A factory automation (FA) system consists of various devices. As the number of installed sensors and their types, particularly digital and multi-functional types, increases, they must be made easier to use. To meet this requirement, Mitsubishi Electric proposes the “iQ Sensor Solution (iQSS)” by “MELSOFT iQ Works,” the FA Integrated Engineering Software package (referred to as “iQ Works”).

1. Present Issues and Customer Requirements

The uses of sensors installed in an FA system are diversifying, and the number and types of installed sensors are also increasing. As a result, it is becoming more difficult to identify the configuration of installed sensors by reviewing the drawings or by directly checking them, necessitating many man-hours for system startup and modification (Fig. 1).

In addition, the percentage of digital and multi-functional types is increasing, and customers have asked us to make it easier to adjust and monitor sensors. At present, however, each sensor has its own configuration tool, and adjustment and monitoring needs a different tool for each sensor; thus, not only is it time-consuming work, but it also takes a long time for customers to master the operation (Fig. 2).
To solve these issues, Mitsubishi Electric proposes iQSS by iQ Works to provide the functions described in Chapter 2.

2. iQSS by iQ Works
With iQSS by iQ Works, the information on sensors is managed through their profiles. The sensor-specific information and behavior is summarized in the profile, and thus the data display and other operations for each sensor can be executed using its profile.

2.1 System configuration
To help identify the configuration of installed sensors, iQSS has a function that automatically detects connected modules, reads their information into iQ Works, and graphically displays the system configuration. Previously, spreadsheet, CAD, or similar software was used to draw the configuration of connected modules. The new iQSS function, which automatically detects connected modules, reads the module identification data from the master module connected to the CC-Link, AnyWireASLINK1 or Ethernet2 network, and then displays the configuration of installed modules by mapping the read-out information to the modules’ profile data (Fig. 3).

2.2 Sensor monitoring
iQSS also has a sensor/module monitoring function to easily monitor the status of sensors. The information on sensors connected to the CC-Link, AnyWireASLINK, or Ethernet network is graphically displayed on the sensor monitoring screen (Fig. 4). Since the information and icon of each sensor are displayed, the sensor to be monitored can be selected without any mistakes. Simultaneously displayed sensor image and diagnostic information make it possible to monitor the status of the selected sensor, where the sensor image and the items to be displayed as diagnostic information are defined in the profile. It is not necessary to use the configuration tool of each sensor; the status of various sensors can be monitored by iQ Works.

2.3 Sensor parameter read/write
Parameters of the connected sensors can be read or written on the configuration chart as described in Section 2.1 (Fig. 5). Communication with each sensor is performed according to the specified protocol, and each parameter value is checked against the profile data, so sensor setting can easily be verified or changed.

Also, as described in Section 2.2, parameters of

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1 AnyWireASLINK is a registered trademark of Anywire Corporation.
2 Ethernet is a registered trademark of Fuji Xerox Co., Ltd.
various sensors can be set up by iQ Works without using the configuration tools, and thus it is no longer necessary to execute multiple configuration tools or master their operation, resulting in reduced man hours.

2.4 Sensor parameter backup/restoration

Sensor parameters can be collectively backed up or restored to/from an SD memory card in a programmable logic controller (PLC). This function makes it easy to import certain parameter data into multiple sensors and restore the parameter data when replacing a sensor.

3. Solution with Mitsubishi Display Terminal GOT

While all iQSS functions described in Chapter 2 are realized by using iQ Works, they are also supported by a graphic operation terminal (GOT). As shown in Fig. 6, the iQSS functions are realized on the GOT sample screen. By using these functions, sensors can also be adjusted and monitored on the shop floor. Download service for the sample screen will be implemented on the Mitsubishi Electric FA web site.

4. Conclusion

This paper described the iQ Sensor Solution (iQSS) by iQ Works, which makes it easier to use the sensors installed in FA systems. iQSS helps customers to identify the configuration of many connected sensors, and easily adjust and monitor them (Table 1). We will continue to extend the range of applicable sensor manufacturers and sensor types. Simply by registering their profiles to iQ Works, those sensors can be covered by iQSS without updating iQ Works.

Reference


Table 1 Benefit for customers

<table>
<thead>
<tr>
<th>Function</th>
<th>Before</th>
<th>After</th>
<th>Benefit for customers</th>
</tr>
</thead>
<tbody>
<tr>
<td>System Configuration</td>
<td>Configuration of connected sensors needs to be identified by reviewing the drawings or by directly checking the sensors.</td>
<td>Configuration of connected sensors can be identified using a graphic display on the iQ Works screen.</td>
<td>Configuration of connected sensors is easily identified, thus reducing the man-hours for system startup and modification.</td>
</tr>
<tr>
<td>Sensor Monitoring</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sensor Parameter Read/Write</td>
<td>Different tools must be installed and executed to configure each sensor.</td>
<td>Configuration can be set up by iQ Works.</td>
<td>Man-hours can be reduced for the installation and startup of the tools. The customer only needs to master iQSS.</td>
</tr>
<tr>
<td>Sensor Parameter Backup/Restoration</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

Fig. 6 GOT sample screen

Backup/restoration

Sensor monitoring

Sensor parameter read/write

3 This function is not supported for Ethernet modules.