Characteristics and functioning

eNod4 -C: Characteristics and functioning

1   *eNod4* PRODUCT RANGE:

1.1   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 1600 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.

1.2   eNod**View** *software tool*

So as to configure *eNod4*, SCAIME provides *eNodView* software tool. *eNodView* is the software dedicated to *eNod* devices and *AXD* digital load cell configuration from a PC. Its 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 interface*
- *Numerical filters simulation*
- *Frequential analysis FFT*
- *Process control*

The *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.

1.3   Versions and options:

1.3.1   Versions:

- *eNod4 DIN*: Strain gauges load-cell conditioner with *CANopen®* and *ModBus RTU* communication. 22.5mm packaging width
  EDS configuration file for *CANopen®* can be downloaded from our web site: http://www.scaime.com
- *eNod4 PRO DIN* : Strain gauges load-cell conditioner with *Profibus DP-V1* and *ModBus RTU* communication. 35mm packaging width.
  GSD configuration file for *Profibus DP-V1* can be downloaded from our web site: http://www.scaime.com

1.3.2   Options :

With appropriate option the strain gauges load-cell can be exchanged with:
- 4/20mA analog signal.
- 0/10V analog signal.

1.4 Dimensions:

eNod4 -C: Characteristics and functioning
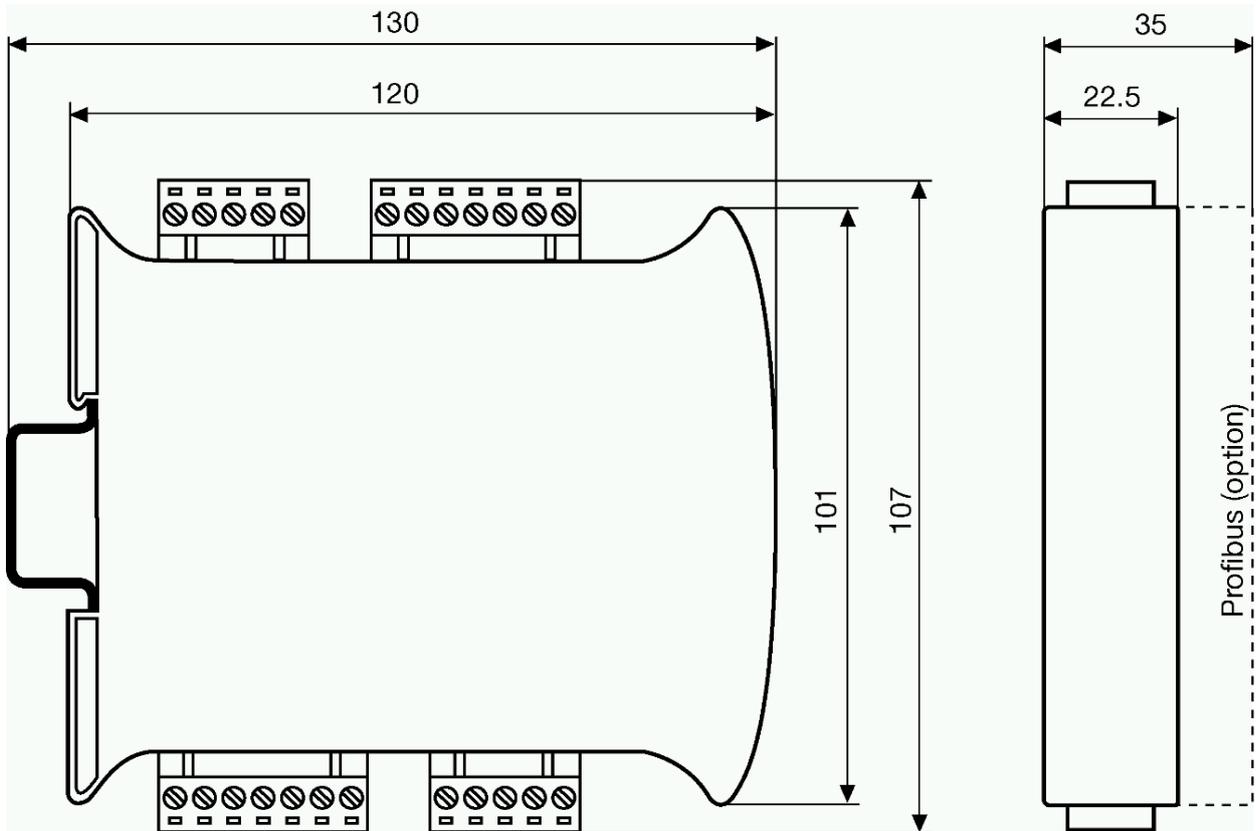
1.5 General specifications:

Power supply		Unit
Supply voltage	11.....28	V_{DC}
Max supply current	250 @11V , 150@28V	mA
Temperature range		
Storage temperature range	-25...+85	°C
Working temperature range	-10...+40	°C
Sensor		
Minimum input resistance	> 80	Ω
sensor connection	4 or 6 wires	
Bridge excitation voltage	5 ± 2%	V_{DC}
Communication		
RS 485	Half-duplex	
Rate	9.600 ... 115.200	kbits/s
Can 2.0A rate	50 ...1000	kbits/s
PROFIBUS DP V1 rate	9.600 ... 12000	kbits/s
Inputs		
Number	2	
Type	opto-coupleurs	
Low level voltage	0 / 5 VDC – 0 / 2 mA	
High level voltage	11 / 30 VDC – 6 / 16 mA 12.6 mA @ 24VDC	
Outputs		
Number	4	
Type	solid state relay	
Max. current @ 40°C	0,4	A
Max. voltage in open state	53 VDC ou 37 VAC	
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	± 7.8	mV/V
Thermal zero drift	1.5	ppm/°C typical
Thermal span drift	2	ppm/°C typical
Linearity deviation	0.003	%
Conversion rate	6.25 ... 1600	meas./s
Metrological specifications on A2 connector input **(option 0-10V or 0/20mA)**		
0-10V input range	10	V
0-10V Accuracy	0.3	%
4/20mA input range	20	mA
4/20mA accuracy	1	%
Thermal zero drift	15	ppm/°C
Thermal span drift	25	ppm/°C
Linearity deviation	0,003	%
Conversion rate	6,25 ... 1920	meas./s

eNod4-C

Digital Process Transmitter

2 CONNECTIONS:
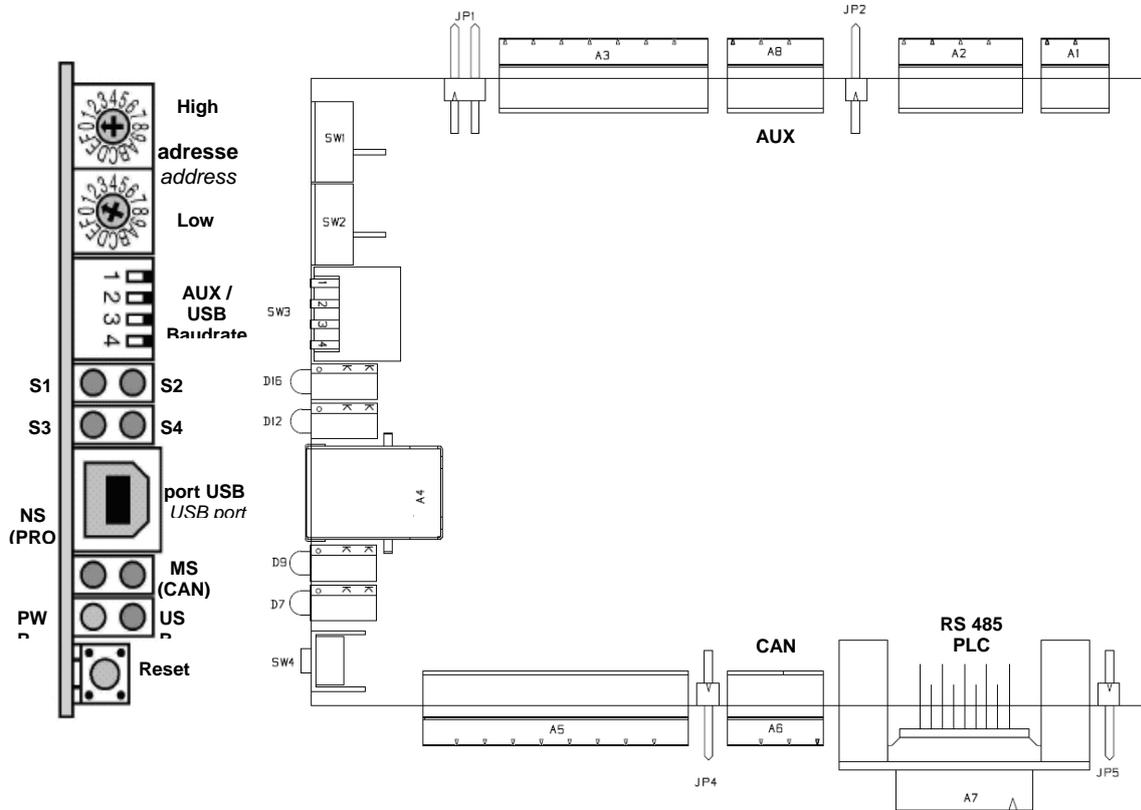
Repère *Mark*		Fonction *Function*	Repère *Mark*		Fonction *Function*
A1 **alimentation** *power supply*	1	**+V$_{DC}$**	**A5** **entrées/sorties** *IN / OUT*	1	**IN1+**
	2	**GND**		2	**IN1-**
A2 **entrée 4/20mA ou 0/10V$_{DC}$ (en option)** *4/20mA or 0/10V$_{DC}$ input (optional)*	1	**+24V$_{DC}$**		3	**IN2+**
	2	**4/20mA or 0-10V$_{DC}$**		4	**IN2-**
	3	**GND**		5	**OUT$_{COM}$**
	4	**Shield**		6	**OUT1**
A3 **connexion capteur** *load cell connection*	1	**Exc+**		7	**OUT2**
	2	**Sens+**		8	**OUT3**
	3	**Exc-**		9	**OUT4**
	4	**Sens-**	**A6** **connexion bus CAN** *CAN bus connection*	1	**CANH**
	5	**Sig+**		2	**CANL**
	6	**Sig-**		3	**REF$_{COM}$**
	7	**Shield**	**A7**		**RS485 Automate (DB9)** *RS 485 PLC (DB9)*
SW4		**bouton poussoir Reset** *reset push button*	**A8** **connexion AUX** *AUX connection*	1	**RB/TB (B-)**
D1-D2-D3-D4		**LED sorties logiques** *outputs LED*		2	**RA/TA (A+)**
D5-D6		**LED CAN/RS485 & Profibus** *CAN/RS485 & Profibus LED*		3	**GND**
D7-D8		**LED alimentation & USB** *power supply & USB LED*	**A4** **USB**		**USB**

2.1 Power supply connection:

1	+VDC
2	GND

A1
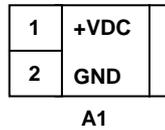
On the front panel a green light *'PWR'*, (D7) indicates if power is connected.

2.2 Load-cell wiring :

1	Exc+
2	Sens+
3	Exc-
4	Sens-
5	Sig+
6	Sig-
7	Shield

A3

4/6 wires jumpers

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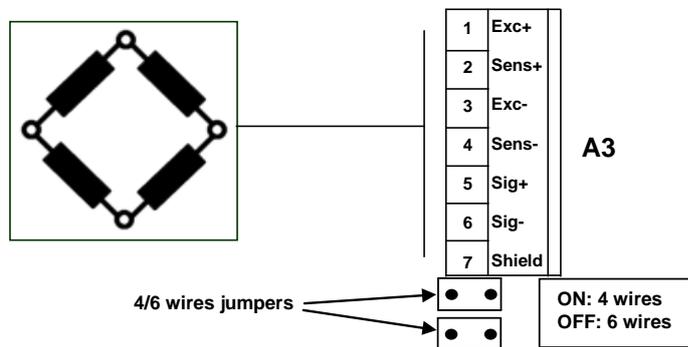
- ❑ **4 wires load-cell**: jumpers in place (by default at delivery).
- ❑ **6 wires load-cell:** jumpers removed

2.3 High level measuring input (0/10V$_{DC}$ or 4/20mA):

Optionally, **eNod4** can be equipped with a connector (A2) allowing a high level (0/10V$_{DC}$ or 4/20mA) signal conditioning. In that case it is no more possible to condition a sensor on A3 connector.
Analog input signal is connected to terminals 2 and 3. Terminal 1 can be used to supply relative high level sensor.

0-10V$_{DC}$ connection	
1	+24V$_{DC}$
2	0-10V$_{DC}$
3	GND
4	Shield

V$_{IN}$

A2

4/20mA connection	
1	+24V$_{DC}$
2	4/20mA
3	GND
4	Shield

I$_{IN}$

A2
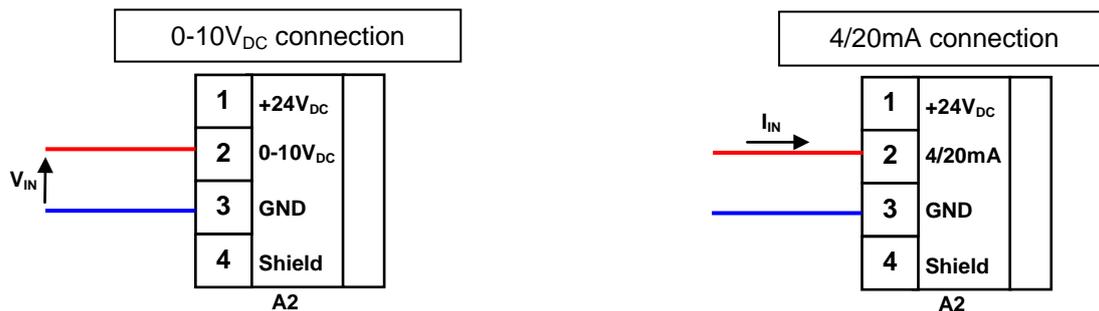
2.4 Inputs / outputs connections:

A5
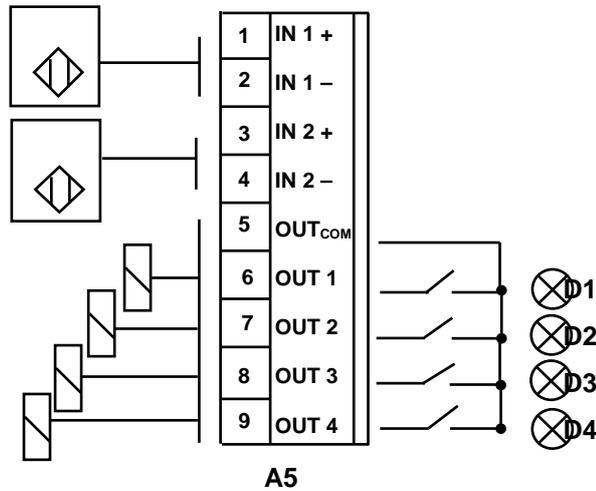
A light in front panel is assigned to each Output.

2.4.1 Typical connections:

Inputs : Connection to a detector	Inputs : Connection to a push button
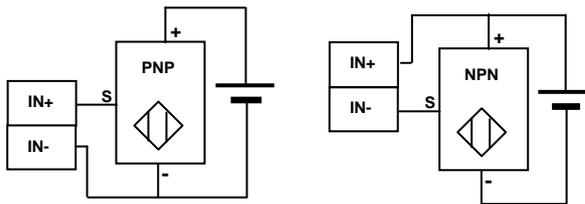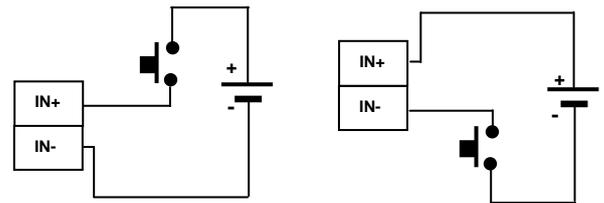
Outputs : Possible connections
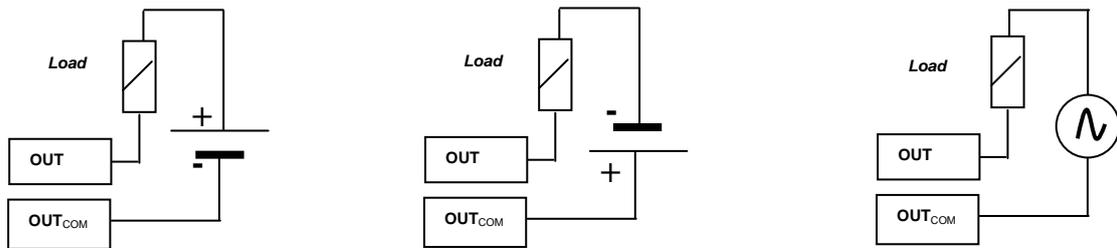
3   COMMUNICATION :

3.1   *Communication Interface connections:*

3.1.1   Process control communication:

Version	Type of communication	Connector
eNod4 DIN	*RS485*	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-T*. To use this impedance set the corresponding jumper.

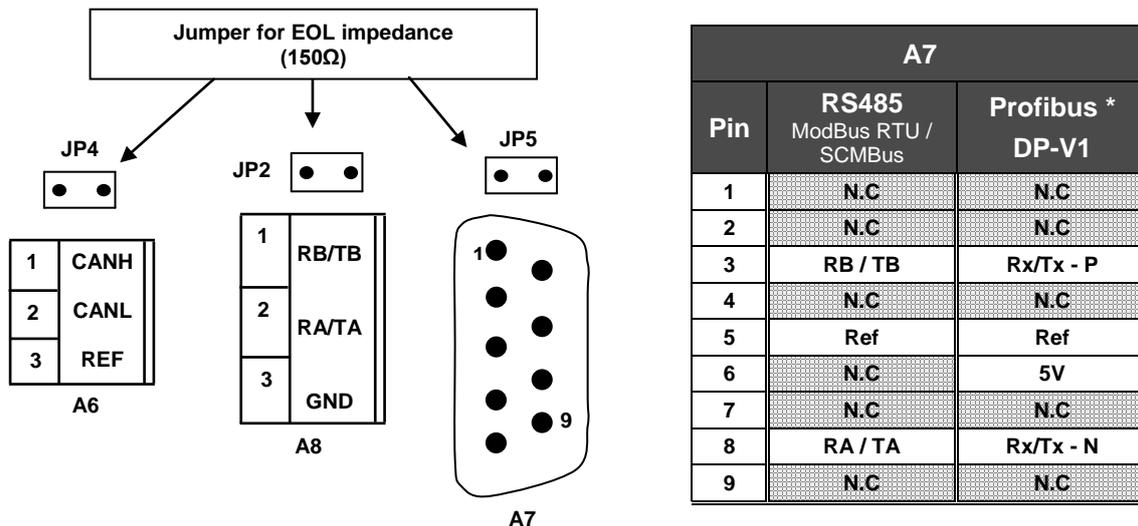| A7		
Pin	**RS485** ModBus RTU / SCMBus	**Profibus *** **DP-V1**
1	N.C	N.C
2	N.C	N.C
3	RB / TB	Rx/Tx - P
4	N.C	N.C
5	Ref	Ref
6	N.C	5V
7	N.C	N.C
8	RA / TA	Rx/Tx - N
9	N.C	N.C

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 optocouplers 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[2]**	**max bus length for type A[3] cable**	**max bus length for type B[3] cable**
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.

3.1.2   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).

3.1.3   AUX Communication (for HMI):

GND (connector pin3) is connected with power supply GND. 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).

3.2 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.**
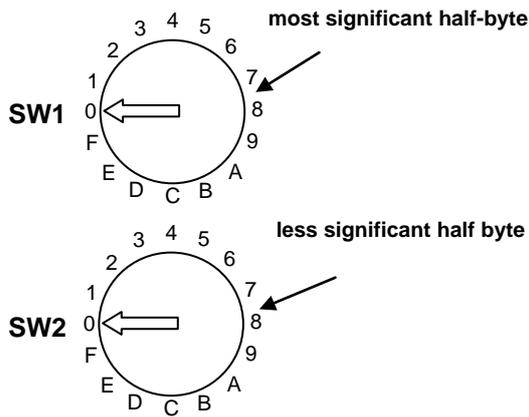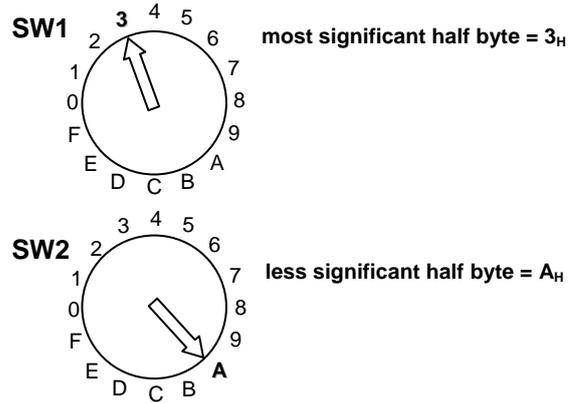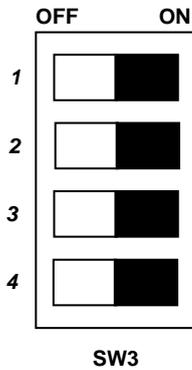
- **Example**

  eNod4 address = $3A_H$ = 58_d

SW1 most significant half-byte

SW2 less significant half byte

SW1 most significant half byte = 3_H

SW2 less significant half byte = A_H

3.3 Communication rate selection:

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

SW3

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**

3.4 Communication protocols:

Version	communication interface	Protocols*	Connector	LED on front panel
eNod4 DIN	RS485 Automate	ModBus RTU	A7	/
	RS485 AUX	ModBus RTU SCMBus	A8	/
	USB	ModBus RTU SCMBus	USB Front panel	D8
	CAN	CANopen®	A6	D5
eNod4 PRO DIN	Profibus	Profibus DP-V1	A7	D6
	USB	ModBus RTU SCMBus	USB Front panel	D8

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

3.5 Simultaneous functioning of communications

3.5.1 Standard version

AUX Connection

Modbus

PC Connection

eNodTouch

Modbus

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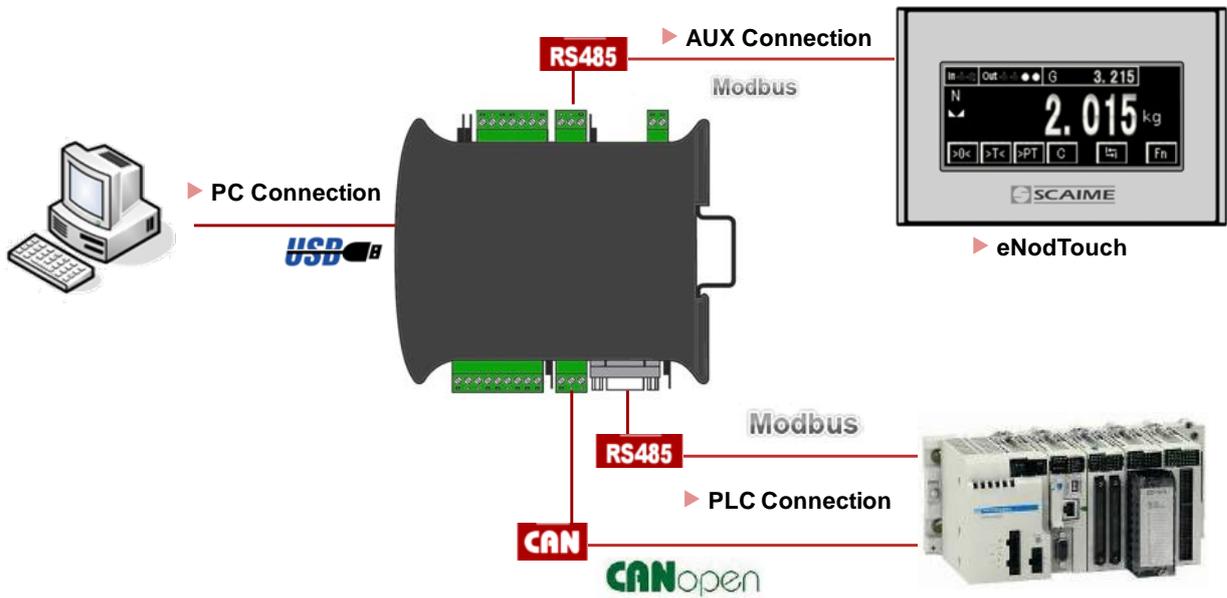
Simultaneous communication	RS 485 PLC	RS485 AUX	CAN
USB	yes*	No	yes*
RS 485 PLC		yes	No
RS485 AUX			yes**

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

(**) *In this configuration, we recommend a typical speed on AUX output of 9600 bps (Max 19200 bps)*

3.5.2 Profibus version

▶ **AUX Connection**

▶ **PC Connection**

▶ **eNodTouch**

▶ **PLC Connection**

▶ **PROFIBUS-DPV1**
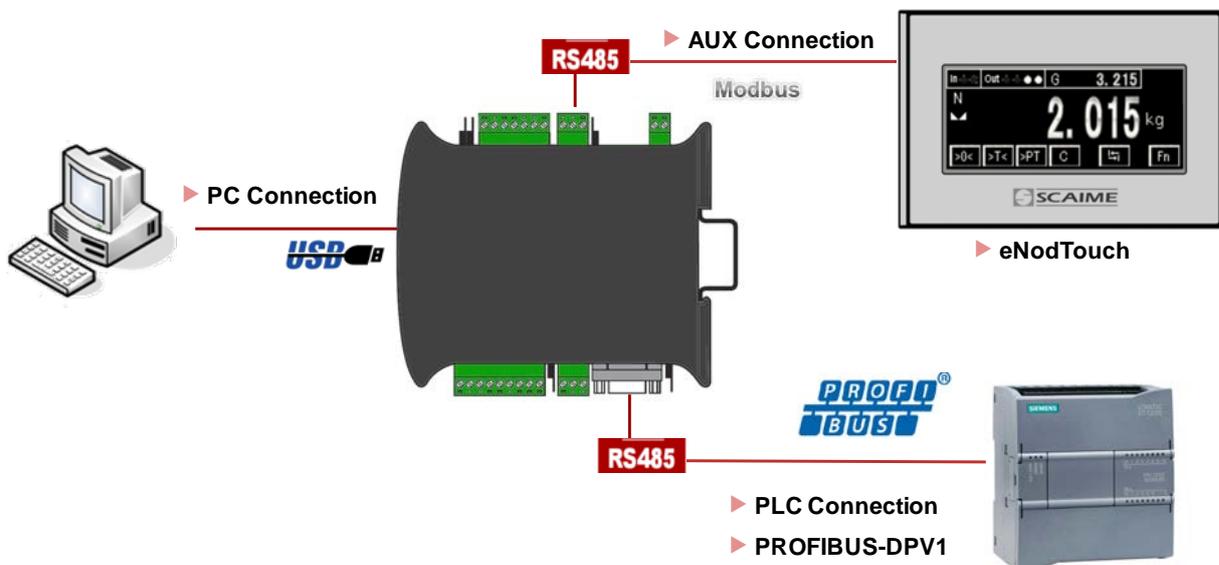
Simultaneous communication	Profibus	RS485 AUX
USB	yes*	No
Profibus		yes**

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

(**) *In this configuration, we recommend a typical speed on AUX output of 9600 bps (Max 19200 bps)*

4   CALIBRATION, SCALE ADJUSTMENT:

eNod4-C is factory calibrated as following:
- **500 000 counts for 2mV/V** with a load cell on the **A3** input.
- **100 000 counts for 10V** on the **A2** high level input. It also corresponds to **100 000 counts for 20mA**.

❑ **Note** : only one sensor input is useful. The analog input type (load-cell, 0-10V or 4-20mA) has to be defined at order.

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

4.1   Physical calibration:

Physical calibration is done by applying to the sensor **from 1 up to 3 known references**. This calibration mode is **available for all types of sensor inputs**.

4.2   Theoretical calibration:

The theoretical calibration allows defining *eNod4-C* user span **without using calibration reference**. The only necessary information 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.

4.3   Scale adjustment coefficient:

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

4.4   Scale interval:

Scale interval is the difference between two consecutive measurement indications, admitted values : 1, 2, 5, 10, 20, 50, 100.

4.5   Gravity correction:

When *eNod4-C* 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-C* was calibrated. *eNod4-C* 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.

5   FILTERS :

There are four available filtering levels:
⇨ 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

5.1   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.

5.2 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. The **eNodView** software can be used to determine appropriate filter values.

5.3 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.

5.4 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.

6 DESCRIPTION OF *TRANSMITTER* FUNCTIONING MODE:

This operating mode consists in transmitting measurements on the bus, possibly after configuring them, filtering them and comparing them to set-points levels.
Measurements can be transmitted individually regardless of the communication protocol or continuously at a defined period in the **SCMBus/fast SCMBus** and **CANopen®** protocols.

6.1 Measurement reading request:

6.1.1 Single measurement transmission:
Regardless of the communication protocol used. The request can apply to:
- gross measurement
- net measurement
- tare value
- measurement according to factory calibration

6.1.2 Continuous measurement transmission:
This is possible using *standard* or *fast* **SCMBus** format, the transmission can be started by a serial command and another one allows stopping it. Measurements are transmitted at a period defined in ms. The request can apply to:
- gross measurement.
- net measurement
- measurement according to factory calibration.

❑ **Note**: This is very similar to operating with a logical input assigned to the *'Measurement window'* function.

CANopen® communication protocol also allows defining a period at which measurements are sent on the bus without any master request.

6.2 Specific commands with an input:

6.2.1 Send measurement:

This is only possible using **SCMBus/fast SCMBus** or **CANopen®** protocols.

The request can apply to:
- gross measurement
- net measurement
- measurement according to factory calibration

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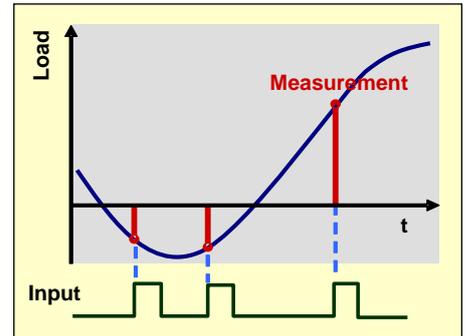

Fig. 1

6.2.2 Measurement window :

This is only possible using **SCMBus/fast SCMBus** or **CANopen®** protocols.

The request can apply to:
- gross measurement
- net measurement
- measurement according to factory calibration

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 '*Measurement window'*, only input 2 is operating.
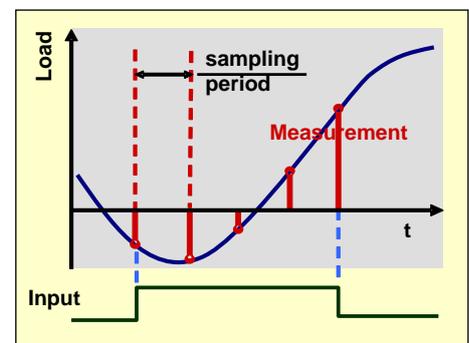

Fig. 2

6.2.3 Cancel tare:

Erases current tare (same functioning as *'cancel tare'* command).

7 CHECKWEIGHER OPERATING MODE:

This operating mode consists of determining the weight of an object while it is present on a conveyor portion on which a weighing system is fitted.

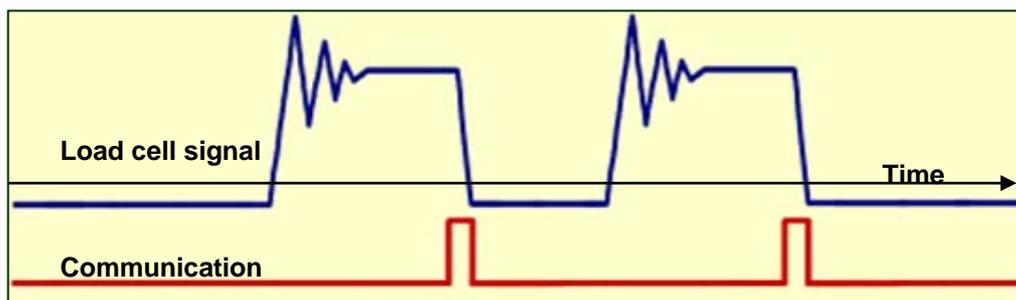**Note**: The measurement is determined for net measurements only.

Fig. 3

When the object arrives on the weighing system, the weight determination cycle can be started:
- by an input assigned to *'start checkweigher cycle'* (Fig. 4 & 5). Caution, only input 2 is operational if both inputs are assigned to the *'start checkweigher cycle'* function.
- by a trigger level (Fig. 6) when the load cell signal reaches the specified value.
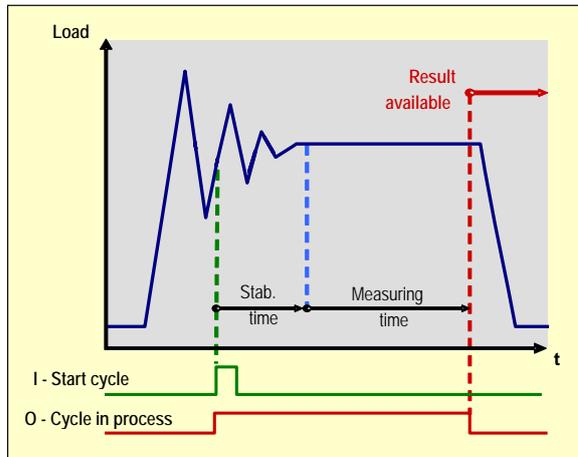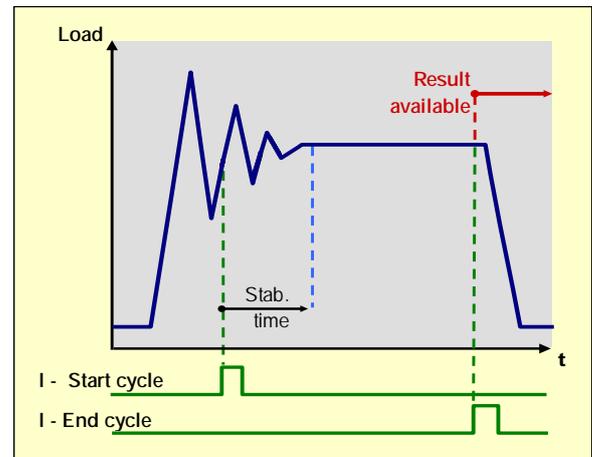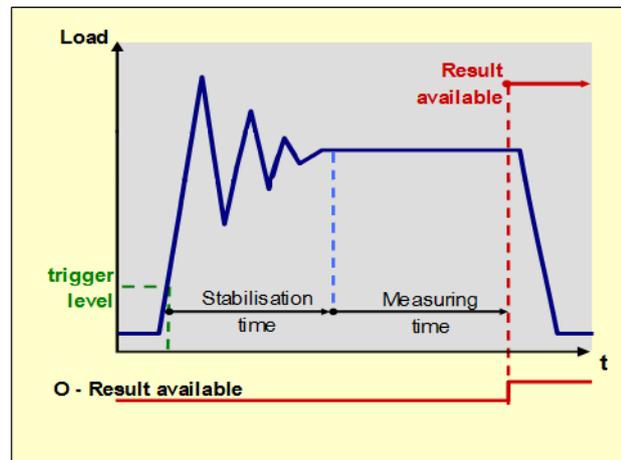
Fig. 4

Fig. 5

Fig. 6

Then, during a *'stabilization time (Ts)'*, the signal is highly disturbed so measurements are not taken into account. Finally, during a '*measuring time (Tm)*' defined by either:
- a time value (Fig.4).
- a duration prior to an edge on an input assigned to 's*top checkweigher cycle*' (Fig.5). Caution, only input 2 is operational if both inputs are assigned to the *'stop checkweigher cycle'* function.

eNod4-C automatically calculates a result corresponding to the object weight. This result value may be weighted by a coefficient.

A value representative of the quality of the result is also determined. This value is the standard deviation of measurements acquired during the measuring time; more this value is low, the better the checkweigher result.

If target and tolerances (+-) have been defined, the checkweigher result is checked and logical outputs can be activated (see logical outputs chapter).

Each cycle is counted and the following statistical data are updated for each new complete cycle:
- results average
- running total (results sum)
- number of cycles
- standard deviation

- number of out of tolerance results

Statistics can also be calculated only on "within tolerances" results.

eNodView can be used to determine stabilization and measurement times so as to optimize parameters. (See *eNodView* user's instructions documentation).

7.1 Providing the result value:

With the *SCMBus* protocol:

- In *'Checkweigher automatic transmission'* mode, when the cycle is finished, the result is automatically sent through the serial line. After the transmission, the measurement result is set to **????????**.

- In *'Checkweigher transmission on request'* mode, the measurement result has to be read. Reading automatically resets measurement memory to **????????**. Starting of a new cycle induces also a reset to **????????**.

The measured result can also be cancelled (set to **????????**) without reading. It can be done by an input assigned to '*clear*' or by the *'clear'* command, in this case **pay attention:** not only current checkweigher result is cancelled, all other checkweigher statistic results are also set to zero (cycle number, checkweigher results total, results average, standard deviation).

With the *ModBus* protocol:

- As soon as the measurement result is available, it can be read. Starting a new cycle cancels the previous measurement result (set to '**FF FF FF FF**').

The measurement result can also be cancelled (set to '**FF FF FF FF**') before a new cycle is started. It can be done by an input assigned to *'clear'* or by the '*clear'* command, in this case **pay attention:** not only current checkweigher result is cancelled, all other checkweigher statistic results are also set to zero (cycle number, checkweigher results total, results average, standard deviation).

With the *CANopen®* protocol:

- As soon as the measurement result is available, it can be read. Starting a new cycle cancels the previous measurement result (set to '**FF FF FF FF**').

The measurement result can also be cancelled (set to '**FF FF FF FF**') before a new cycle is started. It can be done by an input assigned to *'clear'* or by the '*clear'* command, in this case **pay attention:** not only current checkweigher result is cancelled, all other checkweigher statistic results are also set to zero (cycle number, checkweigher results total, results average, standard deviation).

The result transmission can be triggered in different ways. It depends on the chosen trigger event (see document Ref. 165 714).

7.2 Management of Set-points:

Outputs may be assigned to the set-point function, especially for the monitoring of exceedance of the checkweigher running total value (cumulated weight) or the number of results out of tolerances.

7.3 Dynamic zero

If an input assigned to the *'dynamic zero'* function is activated or if a *'dynamic zero'* command is received, *eNod4-C* calculates the measurement average value during a configurable time. This value becomes effective if it is within a ± 10% range of the specified maximum capacity. Stability is not required.

7.4 Checkweigher zero automatic correction

eNod4-C also provides an automatic zero tracking for dynamic applications. It allows following the evolution of the zero in checkweigher functioning mode, for example on a conveyor belt on which there is some product accumulation

This function is efficient only when the measured signal is filtered enough with few noise and oscillations. When this function is enabled, an average value is calculated if comprised within a configurable interval around the calibration zero. Some other criteria are also taken in account:

- A minimum of 75% ratio between accepted measurements and total measurements received during checkweigher dynamic correction time is considered.
- A minimum of 10 measurements accepted during correction time is necessary.

In legal for trade mode:

- Checkweigher zero dynamic correction is not done if measurement is stable.
- A maximum correction range of ±5 d is admitted.
- Time during measurement average is calculated is at least 1 second.

To use checkweigher zero automatic correction it is recommended:

- Use it only if belt conveyor is in use.
- Zero dynamic time should be higher to checkweigher measuring time.

eNod4 -C: Characteristics and functioning

- Zero dynamic time should be lower than free time between two arriving load.
- Zero dynamic interval should be lower than checkweigher trigger level.
- Zero dynamic interval should be in connection with mechanical vibrations, it should be lower than 10d.

8   logical INPUTS:

Each input can be individually set to positive or negative logic. A minimum stabilization time can be configured; it is the same for both inputs.

8.1   Inputs assignment:

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

Fonction	Operating mode	
	transmitter	checkweigher
none	●	●
tare	●	●
cancel tare	●	●
Zéro	●	●
transmit measurement	●	
Continuous transmit measurement	●	
start cycle		●
stop checkwheiger cycle		●
Clear checkweigher results		●
dynamic zero		●

8.2   Inputs function description:

8.2.1   None:

Inputs have no effect.

8.2.2   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.

8.2.3   Cancel tare:

Cancel tare

8.2.4   Zero:

Each input can be assigned to the **zero** function. Taking zero is assigned a stability criterion configurable. 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 $\pm$ 10% of maximum capacity or $\pm$ 2% if *eNod4-C* is in legal for trade functioning mode. This new value is the useful zero value, a reset cancels it.

8.2.5   Transmit measurement:

This is only possible using **standard or fast SCMBus** format *or* **CANopen®** protocols.

The request can apply to:

- gross measurement.
- net measurement.
- factory calibrated measurements

A single measurement is transmitted per rising or falling edge (depending on the configured logic) on the input signal.
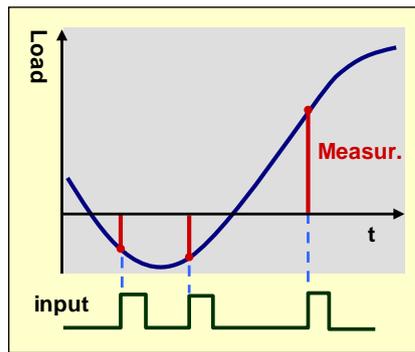
Fig. 7

8.2.6   Measurement   window:

This is only possible using *standard or fast SCMBus*.

The request can apply to:

- gross measurement.
- net measurement.
- factory calibrated measurements.

While the input is kept at the right level, a series of measurements are transmitted at the period defined by the *'sampling period'* setting. Only input 2 is operational if both inputs are assigned to

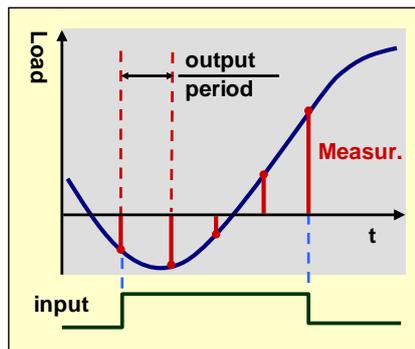**Fig. 8**

8.2.7   Start cycle:

See checkweigher operating mode.

8.2.8   Stop checkweigher cycle:

See checkweigher operating mode.

8.2.9   Clear checkweigher result:

See checkweigher operating mode.

8.2.10 Dynamic zero:

See checkweigher operating mode.

9   LOGICAL OUTPUTS :

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

9.1   Outputs assignment:

Function	Operating mode	
	Transmitter	Checkweigher
None	●	●
Set point	●	●
Motion	●	●
Defective measurement	●	●

Checkweigher result available		●
Cycle in progress		●
Inputs image	●	●
Level on request	●	●
Checkweigher result out of tolerances		●
Checkweigher result within tolerances		●

9.2 Description:

9.2.1 None:

Output state is fixed.

9.2.2 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.
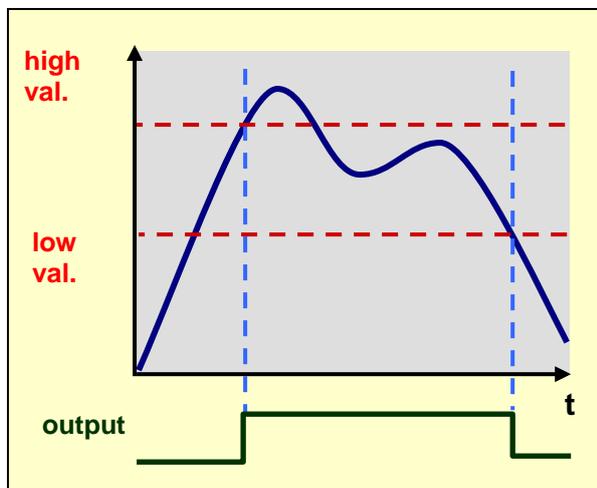
Set points can be assigned to:

- gross measurement
- net measurement
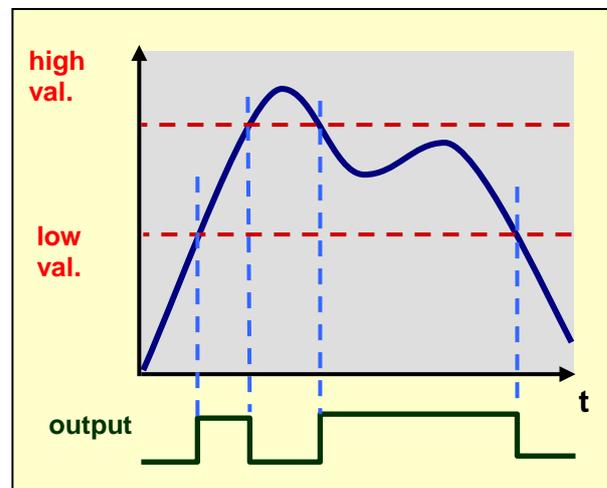- Checkweigher result
- Checkweigher total running

Set points 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. 9

Functioning in window
Fig. 10

9.2.3 Motion:

The outputs can be assigned to copying measurements stability.

9.2.4 Defective measurement:

The outputs can be assigned to copying the measurements faults. These faults are also coded in the status word attached to measurements, 3 faults are recognized:

- signal outside the converter analogue input range
- signal outside the capacity on the positive side
- signal outside the capacity on the negative side

9.2.5 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.

9.2.6   Level on request:

Activation of outputs is triggered by master requests. When an '*output activation*' command is received.

9.2.7   Cycle in progress:

See checkweigher operating mode.

9.2.8   Checkweigher result available:

See checkweigher operating mode.

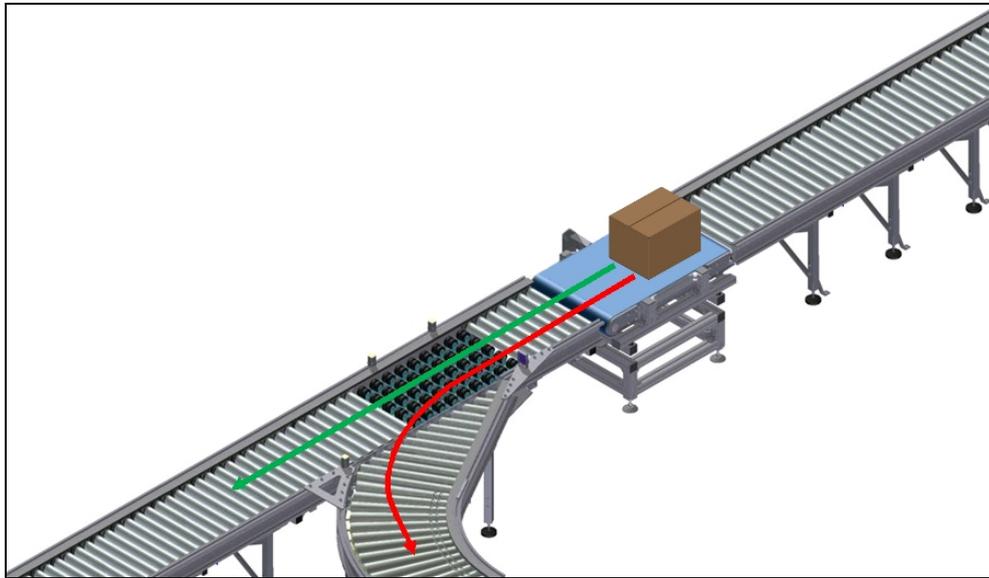### 9.2.9   Checkweigher result out of tolerances:

Fig. 11

For sorting applications an ejection or switching system can be set up downstream of the weight sensor (Fig.11). Thus, out of tolerances objects can be sorted.
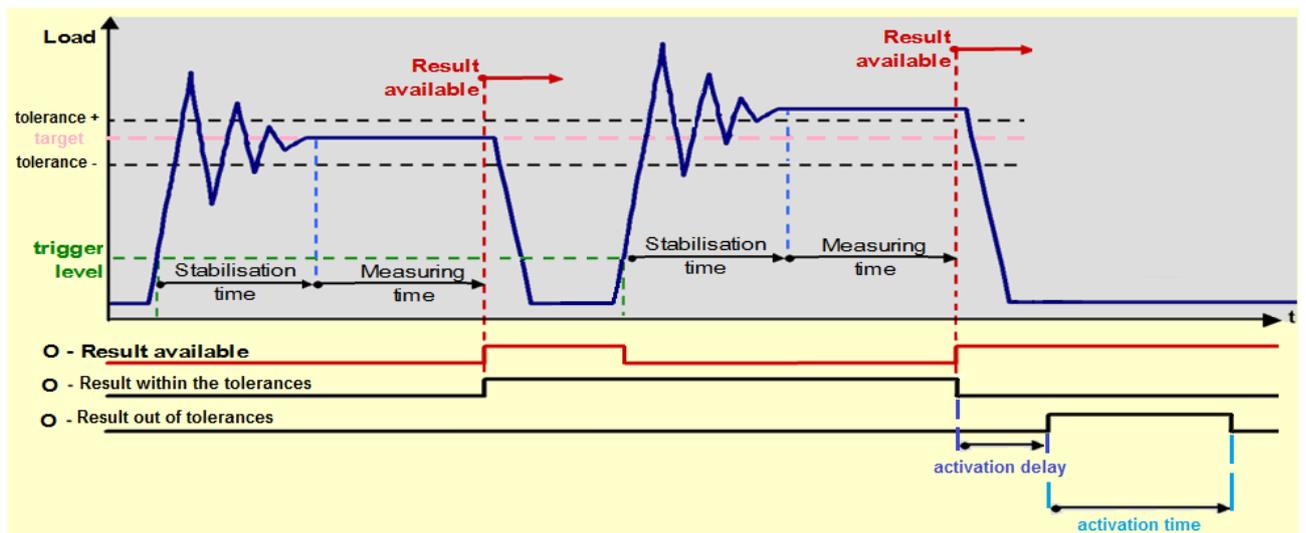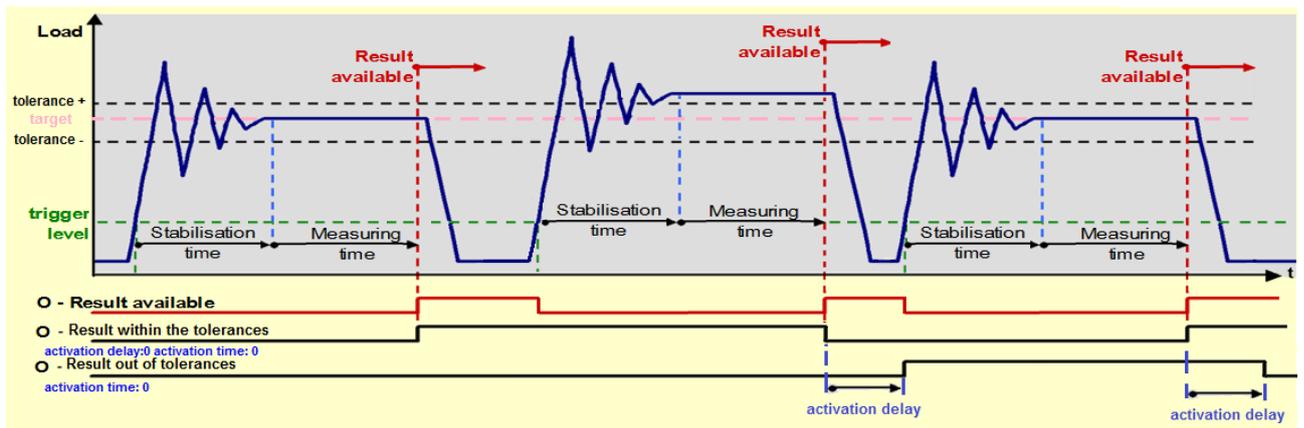

Fig. 12

For applications with ejector an outputs activation delay up to five seconds can be configured and an output activation time up to five seconds (Fig. 12). This allows controlling of the actuators of the ejector.

Fig. 13

For applications with switcher an outputs activation delay up to five seconds can be configured (Fig. 13). This allows controlling of the actuators of the switcher. The output activation time should be set to zero.

Up to five outputs activation delays can be stored from the weighing point to the ejection point. If this limit is exceeded an error is reported in the checkweigher error report.

9.2.10 Checkweigher result within tolerances:

Sorting can also be performed on within tolerances objects.