eNod & eNodView

eNod4

**Weighing controller for
automated systems**

SCAIME

Presentation

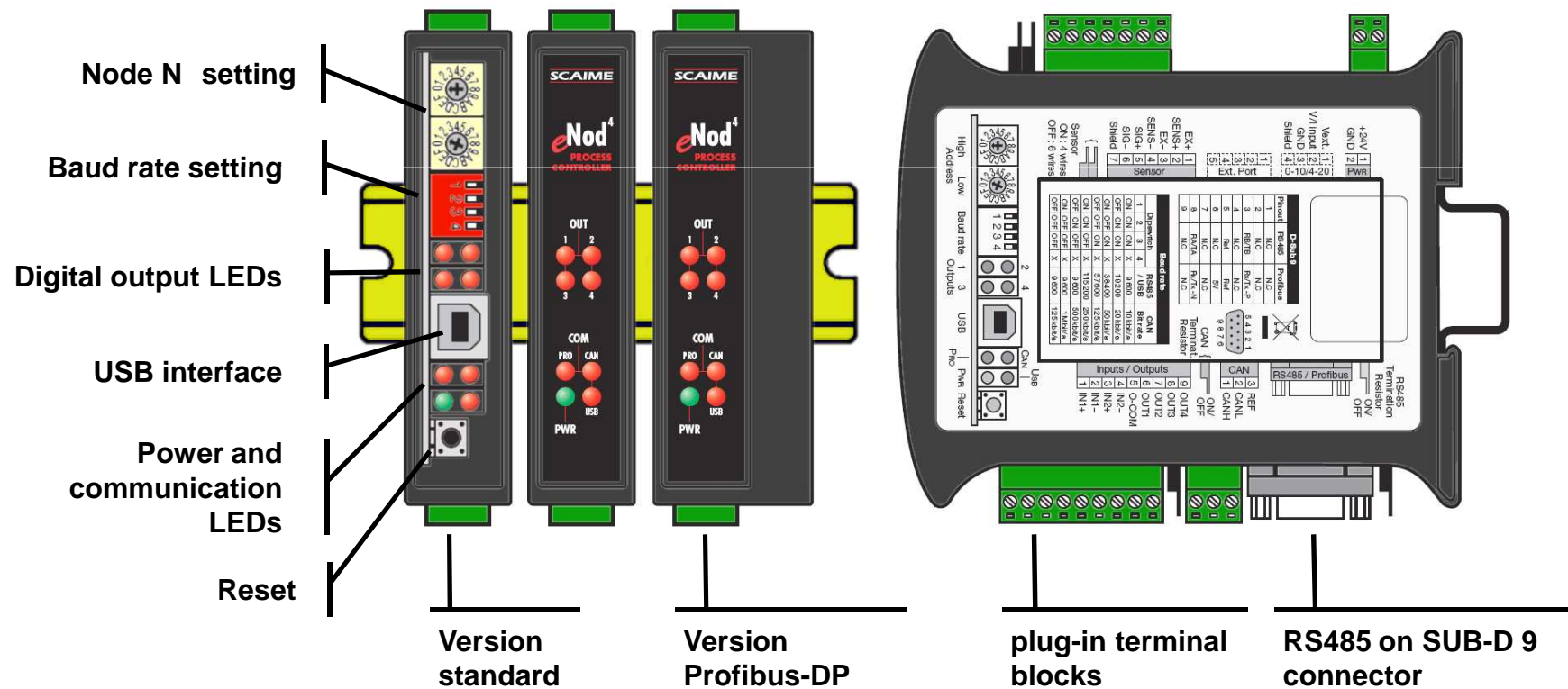eNod4 is a weighing module especially designed for integration into an automated system

▶ **It transforms any strain gauge sensor into intelligent digital system.**

▶ **It offers a high performance weighing function for process control**

Presentation

DIN rail housing

Vertical and compact size housing allowing quick and easy installation on DIN rail

Node N setting

Baud rate setting

Digital output LEDs

USB interface

Power and communication LEDs

Reset

Version standard

Version Profibus-DP

plug-in terminal blocks

RS485 on SUB-D 9 connector

Interfaces

eNod4 - Sensor input

▶ **Standard strain gages input**
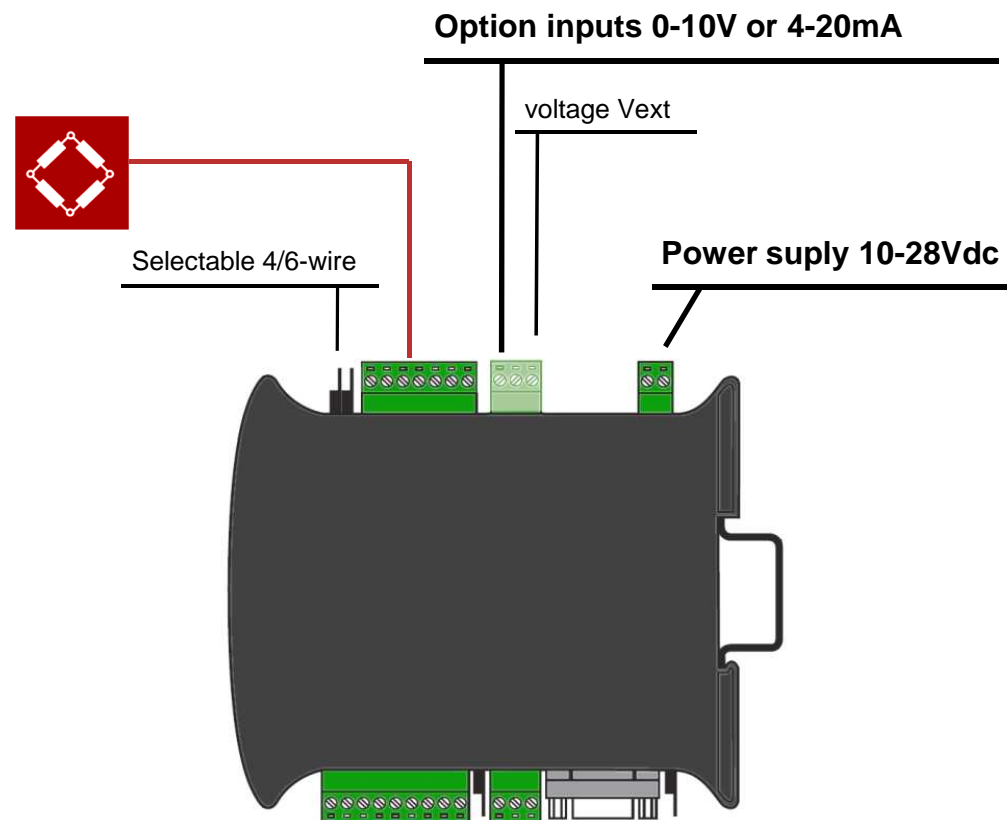
- Up to 4 load cells 350Ω
- Input range 0 - ±7,8mV/V
- Factory calibration : 500 000d @ 2mV/V
- Wiring in 4 or 6-wire

▶ **Optional voltage input 0-10Vdc**

- Factory calibration: 100 000d @ 10Vdc
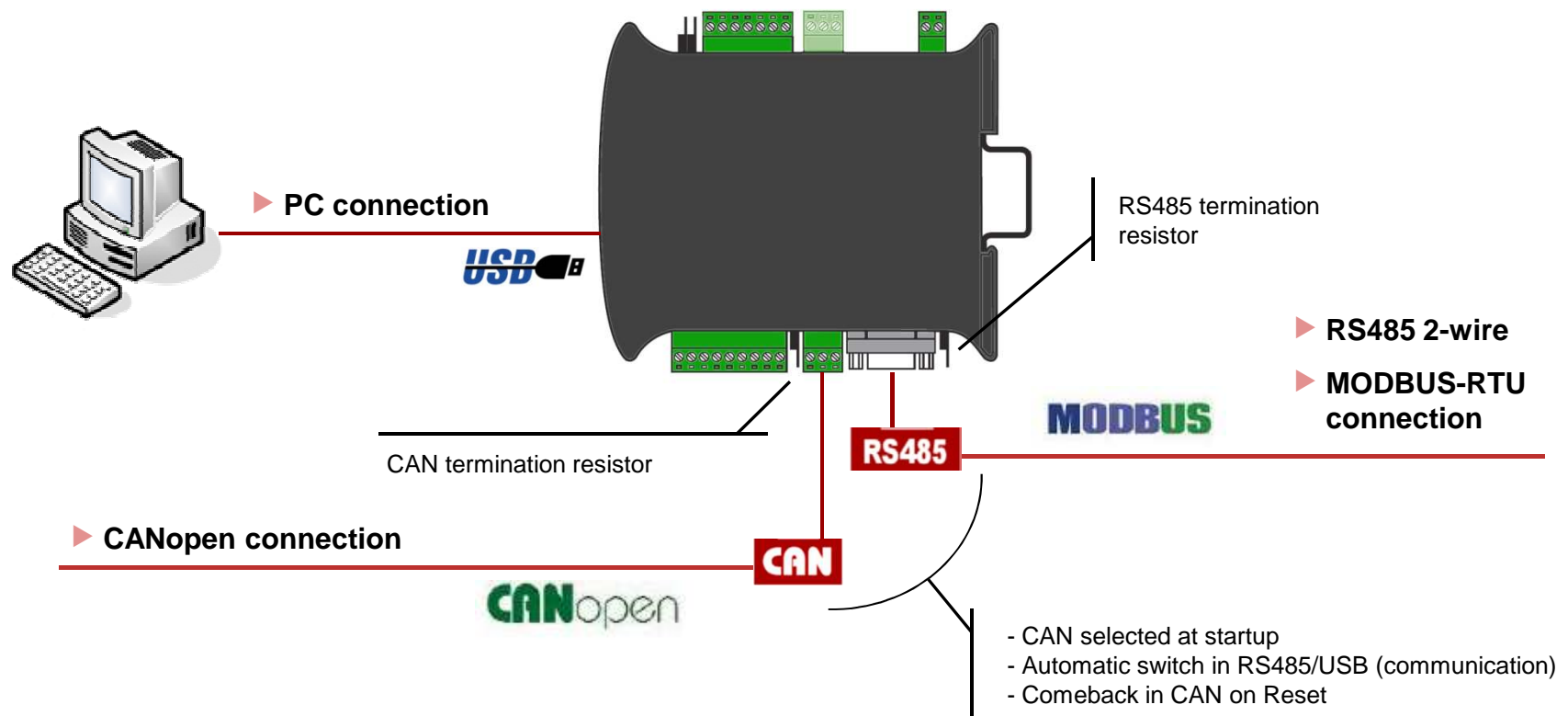
▶ **Optional current input 4-20mA**

- Input resistance 50Ω
- No factory calibration
- Voltage output Vext available

Option inputs 0-10V or 4-20mA
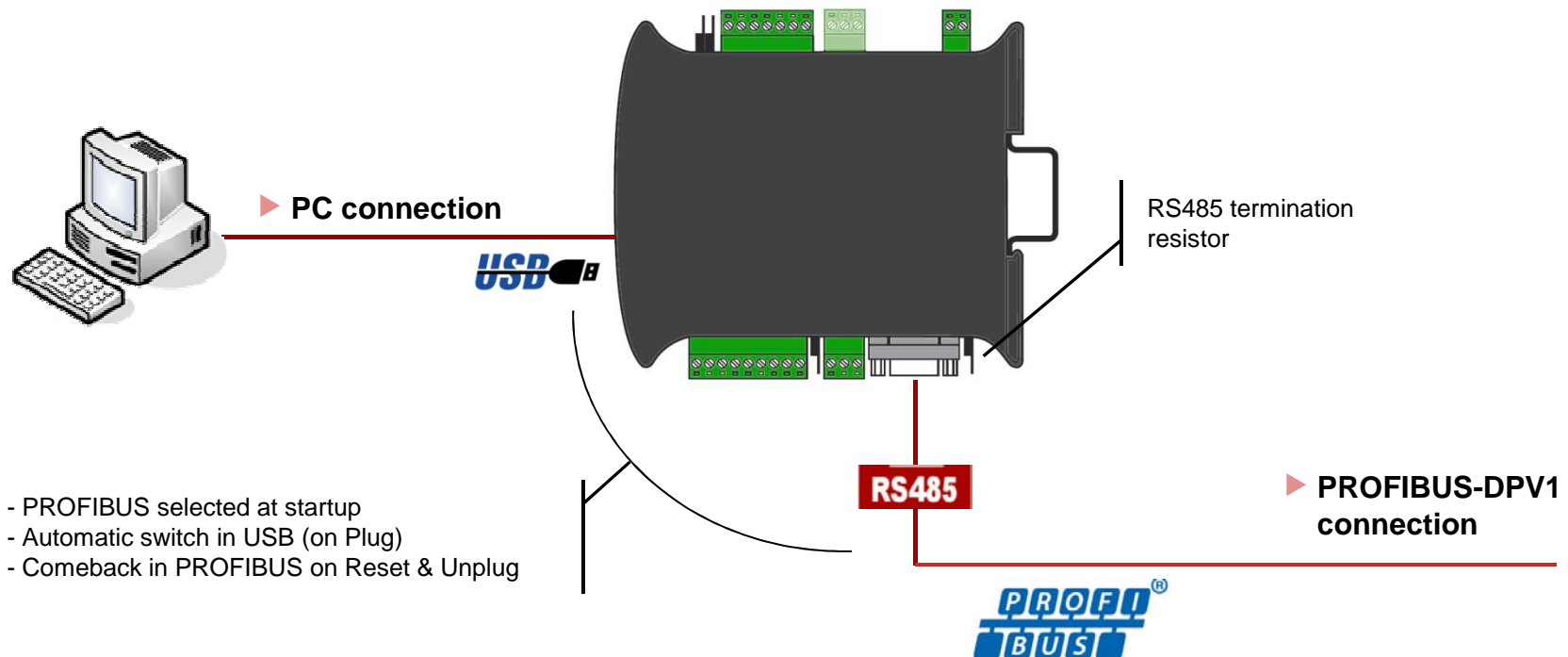
voltage Vext

Power suply 10-28Vdc

Selectable 4/6-wire

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Interfaces

eNod4 Connectivity

Easy connection to several automated systems

▶ **PC connection**

USB

RS485 termination resistor

▶ **RS485 2-wire**

▶ **MODBUS-RTU connection**

MODBUS

RS485

CAN termination resistor

▶ **CANopen connection**

CAN

CANopen

- CAN selected at startup
- Automatic switch in RS485/USB (communication)
- Comeback in CAN on Reset

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Interfaces

Easy integration into PROFIBUS architecture

▶ **PC connection**

USB

RS485 termination resistor

- PROFIBUS selected at startup
- Automatic switch in USB (on Plug)
- Comeback in PROFIBUS on Reset & Unplug

RS485

▶ **PROFIBUS-DPV1 connection**

PROFI BUS®

SCAIME

6

Interfaces

1 PLC's

Validated Connectivity with =S= PLC's

2 ADVANTYS-STB system

Integrated into Advantys-STB I/O platform

CANopen CAN

CAN CANopen

▶ **Ethernet-IP**

▶ **Modbus-TCP**

▶ **Profibus-DP**

▶ **ADVANTYS-STB allows to connect eNod4-T on several industrial fieldbus**

Collaborative Automation
by
Schneider Electric

SCAIME

Interfaces

eNod4 – Digital I/O
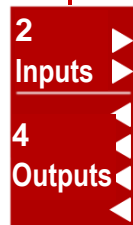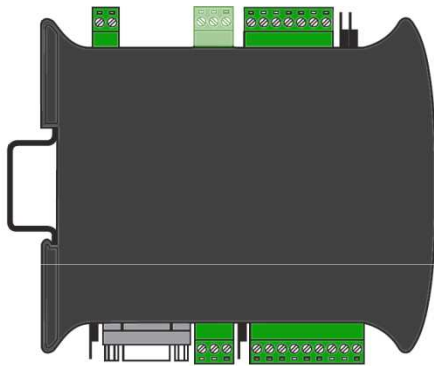
▶ **2 opto-isolated digital inputs**

- External triggering , external Zero or Tare

▶ **4 opto-isolated digital outputs (static relays)**

- Set point control, Default, Input recopy, signal stability
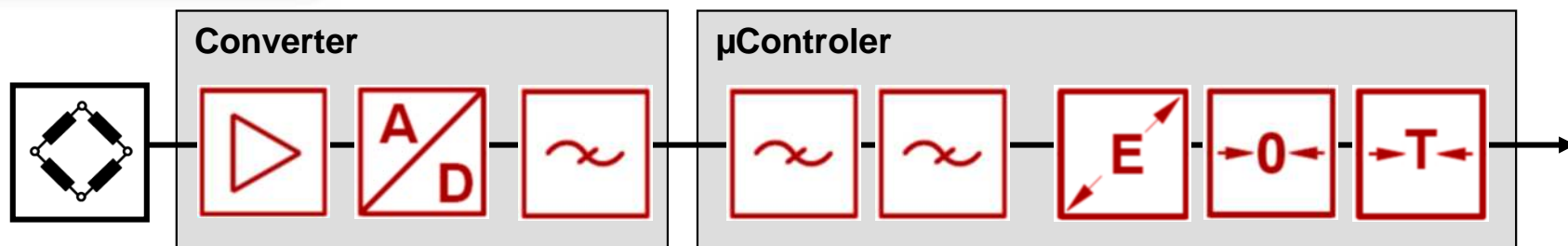- Relay contact rating 55V/400mA

2 Inputs ▶ ▶

4 Outputs ◀ ◀ ◀ ◀

Set point control

- **Hysteresis mode**
- **Window mode**
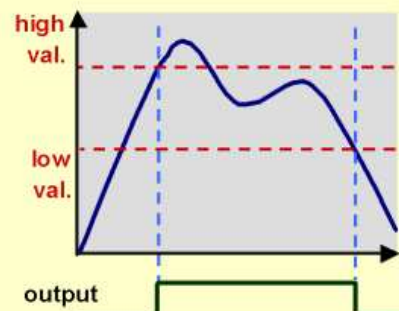
SCAIME
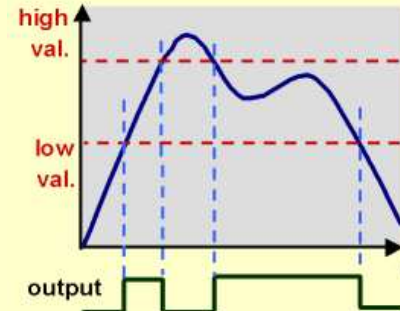
Signal processing

Amplification - conversion

Converter

µControler

Converter

- Sensor input: ±**7.8 mV/V**
- Sampling frequency **4KHz**
- Resolution **24 bits**
- Low-pass filter

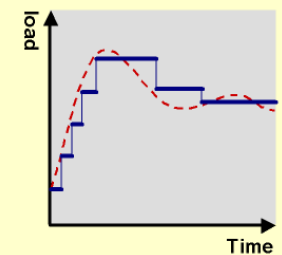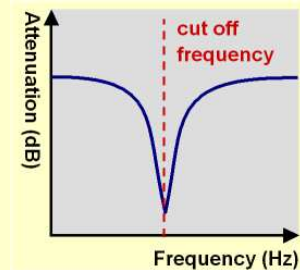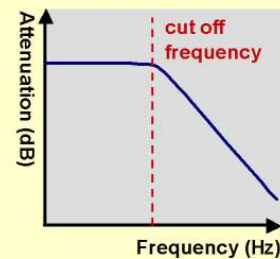| A/D converter |
|---|
| **7.5 à 1900Hz** |
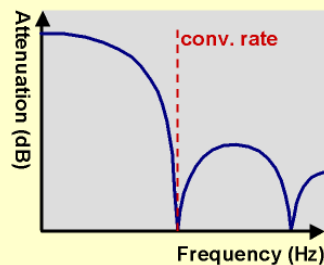
Post-Filtering

- Low-pass
- Notch
- Auto-adaptative

- Scaling
  ±500 000 pts

eNodView

▶ **eNodview offers many tools to facilitate eNod4 implementation**

▶ **It allows parameters setting and calibration of eNod4.**

▶ **It's also a powerful measurement acquisition and analysis software.**

eNodView

1   Set up

- **Automatic detection of all eNod connected to the network**
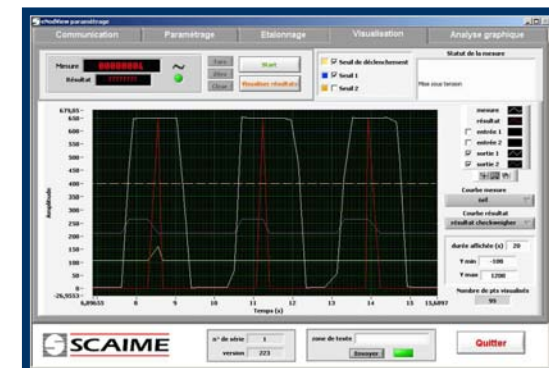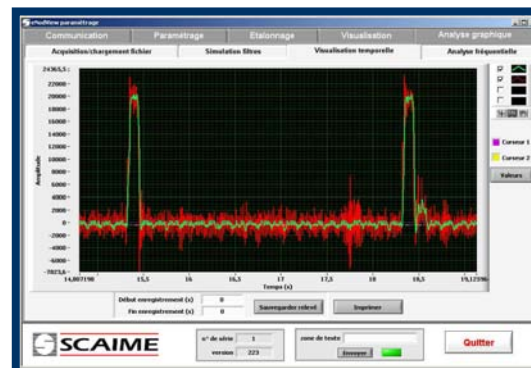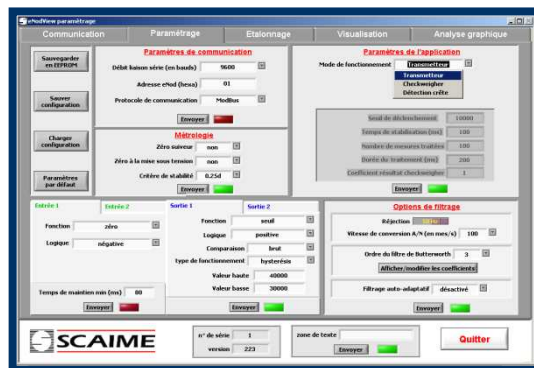- **Access to all eNod4 parameters**
- **physical or theoretical calibration**

2   Analyse

- **Measurement aquisition and displaying**
- **Frequency analysis (FFT)**
- **Digital filters simulation and displaying**

3   Real time display

- **Graphical and real time display of measurement and digital In/Out**
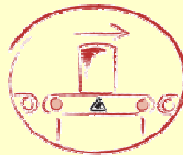
Applications

Transmitter

- High speed measurement acquisition and transmission
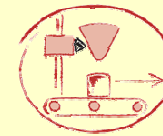- Triggering and samppling functions

Checkweigher

- Cycle management dedicated to dynamic weighing
- Calculation functions for sorting process and checkweighing
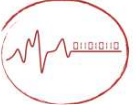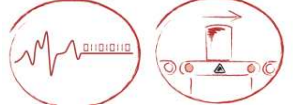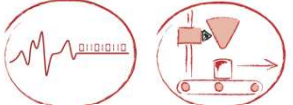
Dosing

- Mono-product dosing by filling or by unloading
- Fine and coarse feed management
- Automatic in-flight correction

Applications

eNod4 applications

Several firmware versions dedicated to user application

eNod4-T	eNod4-C	eNod4-D

Measurement transmission
- Very high speed measurement acquisition and transmission

Checkweigher
- Cycle management dedicated to dynamic weighing

Dosing process
- Mono-product dosing by filling or by unloading

Functions

eNod4 common functions

eNod4 allows high speed and high accuracy measurement transmission.

- ▶ **Able to transmit up to 1000 measurement by second**
- ▶ **Factory pre-calibration at 500 000d for 2 mV/V**
- ▶ **Physical or theoretical calibration, gravity correction**
- ▶ **Digital filtering including low-pass, notch and self-adaptative**
- ▶ **Measurement scaling with decimal point and unit management**
- ▶ **Triggering and sampling functions**
- ▶ **Weighing functions**
  - Zero, automatic Zero at startup, Zero tracking
  - Tare
  - Measurement stability control
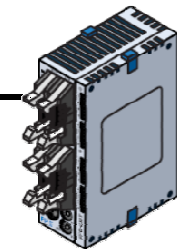 - Gravity correction of calibration

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Measurement transmission

CANopen communication

▶ **With CANopen, eNod4 allows a very high speed and versatile transmission**

10 kb/s … 1Mb/s

PLC

CANopen

▶ **Exchanges client-server by SDO** (service data object)

▶ **Exchanges Producer-consumer by PDO** (Process data object)

- On timer event (periodic base, min = 1 ms)

- cyclic or acyclic synchronized (linked to bus sync. messages)

- On Digital input event

- On value variation of data to transmit

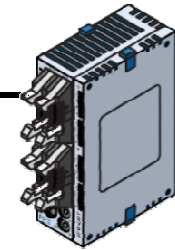**Measurement transmission up to 1000 meas/s**

Measurement transmission

MODBUS communication

▶ **With Modbus, eNod4 allows simple and quick transmission**

9600 b/s … 115200b/s

MODBUS

PLC

▶ **Master-Slave exchanges**

- Only one master

- RTU (Remote Terminal Unit) transmission mode

- Encapsulated SCMbus commands allowing mono-point measurement transmission up to 1000 meas/s

- Physical bus RS485 and USB in RS232 emulation

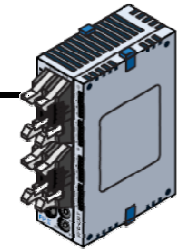**Measurement transmission up to 400 meas/s**

Measurement transmission

PROFIBUS DP communication

▶ **Profibus DP-V1 class 2 : All the eNod4 parameters are configurable by the bus**

9600 b/s … 12Mb/s

PLC

▶ **Master-Slave exchanges, multi-master**

- 2 simultaneous acyclic connections are possible with masters
- Cyclic communication cyclique with module choice (Selection of data to include in the Profibus frame)
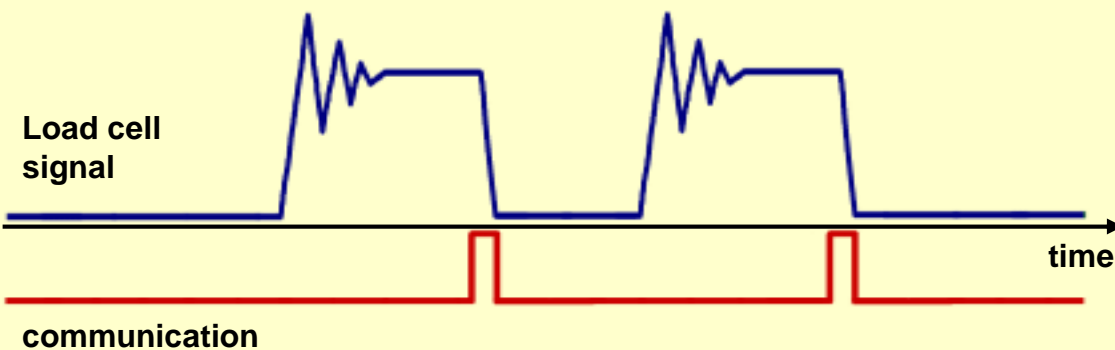- Acyclic and cyclic capabilities

**Data (measurement) update frequency :
50 time/s**

Dynamic checkweighing

eNod4-C - Checkweigher mode

Process

► eNod4-C makes high speed measurement acquisition

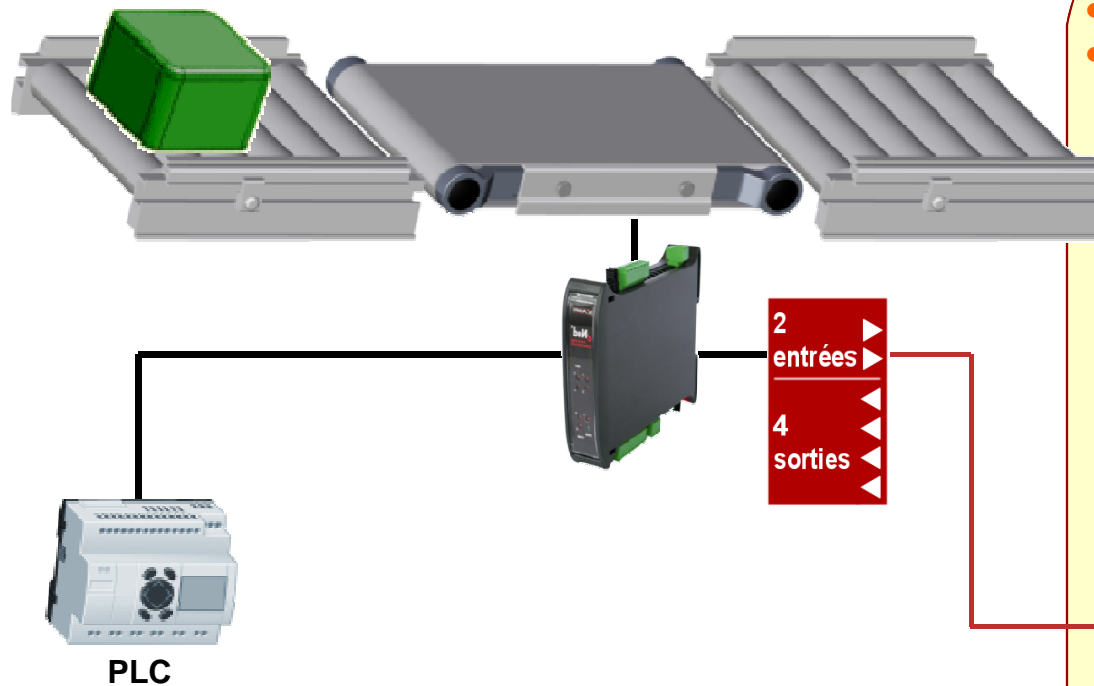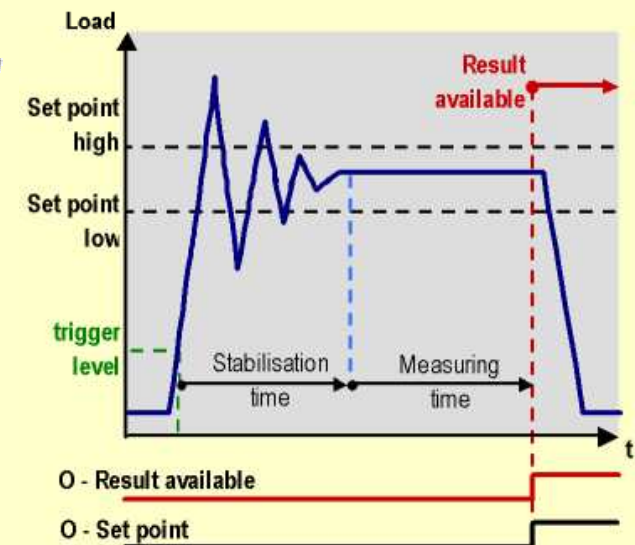► eNod4-C calculates the weight value and send it to the PLC

Load cell signal

time

communication

PLC

Dynamic checkweighing

▶ **Level triggering**

Process

- Cycle management without detector
- Sample with limit value control

2 entrées

4 sorties

PLC

SCAIME

Dynamic checkweighing

eNod4-C - Checkweigher mode

▶ **External triggering (with one or two detectors)**

Processus

2 entrées

4 sorties

PLC
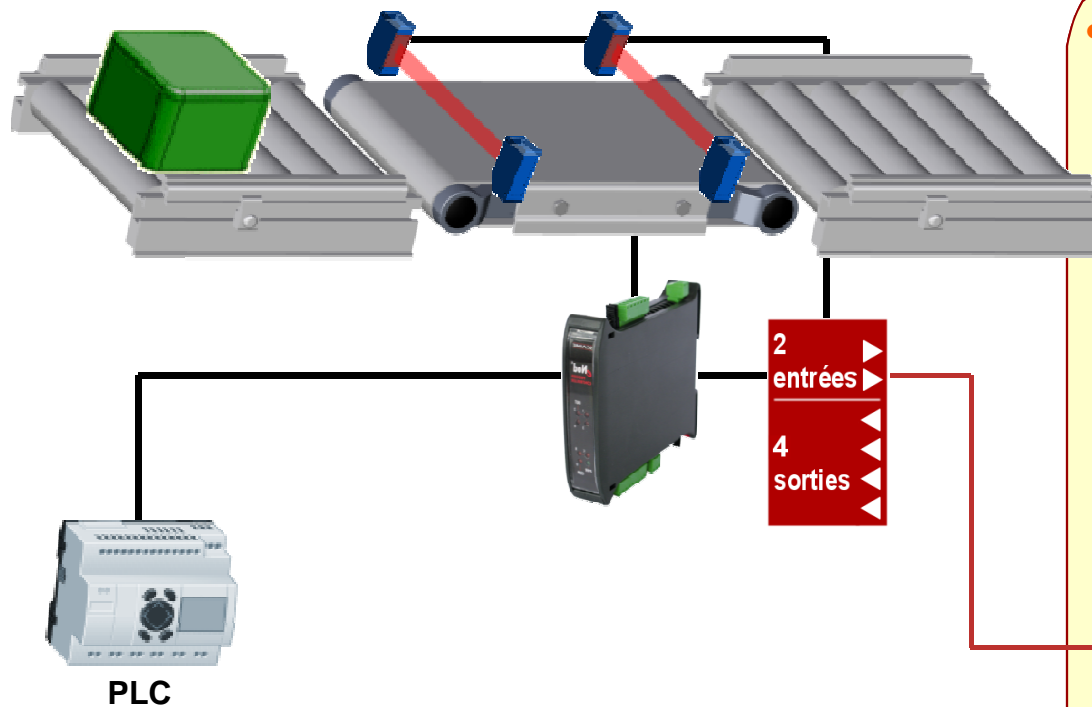
- **Cycle management with detector**

Load

Result available

Stab. time

Measuring time

t

I - Start cycle

O - Cycle in process

Dosing

2 entrées

4 sorties

RS485 CAN

Logical I/O

▶ **2 opto-isolated inputs**

- Cycle start, Zero, Tare, Clear
- Adjustable debbouncing

▶ **4 opto-isolated outputs**

- Fine/Coarse feed, emptying/ejection, limits control, Defect
- Static relays 55V/400mA

AK Load cell

PLC

SCAIME
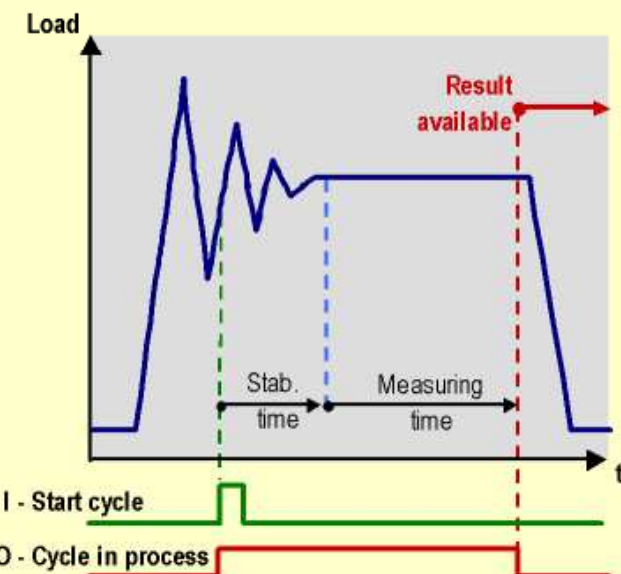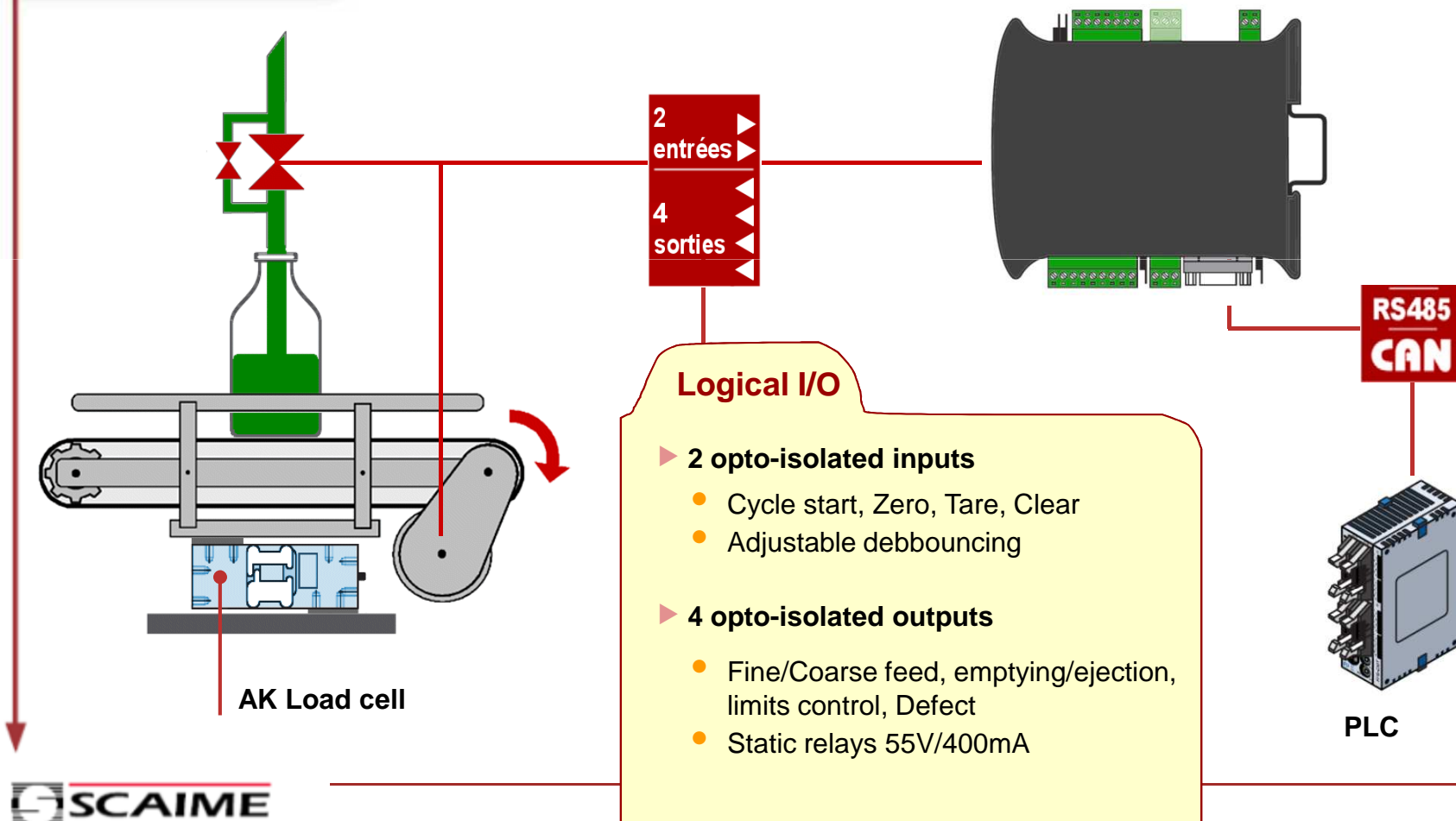
Dosing

eNod4-D - Dosing by filling mode

Dosing

Weight

Loading
Low/High level

Delay

Fine feed level

In-flight
correction

In-flight level

Limits
control

Time

Start

Coarse feed

Fine feed

Loading

Loading

Coarse feed

Fine feed

Start

PLC

SCAIME