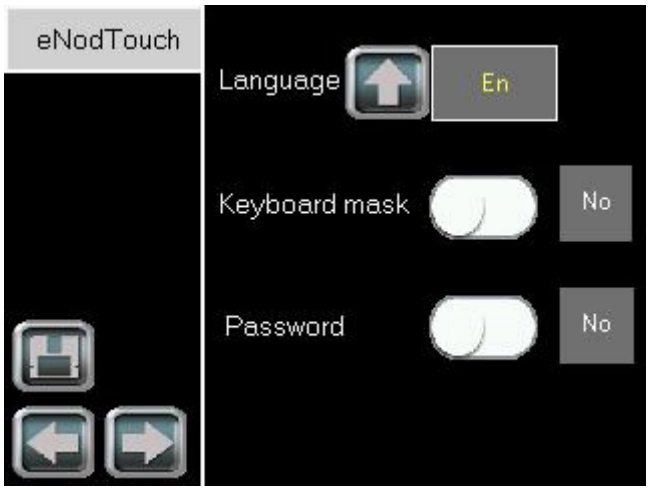
11.1.2 Multi-eNod screens

11.1.2.1 Increase eNod number

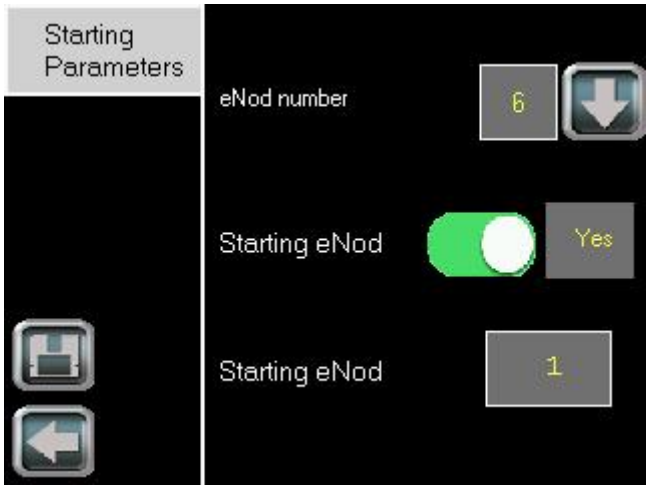
- To increase the eNod number and have an access to the multi-eNod screen, please follow the procedure:
  - Touch the Fn button of the main screen, the main menu appears.
  - Enter in the eNodTouch menu.
  - Go to the Starting Parameters screen by touching the right arrow button.



Main Menu



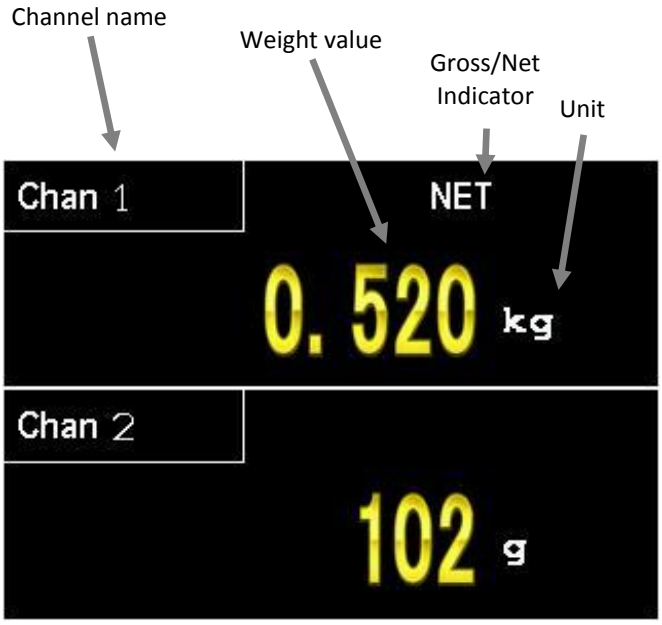
eNodTouch menu



Starting parameters

- By default the eNod number is 1, eNodTouch starts on the main screen of the first eNod.
- Increase eNod number if needed. The display module can start on the main screen of any eNod or on the multi-eNod screen by disabling « Starting eNod » function.
- If starting eNod is disconnected or have communication problems, the multi-eNod screen appears.
- When settings are finished, touch the left arrow button, to restart eNod Touch.

- According to the number of eNod settled, eNodTouch redirects to the following multi-eNod screens:



Multi eNod (2 eNod)

Multi eNod (3 eNod)

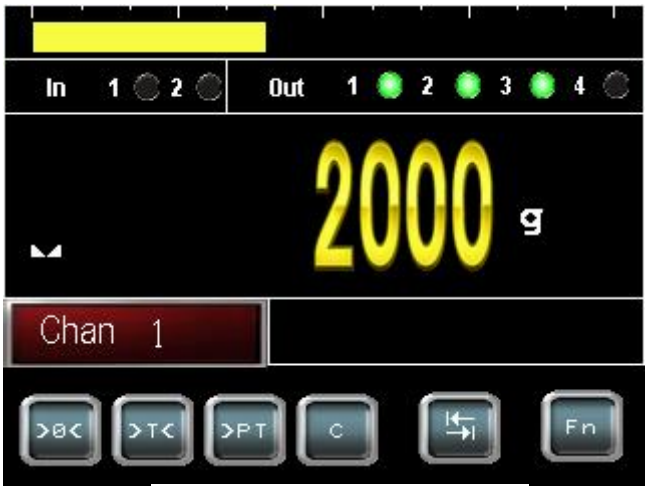
Multi eNod (4 eNod)

Multi eNod (5 eNod)

Multi eNod (6 eNod)

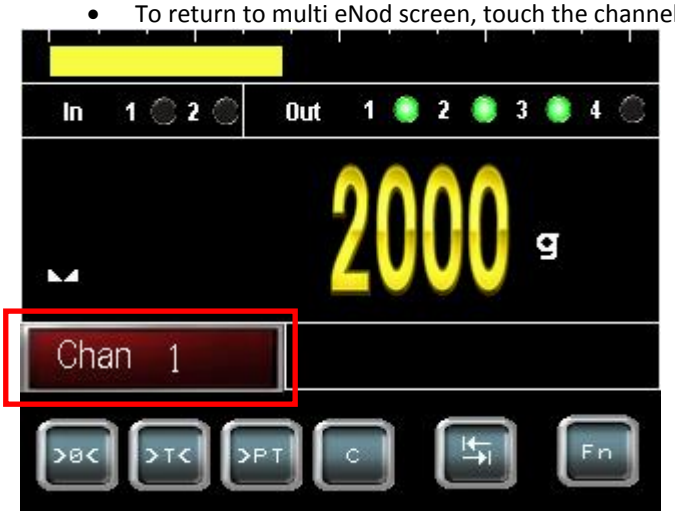
11.1.2.2 Select an eNod

Touch its display area



Main screen of eNod

- To display the main screen of an eNod, touch its display area (Example for eNod n°1):
- To return to multi eNod screen, touch the channel red button:



Touch of channel display

Multi-eNod screen

11.1.2.3 Communication error and disconnection

- When an eNod4 has communication problems or is disconnected, the data from other channels freezes for 5 seconds. During this time, a reconnection button appears, eNodTouch tries to recover the connection with eNod4.

- After 5 seconds if eNodTouch can not recover the connection with eNod4, the button enters in the state « eNod disconnected », the data display resumes.

- Identify the communication problem in the following list: wiring problem (§1.4), communication parameters misconfigured on eNodTouch or eNod4 (§2.2.3).
- When you found out the issue, touch the « eNod disconnected » button to re-establish the communication.
- The display module tries to recover the communication with eNod4 during 1 second, the button toggles to the « Reconnection » state. After 1 second if data from the eNod4 appears, the communication is re-established, else the button toggles to « eNod disconnected » state.

11.1.3 Main screen

11.1.3.1 Transmitter Mode (eNod4-T)

- To switch from the main keyboard to the 2nd keyboard touch 
- To switch from the main screen to the multi-eNod screen touch 

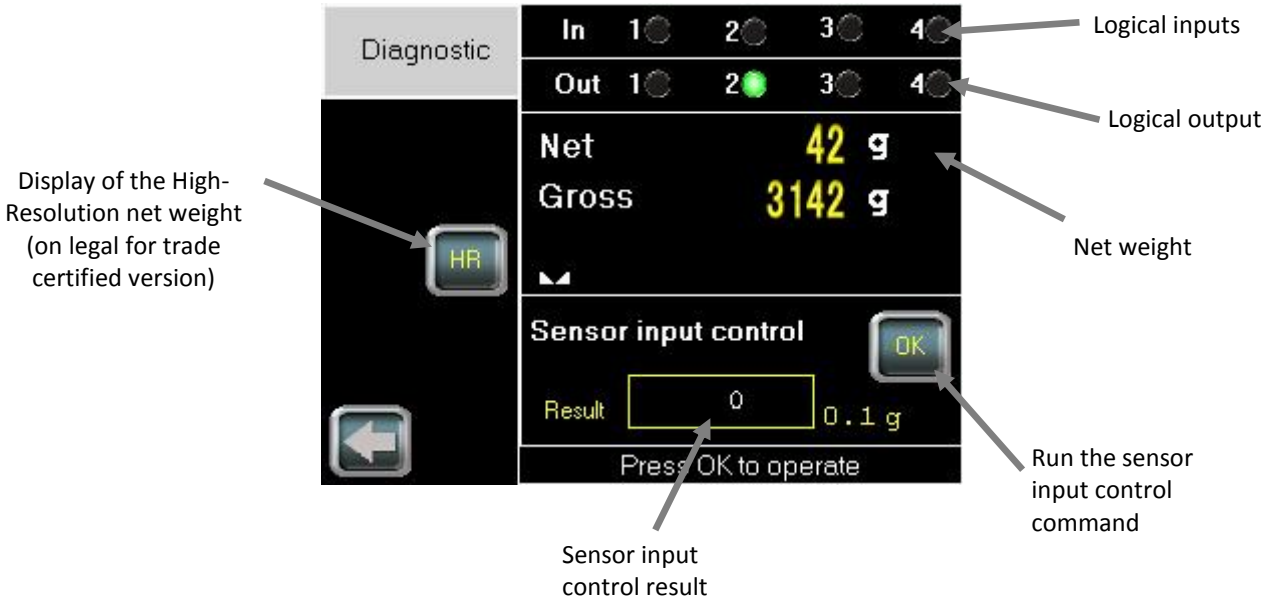
11.1.3.2 Keyboard functions

eNod4 model	Key	Action
Main Keyboard and 2nd Keyboard		
All		ZERO function: possible only under stability condition, according to stability criterion *NOTE: The ZERO function allows to reset the gross measurement. It is only available if the measured value is included in +/- 10% of the full scale.*
		TARE function: possible only under stability condition, according to stability criterion *NOTE: The TARE value is the value subtracted from the gross measurement to get the net measurement.*
		PRESET TARE function *NOTE: A previous calculated TARE can be restored using this variable.*
		CANCEL TARE function *NOTE: Cancel TARE allows to switch back to the gross measurement display.*
		Shift to 2nd keyboard
		Enter to Setup menu
		Access to thresholds adjustment screen (in Transmitter mode)
		Enter in the Quick Access Menu that give access to sensor input diagnosis and allows to set applicative target weights for eNod4-C, D, F and B. Quick access can be configured to manage what is accessible in this menu for eNod4-D and F.
		Weighing result acquisition (DSD) only in transmitter functioning mode.

eNod4-C		DYNAMIC ZERO function: Zero calculation (measurement averaging) without stability condition *NOTE: Dynamic ZERO function has the same result as the ZERO function except that the stability condition is not existing anymore (only measurement averaging).*
eNod4-D and F		SUSPEND DOSING: Allows suspending the ongoing dosing batch cycle. **D:** only possible when the "Suspend/Resume cycle allowed". **F:** only possible when batch mode is activated. To resume the cycle touch, START CYCLE.
		MANUAL EMPTYING: **D:** Visible only in filling mode with Manual Emptying mode. Allows to activate the emptying logical output during the emptying phase. **F:** Start the extraction until the empty hopper level is reached.
eNod4-C, D, F and B		START CYCLE: **C:** Start Checkweigher cycle. **D:** Start the dosing cycle if starting conditions are satisfied. **F:** Start feeder cycle and the extraction. **B:** Start Belt dosing cycle. Invisible if process cycle is ongoing.
eNod4-D, F and B		STOP CYCLE: Stop the dosing cycle. The dosing counter is not incremented for eNod4-D.
eNod4-F		REFILLING: Allows starting manual refilling. A touch when refilling is ongoing stops the refilling. Visible only if hopper's weight is under high refilling level. Any way refilling will stop automatically if hopper's weight reaches high refilling level.
eNod4-B		DYNAMIC ZERO function: In belt mode and when the system is running, after receiving a "dynamic zero" command eNod4 calculates the average of integrated weight per length during the belt revolution time.
eNod4-B		STOP and RESTART PID at each cycle step.
eNod4-F and B		RESET TOTALIZATION: Reset the totalization value.

11.1.3.3 Diagnostic (available depending on version)

- The Quick Access diagnostic screen can be called directly from the main screen with the touch 
- The Diagnostic screen can be called using the key 

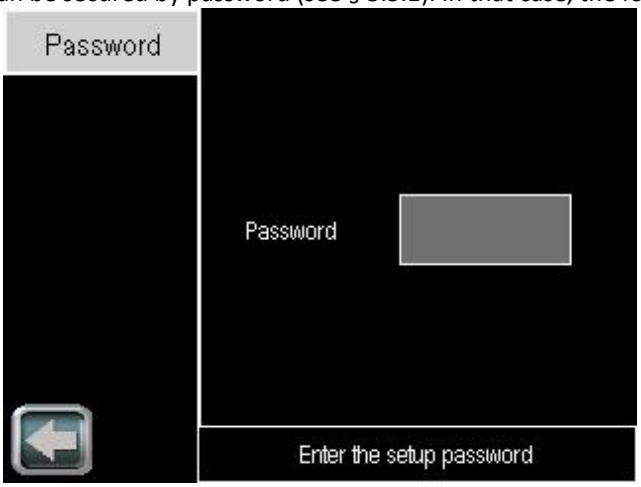


NOTES:

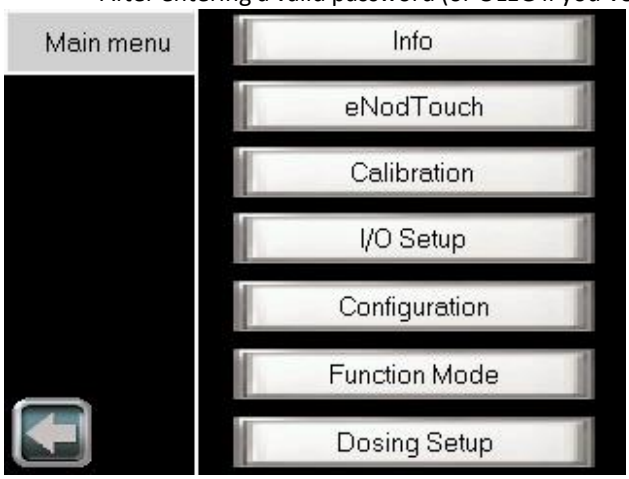
- Sensor input reference must be performed before using the sensor input control functionality, see Sensor Input control Parameters menu in the Configuration Setup chapter.
- When you press the HR key, the High-Resolution net weight expressed in tenth of the user weight unit is displayed during 5 seconds. This may be used for weighing system metrological qualification.

11.1.4 Main setup menu

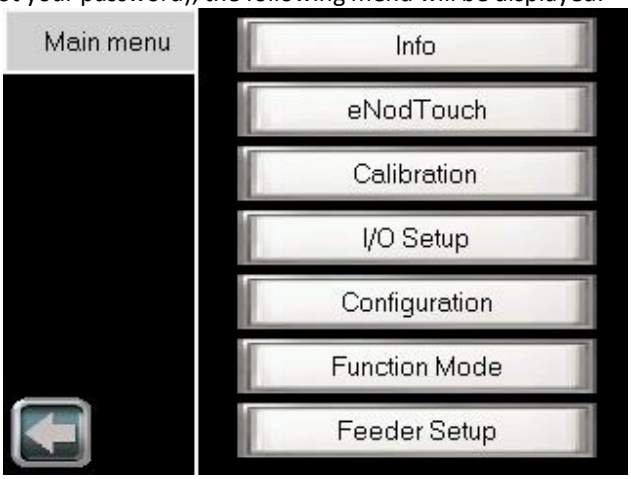
- eNodTouch setup menu allows to display and modify all the eNod4 parameters. For more information about parameters, consult eNod4 software manuals.
- Setup menu access can be secured by password (see § 3.5.1). In that case, the following screen is displayed:



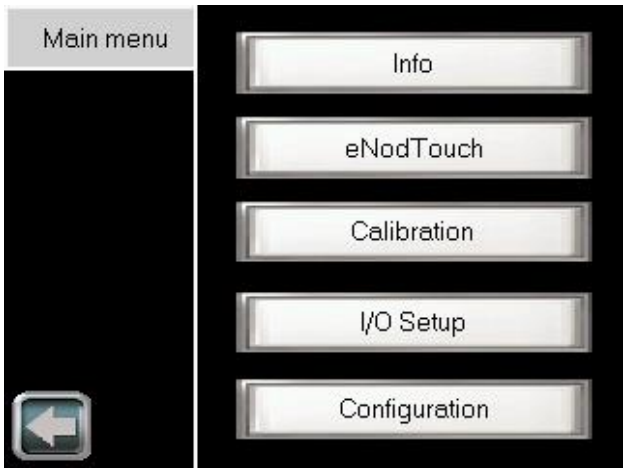
- After entering a valid password (or OLEG if you've forgot your password), the following menu will be displayed:



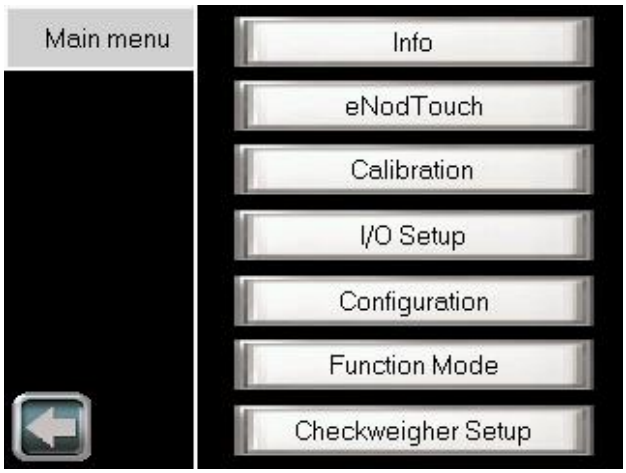
eNod4-D : Dosing Modes



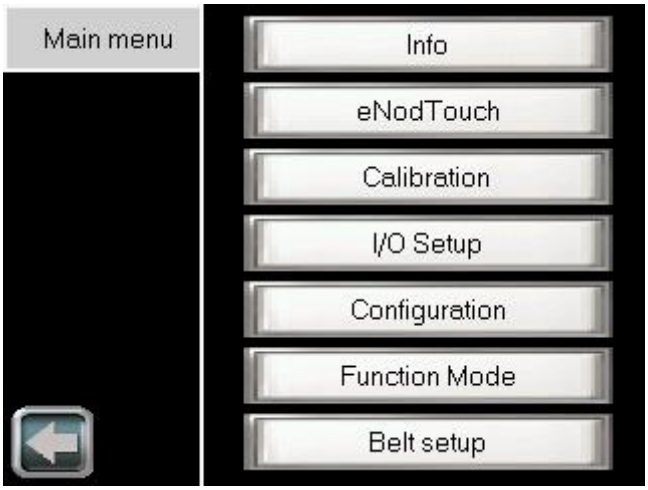
eNod4-F : Dosing Modes



eNod4-T : Transmitter Mode



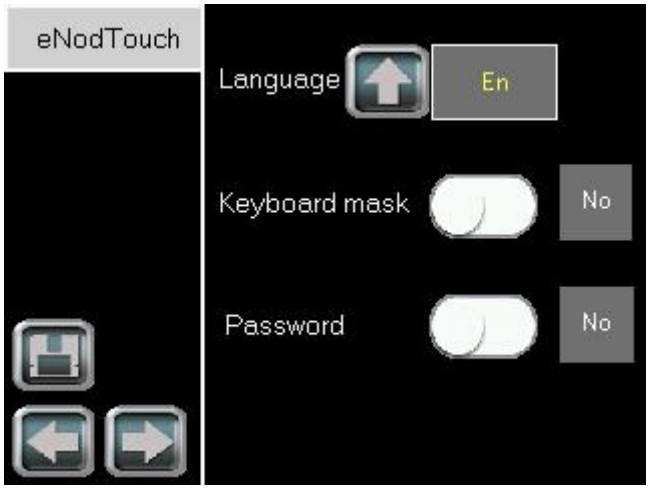
eNod4-C : Checkweigher Mode



eNod4-B: Dosing modes

11.1.4.1 eNodTouch setup

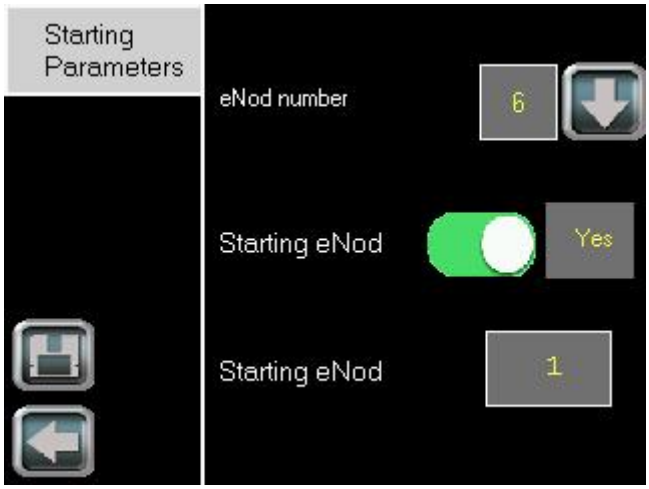
Parameter	Possible Value	Description



Language	[Fr], [En]	Change the language of eNodTouch software
Keyboard mask	[Yes], [No]	Enable/Disable keyboard display on main screen
Password	[Yes], [No]	Enable/Disable access protection to setup menu
	4 Char	By default, “OLEG” is a master password always valid

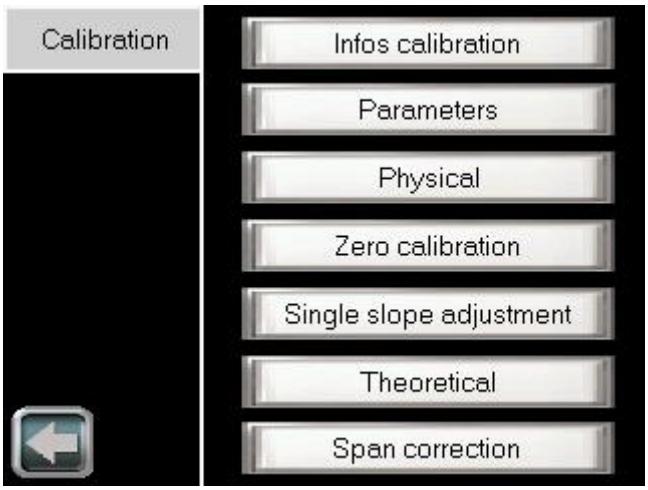
11.1.4.2 Starting parameters

Parameter	Possible value	Description



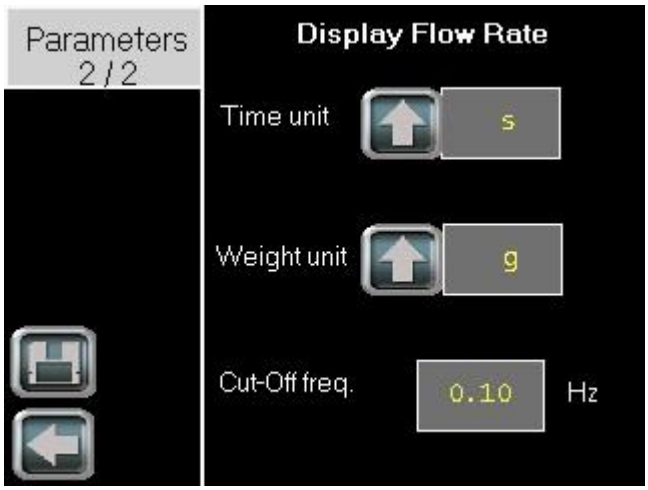
eNod number	1-6	Number of eNod4 supported
Starting eNod	[Yes], [No]	Enable/Disable the function to start on main screen of a specific eNod
	1 – eNod Number	Number of starting eNod4. If there is only one eNod4 supported this function is necessarily activate.

11.1.4.3 Calibration setup



When using eNod4 for legal for trade purpose, it is imperatively required to activate the legal for trade switch BEFORE any calibration procedure (cf § legal for trade switch).

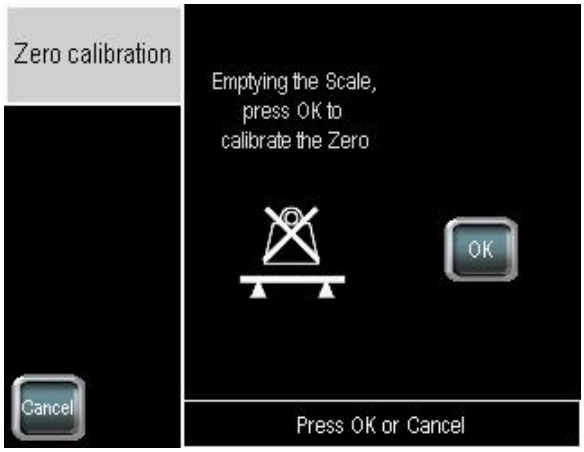
Parameter	Possible Value	Description
Calibration Parameters		

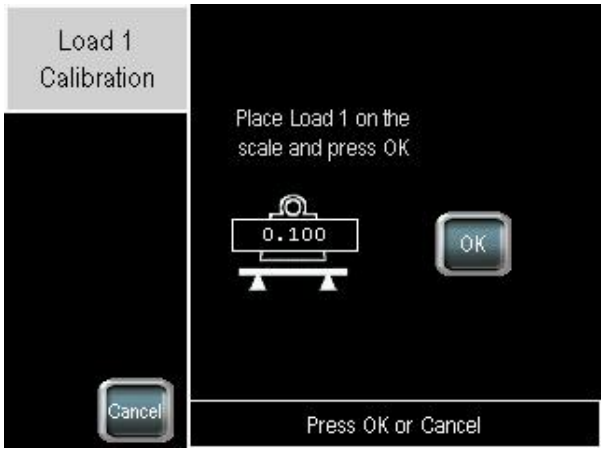


Range	0 – 10 000 000	Maximum weighing capacity
Division	1, 2, 5, 10, 20, 50	Difference between two consecutive indicated values
Decimals	0-7	Position of decimal point
Weight unit	4 visible char	Weight measurement unit (g, kg, t, lb…) using for calibration
Time unit	s, mn, h	Time unit using for calibration (eNod4-F and B). Only s and h can be selected in eNod4-B.
Weight unit (display flow rate)	g, kg, t	Weight unit of flow rate which is displayed on main screen.
Time unit (display flow rate)	s, mn, h	Time unit of flow rate which is displayed on main screen.
Cut-off frequency (display flow rate)		Cut-off frequency of flow rate which is displayed on main screen.

Physical calibration

Allows creating relation between the weighing sensor and the physical values.





Number of loads	1, 2, 3	Number of calibration loads used during the physical calibration.
Load 1/2/3	1 – 1 000 000	Weight values corresponding to each calibration segment.

The steps of this physical calibration operation are the followings :

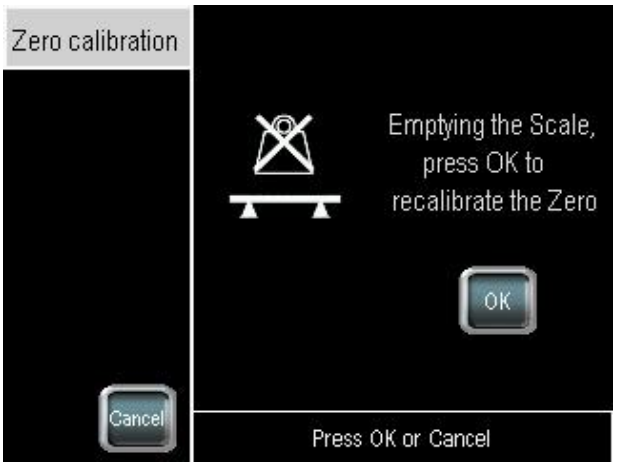
1. Define the number of points to realize the calibration and the load values for each,
2. Press  ,
3. Emptying the scale and press  ,
4. Wait for the end of data acquisition,
5. Place the Load 1 and press  ,
6. Wait for the end of data acquisition,
7. Repeat steps 5 and 6 (if several points have been defined).

Remark : If you press  , the operation will stop and the values will not be saved.

The latest valid calibration values will be restored.

Zero Calibration

Allows acquiring stable measurement with no load on the scale to set the calibration Zero



The steps of this zero calibration operation are the followings :

1. Emptying the scale and press  ,
2. Wait for the end of data acquisition.

Remark : If you press  , the operation will stop and the values will not be saved.

The latest valid calibration values will be restored.

Single slope adjustment

Allows acquiring stable measurement with a load on the scale to set the first segment. Performing physical calibration in this way do not allows multiple segments calibration. Use this calibration method only if you cannot acquire the segment calibration immediately after the Zero calibration (e.g.: big hopper). Zero calibration must have been done before.

The steps of this single slope adjustment operation are the followings :

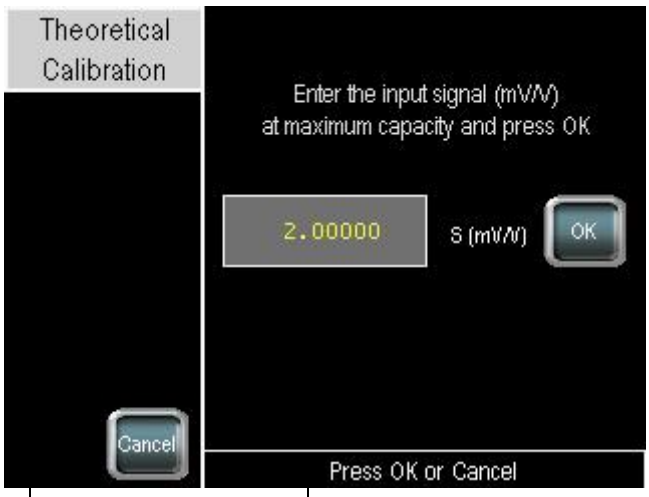
1. Define the number of points to realize the calibration and the load values for each,
2. Press  ,
3. Place the Load 1 and press  ,
4. Wait for the end of data acquisition,
5. Repeat steps 3 and 4 (if several points have been defined).

Remark : If you press  , the operation will stop and the values will not be saved.

The latest valid calibration values will be restored.

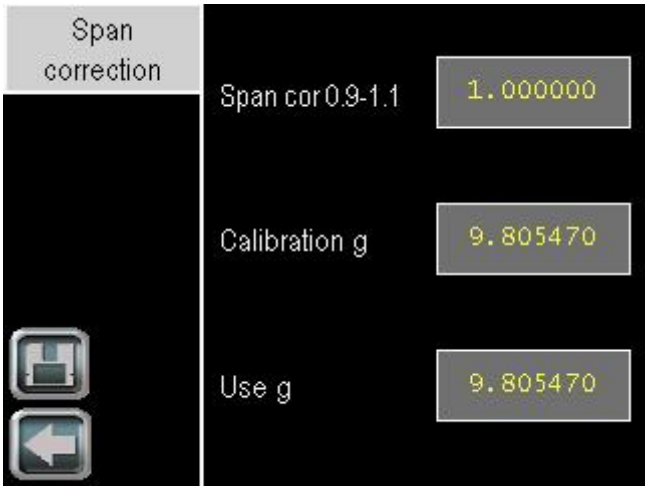
Theoretical calibration

An automatic scaling to migrate from the factory calibration to the user calibration.



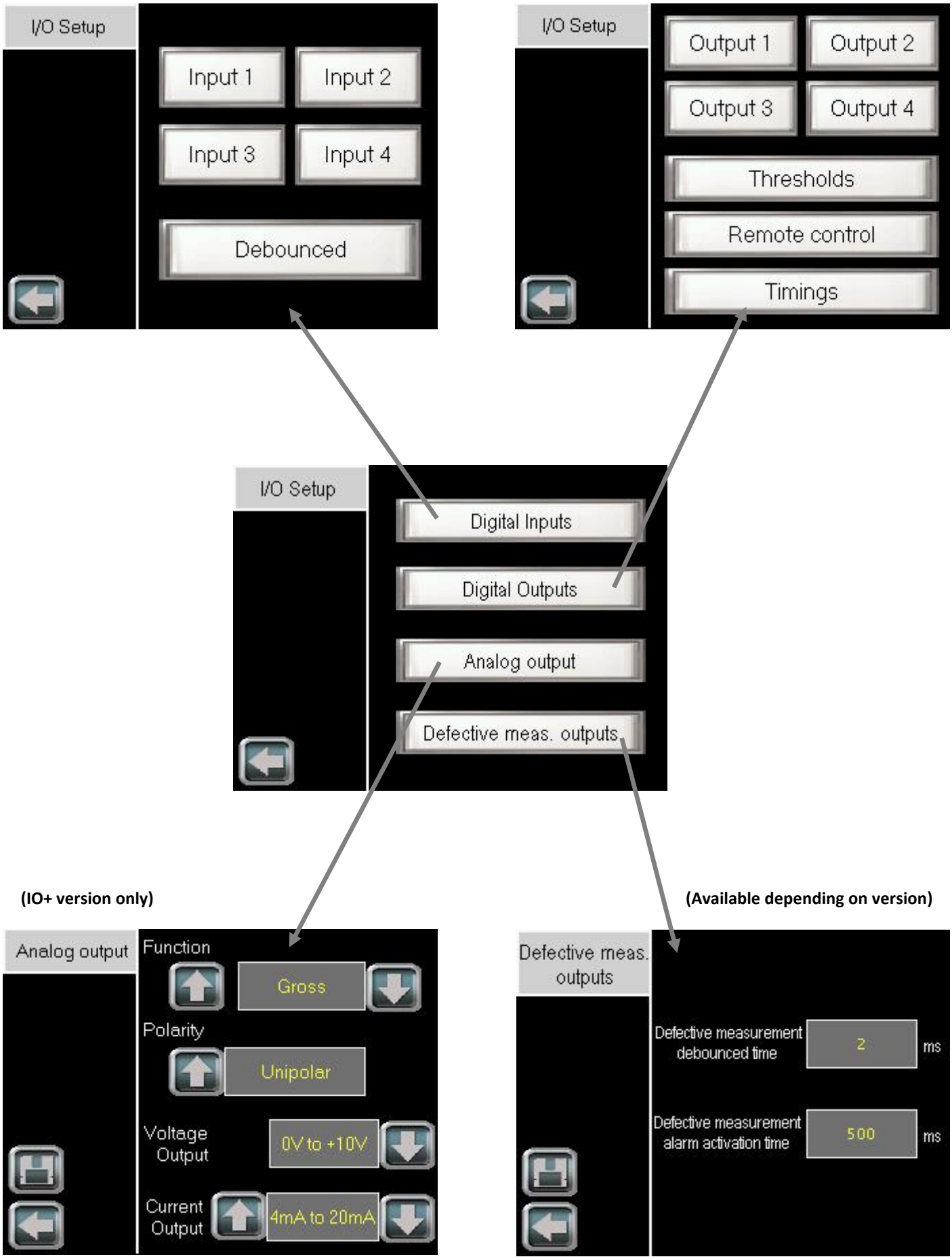
S (mV/V)	0 – 6.00000	Load cell sensitivity in mV/V at maximum capacity

Span Calibration correction

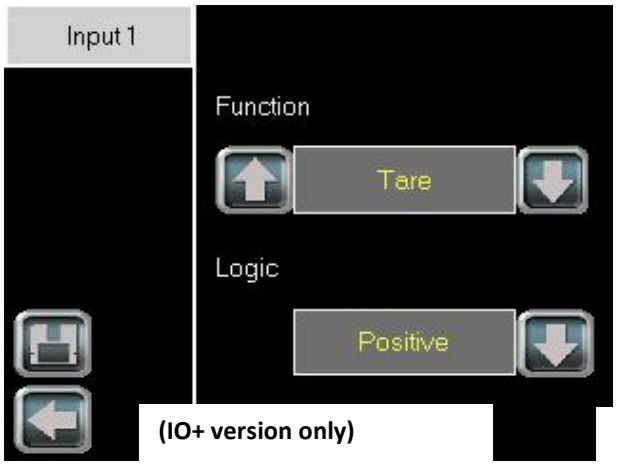


Span. cor	0.9 – 1.100000	Allows to adjust initial calibration
Calibration g	>0 (9.805470)	Allows compensating the gravity difference between calibration place and using place.
Use g	>0 (9.805470)	

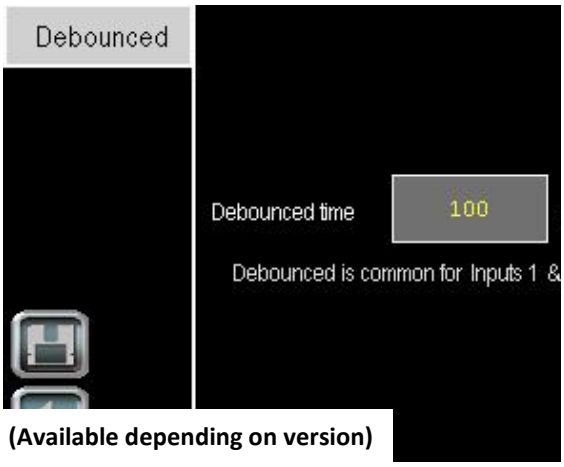
11.1.4.4 I/O setup



Parameter	Possible Value	Description
Input 1-4 Parameters		



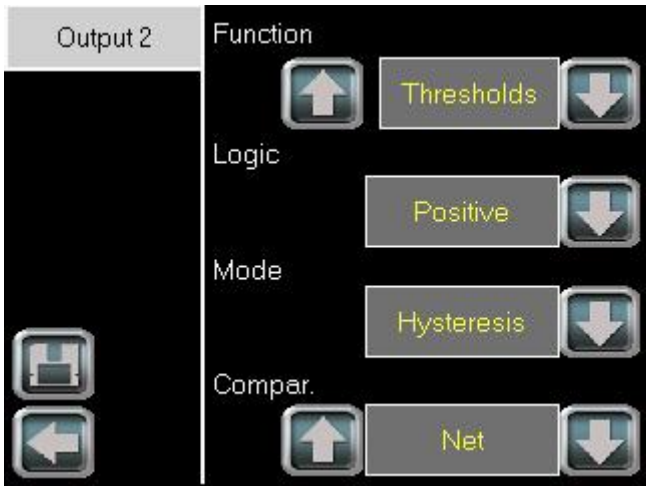
(IO+ version only)

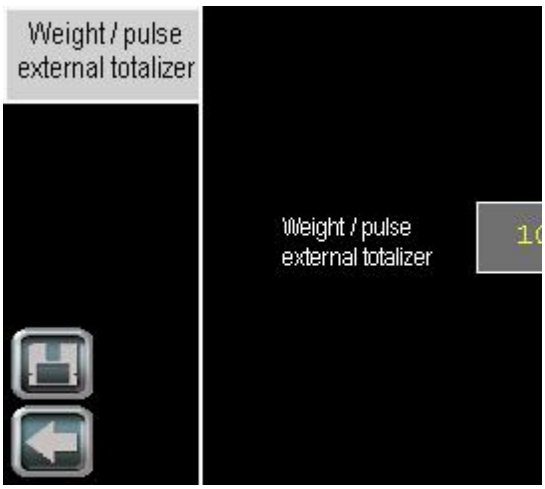


(Available depending on version)

Function	Function assigned to the related input: None, Zero, Tare, Clear, start cycle, stop cycle, Suspend cycle, Dynamic Zero, Manual emptying, Belt fault	
Logic	[Positive]-[Negative]	defines the edge (or level) that triggers input function
Debounced time	0 – 6553 ms	Minimum required time of the logical inputs before their activation

Output 1-4 Parameters





eNod4-F external totalizer (Page 2)

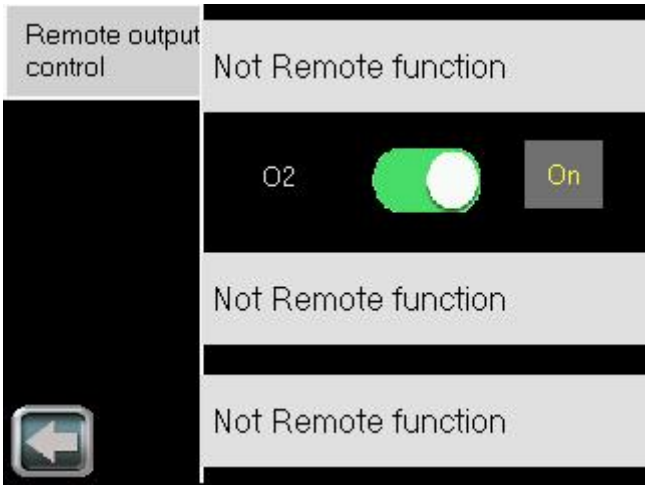
Function	Function assigned to the related output: None, Thresholds, Stability, Coarse feed, High feed, fine feed, Cycle ongoing, result available, Out of tolerance, Dosing fault, Input copy, Remote control, Out of tolerance +, Out of tolerance –	
Logic	[Positive], [Negative]	Defines idle output state.
Mode	[Windows], [Hysteresis]	Thresholds functioning principle
Comparison	[Gross], [Net], [result]	Comparison value for thresholds control
Weight / pulse external totalizer	0 – 65535	For external totalization purpose, eNod4 sends a pulse on logical output when the totalization value reaches multiple of this parameter. When an overflow is occurred on pulses output an alarm is set.

Thresholds control

Allows modifying the Threshold values of the concerned outputs.

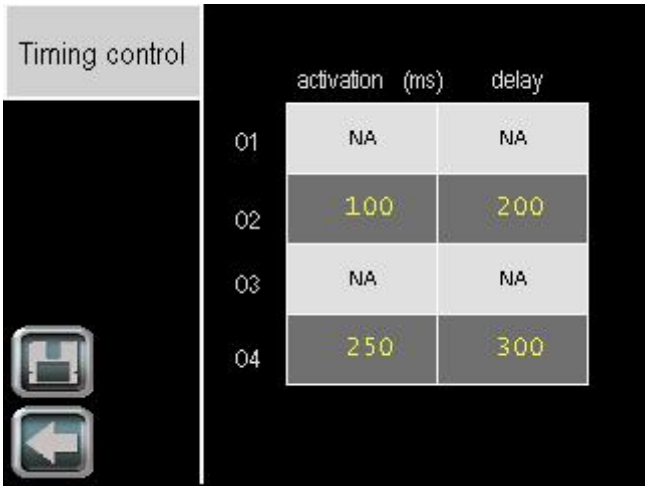
Remote Control

Allows fixing the level [On], [Off], of the concerned outputs.

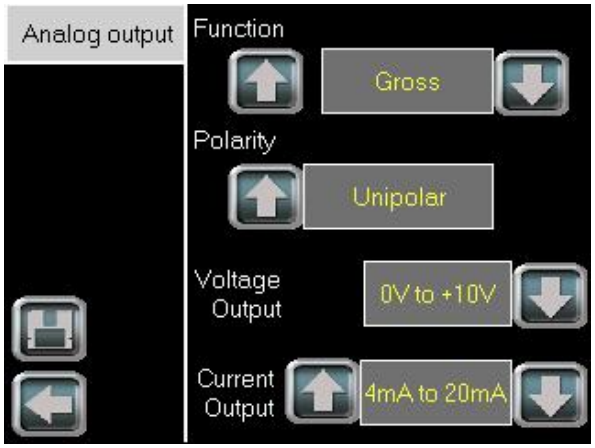


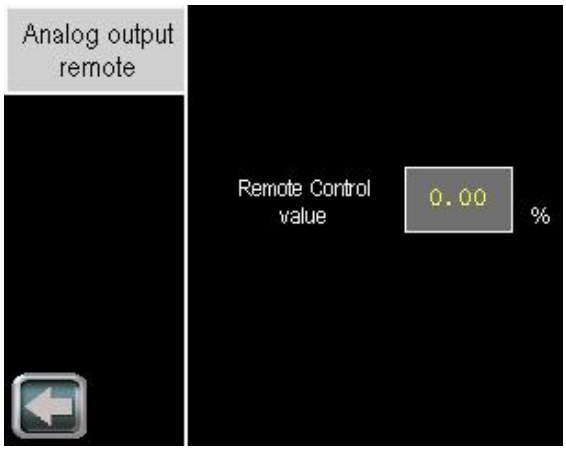
Outputs 1-4 timings

In Checkweigher, allows modifying timings on outputs with functions « Remote control » (activation time), « Result within tolerances » and « Result out of tolerances » (activation time and delay).



Parameters Analog output (IO+ version only)





Analog output remote (Page 2) with remote control function

Fonction	The allocation of the analog output is unique for both outputs (current and voltage)	
Polarity	Bipolar / Unipolar	Analog outputs can be assigned to gross measurement copy. Maximal level value is related to maximum capacity (MC) parameter and works in mono-quadrant functioning. Bipolar option can only be applied to gross measurement copy. When this option is activated, the lowest value of current and voltage levels corresponds to -MC and the highest value to +MC.
Voltage Output	Voltage output might be set either 0-5V or 0-10V.	
Current Output	Current output to 4-20 mA, 0-24 mA, 0-20 mA or 4-20 mA alarm 3.6 mA.	

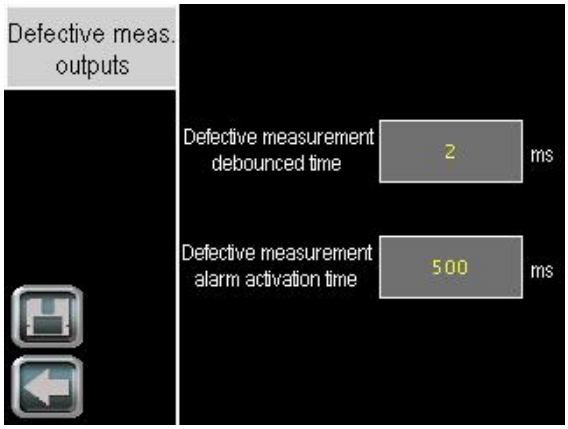
Defective measurement outputs parameters (Available depending on version)

Changes Defective measurement outputs timing.

An internal alarm flag reflects the integrity of the whole measurement chain. It's used to set logical output active or optional analog output in an error mode in order to warn about any defection on the measurement chain (defective measurement).
This variable is set active when at least one of the followings conditions occurs:

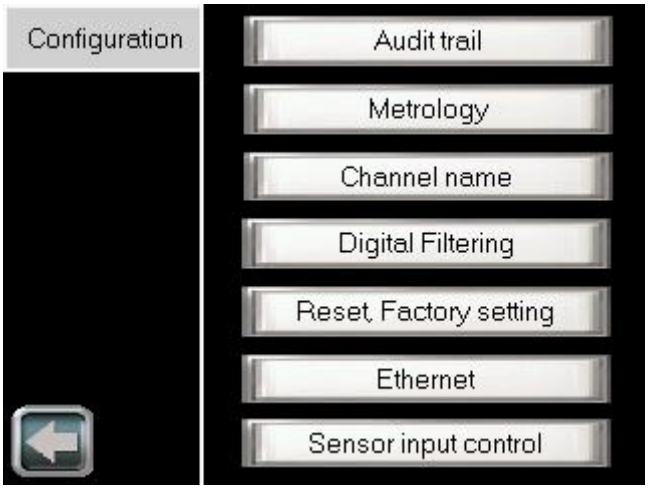
- sensor input control results out of tolerances
- sensor input control command in progress
- sensor input control command failed (timeout)
- sensor input reference command in progress
- gross meas. < (- max capacity)
- gross meas. > (max capacity)
- analog signal out of the A/D converter input range
- EEPROM failure

This internal alarm flag is featured with adjustable specific de-bounced time and minimal activation time:

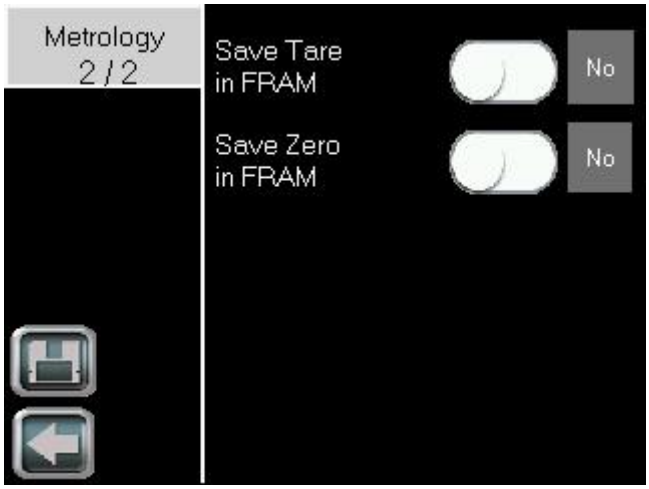


Defective measurement debounced time	0 – 65535 ms	The internal alarm flag which reflects the integrity of the whole measurement chain is set active only after error conditions have always been true during this de-bounced time.
Defective measurement alarm activation time	0 – 65535 ms	The internal alarm flag which reflects the integrity of the whole measurement chain remains active for this minimal *"defective measurement alarm activation time"* when it come to be active and whatever the error conditions are during activation.

11.1.4.5 Configuration setup



Parameter	Possible Value	Description
Metrology Parameters		

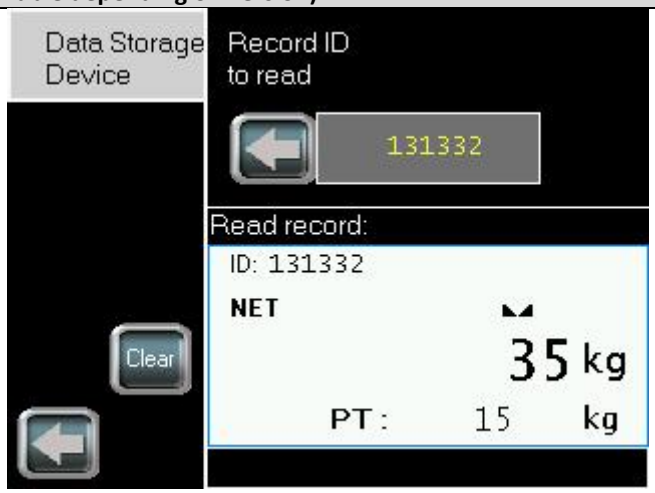


Stability criterion	None, 0.25 0.5, 1, 2d	Defines a stability interval, related to scale interval.
Zero at Startup	[Yes], [No]	Enable the Automatic Zeroing at power-on
Zero Tracking	[Yes], [No]	Enable the Zero tracking function
Legal for trade Switch **(Available depending on version)**	[Yes], [No]	Enable the legal for trade mode. The prerequisite conditions for the activation of legal for trade mode are: - The weight unit must be one of the following: mg, g, kg, t, ct, µg, oz. (possibility to put spaces after unit) - The stability criterion must be 0.25 d. - Filter settling time must be less than 1 second in transmitter mode. - The quotient (Maximum capacity / Scale interval) must be less or equal to 6000. - On eNod4-C, zero tracking device must not be activated together with dynamic zero tracking device. On eNod4-T, C and D this mode has an effect on user calibration. Thus, this mode must be activated before processing any calibration.
Save Tare in FRAM	[Yes], [No]	It allows saving tare in non-volatile memory (FRAM).
Save Zero in FRAM	[Yes], [No]	It allows saving zero in non-volatile memory (FRAM).

Audit trail (Available depending on version)

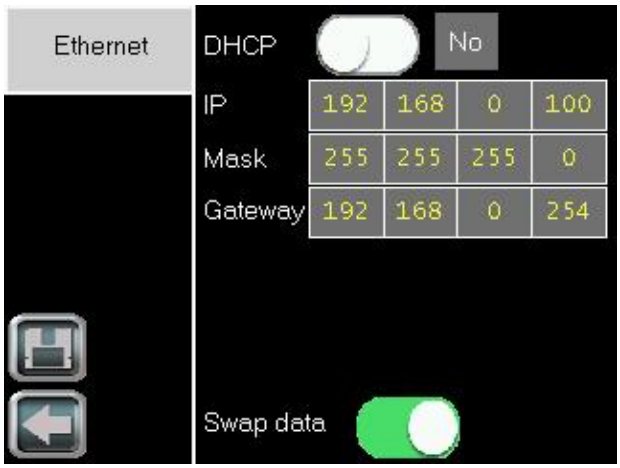
Legal for trade sealing	[Yes], [No]	Once legal for trade sealing activated, it forbids the change of any parameters that can affect the eNod4 metrological specifications. Such parameters appear in blue and are disabled over the eNodTouch menus.
Counter (audit trail)		This number is incremented on each legal for trade sealing switching.
Checksum		Checksum calculated over set of sealed parameters when legal for trade sealing is being activated.
eNod program version		Program version of eNod4 embedded software.
eNod metrological version		Version of set of metrological functions embedded in eNod4.
eNodTouch version		Program version of eNodTouch embedded software.
		Data Storage Device records consultation access.

Data Storage Device (Available depending on version)

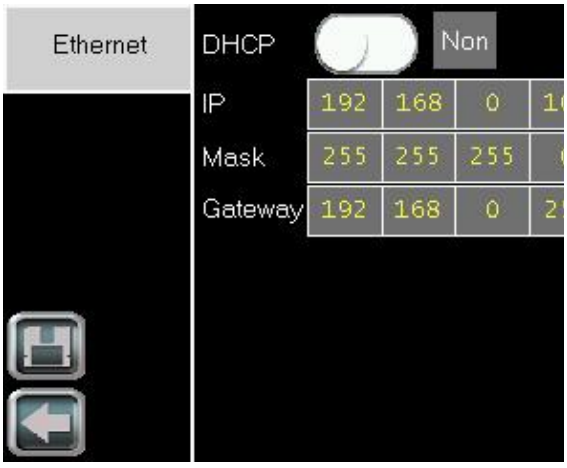


Record ID to read		Record of the ID to be read.
		Erase all records from the DSD memory. This is possible only when the legal for trade sealing is disabled.

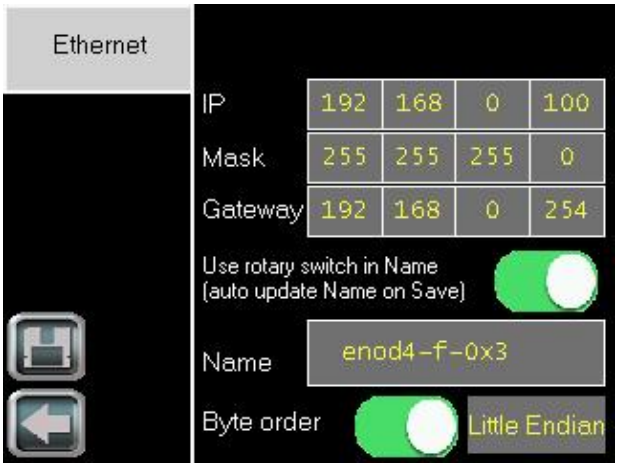
Ethernet Parameters (Ethernet versions only)



Modbus TCP



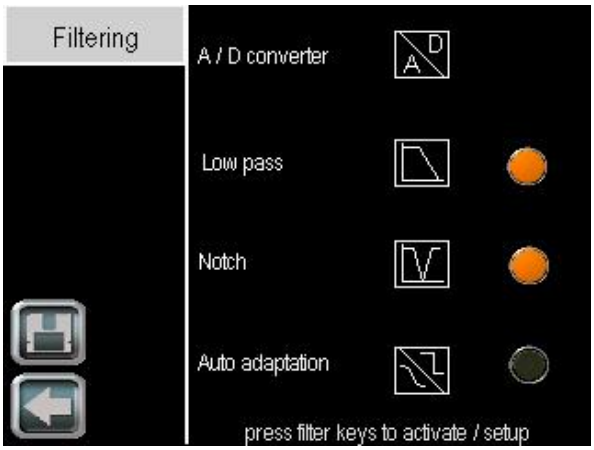
Ethernet/IP

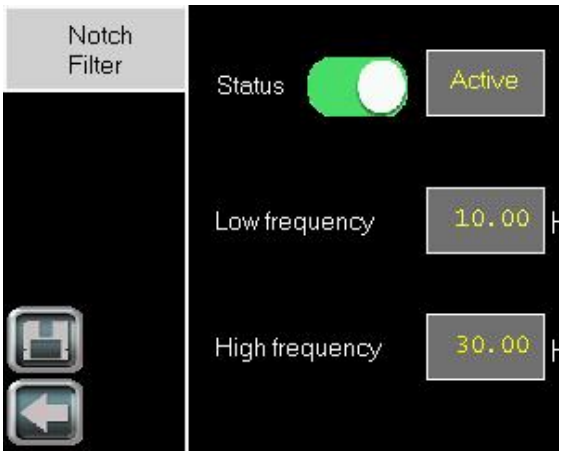


Profinet

IP	IP address
Mask	Subnet mask
Gateway	Default gateway (must match with IP address and Mask)
DHCP	Assignment of IP address from a DHCP server on this subnet
Swap data	Swap data (bytes) in Modbus TCP registers (16 bits words)
Name	Profinet station name (up to 10 chars with Option « Use rotary switch in Name » else 15, lower case, figures, dots and dashes only)
Option « Use rotary switch in Name »	Allows on Save automatic appending of hexadecimal representation of rotary switches in the Name.
Byte order	Byte order in Profinet exchanges ([Little Endian], [Big Endian])

Digital Filtering parameters





A/D converter parameters

Rejection	[50Hz]-[60Hz]	The A/D converter have In-built adjustable low-pass filter with frequency rejection of 50 Hz or 60 Hz harmonics.
Frequency	6 – 1600 Hz	Filtered measurement frequency is adjustable from 6.25 to 1600 Hz

Bessel low-pass filter parameters

Filter Order	0, 2, 3, 4	For the suppression of periodic vibrations, a Bessel low-pass digital filter can be applied as an output of the A/D converter. Minimum cut-off frequency value depends on the A/D converter rate: 0.10 Hz for 6.25 meas/s, 4 Hz for 400 meas/s
Cut-Off Frequency	0.1 to 200Hz	

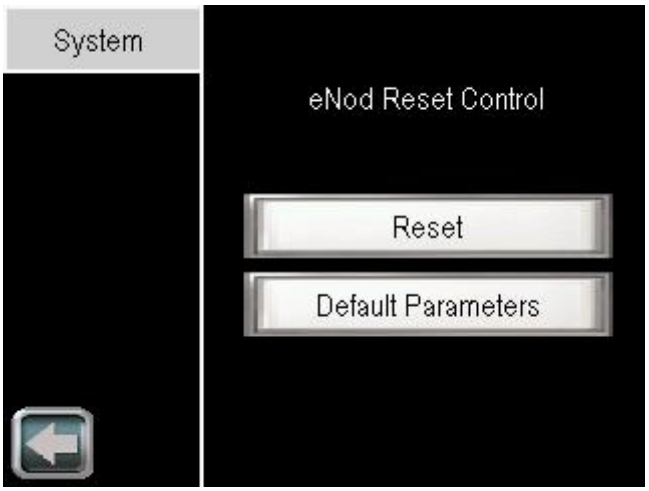
Notch Filter parameters

High & Low Frequency *	0.1 to 200Hz	Frequency band to attenuate with the digital Notch filter

* May not be implemented depending on eNod4 applicative version.

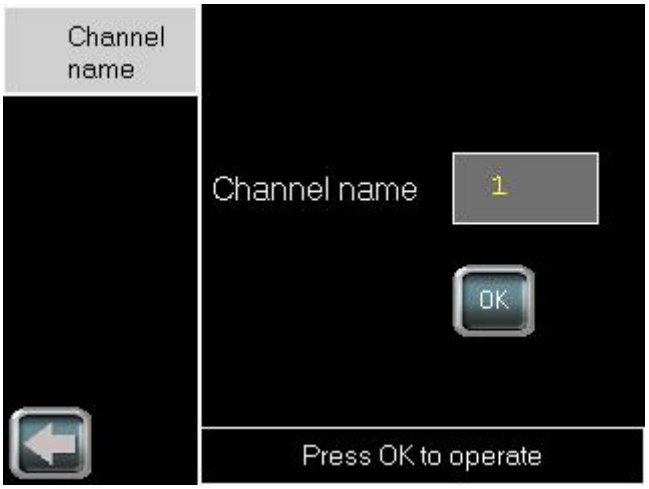
Reset, factory setting

Allows resetting eNod4 or making eNod4 come back to factory settings

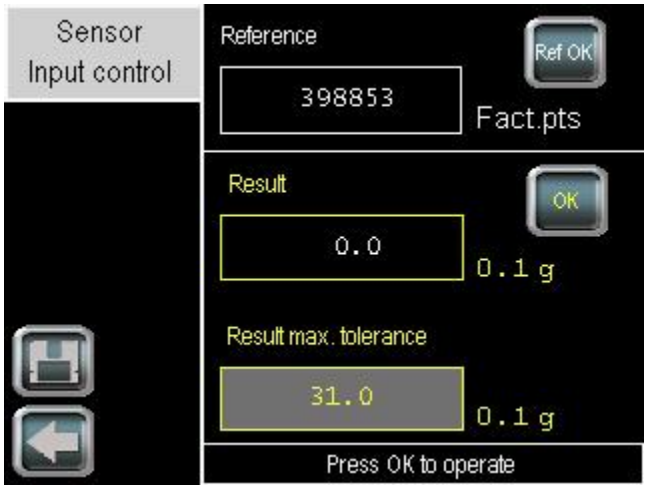


Channel name

Name or rename the channel with a maximum of 4 characters



Parameter	Possible Value	Description
Sensor Input Control Parameters (Available depending on version)		



Reference		Reference value expressed in factory calibrated points for the sensor(s) input control test. The value is automatically determined and stored after executing the sensor input reference command.
Result		Result of sensor(s) input control test expressed in 1/10 of user weight unit. Its value is automatically determined and stored after executing the sensor input control command. This test result represents the weight difference between the reference value and the current test value.
Result max. tolerance	0.0 – 6553.5	The Sensor input control result variable is compared with the Sensor input control result max. Tolerance parameter which is expressed in 1/10 of user weight unit and has a default value of 30. If the sensor input control result value is greater than or equal to “Sensor input control result max. Tolerance” then an error is reported
		Sensor input control command will cause eNod4 to handle special test on sensor input and to deliver a test result. This command must not be realized when any process cycle that use weight is in progress.
		Sensor input reference command will cause eNod4 to handle special sequence to acquire sensor input control reference value of the load cell sensor input. This command must be performed before using the Sensor input control command and each time the weight measurement chain (sensor, connection, calibration) is modified. This command must not be realized when any process cycle that use weight is in progress.