ERM AUTOMATISMES
Didactique | Robotique | Fab&Test | Energies

Solutions didactiques et technologiques
www.erm-automatismes.com

Industrial IoT & Smart Sensors

Design environments and projects for industrial connected objects

Description of the teaching aid

"**Industrial IoT & Smart Sensors**" learning environments address a number of key Industry 4.0 technologies used for production optimization, equipment/process monitoring and predictive maintenance :

- **Smart sensors**
- **IO-Link fieldbus**
- Smart IoT communication gateways for **EDGE or CLOUD computing**
- IoT programming on **Node-RED**
- Control charts and **dashboards**...

Three pedagogical approaches are proposed:

1. **SK00: Sick TDCE Smart IoT Gateway & Smart Sensors Case**
   - Study Industrial IoT and intelligent sensors on a Sick base
2. **SK10 / SK20: Sick TDCE Smart IoT Gateway & Smart Sensors Kit**
   - Deploying Industrial IoT Sick on educational systems
3. **IO11: IFM Monéo kit for multi-machine IOT (IO-Link) deployment**
   - Industrial IoT IFM on training systems

The Sick TDCE environment is ideal for single-system connectivity, while the IFM Moneo environment is unrivalled when it comes connecting multiple systems.

These didactic systems are primarily intended for activities involving the study of technological solutions and the deployment of these solutions existing systems/processes during educational projects.

Bac Pro MELEC, Bac Pro MSPC,
BTS Electrotechnique, BTS MS, BTS CRSA
IUT, Universities...

THEMES ADDRESSED

Industrial Maintenance, Production Control, Multi-technology Systems Design, Electrical Engineering and Automation, Automation & Control, Design and Development.

Highlights

- ✓ Learn about the latest technologies in **communicating industrial sensors and monitoring solutions**
- ✓ **Scalable solution ideal for project activities**
- ✓ Open solution integration of all types of suitable sensors manufacturing or process industries
- ✓ **Educational file** with procedure sheets and tutorials provided

The kits are delivered with a detailed procedure to facilitate implementation on systems by teaching teams and learners. Any integration of these kits on a machine by ERM Automatismes will be subject to a quotation.


Counting buttons & sensors


Image sensors (Codes bars, QR-Codes)


RFID sensors


Cameras

Safety sensors and protection (Laser scanners...)


Load cells and force


Inertial sensors (vibration, acceleration, etc.)


Current sensors


Distance sensors, position, proximity...


Encoders


Gas analyzers


Fluid sensors (Level, Flow, Pressure, Temperature...)

More information at www.erm-automatismes.com

Smart IoT Gateway Sick TDCE & Smart Sensors Case

Applied study and deployment of intelligent sensors for production and maintenance monitoring

Description of the teaching aid

The "Smart IoT Sick TDCE Gateway & Smart Sensors" Kit contains several industrial smart sensor application cases. In each case, in addition to its measured value, the sensor transmits control information to the Smart IoT Sick TDCE Gateway to enable visualization of this data from a cloud or, locally, from the Node-RED interface.

The various application cases have been designed in partnership with Sick for industrial applications (see https://www.sick.com/fr/fr/smart-sensors/w/smart-sensors/). In most cases, the sensors enable the implementation of Smart Task adaptation and predictive maintenance.

Common features of sensors and applications

Sensors can be configured in the Sick SOPAS sensors.

Some are associated with the SIG200 IO-Link Master, which includes a logic editor for programming simple logic functions (logic gates, timers, counts, etc.), IO-Link communication with sensors and Ethernet TCP-IP communication with the TDCE Sick IOT box.

Smart Tasks

Smart Tasks enable data to be processed directly in the sensor. Your process benefits from faster data transfer, lighter structures cost advantages.

- ✓ Logic and/or/no and Timer Tone/Toff/Tone&off
- ✓ Measuring the speed or length a part on a conveyor
- ✓ Counting and validating the number of pieces in the container

Sick SOPAS Smart Tasks parameterization interface

Bac Pro MELEC, Bac Pro MSPC,
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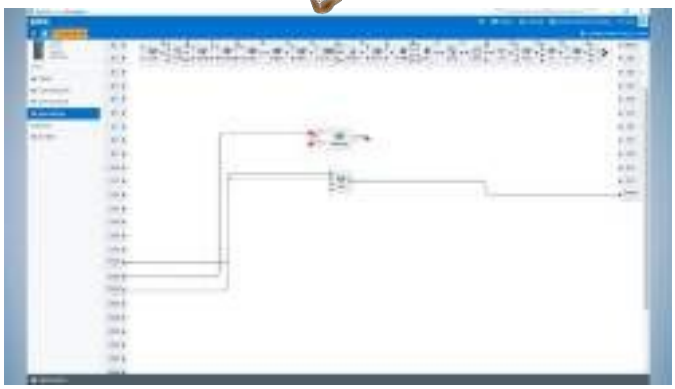
IUT, Universities

THEMES ADDRESSED

Industrial Maintenance, Production Control, Electrical Engineering and Automation, Automation & Control

Management, Design and Development.



SIG200 IO-Link Master programming interface

Operating part

The operative part consists mainly of :

- ✓ A belt conveyor
- ✓ An IO-Link inductive proximity switch
- ✓ An IO-Link ultrasonic sensor
- ✓ Two IO-Link retro-reflective photoelectric sensors (Laser)
- ✓ A miniature reflex barrier photoelectric sensor (Led)
- ✓ Two miniature photoelectric sensors background suppression (Led)
- ✓ SIG200 programmable IO-Link master
- ✓ Accessories for your activities

Reference

✓ SK00: Sick TDCE Smart IoT Gateway & Smart Sensors Case with IO-Link Master

Highlights

- ✓ Learn about the latest technologies in **intelligent industrial sensors and monitoring solutions**
- ✓ **Scalable solution ideal for project activities**
- ✓ Programming dashboards on Node-RED

Educational activities

- ✓ Sensor parameterization
- ✓ Setting up communication with a cloud
- ✓ Programming dashboards on Node-RED

Smart IoT Gateway Sick TDCE & Smart Sensors Case

Applied study and deployment of intelligent sensors for production and maintenance monitoring

SICK Sensor Intelligence.

SIG200 for applications 1, 2, 3 and 5

The SIG200 is equipped with 4 IO-Link ports.

It enables communication with IO-Link sensors and simple, fast configuration of stand-alone detection systems via logic links, without the need for additional controls.

Pedagogical activity 1: "Rev counter" application

An inductive sensor is used to count the revolutions of a rotating element.

The sensor sends an alert when it is too close or too far from the rotating element.

Pedagogical activity 2: Application "Counting with drift alert" A sensor is used to count the products passing on a conveyor.

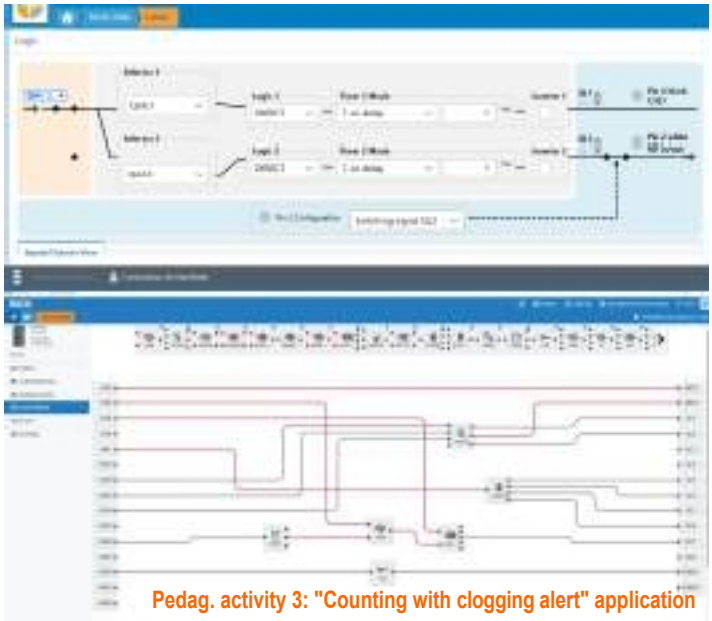
The sensor sends an alert if its distance to a reference wall drifts beyond a certain threshold; or if the distance to the products drifts beyond a certain threshold.

Pedagogical activity 4: "Measuring speed and length" application

Two sensors are used to measure the speed and length of products on a conveyor.

Sensors product speed and length, and send an alert if a speed or length fault is detected.

warn of malfunctions by e-mail alert



Pedag. activity 3: "Counting with clogging alert" application

A sensor is used to count the products that onto a conveyor belt.

The sensor sends an alert if it becomes too clogged (configurable threshold), as it integrates the evolution of the photoelectric reception signal over time for predictive maintenance.

Pedagogical activity 5: Application "Filling check" Two sensors are used to check that products are correctly filled.

The sensors send an alert if a product is detected but not correctly filled.

Pedag. activity 7: SMS alert

SMS alert via NodeRED programming to warn of malfunctions via SMS alert

Smart IoT Gateway Kits Sick TDCE & Smart Sensors

Components for deploying your Industrial IoT projects

SICK Sensor Intelligence.

Description of the teaching aid

The Sick TDCE & Smart Sensors Smart IoT Gateway Kit enables Industrial IoT technologies to be implemented in educational projects. **The Sick TDCE environment is ideal for system connectivity.**

The heart of the product is the Sick TDCE Smart IoT Gateway, benchmark in industrial equipment connectivity and monitoring. Its main applications are:

- Machine parameter monitoring
- Connectivity & Supervision of legacy equipment
- Predictive maintenance
- Indoor & Outdoor location

Basic package (Ref: SK10)

The Sick TDCE & Sensors Smart IoT Gateway Kit (Ref: SK10) contains:

- Sick TDC-E200EU Smart IoT Gateway
- Sensor Integration Gateway SIG100: Binary sensor gateway with decentralized intelligence (enabling the implementation of logic gates, timers, counting) and IO-Link and USB communication.
- 2x IO-Link photoelectric sensors (reflector & background elimination)
- 1x IO-Link inductive sensor
- 1x PT100 temperature with IO-Link/0- 10V signal conditioner
- 1x Ultrasonic distance sensor (20 to 150 mm)
- 24V power supply
- Cables and leads
- 3D box with DIN rail and terminals connecting sensors to the Smart IoT TDCE passerele

Sensors can be configured in the Sick SOPAS sensors.

The environment totally open, allowing all types sensors to be connected. ERM Automatismes offers a selection of sensors covering a wide range of applications. But many other types and brands of sensors can also be integrated.

Bac Pro MELEC, Bac Pro MSPC,
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IUT, Universities

THEMES ADDRESSED

Industrial Maintenance, Production Control, Electrical Engineering and Automation, Automation & Control, Design and Development

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Highlights

- ✓ Learn about the latest technologies in **intelligent industrial sensors and monitoring solutions**
- ✓ **Scalable solution ideal for project activities**
- ✓ Programming dashboards on Node-RED

Educational activities

- ✓ Sensor parameterization
- ✓ Setting up communication with a cloud
- ✓ Programming dashboards on Node-RED

Smart IoT Gateway Kits Sick TDCE & Smart Sensors

Components for Industrial IoT projects

SICK Sensor Intelligence.

Complementary sensor sets for use with Sick SK10 and SK20 Smart IoT Kits

Electrical (Modbus-TCP) and pneumatic measurement sensors" package (Ref IO00)

✓ This **Sensor Pack contains** :

- Modular three-phase energy meter
- IO-Link compressed air meter
- Set of cords, clamps and fittings

IO-Link Vibration and Temperature Pack (Ref IO01)

✓ This **Sensor Pack contains** :

- Capacitive vibration sensor
- Electronic box for temperature sensor
- Set of cords
- 2 Temperature sensors

Detection, Counting, Distance IO-Link" package (Ref IO02)

✓ This **Sensor Pack contains** :

- Inductive proximity switch
- 0 to 200 Hz IO-Link speed controller
- IO-Link counter module
- IO-Link inductive proximity switch
- IO-Link optoelectric sensor
- Set of cords

Hydraulics, Pressure, Level and Temperature" package (Ref IO03)

✓ This **Sensor Pack contains** :

- Pressure sensor
- Level sensor
- Temperature sensor
- Set of cords

Light beacon and IO-Link circuit-breaker" pack (REF IO04)

✓ This **Sensor Pack contains** :

- IO-Link multi-channel electronic circuit breaker
- RGB LED beacon with IO-Link buzzer
- IO-Link humidity and temperature
- Set of cords

This pack is specifically designed for cabinet connectivity.

Pack " 8-port Ethernet IO-Link Master, IO-Link/Bluetooth Gateway & USB Configurator" (REF IO10)

✓ This **Sensor Pack contains** :

- Profinet IO-Link master with 8 IO-Link ports
- Wi-fi access
- IO-Link data splitter
- 24VDC power supply
- Bluetooth IO-Link adapter
- Y-distributor adapter
- IO-Link USB master kit
- Cord set

It increases the number of sensors connected to the IoT Gateway.

Smart IoT Gateway Kits Sick TDCE & Smart Sensors

Applied to ERM teaching systems

SICK Sensor Intelligence.

Smart IoT Gateway Kit Sick TDCE & Smart Sensors for Ermaflex and Unbundler (Ref: SK20)

The Sick TDCE Smart IoT Gateway & Smart Sensors Kit for Ermaflex and Unbundler (Ref: SK20) contains :

- 1 Sick TDC-E200EU Smart IoT Gateway
- 1 IO-Link master communicating with Node-RED to create a dashboard and generate alerts
- 1 IO-Link USB Master Kit for setting parameters of IO-Link components
- 1 IO-Link photoelectric sensor
- 2 TOR photoelectric sensors
- 2 Temperature sensors with IO-Link signal conditioners
- 1 Vibration sensor
- 1 IO-Link compressed air meter (for leak detection)
- 1 MODBUS TCP electrical energy

Thanks to the detailed operating procedures proposed for each machine below, the activity of deploying Industrial IoT monitoring on an industrial system is accessible from Bac PRO level.

Industrial IoT for Process Ermaflex

Industrial IoT for Polyprod Ermaflex

Industrial IoT for Ermaflex Checkweigher

Industrial IoT for Ermaflex Regrouping Case Packing

Industrial IoT for Ermaflex 6-axis robot

Industrial IoT for Ermaflex Palletizer

Industrial IoT for Mechanical decoupler

Industrial IoT for Multitec Ermaflex

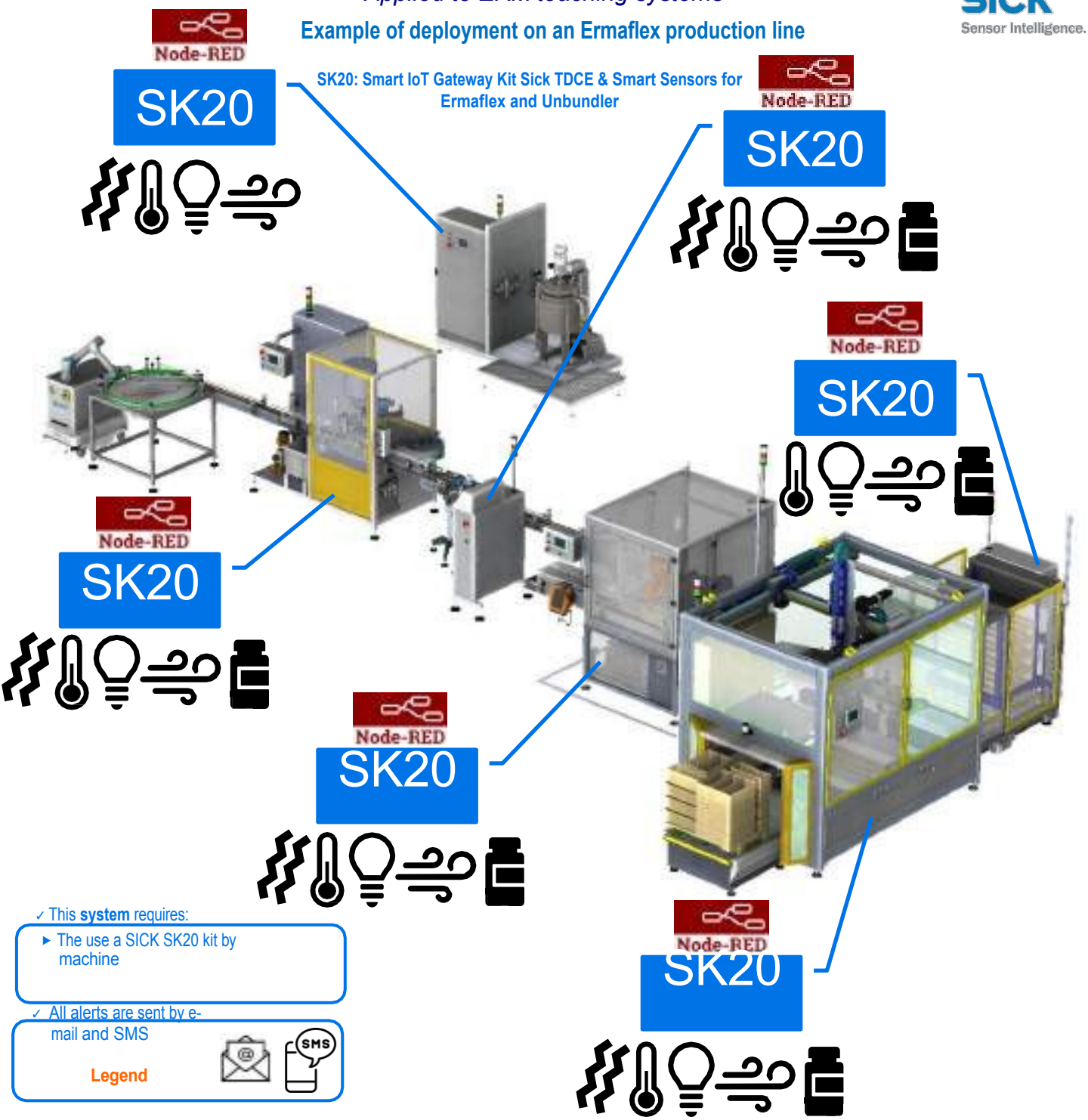
Smart IoT Gateway Kits Sick TDCE & Smart Sensors

Applied to ERM teaching systems

SICK Sensor Intelligence.

Example of deployment on an Ermaflex production line

SK20: Smart IoT Gateway Kit Sick TDCE & Smart Sensors for Ermaflex and Unbundler



✓ This **system** requires:

- The use a SICK SK20 kit by machine

✓ All alerts are sent by e-mail and SMS

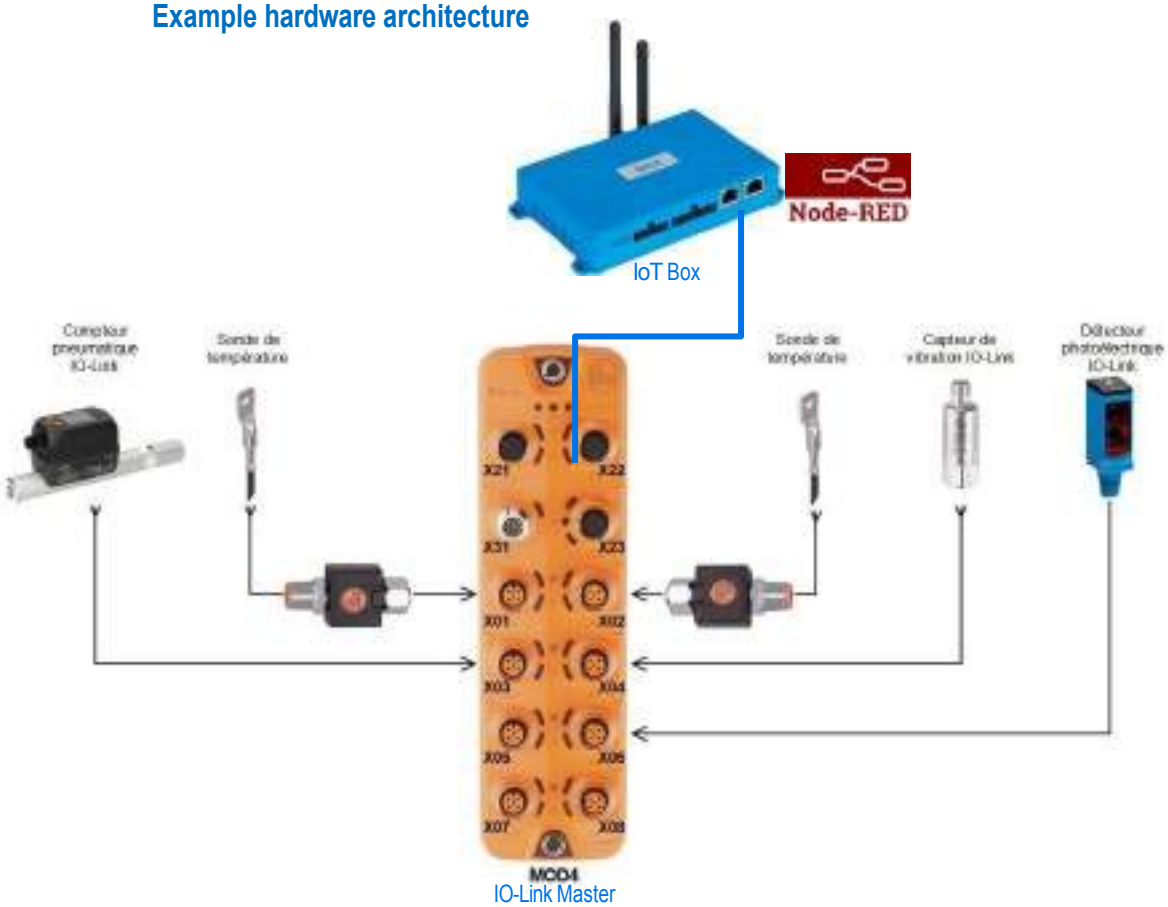
Legend

- Vibration measurement
- Electrical measurements (consumption, current, voltage, etc.)
- Product detection (counting, etc.)
- Temperature measurement
- Pneumatic measurements (consumption, pressure, flow, etc.)

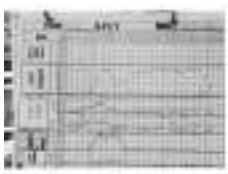
Industrial IoT & Smart Sensors (Sick)

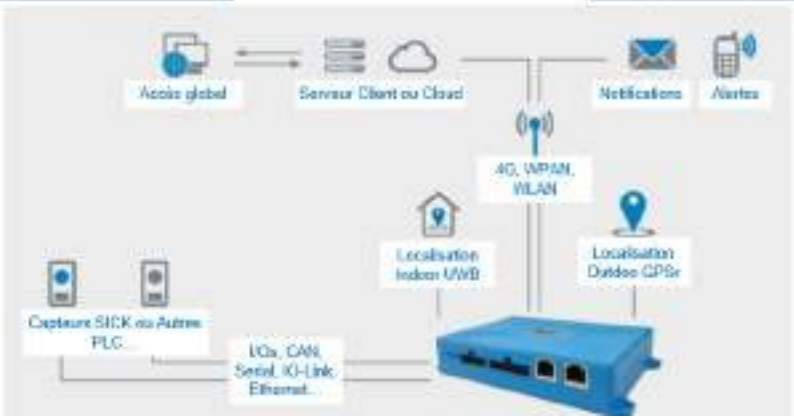
SICK Sensor Intelligence.

Example hardware architecture



De la réalité		A la promesse de l'Industrie 4.0
Process de fabrication critiques contrôlés avec des outils analogiques et reportés sur Word/Excel	SICK Sensor Intelligence.	→ Machines et postes de travail intelligents, connectés et visibles (Même les plus anciens)
Visibilité limitée ou nulle sur les process		→ Interopérabilité des données et prises de décision guidées par l'analyse de données
Données des machines pas/peu collectées et pas utilisées pour l'optimisation		→ Géolocalisation Indoor et Outdoor de flottes d'équipements
Héritage de machines et logiciels anciens		→ "Intelligence dans le Cloud" comme solution à toutes les difficultés de production et maintenance (Prédictif)

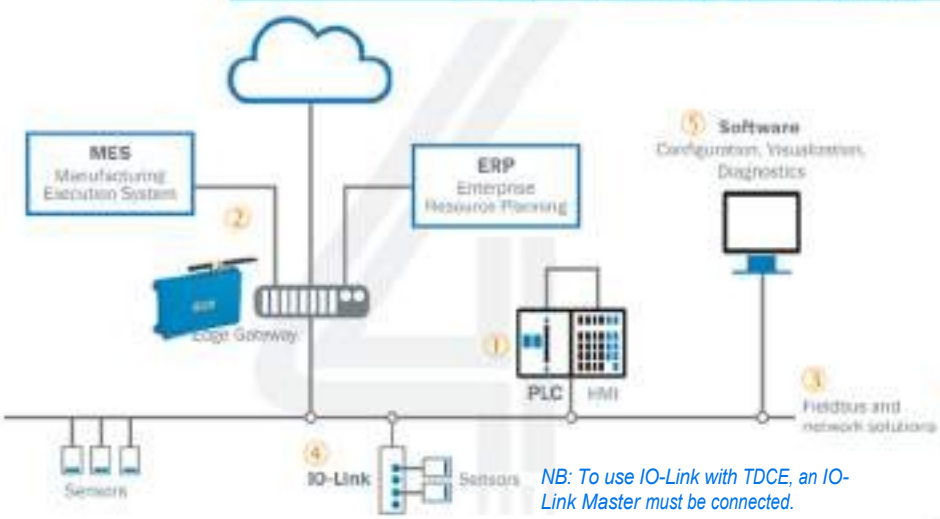




Industrial IoT & Smart Sensors (Sick)

SICK Sensor Intelligence.

La passerelle Sick TDC-E est la solution pour connecter vos équipements et en faciliter l'exploitation et la maintenance



NB: To use IO-Link with TDCE, an IO-Link Master must be connected.

- Intégration facile avec les automates (PLC) et IHM
- Intégration verticale avec les logiciels haut-niveau (ERP, MES)
- Compatible avec les protocoles de communication et interfaces industriels
- Compatible IO-Link, la solution d'intelligence distribuée de l'industrie 4.0
- Logiciel de configuration, programmation, visualization et diagnostic (Local ou Cloud)

SIMPLE A CONNECTER
Configuration Web Browser (Paramètres capteurs...)

GEOLOCALISATION
Combinaison d'un tracking Indoor & Outdoor

NOTIFICATION AVANCEE
Notifications utilisateurs / Alarmes (SMS, Mail...)

EDGE & CLOUD COMPUTING
Traitement des données à la source et envoi sur un cloud

INDUSTRY 4.0 READY
Architecture ouverte

EDGE
- Gestion des données en temps réel
- Visualisation des données en local
- Analyse des données à la source (Mémorisation, Filtrage, Optimisation)
- Communication M2M

CLOUD
- Algorithmes de Big Data (Maintenance prédictive...)
- Indicateurs-clés d'entreprise (KPI)
- Hébergement des données (Clouds Sick, SAP, IBM, Siemens...)

Industrial IoT application examples by Sick

→ SURVEILLANCE DE DONNEES DE TEMPERATURE, NIVEAU ET PRESSION (ex: Process chimique)

- Statistiques et Courbes historiques
- Visualisation des états capteurs
- Services M2M
- Plate-forme Cloud

→ SURVEILLANCE DE PROCESS MANUFACTURIER

- Configuration et Diagnostic des lecteurs de QR-Codes
- Indication des capteurs en défaut
- Visualisation des codes

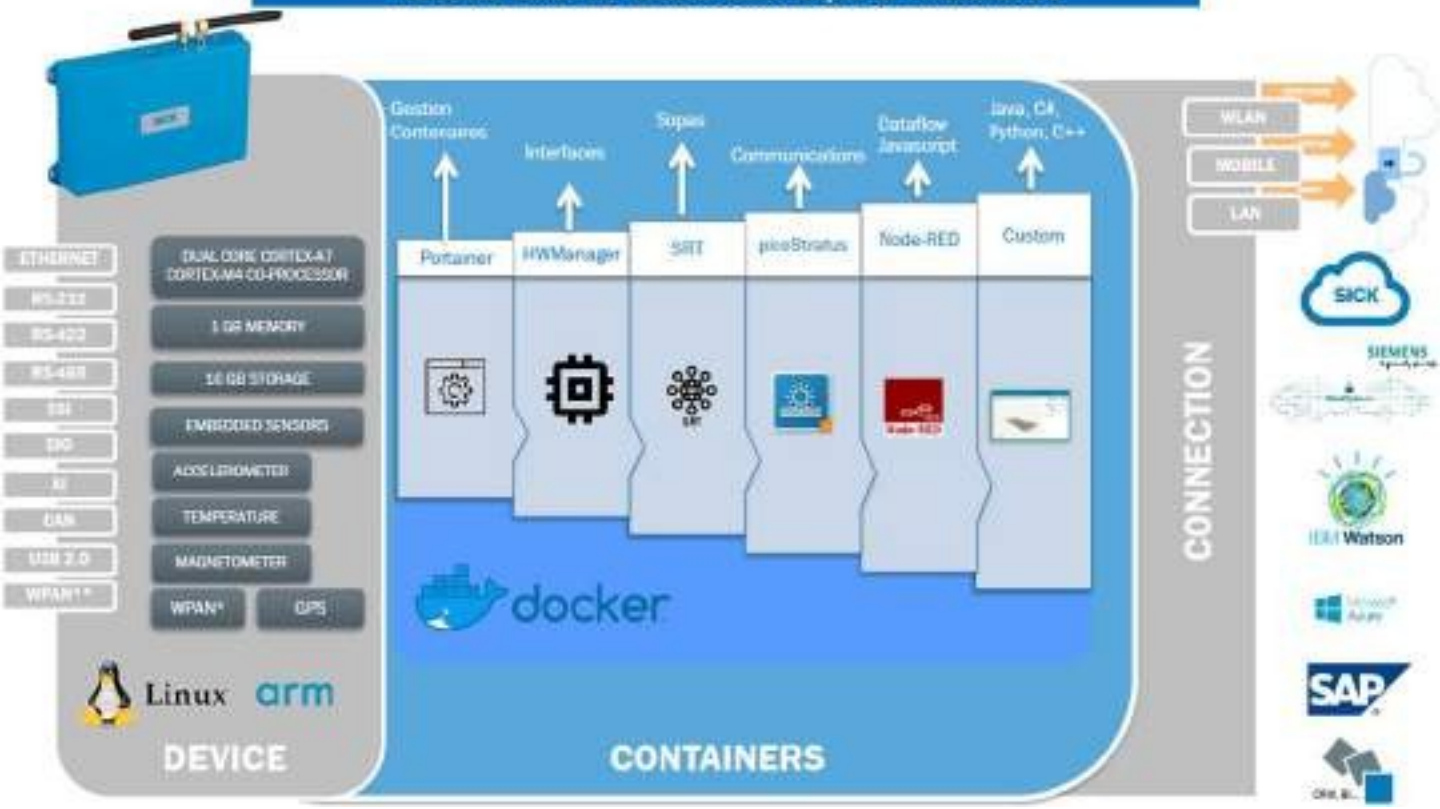
→ SURVEILLANCE D'UN PARC DE SYSTEMES

- Données de diagnostic d'analyseurs de gaz
- Gestion d'alarmes via SMS
- Accès distant via VPN

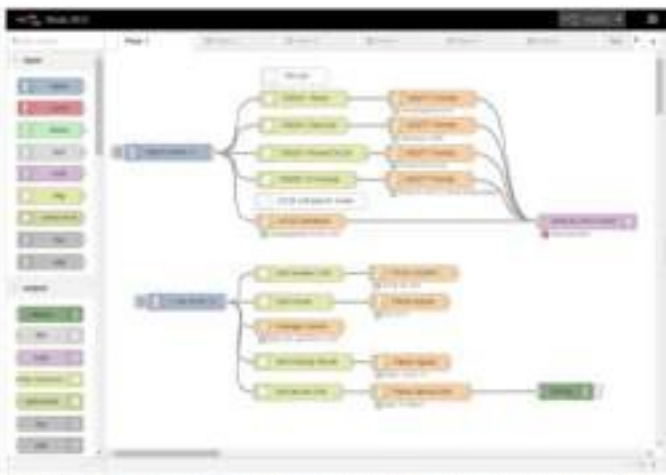
Industrial IoT & Smart Sensors (Sick)

SICK Sensor Intelligence.

Passerelle Smart IoT ouverte dans l'esprit de l'Industrie 4.0



TDC-E Device Manager: Interface utilisateur Web



NODE-RED: Paramétrage graphique des relations TDC ⇔ Cloud

CARACTERISTIQUES

- Architecture ouverte **End-to-End IoT** (Node-Red, Docker…)
- Communication des données vers le cloud via 3G+, WLAN, Ethernet avec support des protocoles **MQTT, OPC UA et JSON**
- Interfaces multiples tels que GPS, I/O, CAN, Série, Ethernet, WLAN, WPAN
- Alertes via messages textes (SMS, Emails)
- **Configuration Plug-and-Play** et diagnostic des capteurs Sick avec le logiciel Sick SOPAS

AVANTAGES

- Configuration simple, **pas de frais de logiciel ou licences**
- Assistants pour la mise en service et le fonctionnement
- Plate-forme de communication performante des Capteurs jusqu'au Cloud
- Raccordement de capteurs et systèmes autonomes (ex. Caméra) **Sick et autres marques**
- Consignation d'évènements et d'états des capteurs
- Base matérielle pour une **maintenance active et prédictive**
- **Alarmes en temps réel définies par l'utilisateur**

IO-Link IFM smart sensor case

Applied study and deployment of IO-Link intelligent sensors

Description of the teaching aid

The "IFM IO-Link Smart Sensors" Kit contains several types of IO-Link smart sensors associated with an IO-Link master. Each sensor can be parameterized and tested using the case's accessories. Thanks to the IO-Link Master's MQTT protocol, data can be visualized locally, via a Node-RED interface.

The selection of sensors was made in partnership with IFM according industrial applications (see https://www.ifm.com). In most cases, sensors are used to implement intelligent tasks and predictive maintenance.

**Bac Pro MELEC, Bac Pro MSPC,
BTS Electrotechnique, BTS MS, BTS CRSA
IUT, Universities**

THEMES ADDRESSED

Industrial Maintenance, Production Control, Electrical Engineering and Automation, Automation & Control

Management, Design and Development.

Common features of sensors and applications

Sensors can be configured in the IFM sensors (moneo Configure).

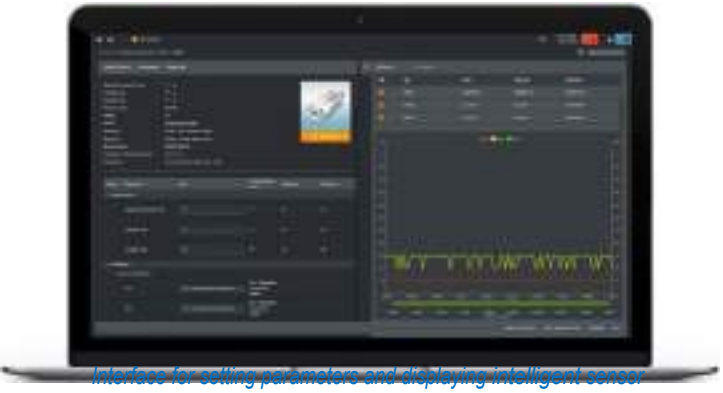
They are associated with the IFM IO-Link Master, which includes 2 network cards (1/ PLC communication - 2/ IoT network with MQTT).

Contents

The case consists mainly of :

- ✓ An 8-port IO-Link Master with TCP/IP and Profinet communications
- ✓ Bluetooth IO-Link adapter for retrieving sensor values via tablet/smartphone interface
- ✓ An opto-electronic sensor (distance measurement) IO-Link
- ✓ A position sensor for ¼-turn IO-Link actuators
- ✓ 1-10 bar IO-Link pressure sensor (air pressure)
- ✓ IO-Link humidity and temperature
- ✓ An RGB light beacon+ Buzzer IO-Link
- ✓ An inductive proximity switch with speed control function
- ✓ Accessories for sensor testing.

IO-Link IFM smart sensor case



Interface for setting parameters and displaying intelligent sensor values: IFM moneo Configure

Highlights

- ✓ Learn about the latest **IO-Link intelligent industrial sensor** technologies
- ✓ **Scalable solution ideal for project activities**
- ✓ Programming dashboards on Node-RED

Educational activities

- ✓ Sensor parameterization
- ✓ Setting up communication between an IO-Link master and a PC in MQTT mode
- ✓ Programming dashboards on Node-RED

Reference

- ✓ IO15: IO-Link IFM smart sensor case

IO-Link IFM smart sensor case

Applied study and deployment of IO-Link intelligent sensors

IO-Link wiring practical activity

- ✓ **Study of master and sensor wiring:**
  Wire the equipment according to the instructions given
  Answer the question "How can we guarantee watertightness?
- ✓ **Master and sensor wiring :**
  Procedure for tightening and dismantling Ecolink plugs and socket-outlets

Learning activity "Remote sensor in SIO / IO-Link mode

- ✓ **Master and sensor wiring :**
  Wire the equipment as indicated
- ✓ **Master IP address configuration**
- ✓ **Case studies**
  Setting the scene, modifying specifications, calculating parameters sensor,...

Learning activity "DI5029 sensor replacement and restoration configuration "

- ✓ **Master and sensor wiring :**
  Connecting devices
- ✓ **The various parameter restoration modes**
  up, configure port and set sensor to factory setting
- ✓ **Configuration of backup and restore mode:**
  Mode "type compatible V1.0 device", Mode "type compatible V1.1 device",...
- ✓ **Conclusion**

Learning activity "Changing the OGD582 sensor and restoring the configuration".

- ✓ **Master and sensor wiring :**
  Connecting devices
- ✓ **The various parameter restoration modes**
  up, configure port and set sensor to factory setting
- ✓ **Configuration of backup and restore mode:**
  Mode "type compatible V1.0 device", Mode "type compatible V1.1 device",...
- ✓ **Conclusion**

Learning activity "Discovering the MVQ101 sensor".

- ✓ **Master and sensor wiring :**
  Connecting devices
- ✓ **Discovering the sensor**
  Setting up the situation, sensor configuration state detection wear, contamination and blockage)

Moneo Blue" learning activity

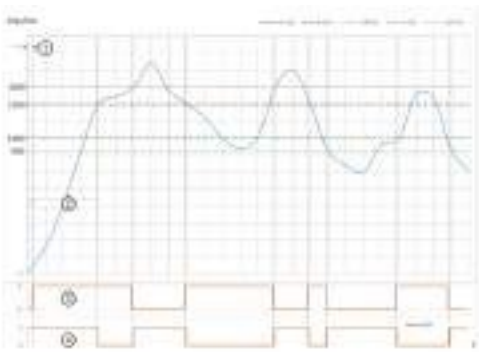
- ✓ **Master and sensor wiring :**
  Connecting devices
- ✓ **Using the Moneo Blue application**
  master IP address, MVQ101 sensor dashboard, sensor parameterization, sensor data logging,...

DI5029 sensor parameterization" learning activity

- ✓ **Master and sensor wiring :**
  Connecting devices
- ✓ **Discovering the sensor**
  Setting the scene, window mode, sensor configuration and process data structure
- ✓ **Data processing and visualization (Moneo Os):**
  Monitoring, dashboard and analysis

PV8004 sensor parameterization" learning activity

- ✓ **Master and sensor wiring :**
  Connecting devices
- ✓ **Discovering the sensor**
  Setting the scene



Educational activity "Pressure monitoring with MVQ101 & PV8004".

- ✓ **Master and sensor wiring :**
  Connecting devices
- ✓ **Setting the scene**
  Sensor parameterization and pneumatic connection
- ✓ **Creation monitoring tools on Moneo OS:**
  Monitoring panel, creation, alarm and warning creation, ...

Learning activity "Controlling a DV2130 signal lamp with Moneo".

- ✓ **Master and sensor wiring :**
  Connecting devices
- ✓ **Setting the scene**
  Set sensor parameters and program signal lamp

Industrial IoT IFM moneo & Smart Sensors

Components for deploying your Industrial IoT projects

Description of the teaching aid

Moneo, IFM's IIoT platform industry and production, bridges the gap between the operational (OT - Workshop) and informational (IT - ERP, MES...) levels. Data generated by sensors in production facilities can be easily read and processed.

The advantages of Monéo :

- An open technology platform
- More efficient installations
- Early detection of damage
- Adaptable solutions and systems
- Possibility of declaring maintenance work orders
- Tracking maintenance operations
- Maintenance history

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IFM Monéo kit for multi-machine IOT deployment (Ref: IO11)

✓ This **kit contains :**

- ▸ 4-port IO-Link master
- ▸ Vibration sensor
- ▸ Temperature sensor and transmitter
- ▸ Speed control sensor
- ▸ Wi-Fi access
- ▸ Set of cords
- ▸ **Industrial PC with the following software configuration:**
  - IIoT platform as a basis for moneo applications (Moneo OS license)
  - Parameter-setting software for configuration and diagnostics IO-Link devices (Moneo configure license)
  - Real-time maintenance software for maintenance conditional preventive and analysis (Moneo RTM license)
  - Data interface to IO-Link master (Moneo EdgeConnect AL) LIC)
  - 25 information points to transmit process values (Moneo Infopoint license)

The IFM Moneo environment is second to none when it comes to connecting several systems

Highlights

- ✓ Learn about the latest technologies in **intelligent industrial sensors and monitoring solutions**
- ✓ **Scalable solution ideal for project activities**
- ✓ Programming dashboards in Monéo

Educational activities

- ✓ Sensor parameterization
- ✓ Setting up communication with an Io-Link Master
- ✓ Programming dashboards in Monéo
- ✓ Alarm creation

The kits are delivered with a detailed procedure to facilitate implementation on systems by teaching teams and learners. Any integration of these kits on a machine by ERM Automatismes will be subject to a quotation.

IO-Link Master & USB Configurator" pack (REF IO10)

✓ This **Sensor Pack contains** :

- ▸ Profinet IO-Link master for 8 IO-Links
- ▸ Wi-fi access
- ▸ IO-Link data distributor
- ▸ 24VDC power supply
- ▸ Bluetooth IO-Link adapter
- ▸ Y-distributor adapter
- ▸ IO-Link USB master kit
- ▸ Cord set

It increases the number of sensors connected to Moneo.

Industrial IoT IFM moneo & Smart Sensors

Components for deploying your Industrial IoT projects

Examples of sensors that can be used with the Moneo platform

Electrical (Modbus-TCP) and pneumatic measurement sensors" package (Ref IO00)

✓ This **Sensor Pack contains** :

- Modular three-phase energy meter
- IO-Link compressed air meter
- Set of cords, clamps and fittings

IO-Link Vibration and Temperature Pack (Ref IO01)

✓ This **Sensor Pack contains** :

- Capacitive vibration sensor
- Electronic box for temperature sensor
- Set of cords
- 2 Temperature sensors

Detection, Counting, Distance IO-Link" package (Ref IO02)

✓ This **Sensor Pack contains** :

- Inductive proximity switch
- 0 to 200 Hz IO-Link speed controller
- IO-Link counter module
- IO-Link inductive proximity switch
- IO-Link optoelectric sensor
- Set of cords

Light beacon and IO-Link circuit-breaker" pack (REF IO04)

✓ **ck contains** :

nnel electronic circuit

k
O-Link
air IO-Link

on with Buzzer I
mperature from

This pack is specifically designed for cabinet connectivity.
electric.

Hydraulics, Pressure, Level and Temperature" package (Ref IO03)

✓ This **Sensor Pack contains** :

- Pressure sensor
- Level sensor
- Temperature sensor
- Set of cords

Industrial IoT & Smart Sensors (IFM)

Components for deploying your Industrial IoT projects

Moneo OS: The IIoT platform

The moneo OS application offers all the functions of modern IIoT software.

The software allows you :

- Create users and administer them in different groups (users can be defined as admin, user and visitor)
- Generate a clear numerical representation
- Adapt process values

Moneo Configure: the parameter-setting software package

With just a few clicks, many IFM IO-Link components and IO-Link masters can be parameterized. To facilitate integration of devices from other manufacturers, a connection to the IODD is integrated.

The software allows you :

- Quickly detect and display IO-Link networks
- Visualize up to two process data with the same unit on the same graph, for configuration and diagnostics of IO-Link devices
- Parameterize and monitor sensors without requiring PLCs

Moneo RTM: analysis software

Thanks to the innovative condition-based preventive maintenance system, users can quickly find out the status their plant and collect important process information.

The software allows you :

- Create user-specific dashboards
- To be informed quickly in the event of deterioration and avoid any failure
- Large-scale data analysis

Moneo edgeConnect: the communications interface

Moneo edgeConnect connects devices and data sources to moneo OS.

The software allows you :

- Read IFM IO-Link master with connected IO-Link sensors
- Read an electronic vibratory diagnosis of the entire IFM sensors connected

Moneo infopoints: data volume

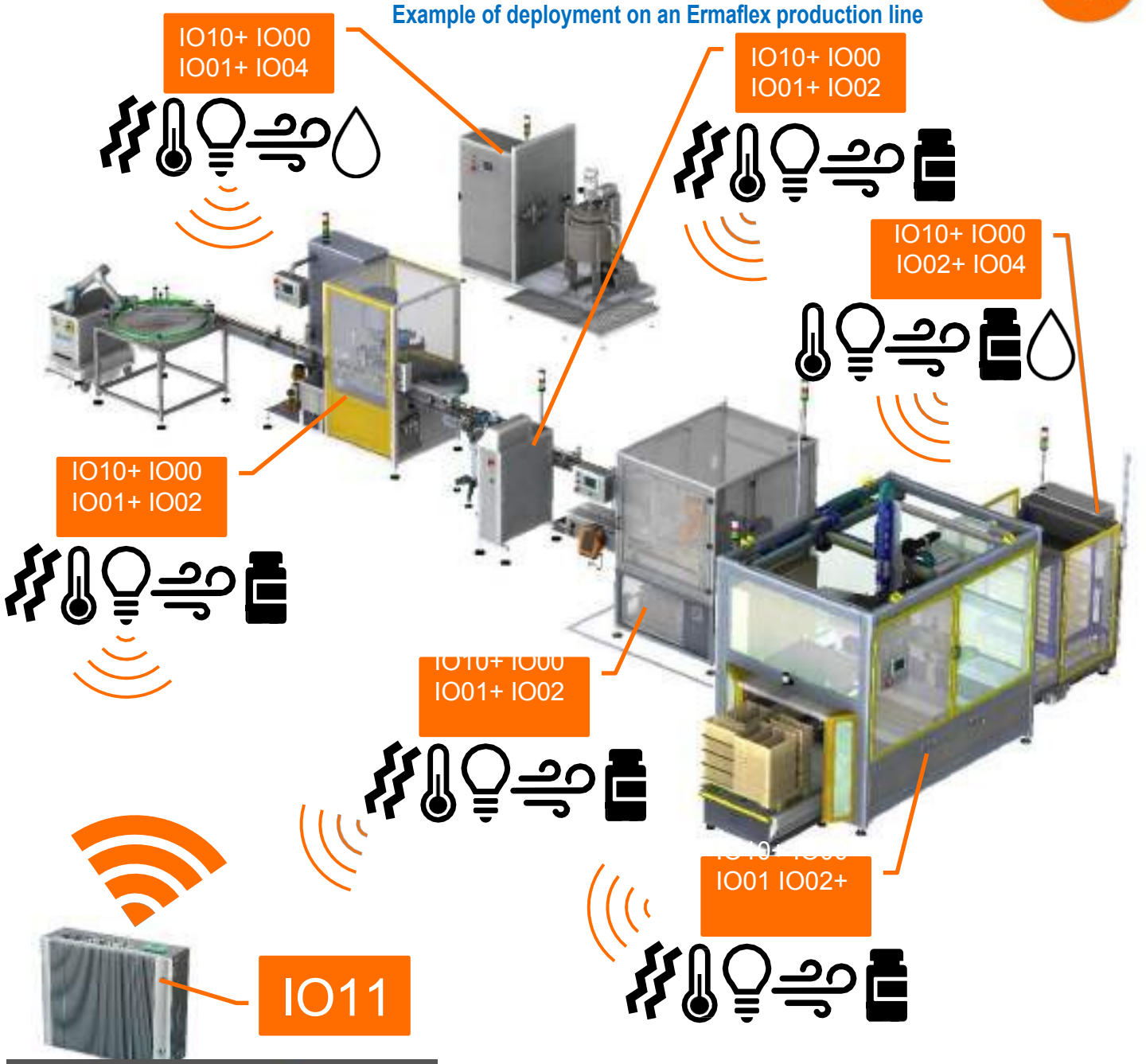
With monéo infopoints, the volume of data from connected devices can be adapted and extended as required.

Depending on the number info points, the size and scope of applications can be individually.

Industrial IoT & Smart Sensors (IFM)

Components for deploying your Industrial IoT projects

Example of deployment on an Ermaflex production line



moneo | application journey

This **system** requires: use of a Moneo IO11 kit for multiple machines

All alerts are sent by e-mail

Legend

- Vibration measurement
- Temperature measurement
- Electrical measurements (consumption, current, voltage, etc.)
- Pneumatic measurements (consumption, pressure, flow, etc.)
- Product detection (counting etc...)
- Humidity

Industrial IoT & Smart Sensors (IFM)

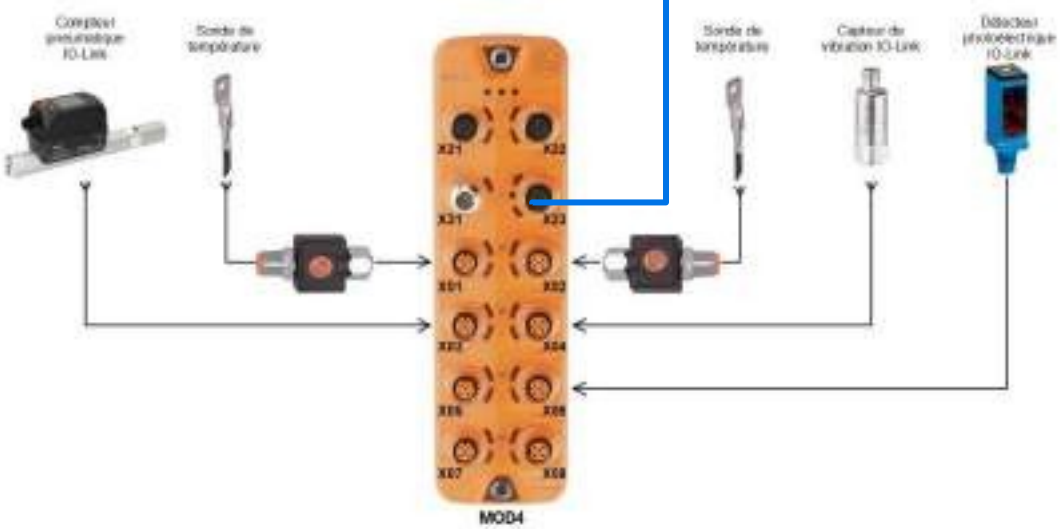
Components for deploying your Industrial IoT projects

Example of hardware architecture for deployment on 2 systems

moneo | application journey

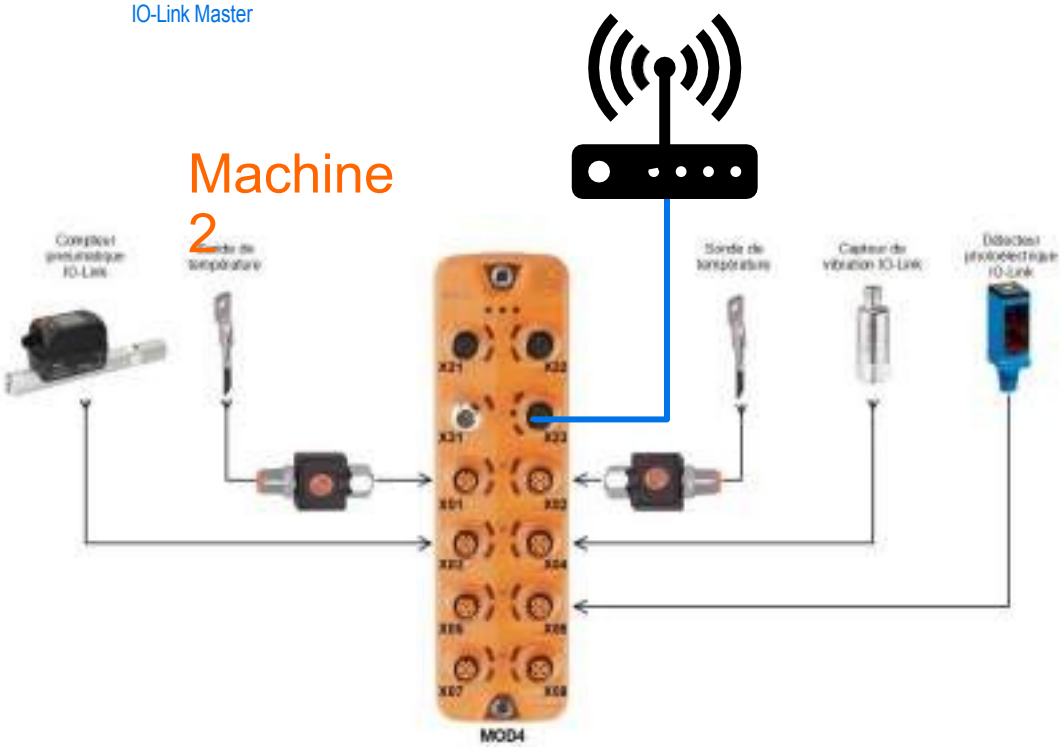
Industrial PC for IoT

Machine 1



IO-Link Master

Machine 2



IO-Link Master

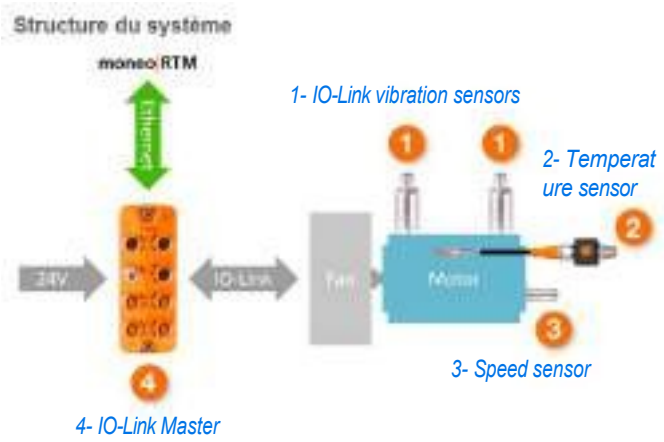
Industrial IoT & Smart Sensors (IFM)

Use : Vibration monitoring of fans in a suction system with moneo RTM

Starting situation

There was no consistent, continuous status of the fans, and a fault detected too late could bring the entire production line to a halt.

- **Objective**: To ensure continuous monitoring of the fans, flexible, preventive maintenance in line with needs .
- **Realization**: moneo RTM makes condition-based maintenance possible
- **Success criteria**: Early detection of impending fan damage, Planning of repair operations to reduce plant downtime.



Dashboard

1 Overview of characteristic vibration values:
v-Rms, a-Peak and a- Rms
2 : Crest Factor bearing condition assessment
3 Crest Factor **4:** Traffic of temperature value
5 Current motor surface temperature
6 : Tricolour display rotation speed
7 Current motor speed

Analysis

1 Motor speed curve
2 Motor speed trend
3 VVB peak value

Industrial IoT & Smart Sensors (IFM)