

## IIoT Weighing solutions

### SIMATIC IOT2000 SG-Shield

#### Overview



The SIMATIC IOT2000 SG-Shield is the simple solution for remotely viewing measured values from load cells based on strain gauges. The load cell cable simply connects directly to the shield. The system digitizes the analog data and sends it to the cloud via the SIMATIC IOT2050 Gateway. This allows you to retrieve the filling levels from your customers at any time and adjust your delivery routes accordingly.

#### Benefits

- Multiple communication options in conjunction with SIMATIC IOT2050
- High flexibility enabled by Node-RED software
- Easy setup of MindSphere thanks to ready-to-use MindConnect Library
- High accuracy at +/- 1 000 000 parts resolution

#### Application

The SIMATIC IOT2000 SG-Shield is supplied with a node-RED software example and all necessary interfaces. This means the system can be put into operation via the Node-RED Dashboard and connected to the cloud. At the same time, the measured values recorded can be stored in MindSphere, our cloud-based, open IoT operating system, for example, and retrieved again with our SITRANS Store IQ app, for example. Of course, you can also connect higher-level office business systems or individual applications for monitoring fill levels, for example to automate order processes or your delivery route planning.

The actual interface to the cloud is provided by our SIMATIC IOT2000 gateway family. The SIMATIC IOT2000 SG-Shield is simply plugged into the device, the necessary software image is loaded onto the Micro SD Card, and your connection to the Internet of Things is already established.

Thanks to integrated open source (Node-RED for connecting IoT components), the measured values do not remain trapped in a closed system, but can also be integrated into any manufacturer-independent system with little programming effort. This offers the user maximum flexibility and openness.

For the OEM sector we have a special variant, which is equipped with an RS485 interface.

#### Selection and ordering data Article No.

| Selection and ordering data  | Article No.               |
|--|---------------------------|
| <b>SIMATIC IOT2000 SG-Shield</b>   | <b>7MH4647-0KK00-0AA2</b> |
| Scope of delivery:<br>1x SIMATIC IOT2000 SG-Shield<br>1x metall mounting clamp<br>3x plastic mounting clamps<br>1x cover plate |                           |
| <b>SG-Shield OEM</b>   | <b>7MH4647-0AA01</b>      |
| <b>SIMATIC IOT2050</b>   |                           |
| 2 x GB Ethernet RJ45; display port;<br>2x USB2.0; 24 V DC industrial power supply  |                           |
| • Standard version   | <b>6ES7647-0BA00-0YA2</b> |
| • Version with 16 GB eMMC  | <b>6ES7647-0BA00-1YA2</b> |



#### Technical specifications

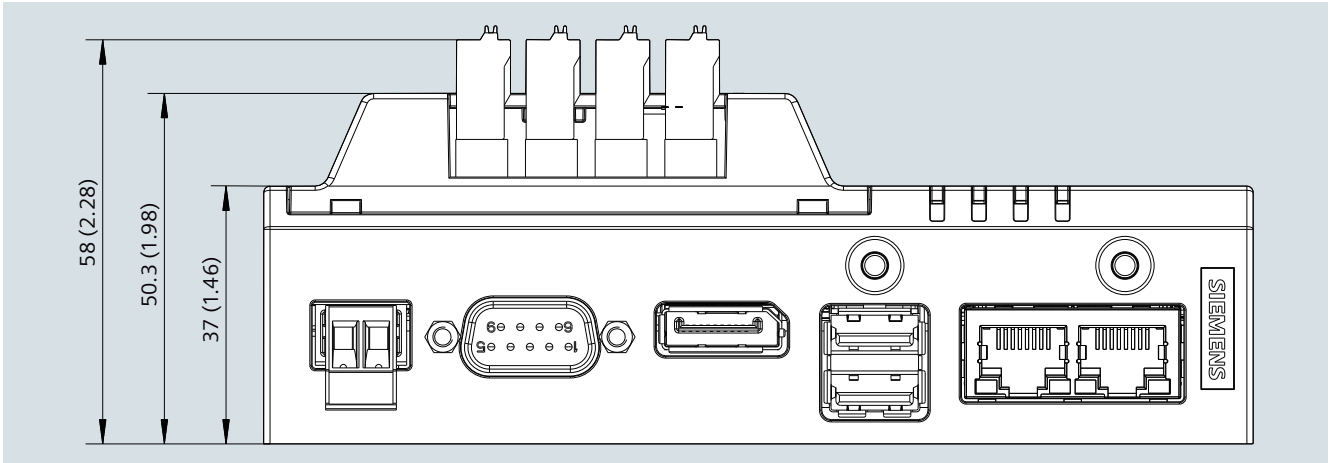
Because the SIMATIC IOT2000 SG shield is inserted into the SIMATIC IOT2050, the same technical specifications apply as for SIMATIC IOT2050:

- Degree of protection: IP20 in accordance with IEC 60529
- Electromagnetic compatibility
- Ambient conditions

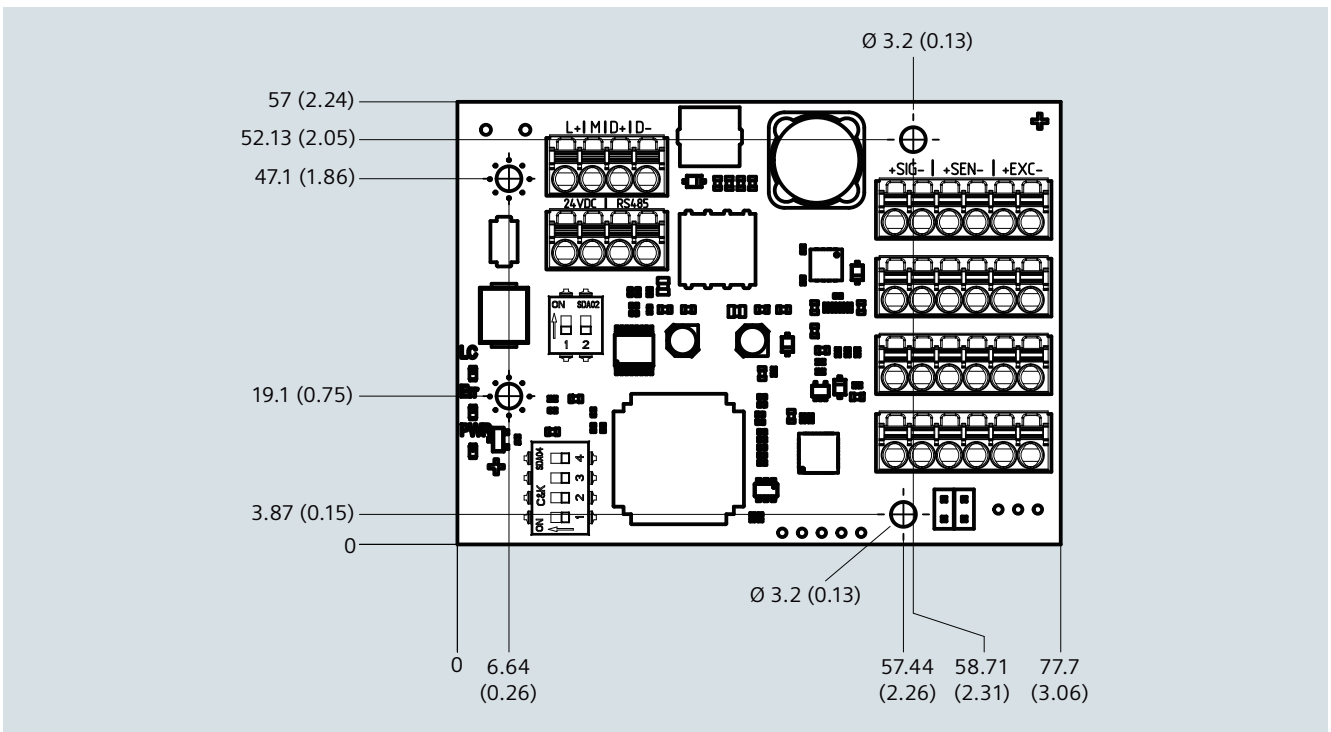
#### Load cell interface

|                               |  |
|-------------------------------|--|
| Accuracy                      | 0.05%  |
| Input signal resolution       | ± 1 000 000  |
| Measuring range               | ± 4 mV/V   |
| Supply of the full bridge     | 4.85 V DC +2/-3%                                   |
| Connection                    | 4-wire or 6-wire                                   |
| Strain gauge input resistance | 50 ... 4.100 Ω                                     |
| Galvanic isolation            | 500 V AC   |
| Communications interface      |  |
| • SIMATIC IOT2000 SG-Shield   | Arduino pin layout compatible with SIMATIC IOT2050 |
| • SG-Shield OEM               | RS 485   |

Dimensional drawings



SIMATIC IOT2000 SG-Shield, dimensions in mm (inch)



SG-Shield OEM, dimensions in mm (inch)

## IIoT Weighing solutions

### SITRANS store IQ

#### Overview

SITRANS store IQ is a Siemens MindSphere based application used to monitor and manage inventories in process and discrete industries.

#### Benefits

- Manage entire inventory network from a central location.
- Reduce overhead required to monitor and plan stock levels.
- Avoid unnecessary downtime and cost associated with unexpected shortages.
- Increase transparency of measurement reliability.

#### Design

- A reliable and accurate record of inventory data from anywhere.
- A flexible structure for configuring an inventory network of any size.
- Provides a visualization of an inventory mix, with material breakdown.
- KPI thresholds to easily assess inventory levels.
- Custom alarms for proactive notifications.
- Based on MindSphere and MindSphere connectivity solutions.
- Open to virtually every measurement technology.
- Ability to monitor any process values, including humidity, temperature, digital inputs.

#### Application

Inventory management is a necessary task in virtually every value chain. Inventories are required whenever material is processed, produced, or assembled. SITRANS store IQ is an inventory management app based on Siemens MindSphere, that records measurements and data from various types of instrumentation, including a level device at a process tank or scales mounted in storage shelves. SITRANS store IQ also monitors auxiliary measurements, helping to better characterize inventories, for example, with temperature readings or binaries.

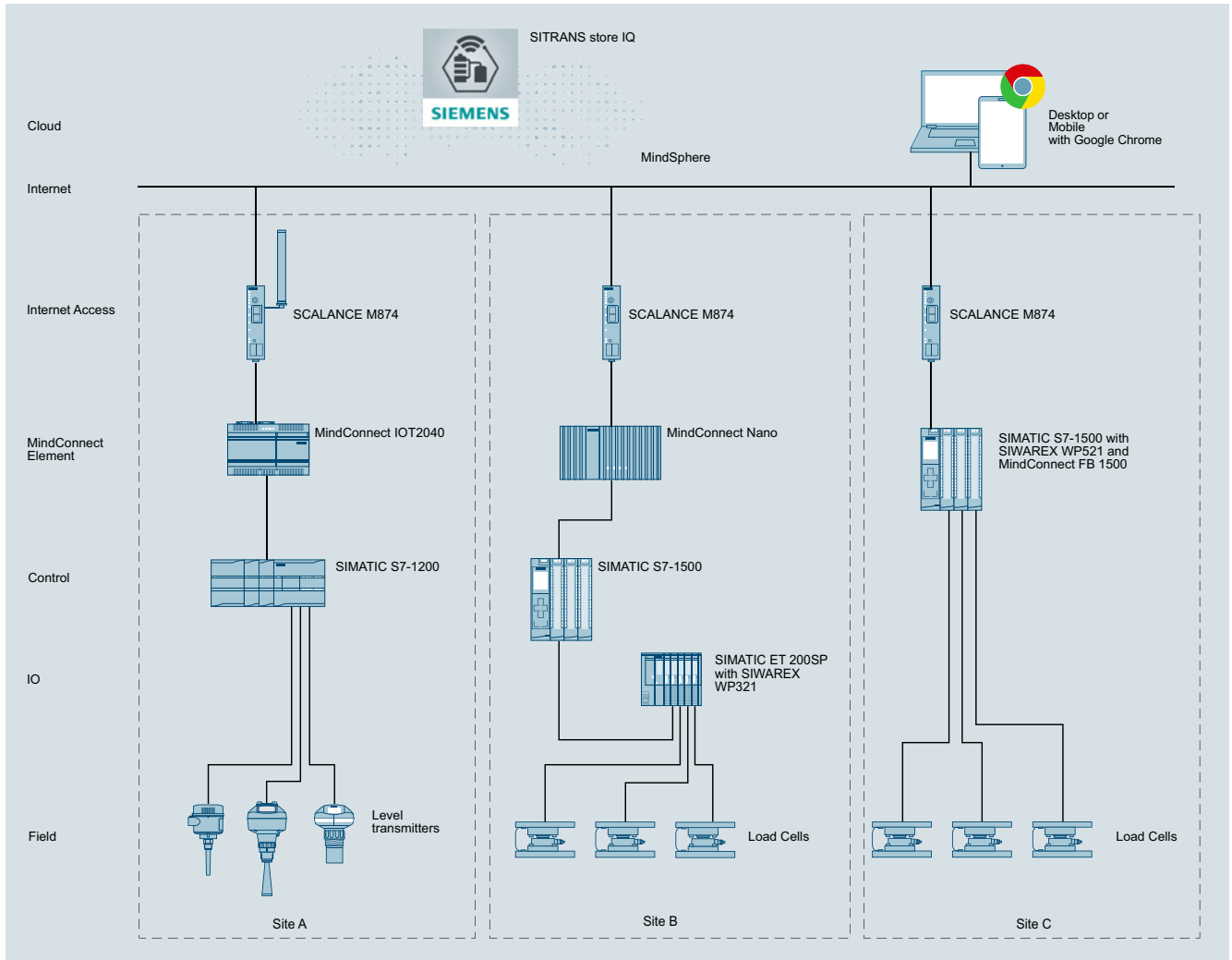
SITRANS store IQ records readings and visualizes them in a customizable way, offering structuring with hierarchies, map views, and graph views. The acquired data can be used to create proactive alarms via email or SMS, exactly as required for your application. The SITRANS store IQ app can be used on a desktop computer or mobile device.

#### **The following standard SITRANS store IQ packages are available:**

SITRANS store IQ is distributed via the MindSphere Digital Exchange: <https://www.dex.siemens.com>

| Software packages                             | Entry  | Small     | Medium   |
|---|--|-----------|----------|
| <b>MindSphere base tenant includes:</b>       | ✓  | ✓         | ✓        |
| MindSphere users                              | 2  | 2         | 5        |
| Agents  | 1  | 2         | 10       |
| Data ingest rate                              | 0.01 kB/s  | 0.05 kB/s | 0.1 kB/s |
| Data storage                                  | 0.5 GB   | 0.5 GB    | 5 GB     |
| <b>SITRANS store IQ application includes:</b> |  |           |          |
| Monitored assets                              | 3  | 10        | 100      |
| <b>License type</b>                           | Subscription with 12-month initial subscription term. The 12 month subscription will renew automatically if not cancelled 60 days before the end of the first subscription term. |           |          |
| <b>License upgrade options</b>                |  |           |          |
| <b>Asset upgrade</b>                          |  |           |          |
| Additional monitored assets                   | 10   |           |          |
| Additional data ingest rate                   | 0.1 kB/s   |           |          |
| Additional data storage                       | 0.5 GB   |           |          |

Integration



SITRANS store IQ is based on MindSphere and supports various possibilities to onboard instrumentation devices and acquire data. The figure shows several integration examples.

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## IIoT Weighing solutions

### SIMATIC IOT2050

#### Overview

The SIMATIC IOT2050 is the reliable, open platform designed for the acquisition, processing and transfer of data directly in the production environment. It is ideally suited for use as a gateway between the cloud or company IT level and production.

The openness of the system in supporting numerous communication protocols and programming in high-level languages enables tailored solutions.

Openness for industrial IOT applications

- Wide range of options for programming in high-level languages
- Implementation of flexible communication solutions with different protocols, from Modbus RTU, OPC UA to cloud protocols such as MQTT/AMQP
- Use of open source application examples and libraries
- SIMATIC Industrial OS, via OSD + free "ISAR" Debian via download

Additional information is available on the Internet at:

<http://siemens.com/iot2000>

#### Benefits

- Highly flexible connection options
  - Variety of interfaces on-board for simple connection
  - Simple and extremely flexible facilities with Arduino Shields and mPCIe cards
- High degree of ruggedness for continuous operation in industrial environments
  - Designed for continuous operation at ambient temperatures up to 50 °C and tough environmental conditions
  - Compact enclosure with diagnostics LEDs
  - Standard rail mounting for easy installation in the control cabinet
- Deterministic response and performance for industrial applications
  - Battery-backed real-time clock for assigning data to relevant time stamp
  - TI ARM SoC, 64-bit processor including x86 deterministic response and security feature such as Secure Boot

#### Application

The combined utilization of machine and production data opens up a wide range of possible applications – the SIMATIC IOT2050 as a freely-programmable data gateway can establish the interface between the field and the IT/cloud. It can harmonize communication between the various sources of data before analyzing it and forwarding it to the appropriate recipients.

The SIMATIC IOT2050 can constitute an easy to retrofit, cost-efficient solution. This easy-to-implement solution facilitates the realization of future-oriented production concepts on already existing systems.

Application examples:

- Connection of additional sensors, and data collection and transfer in existing systems in order to identify optimization potential
- Acquisition of machine data, such as motor performance indicators, for analysis in order to derive preventive maintenance concepts
- Coherence and harmonization of communication from and between different machines and automation components

#### Design

##### Basic design

- Plastic enclosure, resistant to vibration and shock, also for high electromagnetic compatibility
- Isolated power supply:
  - 24 V DC (12 ... 32 V)
- Interfaces (accessible from one side):
  - 2 x LAN 10/100/1000 Mbps Ethernet interface (RJ45)
  - 2 x USB V2.0
  - 1 x COM (RS232 / 485)
- Fieldbus
  - TSN and ProfiNet@TSN capability above standard Ethernet interface
- Processor:
  - TI ARM SoC, 64-bit, 2 cores (approx. 5k DMIPs)
  - TI ARM SoC, 64-bit, 4 cores (approx. 10k DMIPs)
- Main memory configuration:
  - 1 GB RAM / 2 GB RAM
- Hardware expansion:
  - 1 x mPCIe slot x 1
  - ARDUINO UNO R3 Shield interface
- Drives:
  - Micro SD card / Storage internal eMMC and Micro SD card
- Operating system as download:
  - SIMATIC Industrial OS / free "ISAR" Debian via download

#### Selection and ordering data Article No.

##### SIMATIC IOT2050

2 x GB Ethernet RJ45;  
Display Port; 2x USB 2.0;  
SD CARD slot;  
24 V DC industrial power supply

- Hard disk: 1x microSD card slot; memory: DDR4-SDRAM 1 GB
- Hard disk: 16 GB eMMC 1x microSD card slot; memory: DDR4-SDRAM 2 GB

**6ES7647-0BA00-0YA2**

**6ES7647-0BA00-1YA2**

## Technical specifications

| Article number                                 | 6ES7647-0BA00-0YA2<br>SIMATIC IoT2050 | 6ES7647-0BA00-1YA2<br>SIMATIC IoT2050 |
|--|---------------------------------------|---------------------------------------|
| <b>General information</b>                     |                                       |                                       |
| Product type designation                       | IOT2050                               | IOT2050                               |
| <b>Installation type/mounting</b>              |                                       |                                       |
| Design   | IoT Gateway, built-in unit            | IoT Gateway, built-in unit            |
| <b>Supply voltage</b>                          |                                       |                                       |
| Type of supply voltage                         | 12/24 V DC                            | 12/24 V DC                            |
| <b>Mains buffering</b>                         |                                       |                                       |
| • Mains/voltage failure stored energy time     | 5 ms                                  | 5 ms                                  |
| <b>Processor</b>                               |                                       |                                       |
| Processor type                                 | ARM TI AM6528 GP                      | ARM TI AM6548 HS                      |
| <b>Graphic</b>                                 |                                       |                                       |
| Graphics controller                            | Integrated                            | Integrated                            |
| <b>Drives</b>                                  |                                       |                                       |
| Slot for drives                                | 1x microSD card slot                  | 1x microSD card slot                  |
| <b>Memory</b>                                  |                                       |                                       |
| Type of memory                                 | DDR4                                  | DDR4                                  |
| Main memory                                    | 1 GB RAM                              | 2 GB RAM                              |
| <b>Hardware configuration</b>                  |                                       |                                       |
| <b>Slots</b>                                   |                                       |                                       |
| • free slots                                   | 1x Arduino, 1x mPCIe                  | 1x Arduino, 1x mPCIe                  |
| <b>Digital inputs</b>                          |                                       |                                       |
| Number of digital inputs                       | 20                                    | 20                                    |
| <b>Input voltage</b>                           |                                       |                                       |
| • Type of input voltage                        | DC                                    | DC                                    |
| <b>Digital outputs</b>                         |                                       |                                       |
| Number of digital outputs                      | 20                                    | 20                                    |
| <b>Output voltage</b>                          |                                       |                                       |
| • Type of output voltage                       | DC                                    | DC                                    |
| • permissible voltage at output, min.          | 3.3 V                                 | 3.3 V                                 |
| • permissible voltage at output, max.          | 5 V                                   | 5 V                                   |
| <b>Analog inputs</b>                           |                                       |                                       |
| Number of analog inputs                        |                                       | 6                                     |
| <b>Input ranges</b>                            |                                       |                                       |
| • Voltage                                      |                                       | Yes; 0 ... 5 V                        |
| <b>Interfaces</b>                              |                                       |                                       |
| PROFIBUS/MPI                                   | can be implemented with plug-in card  | can be implemented with plug-in card  |
| Number of industrial Ethernet interfaces       | 2                                     | 2                                     |
| Number of PROFINET interfaces                  | 2                                     | 2                                     |
| USB port                                       | 2x USB 2.0                            | 2x USB 2.0                            |
| Connection for keyboard/mouse serial interface | USB                                   | USB                                   |
|  | 1x COM (1x RS 232 / 422 / 485)        | 1x COM (1x RS 232 / 422 / 485)        |
| <b>Video interfaces</b>                        |                                       |                                       |
| • Graphics interface                           | 1x DisplayPort                        | 1x DisplayPort                        |
| <b>Industrial Ethernet</b>                     |                                       |                                       |
| • Industrial Ethernet interface                | 2x Ethernet (RJ45)                    | 2x Ethernet (RJ45)                    |
| - 100 Mbps                                     | Yes                                   | Yes                                   |
| - 1000 Mbps                                    | Yes                                   | Yes                                   |
| <b>Integrated Functions</b>                    |                                       |                                       |
| <b>Monitoring functions</b>                    |                                       |                                       |
| • Temperature monitoring                       | Yes                                   | Yes                                   |
| • Watchdog                                     | Yes                                   | Yes                                   |
| • Status LEDs                                  | Yes                                   | Yes                                   |

# IIoT Weighing solutions

## SIMATIC IOT2050

### Technical specifications

| Article number  | 6ES7647-0BA00-0YA2<br>SIMATIC IoT2050  | 6ES7647-0BA00-1YA2<br>SIMATIC IoT2050  |
|---|--|--|
| <b>EMC</b>  |  |  |
| <b>Interference immunity against discharge of static electricity</b>  |  |  |
| <ul style="list-style-type: none"> <li>Interference immunity against discharge of static electricity</li> </ul>   | ±4 kV contact discharge acc. to IEC 61000-4-2; ±8 kV air discharge acc. to IEC 61000-4-2   | ±4 kV contact discharge acc. to IEC 61000-4-2; ±8 kV air discharge acc. to IEC 61000-4-2   |
| <b>Interference immunity against high-frequency electromagnetic fields</b>  |  |  |
| <ul style="list-style-type: none"> <li>Interference immunity against high frequency radiation</li> </ul>  |  | 10 V/m for 80 ... 1 000 MHz, 80 % AM according to IEC 61000-4-3; 3 V/m for 1.4 ... 6 GHz, 80 % AM according to IEC 61000-4-3   |
| <b>Interference immunity to cable-borne interference</b>  |  |  |
| <ul style="list-style-type: none"> <li>Interference immunity on supply cables</li> <li>Interference immunity on signal cables &gt;30m</li> <li>Interference immunity on signal cables &lt; 30m</li> </ul> | ±2 kV (according to IEC 61000-4-4, burst); ±1 kV (according to IEC 61000-4-5, surge pulse/line to line); ±2 kV (according to IEC 61000-4-5, surge pulse/line to ground)<br>±2 kV acc. to IEC 61000-4-5, surge, length > 30 m<br>±1 kV acc. to IEC 61000-4-4, Burst | ±2 kV (according to IEC 61000-4-4, burst); ±1 kV (according to IEC 61000-4-5, surge pulse/line to line); ±2 kV (according to IEC 61000-4-5, surge pulse/line to ground)<br>±2 kV acc. to IEC 61000-4-5, surge, length > 30 m<br>±1 kV acc. to IEC 61000-4-4, Burst |
| <b>Interference immunity against voltage surge</b>  |  |  |
| <ul style="list-style-type: none"> <li>asymmetric interference</li> <li>symmetric interference</li> </ul>   | ±2 kV acc. to IEC 61000-4-5, surge asymmetric<br>±1 kV acc. to IEC 61000-4-5, surge symmetric  | ±2 kV acc. to IEC 61000-4-5, surge asymmetric<br>±1 kV acc. to IEC 61000-4-5, surge symmetric  |
| <b>Degree and class of protection</b>   |  |  |
| IP (all-round)  | IP20   | IP20   |
| <b>Standards, approvals, certificates</b>   |  |  |
| CE mark   | Yes  | Yes  |
| UL approval   | Yes  | Yes  |
| cULus   | Yes  | Yes  |
| RCM (formerly C-TICK)   | Yes  | Yes  |
| KC approval   | Yes  | Yes  |
| EAC (formerly Gost-R)   | Yes  | Yes  |
| FCC   | Yes  | Yes  |
| EMC   | CE, EN 61000-6-4:2007 +A1:2011, EN 61000-6-2:2005, CE, EN IEC 61000-6-4:2019, EN IEC 61000-6-2:2019  | CE, EN 61000-6-4:2007 +A1:2011, EN 61000-6-2:2005, CE, EN IEC 61000-6-4:2019, EN IEC 61000-6-2:2019  |
| <b>Altitude during operation relating to sea level</b>  |  |  |
| <ul style="list-style-type: none"> <li>Installation altitude above sea level, max.</li> </ul>   | 2 000 m  | 2 000 m  |
| <b>Relative humidity</b>  |  |  |
| <ul style="list-style-type: none"> <li>Relative humidity</li> <li>Operation, max.</li> </ul>  | 5 ... 85 % at 30 °C, no condensation<br>85 %   | 5 ... 85 % at 30 °C, no condensation<br>85 %   |
| <b>Vibrations</b>   |  |  |
| <ul style="list-style-type: none"> <li>Vibration resistance during operation acc. to IEC 60068-2-6</li> </ul>   | tested according to IEC 60068-2-6: 10 cycles; 5 to 8.4 Hz: deflection 3.5 mm; 8.4 to 200 Hz: acceleration 9.8 m/s <sup>2</sup>   | tested according to IEC 60068-2-6: 10 cycles; 5 to 8.4 Hz: deflection 3.5 mm; 8.4 to 200 Hz: acceleration 9.8 m/s <sup>2</sup>   |
| <b>Shock testing</b>  |  |  |
| <ul style="list-style-type: none"> <li>Shock load during operation</li> </ul>   | Tested according to IEC 60068-2-27: 150 m/s <sup>2</sup> , 11 ms   | Tested according to IEC 60068-2-27: 150 m/s <sup>2</sup> , 11 ms   |
| <b>Operating systems</b>  |  |  |
| pre-installed operating system  | No   | SIMATIC Industrial OS  |
| without operating system  | Yes  | No   |
| <b>Mechanics/material</b>   |  |  |
| Enclosure material (front)  | plastic  | plastic  |
| <ul style="list-style-type: none"> <li>Plastic</li> <li>Aluminum</li> <li>Stainless steel</li> <li>Glass</li> </ul>   | Yes<br>Yes<br>Yes<br>No  | Yes<br>Yes<br>Yes<br>No  |
| <b>Dimensions</b>   |  |  |
| Width   | 37 mm  | 37 mm  |
| Height  | 142 mm   | 142 mm   |
| Depth   | 100 mm   | 100 mm   |

### More information

Additional information is available on the Internet at:

<http://siemens.com/iot2000>