

Intelligent Sensors in the Logistics Center

The IQ-Sense Concept quickly provides integrated Automation

At peak times, up to 1800 packages a day leave the delivery center of the Jako AG in Mulfingen-Hollenbach and supply sporting goods stores throughout the world with over 12,000 different articles centered around team sports. From A like <all-weather jacket> to Z like <zip-off jersey> – almost all articles are available immediately or on short call.

In the expansion of the conveyor and sorting system, the distributed I/O station Simatic ET 200S and IQ-Sense – as the intelligent sensor system – fully display their strength as a team.

Since the formation of the company slightly more than 10 years ago, Jako has grown from a sporting goods store to become the second-largest manufacturer of team sportswear in Germany. The continuous expansion of the business as well as the continuously increasing product variety also make higher and higher demands on the logistics. The Jako logistics center handles the daily incoming goods from the worldwide production sites and the delivery to the dealers. A major strength of Jako are the short delivery times. As a rule, the shipment takes place on the same day as the order, at the latest the next day. To continue to offer this customer advantage in the future, the previously employed field warehouses were concentrated at a single location and the existing logistics center expanded.

The control engineering company Ising GmbH of Wermelskirchen – as the supplier to the plant constructor Saar Lagertechnik – had the difficult task of expanding the fully automated system within a very short time, while keeping the logistics center fully operational.

Communication on all Levels

In spring of 2003, the new facility went on line. The expansion resulted in 7000 square meters of total storage area on three floors. The conveyor system required for the smooth transport of the sports articles is of a modular design and consists of individual roller conveyors and two vertical lifts. The conveyor system connects the storage, order picking, packaging and shipping areas. The control of the entire facility is carried out by a Simatic S7-400. The system-wide communication – down to the sensor level – is implemented via the distributed I/O station ET 200S and IQ-Sense.

As a result, each individual sensor can be accessed from any place of the facility. All teach-settings as well as diagnostics information of the sensors can be specified or processed with standard Profibus mechanisms.

Quick Commissioning

With IQ-Sense, sensors are seamlessly integrated into the control environment. The special IQ-Sense optical sensors are connected with the IQ-Sense electronics



Picture 1: The ordered articles are carefully put together and packaged (Ill: Siemens AG)

module of the Simatic ET 200S via a simple two-wire cable. This two-wire cable carries power as well as data. The collaboration between sensor and controller resulted in considerable time savings during the installation and



Picture 2: The packages are detected by a photo sensor

commissioning of the sensors by Ising. Altogether, time played a crucial role. After all, the system had to be put into operation as quickly as possible. The parameterization via IntelliTeach enables the distance values of each sensor to be assigned by the controller. The synchronization of each individual sensor during the installation could thus be omitted. Thanks to the novel anti-interference function of IQ-Sense, no minimum installation distances have to be observed, which greatly facilitated the mechanical configuration. Errors due to the interaction of neighboring sensors are prevented by this technique. The errors that occasionally occurred during the commissioning phase – such as wire break, short circuit or improper adjustment – are automatically recognized by the channel-specific diagnostics functions integrated in IQ-Sense and can thus be corrected quickly and early.

Particularly helpful is that IQ-Sense not only shows diagnostics information directly at the sensor or electronics module, but also outputs a plain text diagnostics message on the operator display of the system. All this saved a lot of time, money and nerves during the commissioning.

High Availability

Not only the fast commissioning, but especially the easy system maintenance is crucial for Jako. Given that the deliveries to the numerous customers have to follow a strict time schedule, the availability of the order picking and conveyor system is extremely important. Here, IQ-Sense impresses with its ease of maintenance. As during the commissioning, errors occurring in runtime are immediately shown on the system's operator display in the form of a diagnostics message. Besides the channel-specific information about a wire break or short circuit, the information about the level of dirt contamination is of particular importance in this application. The creeping dirt contamination that inevitably occurs during operation is monitored by IQ-Sense, which differentiates between three states: safe operation in the normal range – the sensor is clean.

Currently available IQ-Sense Products:

IQ-Sense I/O Module:

- 4-channel IQ-Sense module for the distributed I/O station ET 200S
- 8-channel IQ-Sense module for the Simatic S7-300 and the distributed I/O station ET 200M

Optical Proximity Switch Series K80 IQ-Sense

- Photoelectric diffuse sensor, energetic, range of 2 m
- Photoelectric diffuse sensor with background suppression, range from 0.1 to 1 m
- Photoelectric reflex sensor, range up to 6 m

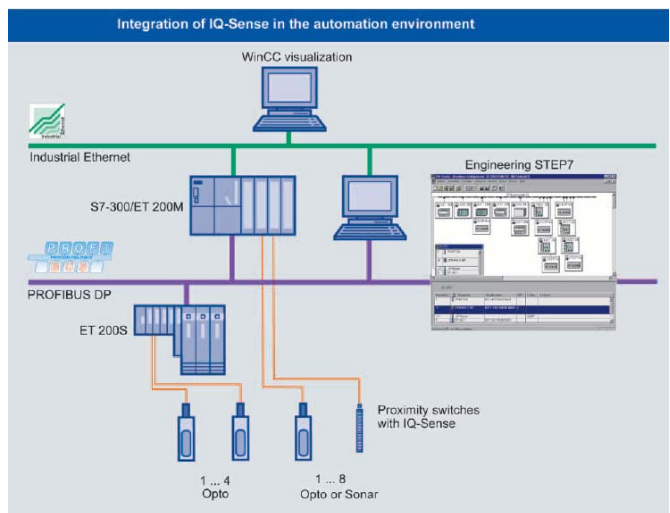
Optical Proximity Switch Series C40 IQ-Sense

- Photoelectric diffuse sensor, energetic, range of 0.7 m
- Photoelectric reflex sensor, range up to 6 m

Ultrasonic Sensor Series M18 IQ-Sense

- Sonar BERO, range from 6 to 30 cm
- Sonar BERO, range from 15 to 100 cm

www.siemens.com/simatic-sensors/px



Safe operation at the threshold – the sensor is dirty, but still functions reliably (preventive maintenance and continued system operation possible). No safe operation possible – the sensor is contaminated to such a degree that a reliable operation of the sensor is no longer possible. A replacement of sensors as well as of IQ-Sense modules can be carried out without interrupting the operation – the system does not have to be deactivated. All sensor settings are automatically transferred by IntelliTeach to the replacement units – no action by the maintenance staff is required for this. As a result of the experience at Jako, Ising will also equip their next systems with IQ-Sense.

Integration of IQ-Sense into the Automation Environment

Wiring: The wiring of the IQ-Sense sensors is carried out via a two-wire cable between each sensor and a channel of the IQ-Sense module. This cable supplies the power and also handles the data communication. Thanks to the polarity independence of the cable, wiring errors are practically impossible.

Configuration/Parameterization:

Standardized configuration tools such as STEP7 or COM PB ensure a continuous, central data management of the configuration/parameterization data for all sensors.

Settings changeable in runtime can be entered directly at the sensor or be specified by the controller through IntelliTeach. Sensors can be hot-swapped, since the controller automatically restores all sensor settings.

Processing of Process Values:

All process values, settings and sensor-specific data of the sensors are available system-wide through the controller program. A provided Simatic S7 function block supports the supply and analysis of this data for the S7 programmer.

Diagnostics:

The transmission of sensor diagnostics messages occurs event-driven via the two-wire cable running between the IQ-Sense sensor and IQ-Sense module. These messages are embedded in the S7 system diagnostics as well as the Profibus DP standard diagnostics. The access to these messages is thus handled identical to all other automation components.