My role in Yokogawa

Herman Zwijnenberg
Joined Yokogawa in 2006

Full time trainer in the following areas:
- Distributed Control Systems (DCS)
- Safety Control Systems (SCS)
- Foundation Fieldbus (FF) & FieldMate
- Supervisory Control And Data Acquisition (SCADA)
- ISA 100  Wireless
- More…
ISA 100 and Yokogawa

From ISA 100 standard ISA-100.11a-2011 / 4 May 2011

Figure 1 – Standard-compliant network
EMEA WCI Focus Group – ISA100 Wireless End-user event
Tuesday 18 June 2019 – Dräger Nederland BV Zoetermeer
13:00 – 14:00 Design and implementation of Wireless Gas detection and end-to-end SIL2
System Configuration for SIL2 communication

- Displays:
  - Faceplate for GS01
  - YFGW operational condition
  - Alarm message of wireless communication status

- Function block for GS01
- PROFIsafe implemented

- Communication definitions for GS01, PROFINET communication memory definitions
- PROFIsafe data/parameter definitions, communication I/O variable definitions

General YFGW410 configuration
- PROFINET / PROFIsafe SIL2 comm. definitions for GS01 / ProSafe RS

YFGW410 (Gateway)
- Function block for GS01
- PROFIsafe implemented

PROFINET I/F
- Communication definitions for GS01, PROFINET communication memory definitions
- PROFIsafe data/parameter definitions, communication I/O variable definitions

YFGW510 (Backbone router)
- Device definitions for GS01
- Communication definitions for ISA100 / PROFIsafe

GS01 Engineering tool
- General YFGW410 configuration
- PROFINET / PROFIsafe SIL2 comm. definitions for GS01 / ProSafe RS

Systems involved

- SCS (CPU)
  - Safety Application
  - PROFIsafe
  - ESB bus

- YFGW410
  - PROFINET-ISA100 Mapping/Translation
  - PROFINET
  - ISA100

- GS01
  - Safety Application
  - PROFIsafe
  - ISA100

- S2LP131 (Gateway)
  - PROFINET
  - ESB bus

- ESB bus
  - PROFIsafe communication
Situation 1: GS01 – everything in normal operation

Information from the GS01 device using PROFINET/PROFIsafe presented on the operator station
1. Diagnostic information
2. Actual process information
Situation 2: GS01 example Diagnostic alarm

Here a simulated “Optical beamer block” is shown. As a result bit “08” will be set. Also bits 26 (summary alarm) and bits 28 and 31 (NE107) are set.

NE107: Self-Monitoring and Diagnosis of Field Devices

Situation 3: GS01 Example High trip (Gas detected)

For simulation a cleaning solvent is injected. Level is rising to 15% As the alarm level is set to 5% the indicator level turn to red.

It can also be trended

Alarm is generated to alert the operator
How to achieve this from configuration point of view?

1 Configure the GS01 detector

- Device definitions for GS01
- Communication definitions for ISA100
1.1 GS01 configurator

1.2 PROFIsafe Constants GS01 detector

<table>
<thead>
<tr>
<th>LEL Standard</th>
<th>Gas Config</th>
<th>F_IPAR_CRC (HEX)</th>
<th>F_IPAR_CRC (DEC)</th>
<th>Remark</th>
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<tbody>
<tr>
<td>IEC60079-20</td>
<td>Methane</td>
<td>0xF4ACFB13</td>
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<td>Propane</td>
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<td></td>
<td>Propane</td>
<td>0xB205AC39</td>
<td>2986716217</td>
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</tr>
</tbody>
</table>
1.3 GS01 Device Diagnostic Status

The GS01 has implemented the recommended status and diagnostic information. See table from manual.

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2 ISA100 Gateway Configuration

- Displays:
  - Faceplate for GS01
  - YFGW operational condition alarm message of wireless communication status

- Function block for GS01
- PROFIsafe implemented

- Communication definitions for GS01, PROFINET communication memory definitions
- PROFIsafe data/parameter definitions, communication I/O variable definitions

- YFGW410 (Gateway)
- SCS: Fire and Gas Communication Module [PROFINET]

- Ethernet

- [ISA100.11a]
- PROFNET I/F
- GS01 (Sil2 certified Gas Detector)
- Device definitions for GS01
- Communication definitions for ISA100

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2.1 Import GS01 provisioning info into the Gateway

Part of the FWMC for the gateway. The figure shows the imported provisioning file data that was created in step 1.1

2.2 Set PROFINET /PROFIsafe Sampling time

<table>
<thead>
<tr>
<th>Publication Period (sec)</th>
<th>Read Parameter (Uplink)</th>
<th>Write Parameters (Downlink)</th>
</tr>
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<tbody>
<tr>
<td></td>
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<th>MODBUS / SIL2</th>
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</table>

For hydrocarbon gas detection, this process safety time is in the IEC 60079-29-1 standard defined to 60 seconds
2.3 Complete Gateway configuration

Attention points
- Make sure you have the Capability files (CF) for the GS01 Field Device.
- Also possible to create a Modbus map.
- Select “Download” in the menu. Check the download result.

3 ProSafe RS configuration

- Displays: faceplate for GS01, YFGW operational condition, alarm message of wireless communication status
- Function block for GS01, PROFIsafe implemented
- Communication definitions for GS01, PROFINET communication memory definitions
- PROFIsafe data/parameter definitions, communication I/O variable definitions
- PROFINET I/F
- Communication definitions for YFGW and ISA 100
- Device definitions for GS01, Communication definitions for ISA 100
- ISA100.11a
3.1 PROFINET / PROFIsafe communication

Here the PROFINET / PROFIsafe mapping is shown. (Notice the difference in column "Signal Protocol")
1. Mapping from the gateway
2. Connection to the ProSafe RS (Yokogawa’s safety system).

3.2 ProSafe RS Program Organization Unit (POU)

Part of the application program in the safety controller.
The function block “GASDTR” is supported by the operator station for operation and monitoring.
4.1 Graphical representation and runtime information

Example of the GS01 using "GASDTR" fb
4.2 Graphical representation and runtime information

Example of the diagnostic information

Thank you for your attention