eNod & eNodView

eNod products range

Digital process controllers

SCAIME

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Presentation

What is eNod ?

Products from eNod range are measurement transmitters and powerful weighing process controllers

- **eNod transforms any strain gauge sensor into intelligent digital system.**
- **Especialy designed for integration into automated systems**
- **Some models are OIML approved to be used in legal for trade applications**

Presentation

A choice of several versions

Its various housing allow a perfect adaptation to the environment

eNod1

- Electronic board
- Wires to solder

eNod3 DIN

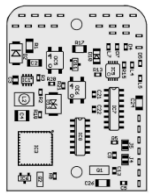
- Board on DIN rail support
- Screw terminals

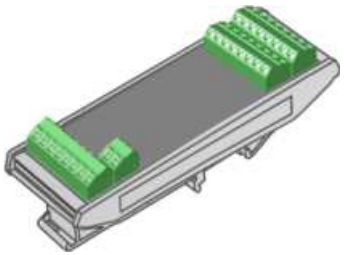
eNod3 ALUBOX

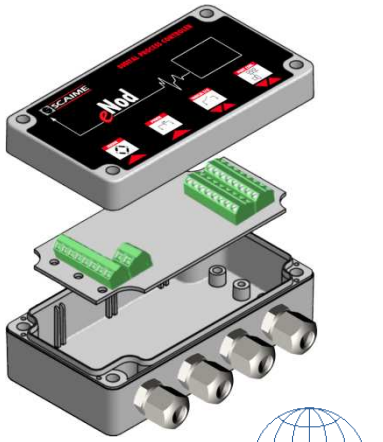
- IP65 Aluminum box
- OIML approved R76, R51, R61

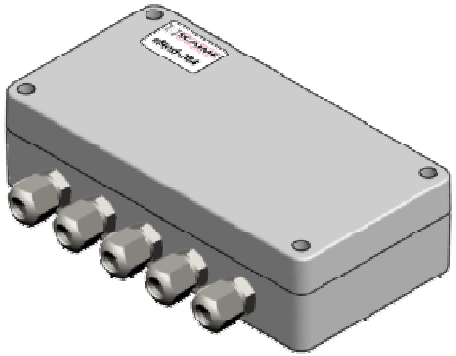
eNod3 JB4

- Aluminum housing
- Direct connection and trimming of 4 load cells
- Protection IP65







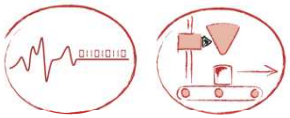


OIML

Presentation

eNod applications

Several firmware versions dedicated to user application

eNod-T	eNod-C	eNod-D
		

Measurement transmission

- Very high speed measurement acquisition and transmission

Checkweigher

- Cycle management dedicated to dynamic weighing

Peak detection

- Acquisition / calculation of specific values «Min, Max, Peak to peak»

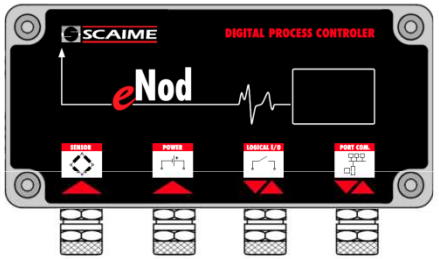
Dosing process

- Mono-product dosing by filling or by unloading

Interfaces

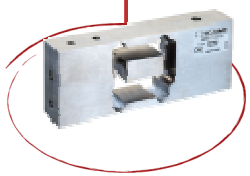
eNod - Sensor input

eNod is able to run up to 4 strain gauge sensor, with 4 or 6wire connection

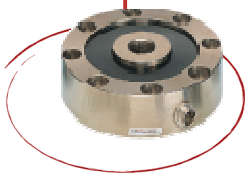


- Power supply 10-28Vdc

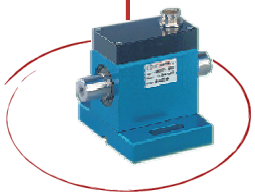
- Up to 4 load cells, resistance 350Ω
- Standard input range: 0 - 7,8mV/V
- 4 or 6wire connection



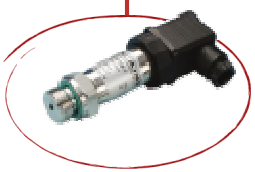
Load cells



Force sensors



Torque sensors

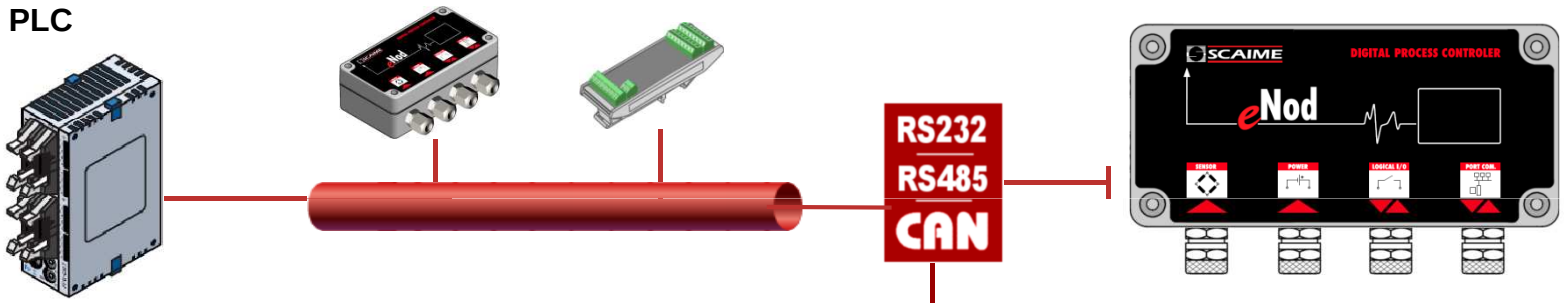


Pressure sensors

Interfaces

eNod - Connectivity

eNod interfaces allow an easy integration to the automated systems



- **eNod supports MODBUS-RTU, SCMBUS and CANopen**

MODBUS CANopen

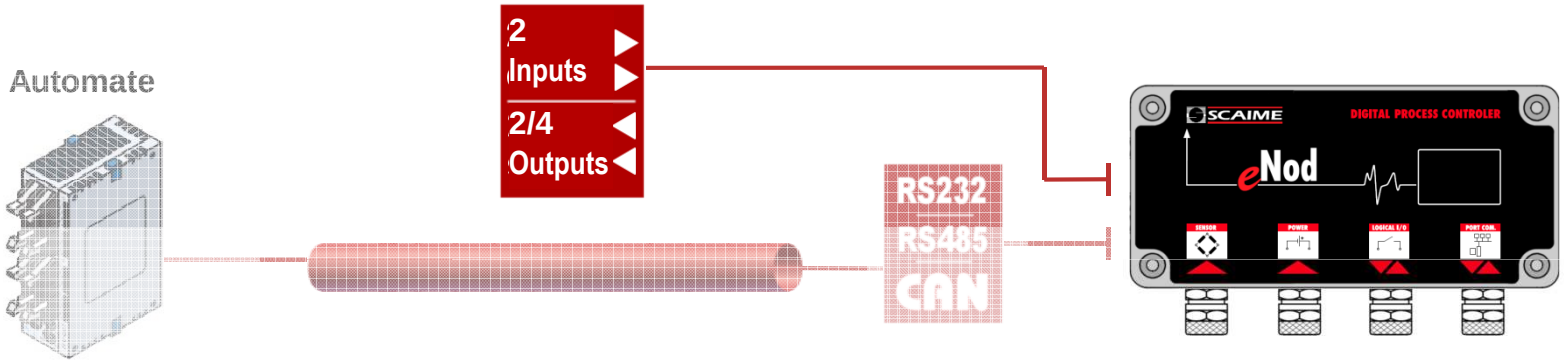
- **eNod**
  - RS485 or RS232 output
    - eNod3: Half/Full duplex selectable
    - eNod1: Half duplex
  - CANbus 2B output

Collaborative Automation by Schneider Electric

- **Perfect connectivity with Schneider Electric PLCs**

Interfaces

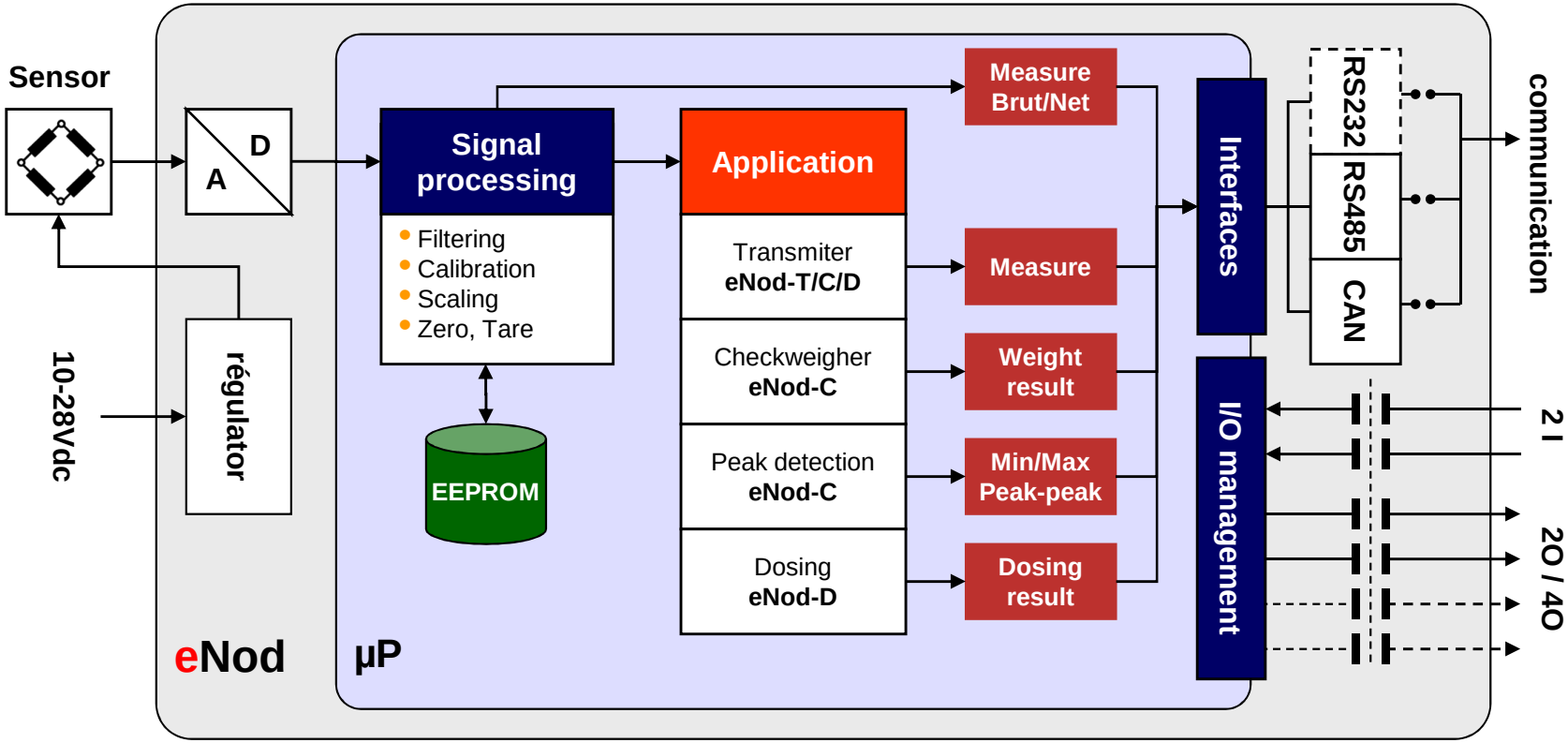
eNod– Digital input / output



- **2 isolated digital inputs**
  - Assignment to Triggering, Zero, Tare, or Clear functions
  - Adjustable debbouncing
- **2 or 4 (eNod3-D) isolated digital output**
  - Assignment to set point control, Default, input recopy, measurement ready
  - Relays contact rating 55V/400mA

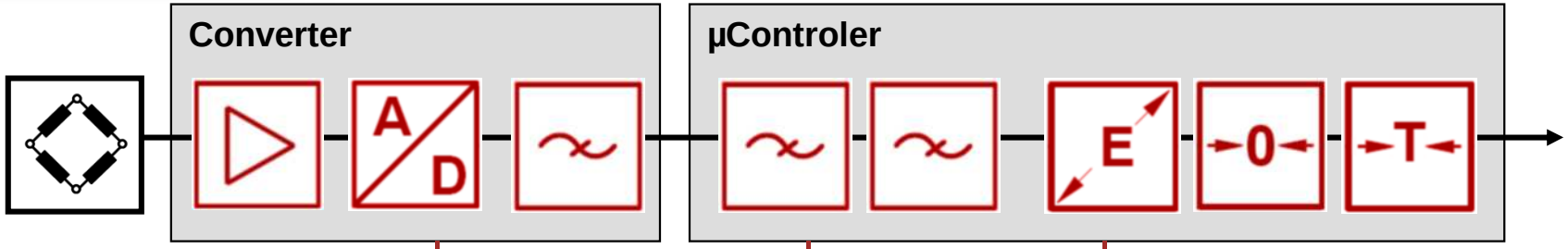
Architecture

eNod – Internal structure



Signal processing

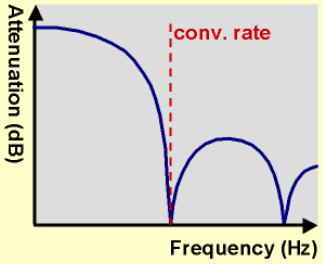
Amplification - conversion



Converter

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

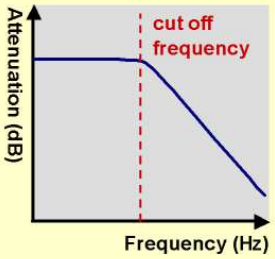
A/D converter
6.25 à 1600Hz

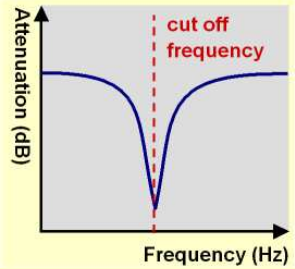


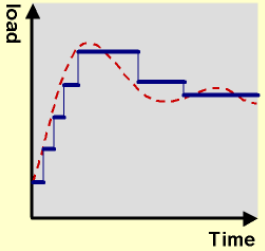
- Scaling
  ±500 000 pts

Post-Filtering

- Low-pass
- Notch
- Auto-adaptative



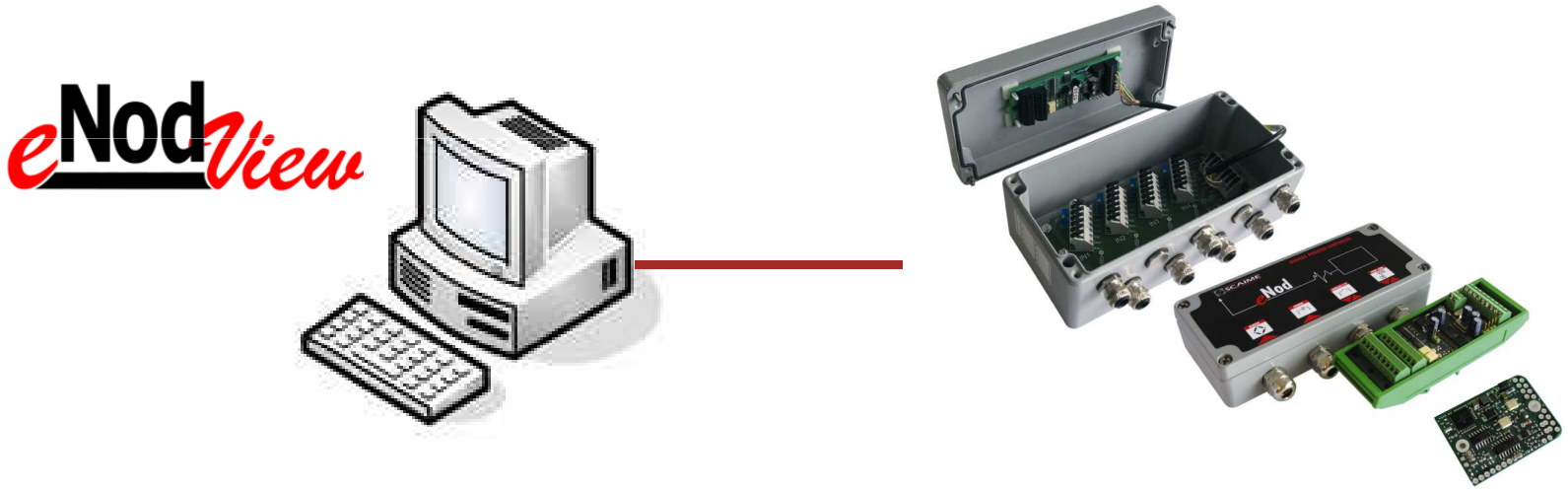




eNodView

What is eNodView ?

- eNodview offers many tools to facilitate eNod implementation.



- It allows parameter setting and calibration of eNod products.
- It’s also a powerful measurement acquisition and analysis software.

eNodView

Which functionnalities ?

1 Set up

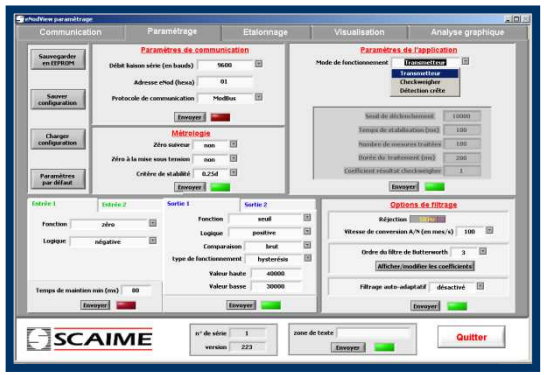
- Automatic detection of all eNod connected to the network
- Access to all eNod parameters
- physical or theoretical calibration

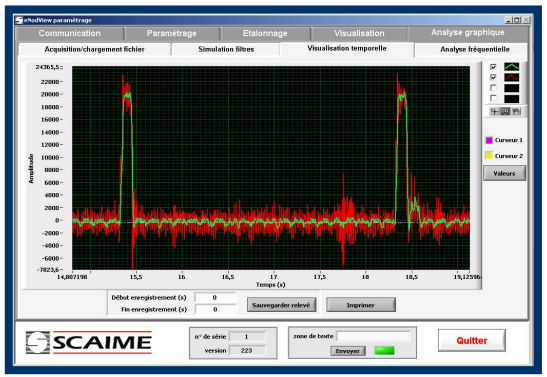
2 Analyse

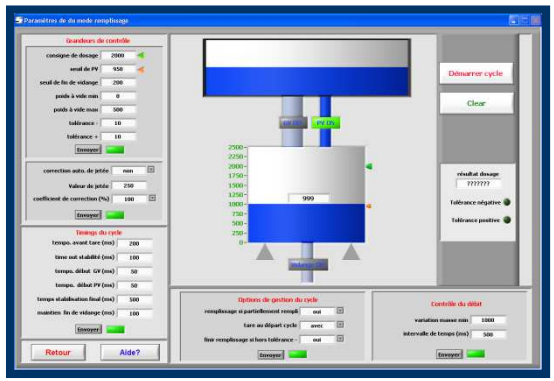
- Measurement aquisition and displaying
- Frequency analysis (FFT)
- Digital filters simulation and displaying

3 Real time display

- Graphical supervision of application processes (dosing, checkweigher…)







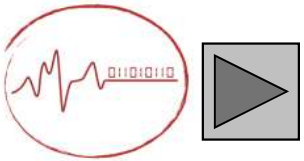
eNod procducts range

eNod products choice

		HardWare			
		Miniature board without terminal blocks	Board on rail Din support	Aluminium box	Junction box with 4 sensors connection board
Firmware	Transmitter	eNod1-T	eNod3-T DIN	eNod3-T ALUBOX	eNod3-T JB4
Firmware	Checkweigher		eNod3-C DIN	eNod3-C ALUBOX	eNod3-C JB4
Firmware	Dosing		eNod3-D DIN	eNod3-D ALUBOX	eNod3-D JB4
MID approval according to OIML R76, R51 and R61				OIML 6000 d	

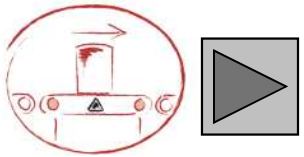
Applications

eNod firmware choice



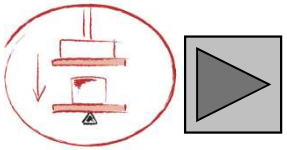
Transmitter

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



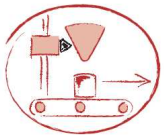
Checkweigher

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



Peak detection

- Acquisition and calculation of directly usable values (Min, max)
- Cycle management dedicated to manufacturing process



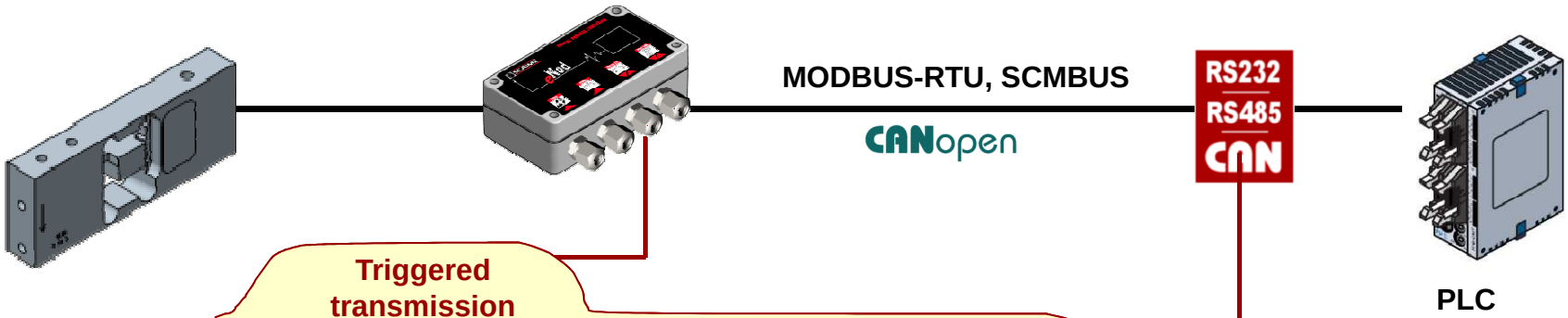
Dosing

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

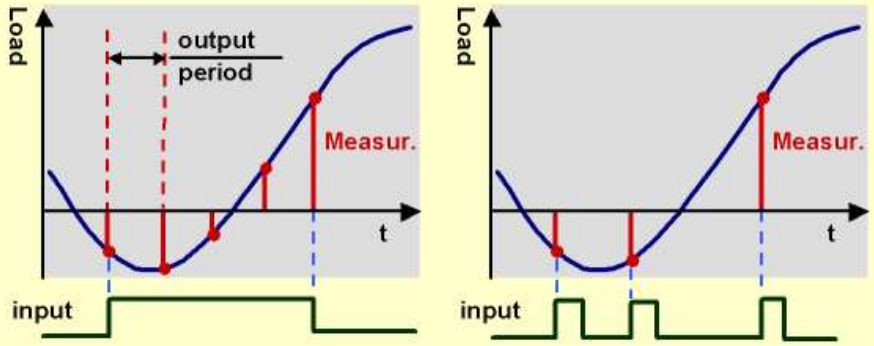
Measurement transmission

eNod-T/C/D - Transmitter mode

- eNod-T/C/D allows high speed measurement acquisition and transmission



Triggered transmission
(SCMBus & CANopen)



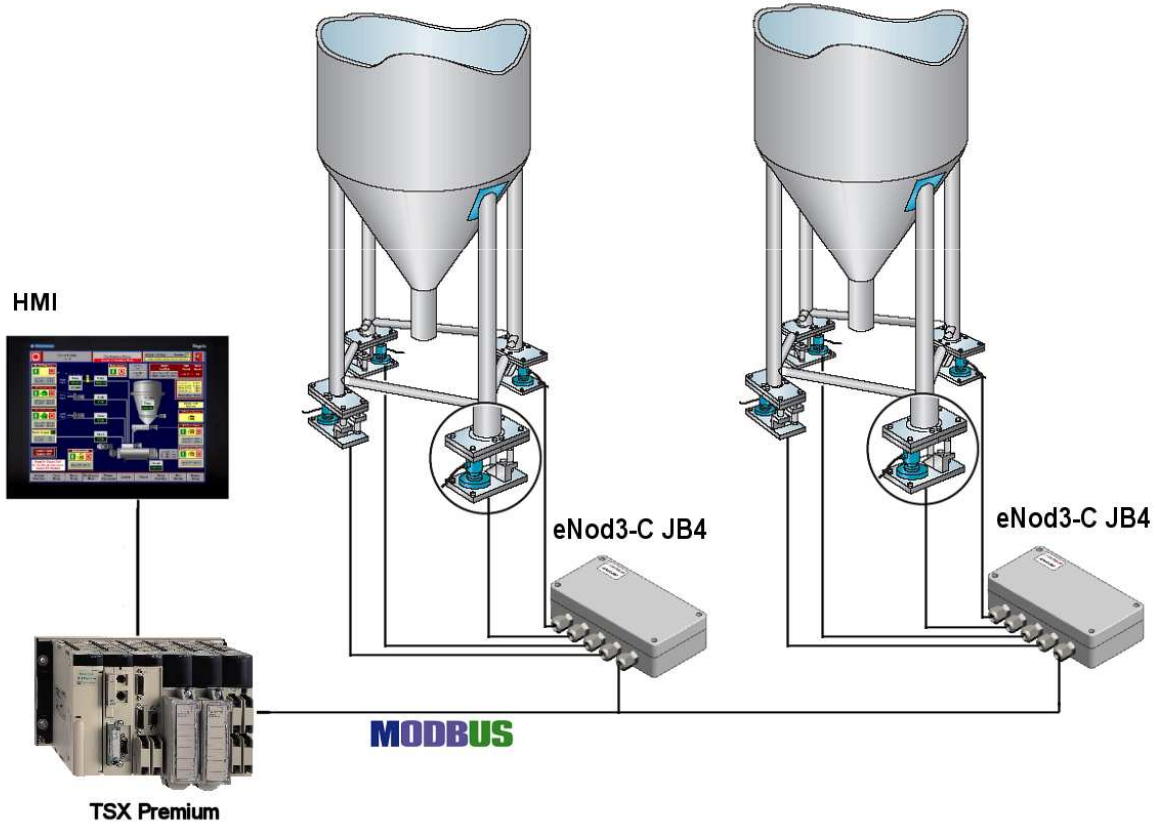
Protocole	Bds rate	Nb meas/s
SCMbus	115200	900
MODBUS	115200	400
CANopen		1000

Measurement transmission

Application example

Level monitoring

- Level monitoring of 2 storage silos
- eNod3 JB4 allows to directly connect the load cells to the transmitter board
- The eNod RS485 MODBUS output allows to easely integrate the boards into the MODBUS-RTU factory filedbus.



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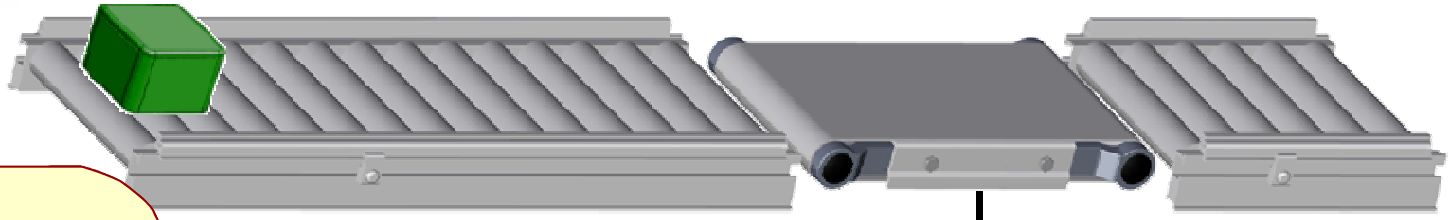
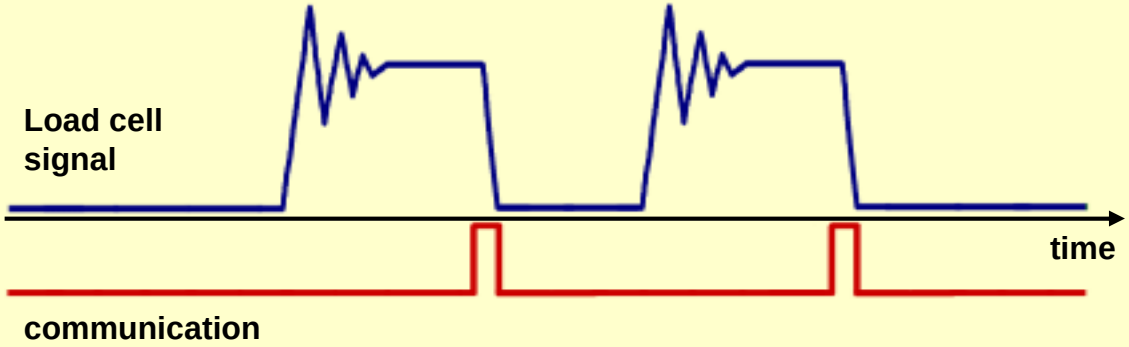
Dynamic weighing

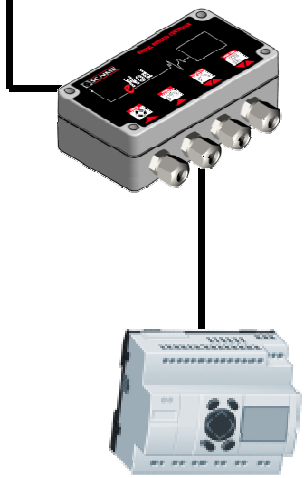
eNod3-C - Checkweigher mode



Process

- eNod3-C makes high speed measurement acquisition
- eNod3-C calculates the weight value and send it to the PLC



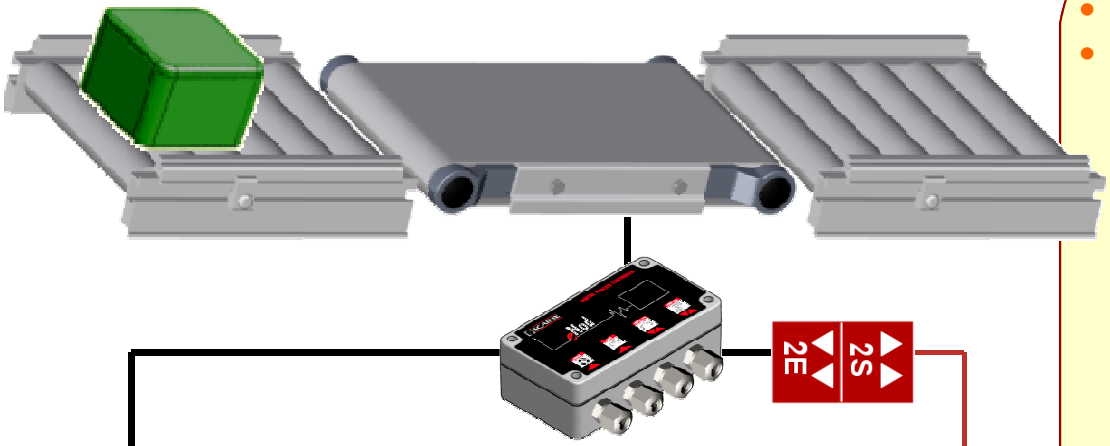


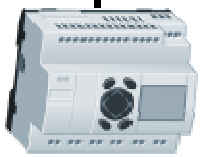
PLC

Dynamic weighing

eNod3-C - Checkweigher mode

- Level triggering

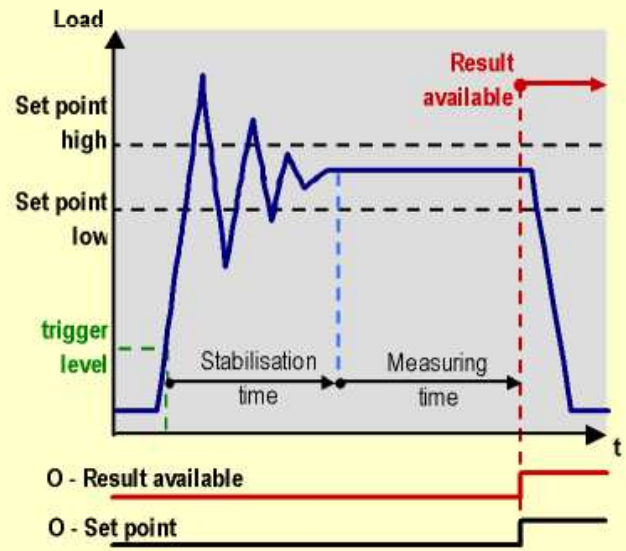




PLC

Process

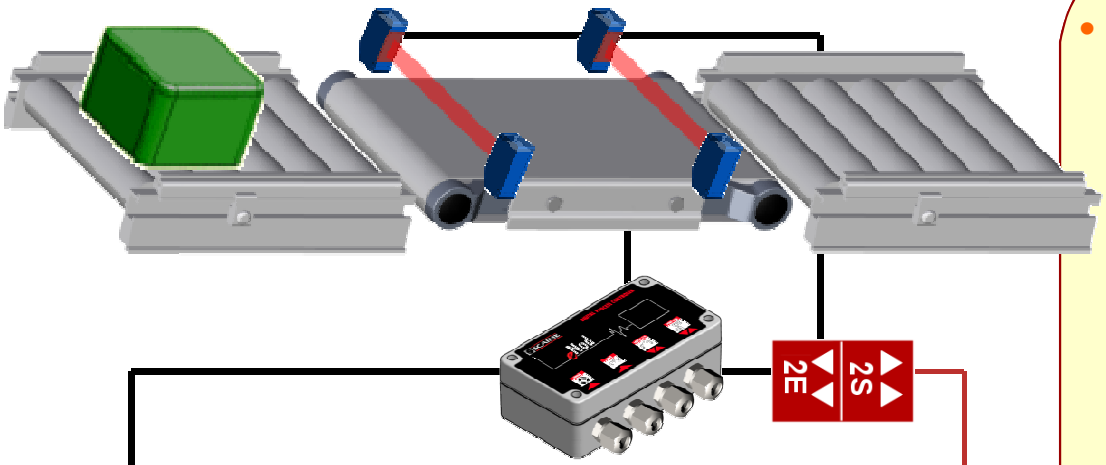
- Cycle management without detector
- Sample with limit value control

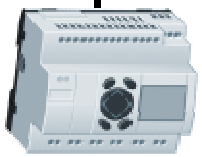


Dynamic weighing

eNod3-C - Checkweigher mode

- External triggering (with one or two detectors)

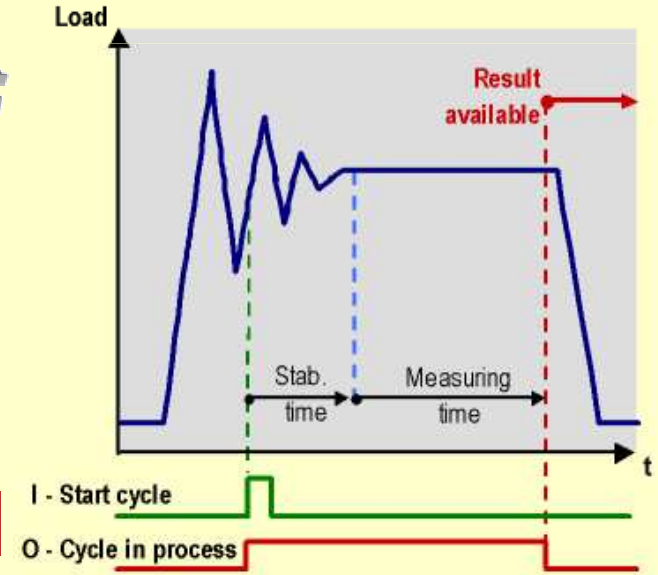




PLC

Processus

- Cycle management with detector



Dynamic weighing

Checkweigher application example

Fruit grader

- Replacement of existing electronic device which had become obsolete.

- Improvement of machine performance by grading up to 10 fruits/vegetables per second with an accuracy of +/- 1 g

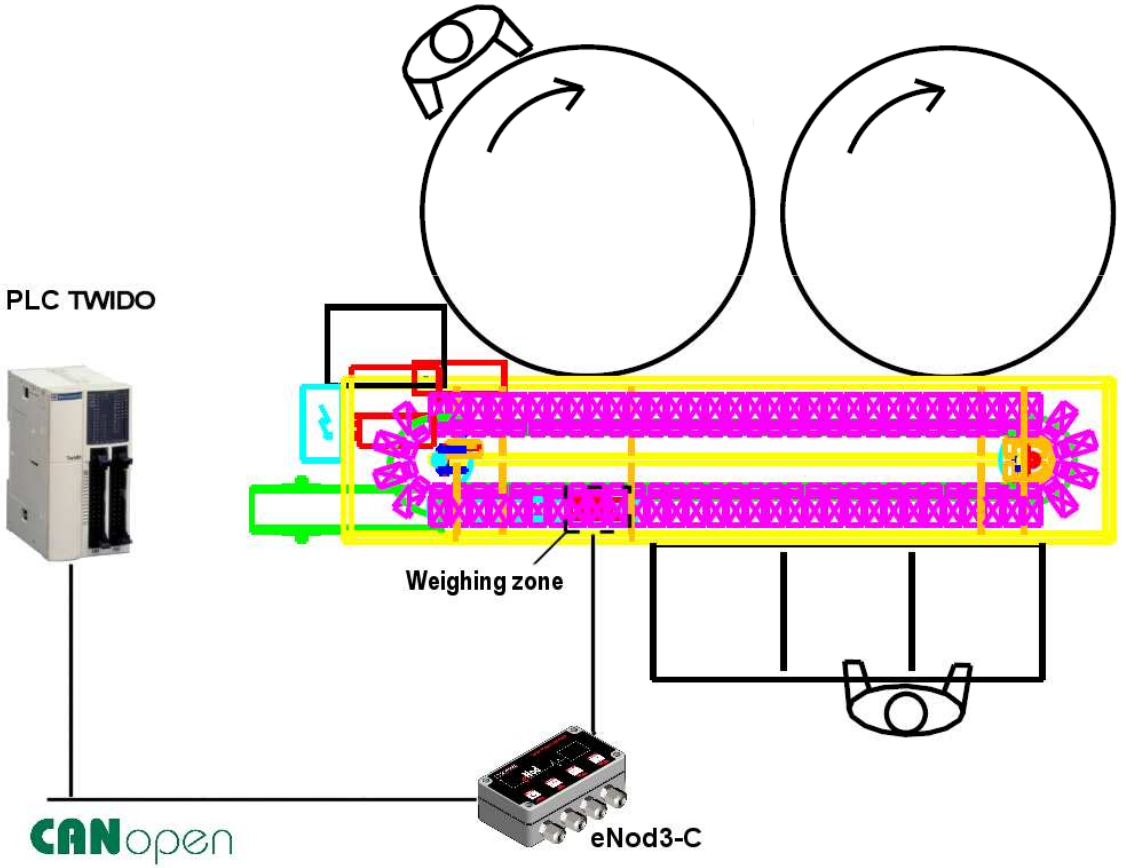
- New system architecture separating measurement tasks and automation tasks in order to have total control on the machine process software.

SCAIME

Dynamic weighing

Checkweigher application example

- the PLC manages all the application setting and machine commands.
- Depending on the fruit type, the PLC sends filtering and checkweighing parameters to the eNod3-C controller.
- eNod3-C takes care of digital filtering and all weighing measurements and calculations.
- eNod3-C sends fruit weight value to the PLC which eject it into the requested section.



SCAIME

Dynamic weighing

Checkweigher application example

Circular oysters grading machine

- This rotating machine include up to 30 weighing heads : AK12 load cell + eNod3-C

- The machine is managed by PLC which trigger the eNod3-C weighing cycles in Checkweigher mode.

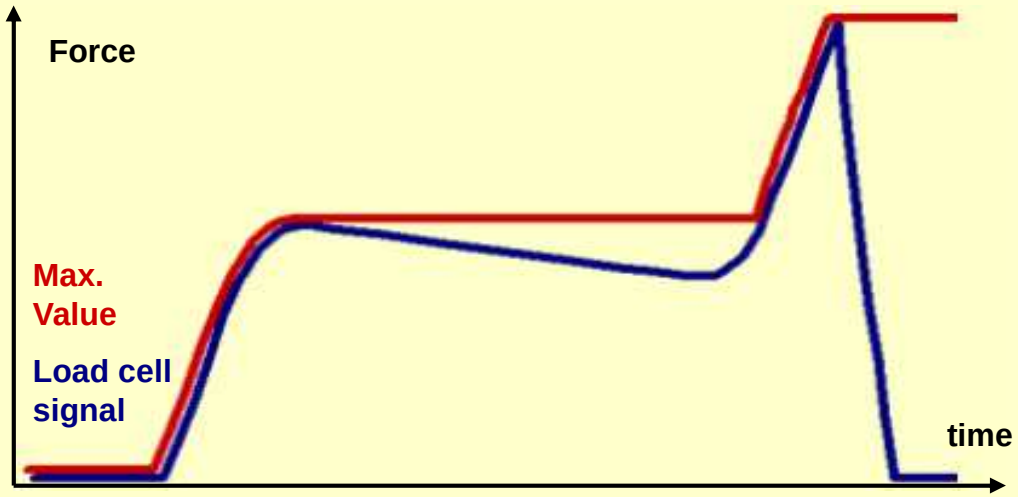
- With 30 heads, this machine is able to sort 25000 oysters/h. with +/- 1g accuracy

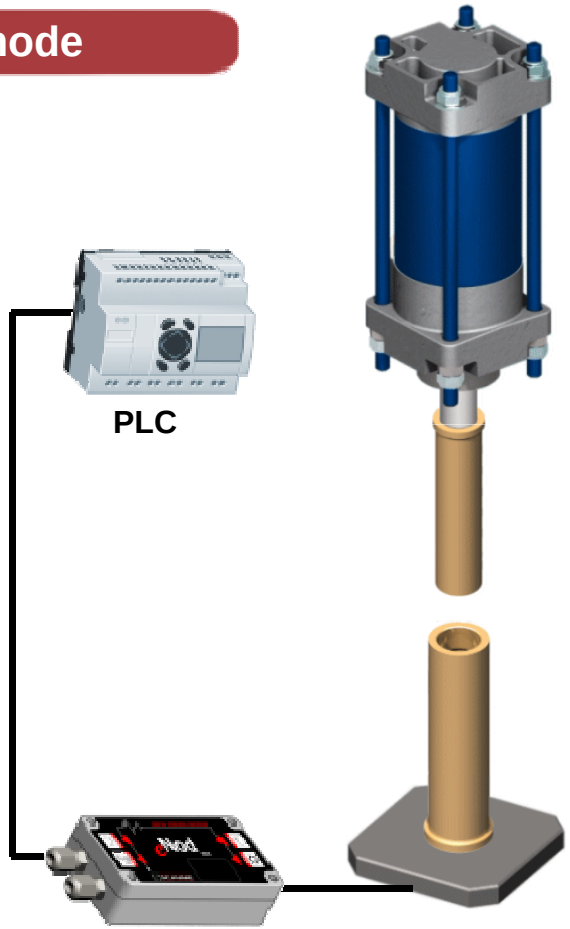
Process control

eNod3-C - Peak detection mode

Process

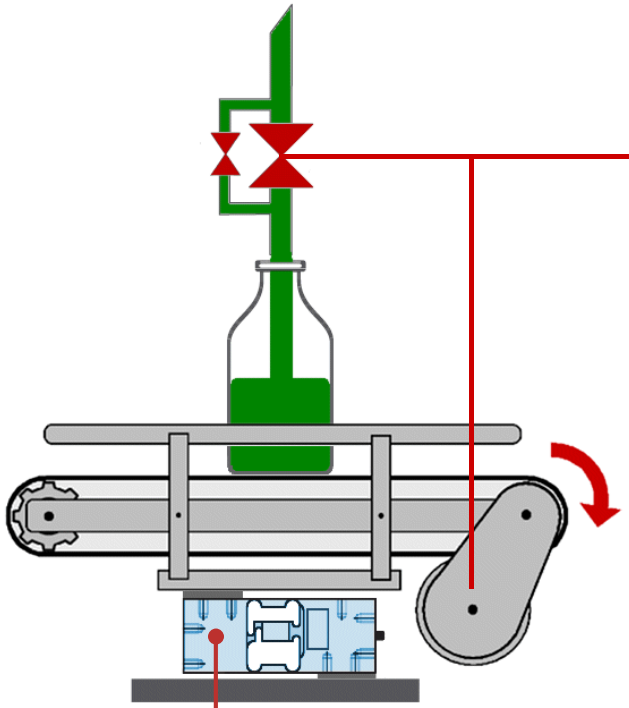
- Min, Max and Peak-to-Peak value acquisition.
- Level or external Triggering management





Dosing

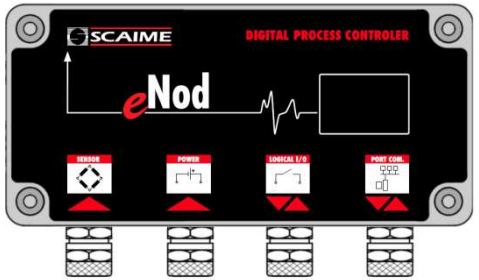
eNod3-D - Digital Input / outputs



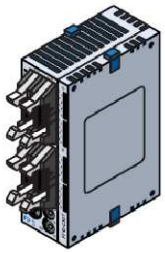
AK Load cell

2 entrées

4 sorties



RS232
RS485
CAN



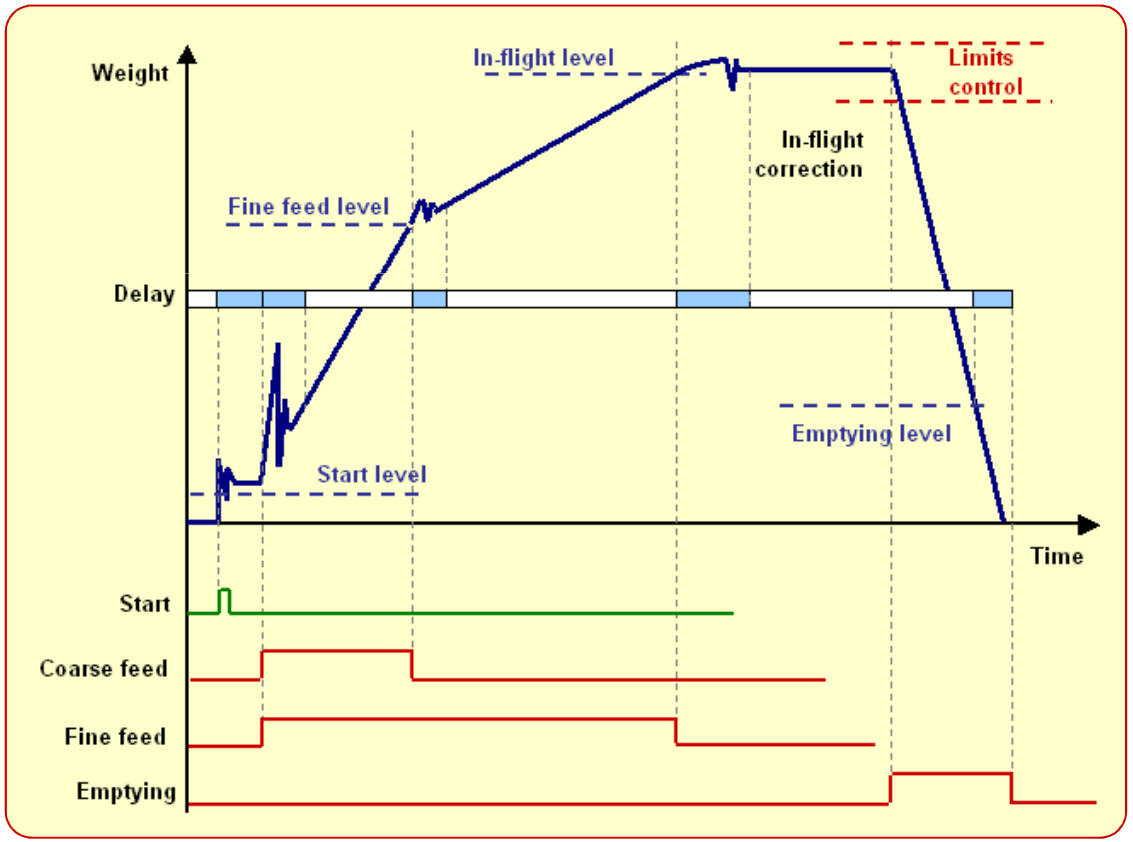
PLC

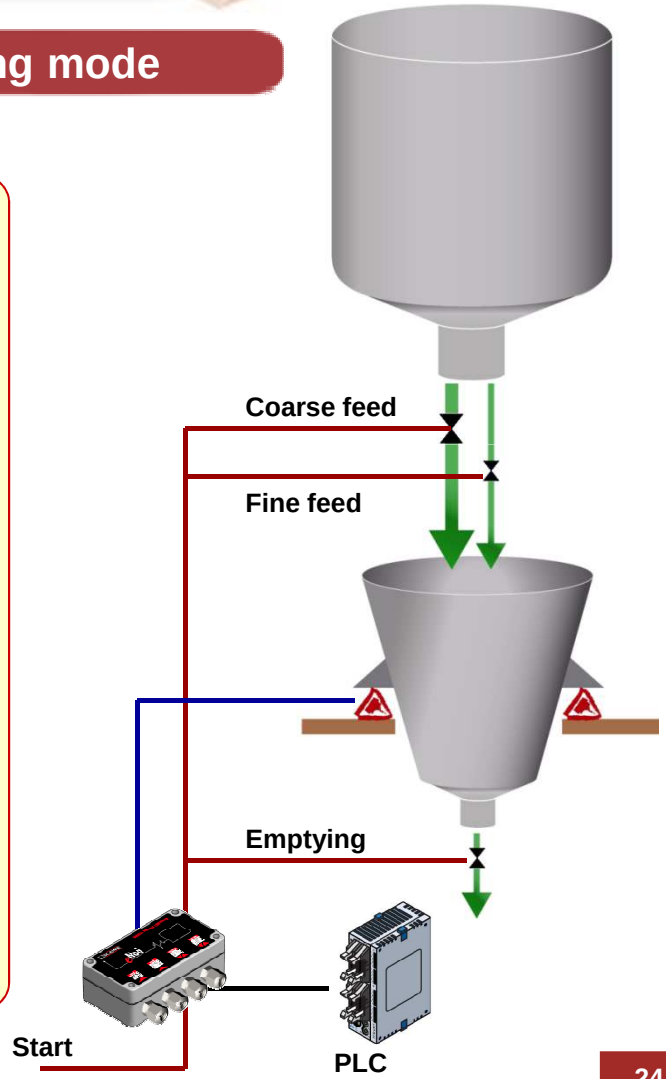
Logical I/O

- **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

Dosing

eNod3-D - Dosing by filling mode

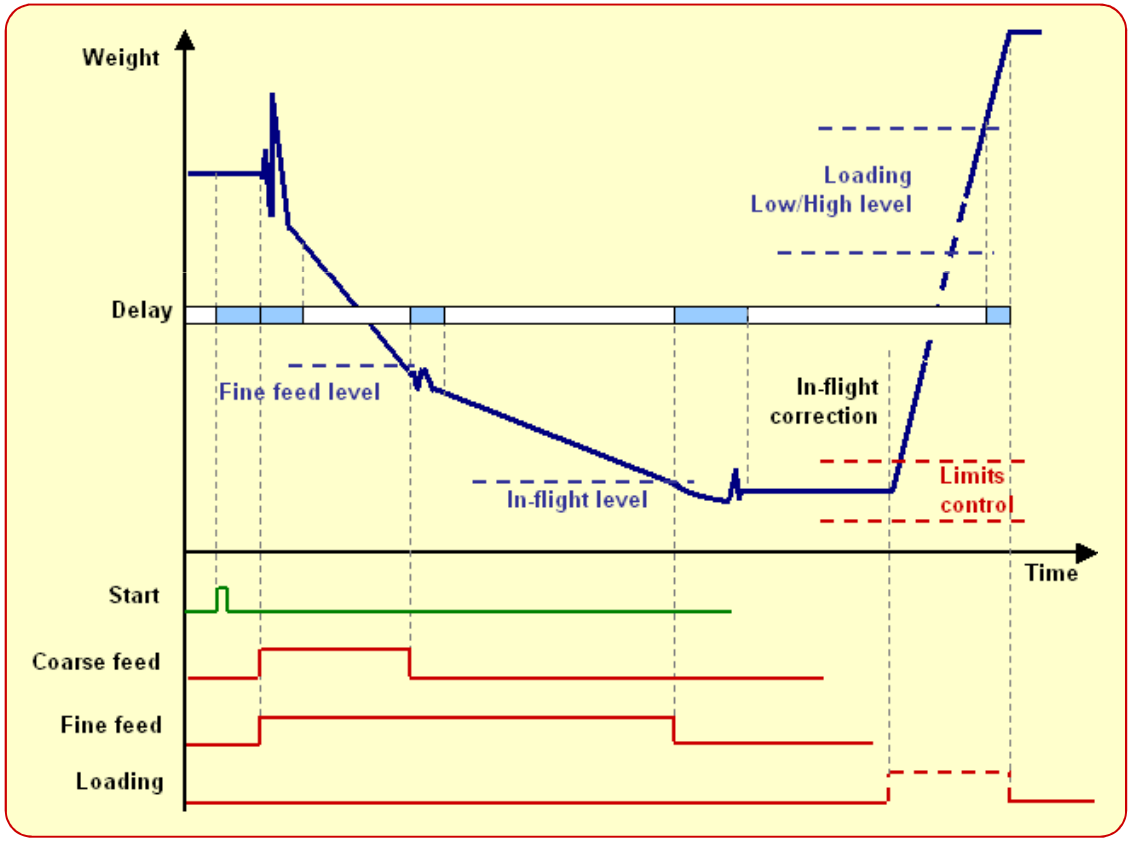


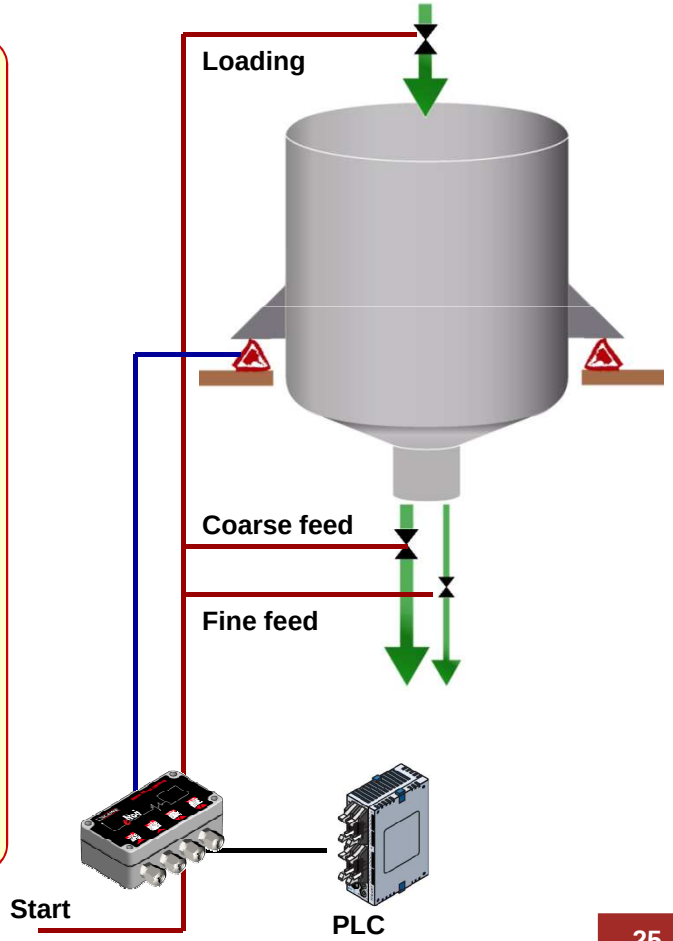


SCAIME

Dosing

eNod3-D - Dosing by unloading mode





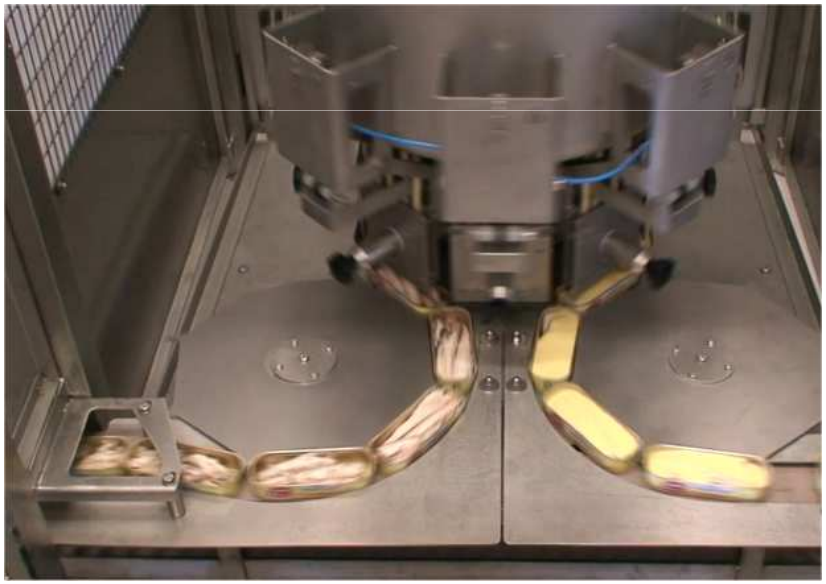
SCAIME

Dosing

Application example : Filling

Sauce filling machines for fish filets cans

- Filling fish filet cans with sauce at high speed before closing
- Accuracy +/- 1g
- System architecture separating measurement tasks and automation tasks in order to have total control on the machine process software.
- solution was built using a PLC connected to an eNod3-D using CANopen network.



CANopen

SCAIME

Dosing

Application example : Unloading

Dosing and mixing system

- system to feed an extruder for candy production

- The system is based on two hoppers for powders storage, each being equipped with load cells for dosing control. A third hopper is dedicated to receiving and mixing the batch after dosing.

- The mixed material feeds the candy extruder on continuous process.

SCAIME

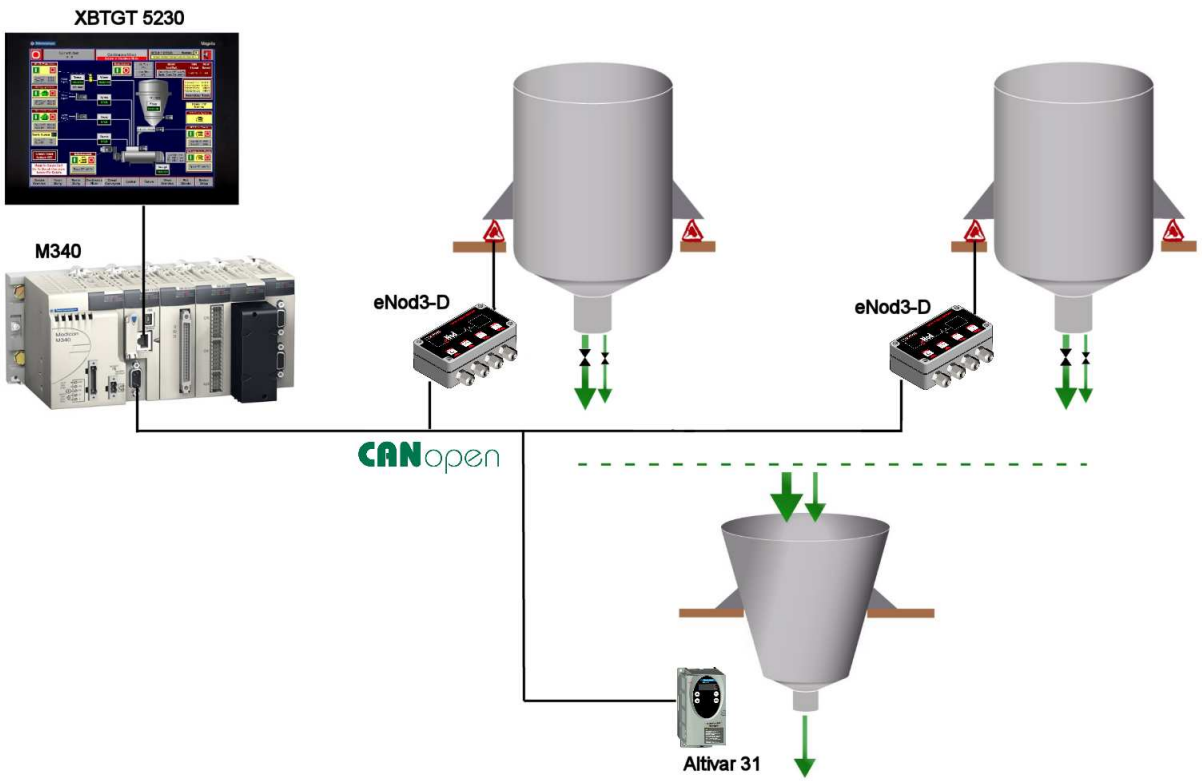
Dosing

Application example : Unloading

- a PLC takes care of general system controlling using data's coming from the HMI screen.

- All the weighing measurement tasks are sub-contracted to the eNod3-D dosing controllers.

- In order to fill the hopper where the powders are mixed, the PLC sends dosing parameters to the 2 eNod3-D's. Each eNod3-D works in parallel and takes care of weighing measurements as well as dosing batch control by unloading.

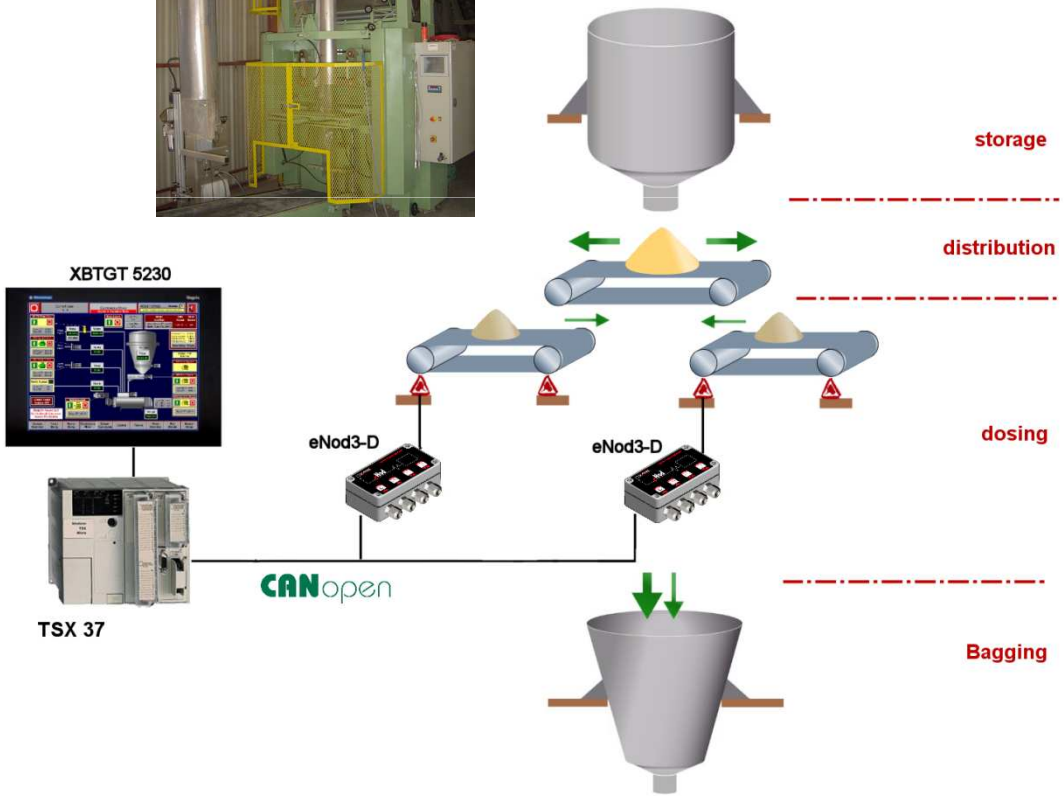


Dosing

Application example : Filling

Automatic bagging system

- high speed system to fill bags of sand. Bags are made from a plastic film and have capacities varying from 2 kg to 40 kg.

- The bagging machine includes a hopper for sand storage, a sand distribution device, two conveyor belt scales for filling control and a bag sealing device.

- The sand is alternatively distributed on the two dosing lines. Each batch is prepared on a belt scales and unloaded into a bag filling and sealing device.