

# SEC3x

## Small Embedded Controller

### General Operating, Maintenance, and Installation Manual



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# 1 Introduction

All technical information, descriptions and illustrations contained in this 'Operating, Maintenance, and Installation Manual' remain our property and shall not be used differently than for operating this system, nor shall they be copied, reproduced or passed on to third parties or brought to their notice without our prior written consent.

The information represented in this manual is in keeping with current standards and is subject to subsequent alterations.

This manual contains important instructions referring to safe installation, commissioning, operation, and maintenance.

Read this manual thoroughly, before starting up the gateway, and observe the instructions.

In order to comply with the guidelines for electro-magnetic compatibility in embedded controllers, only CE-certified components are used in compliance with project-specific requirements.

Please note that the hardware platform (SEC3x) is not protected against lightning and the operator should, if desired, take appropriate protective precautions.

The addition of our RS-232 isolator provides efficient protection of your data and equipment against external influences. We will be pleased to draw up a non-binding offer for you.

Finally we want to draw your attention to the fact that any warranties with respect to the embedded controller will be invalid in the event that:

- Operation, servicing, and maintenance are not carried out accurately according to the instructions; repairs are not carried out by our personnel or without our prior written consent.
- Commissioning is not carried out by our personnel or we have not given our approval for the commissioning or the commissioning is carried out by untrained personnel.
- The unit is used inadequately, incorrectly, negligently, or inappropriately or for a purpose other than originally intended.
- The serial number is removed from the product.

## **For your protection, observe the following safety precautions when setting up your equipment:**

- Follow all cautions and instructions marked on the equipment.
- Ensure that the voltage and frequency of your power source match the voltage and frequency inscribed on the equipment's electrical rating label.
- Never push objects of any kind through openings in the equipment. Dangerous voltages may be present. Conductive foreign objects could produce a short circuit that could cause fire, electric shock, or damage to your equipment.

*All trade names or trademarks mentioned in this document are used for identification purposes only and are property of their respective owners.*

## 2 Hardware Description

### 2.1 General

This embedded controller has been designed for industrial environments and offers a high degree of flexibility, performance, and reliability.

All components are cooled passively.

Factors like quality, availability, and high durability are of particular importance for the selection of our components.

Exhaustive tests of the embedded controller are performed by our company. Each device undergoes an in-depth function test. This function test includes a burn-in test with full communication on all interfaces (min. 48 hours). Communication disruptions, transmission errors, and every important component with regard to function, temperature, voltages etc. are monitored. Hundreds of restarts are executed whereby connections to all interfaces are re-established at each reboot.

Quality assurance is conducted according to the four-eye principle. Each device passes a number of quality inspections.

*The DIN rail mounting clip can show signs of usage due to the functional tests carried out.*

The SEC3x is available in the following variants:

- SEC3 - The Base Model
- SEC3PB - The PROFIBUS Sniffer
- SEC3IO - The I/O Controller

### 2.2 IEC 61850-3; EN 61850-3

The particular requirements of the IEC 61850-3 standard for electromagnetic compatibility and power supply are met by the following hardware models:

- SEC3-SA - The Base Model
- SEC3IO-SA - The I/O Controller

## 2.3 Controls and Display Elements

### 2.3.1 SEC3 / SEC3-SA

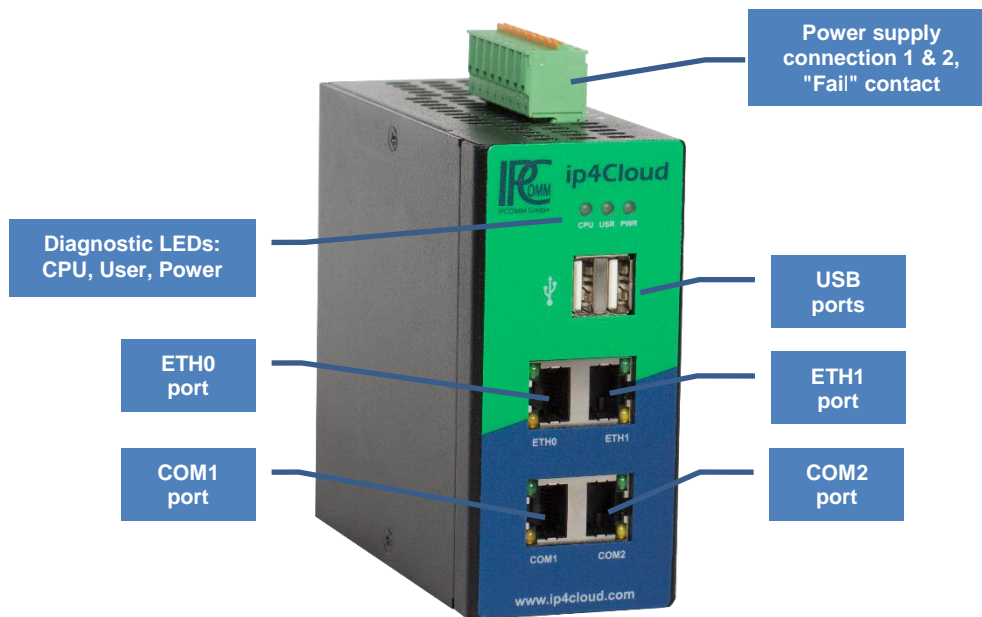


Figure 1: SEC3 front view

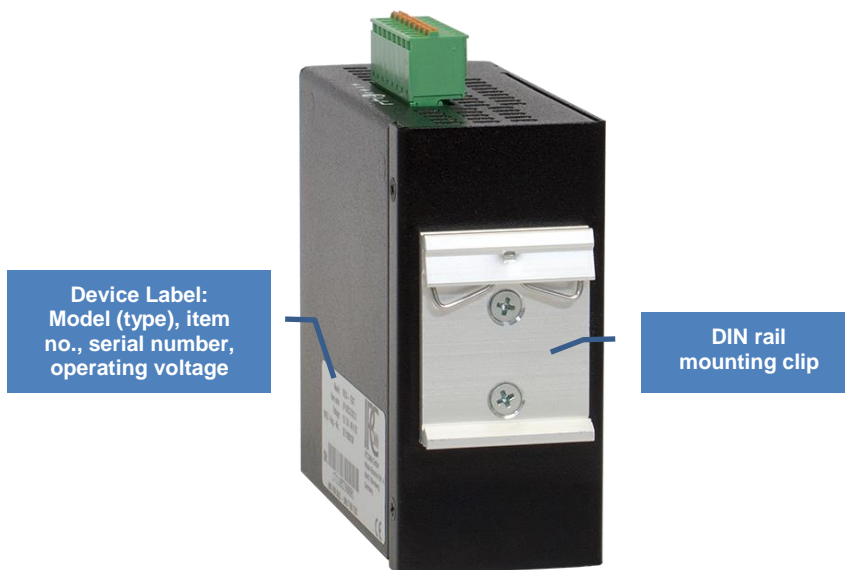


Figure 2: SEC3 rear view

## 2.3.2 SEC3PB

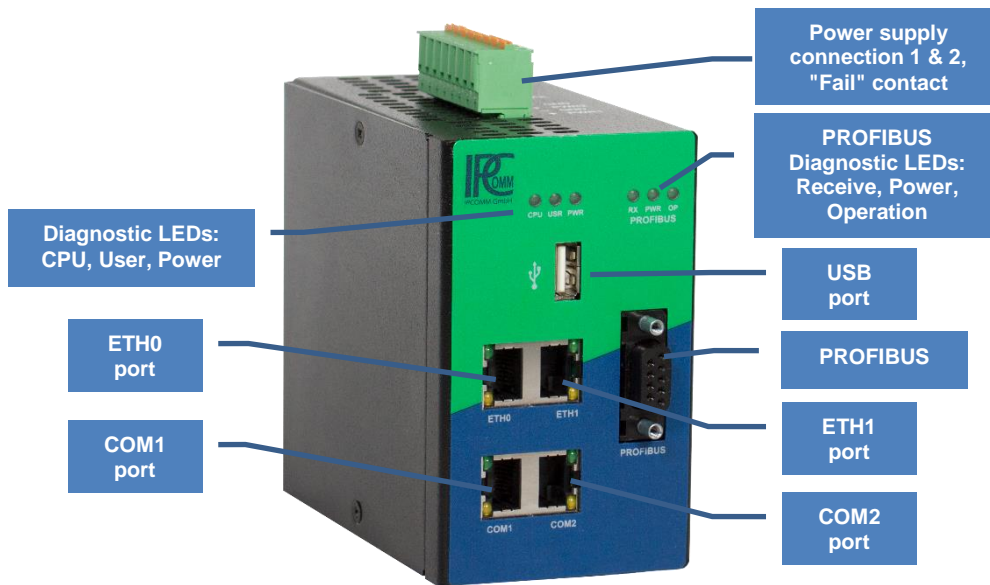


Figure 3: SEC3PB front view

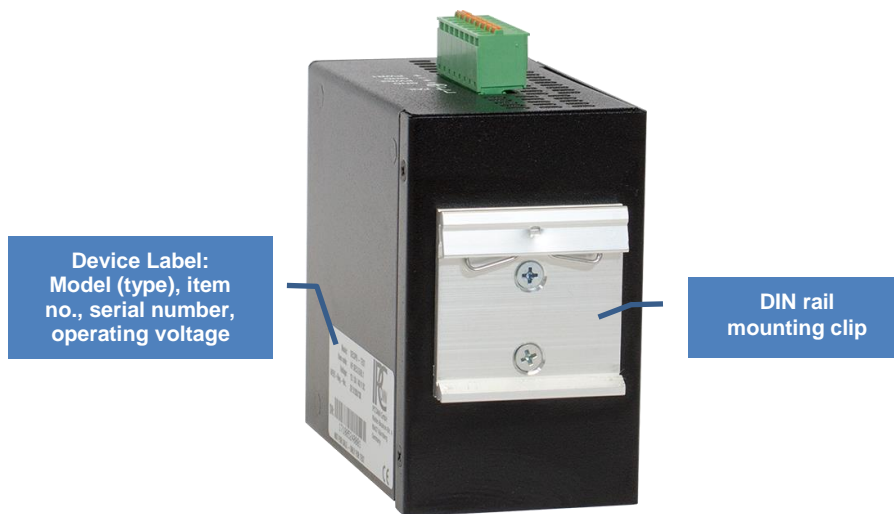


Figure 4: SEC3PB rear view

### 2.3.3 SEC3IO / SEC3IO-SA

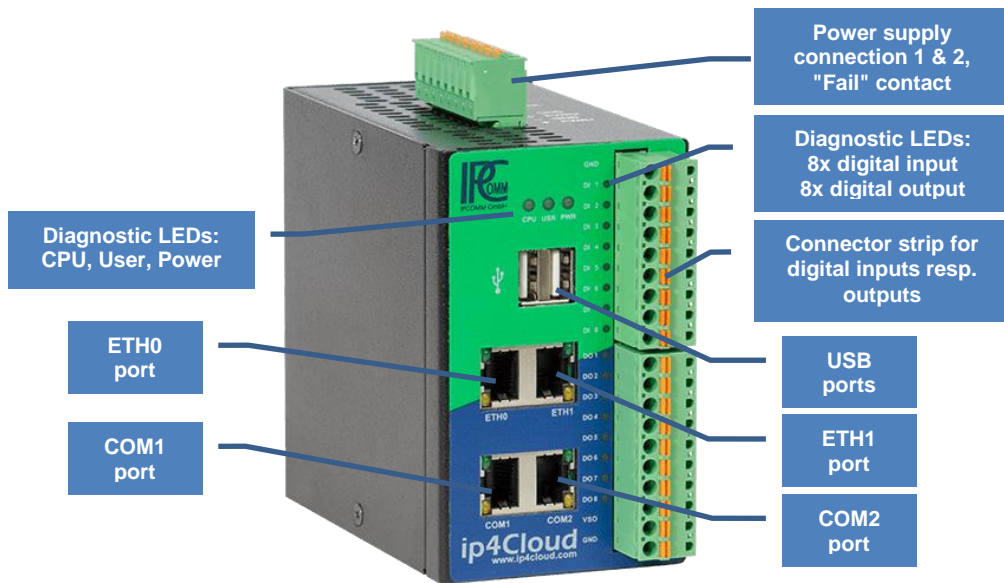


Figure 5: SEC3IO front view

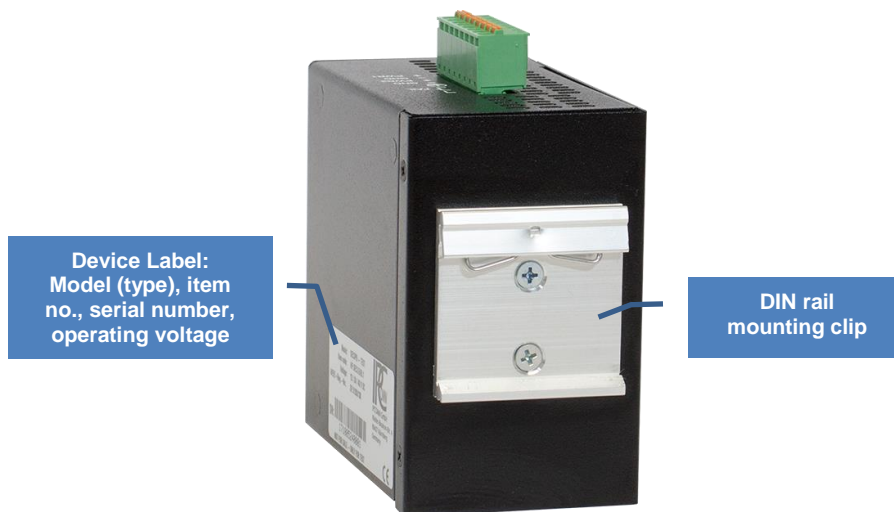


Figure 6: SEC3IO rear view

## 2.4 Hardware Components

### 2.4.1 Mainboard

The utilized mainboard is an ultra-compact ARM platform with two integrated network interfaces and two serial interfaces. The heart of the system is powered by a passively cooled ARM processor with 1 GHz, 256 MB system memory, and 512 MB flash memory.

Detailed information on each model (variant) can be found in chapter 4 "Technical data sheet".

### 2.4.2 RS-232/RS-422/RS-485 Interfaces

COM 1 & 2 can be configured as a RS-232/RS-422/RS-485 interface by the software.

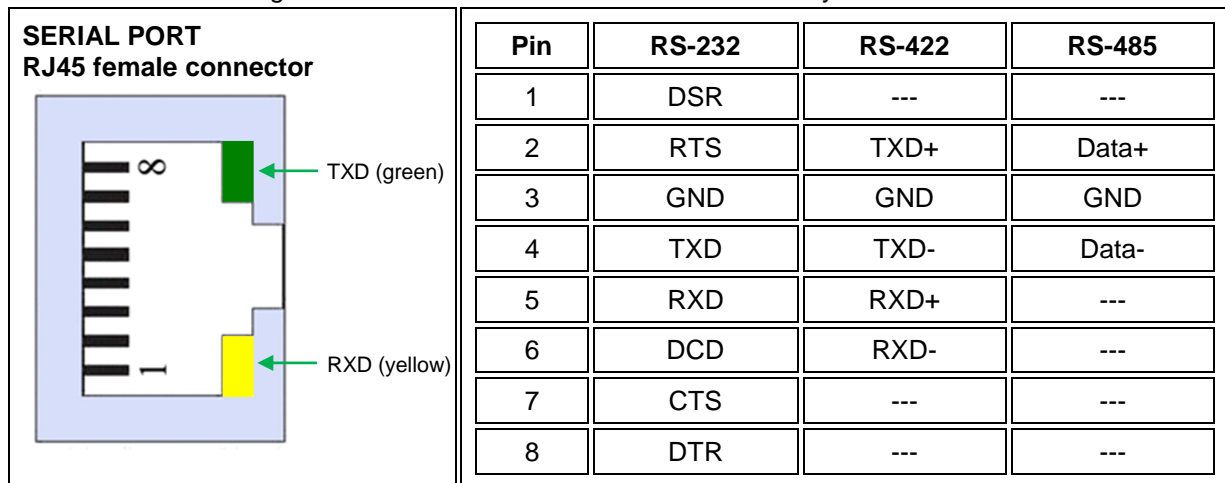


Figure 7: Pin assignment RS-232/RS-422/RS-485

LEDs to display transmission and reception of data on the COM interfaces are located directly on the RJ45 socket. An "RJ45 - DB9 male" adapter cable is available as an option.

### 2.4.3 Network Interfaces

The embedded controller is equipped with two 10/100 Mbps BaseT (RJ45) interfaces.

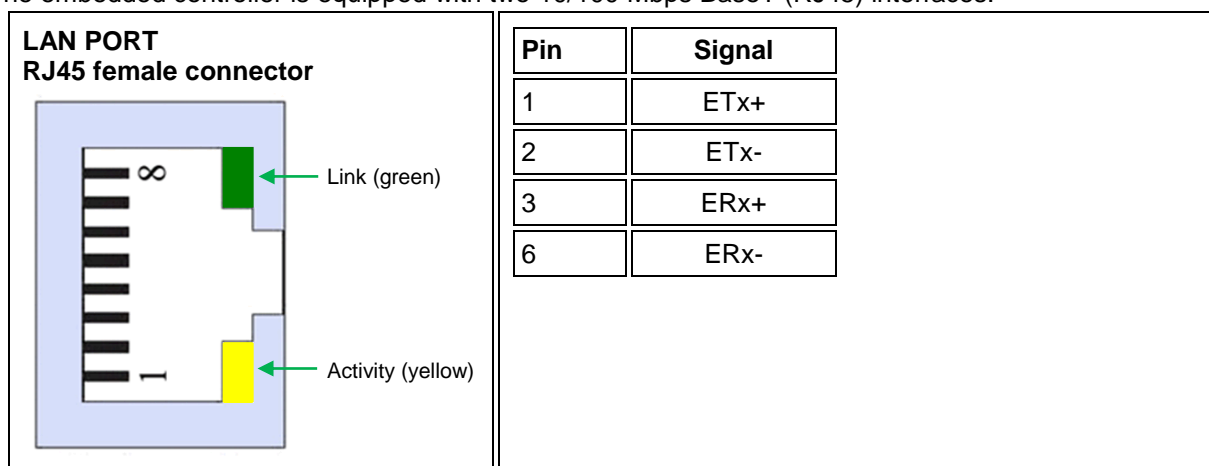


Figure 8: Pin assignment LAN

LEDs to display the link status and the activity of the Ethernet interfaces are located directly on the RJ45 socket.



## 2.4.4 PROFIBUS

The SEC3PB embedded controller offers a purely passive PROFIBUS DP interface. The injection of data into the PROFIBUS is physically prevented.

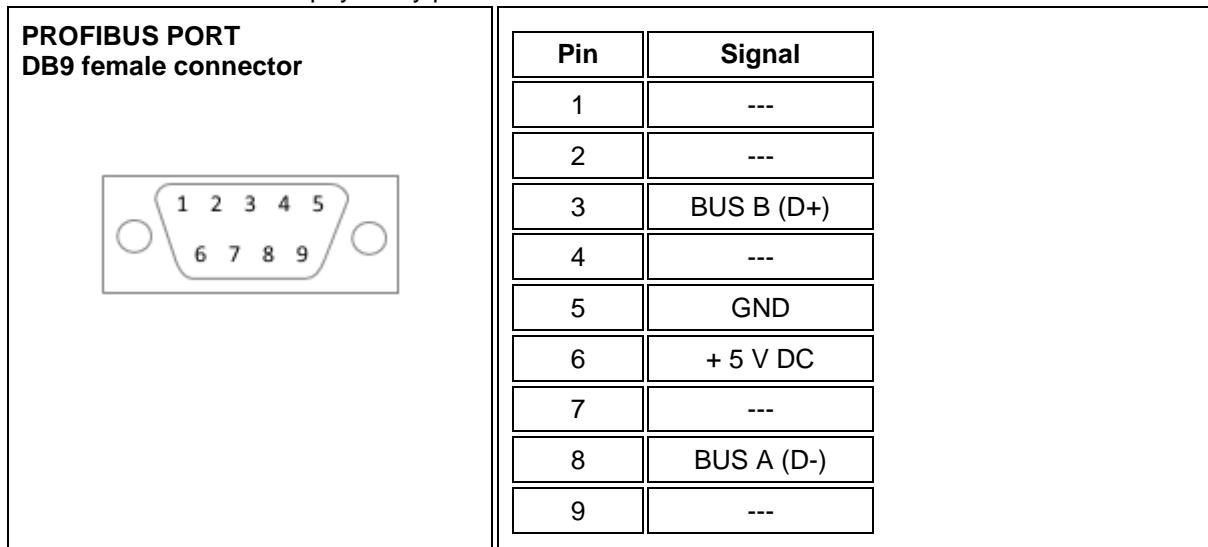


Figure 9: Pin assignment PROFIBUS

An optional terminating network (bias network) avoids undefined bus levels caused by inactive line drivers.

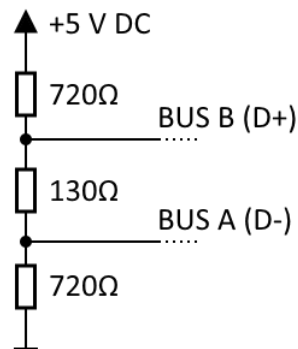


Figure 10: PROFIBUS termination

## 2.4.5 I/O Interfaces

The SEC3IO embedded controller features eight digital inputs and eight digital outputs. The digital inputs are equipped with overvoltage protection.


Digital input 9-pin multipoint connector																					
	<table border="1"> <thead> <tr> <th>Pin</th> <th>Signal</th> </tr> </thead> <tbody> <tr><td>1</td><td>GND</td></tr> <tr><td>2</td><td>DI 1</td></tr> <tr><td>3</td><td>DI 2</td></tr> <tr><td>4</td><td>DI 3</td></tr> <tr><td>5</td><td>DI 4</td></tr> <tr><td>6</td><td>DI 5</td></tr> <tr><td>7</td><td>DI 6</td></tr> <tr><td>8</td><td>DI 7</td></tr> <tr><td>9</td><td>DI 8</td></tr> </tbody> </table>	Pin	Signal	1	GND	2	DI 1	3	DI 2	4	DI 3	5	DI 4	6	DI 5	7	DI 6	8	DI 7	9	DI 8
Pin	Signal																				
1	GND																				
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3	DI 2																				
4	DI 3																				
5	DI 4																				
6	DI 5																				
7	DI 6																				
8	DI 7																				
9	DI 8																				

Figure 11: Pin assignment digital inputs

The digital outputs are also equipped with overvoltage protection and an additional overcurrent protection. In case of a fault, the respective digital output switches to a high-impedance state. This safety-shutdown of a digital output can be reset by setting the specific output to “low” (pin 10 - GND) via the software.

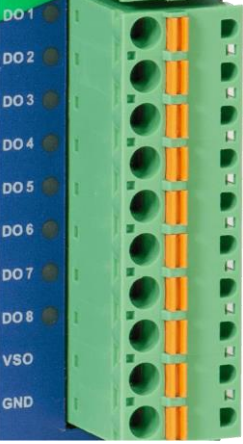
Digital output 10-pin multipoint connector																							
	<table border="1"> <thead> <tr> <th>Pin</th> <th>Signal</th> </tr> </thead> <tbody> <tr><td>1</td><td>DO 1</td></tr> <tr><td>2</td><td>DO 2</td></tr> <tr><td>3</td><td>DO 3</td></tr> <tr><td>4</td><td>DO 4</td></tr> <tr><td>5</td><td>DO 5</td></tr> <tr><td>6</td><td>DO 6</td></tr> <tr><td>7</td><td>DO 7</td></tr> <tr><td>8</td><td>DO 8</td></tr> <tr><td>9</td><td>VSO</td></tr> <tr><td>10</td><td>GND</td></tr> </tbody> </table>	Pin	Signal	1	DO 1	2	DO 2	3	DO 3	4	DO 4	5	DO 5	6	DO 6	7	DO 7	8	DO 8	9	VSO	10	GND
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6	DO 6																						
7	DO 7																						
8	DO 8																						
9	VSO																						
10	GND																						

Figure 12: Pin assignment digital outputs

## 2.4.6 Flash (Mass Storage)

An SLC NAND flash is used for mass storage, on which the operating system, the gateway software, and all configuration data is stored. The major advantage over a hard disk drive is the elimination of moving parts, which significantly increases the reliability.

## 2.4.7 Lithium Battery

When the system is powered off its real-time clock is buffered by a battery. The durable lithium battery generally offers a lifespan of more than 5 years.

The default settings are designed in a way that the gateway can operate without errors even after a battery failure. After replacing the battery, the date and time must be re-synchronized (NTP). When the gateway is time synchronized, the current time and date information is available to the system without a battery as well.

Only a qualified electronics technician should perform the battery replacement. However, there is the possibility to instruct IPCOMM GmbH with this task. Incorrect replacement might yield the danger of explosion. Replace the battery exclusively with the same type (3 V DC, CR2032). Used batteries are to be disposed in accordance with the manufacturer's instructions. Contact IPCOMM GmbH to order a low priced spare battery.

**CAUTION:** The device must be de-energized. The change of a battery requires ESD safety measures to avoid charge transfer to the circuit board and system components. Please perform the exchange only on an earthed and conductive surface when using an antistatic wrist strap!

### Battery replacement:

1. Disconnect the embedded controller from mains; disconnect data lines.
2. Remove the device from DIN-rail.
3. Unscrew and lift the housing cover by loosening the corresponding four screws. It is recommended to use a screwdriver of size PH1.
4. Pull the old battery out of the battery holder.
5. When inserting the new battery, make sure the polarity is correct (see polarity marking on the battery socket).
6. The embedded controller can be put back into operation after the correct installation.

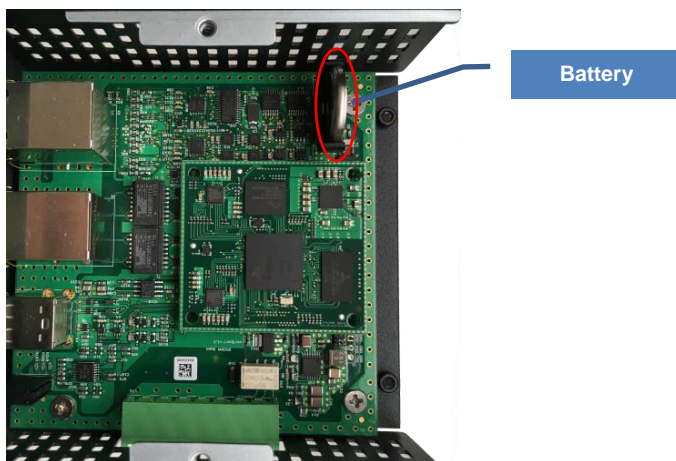


Figure 13: Battery

**Caution: When replacing the battery, pay attention to the polarity of the battery!**

## 2.4.8 Power Supply

To ensure power supply, cables with a minimum cross-section of 0.5 mm<sup>2</sup> must be used.

The SEC3x is equipped with a redundant feed-in for the operating voltage.

- The power supply is 12, 24 or 48 V DC (9 - 60 V DC).
- Different input voltages can be used for the redundant supplies.
- The device can also be operated without redundant power supply.
- Input voltage in reverse polarity is not operational.

Please pay attention to the polarity and the limit of the maximum input voltage.

Pin assignment power supply connection:

Pin	1	2	3	4	5	6	7	8
Function	+	-	+	-	PE	Relay: opener		
							Relay: closer	

There are two voltage inputs for redundant feed-in.  
 Voltage input 1 ( $U_{PWR1}$ ): Pin 1 & 2  
 Voltage input 2 ( $U_{PWR2}$ ): Pin 3 & 4



Figure 14: Power supply connection

Each unit comes with a power supply plug. This plug must be used.

## 2.4.9 State Relay „FAIL“

The state relay has two switch positions (changeover switch) and can be freely configured and controlled by the software. In the event of a power failure or as soon as a configured condition is no longer met, the relay will fall into the idle state "FAIL" (break contact).

For example, all configured connections (or specific ones only) can be monitored and reported combined without any protocol. The system could also be used to monitor failures of one of the two redundant power sources. The triggering of a traffic light or a horn as an alarm is also conceivable.

### 3 Diagnostic LEDs

Each SEC3x version has the LEDs CPU, USR, and PWR with the same function.



Figure 15: CPU, USR, and PWR display

If the PWR LED is lit, the module is supplied with voltage.

The USR LED is freely configurable. An imaginable function would be to display a particular connection status (or more than one as an overall status).

#### 3.1 CPU

The CPU LED visualizes the status of the operating system and the converter software. The following figure shows the possible operating states:

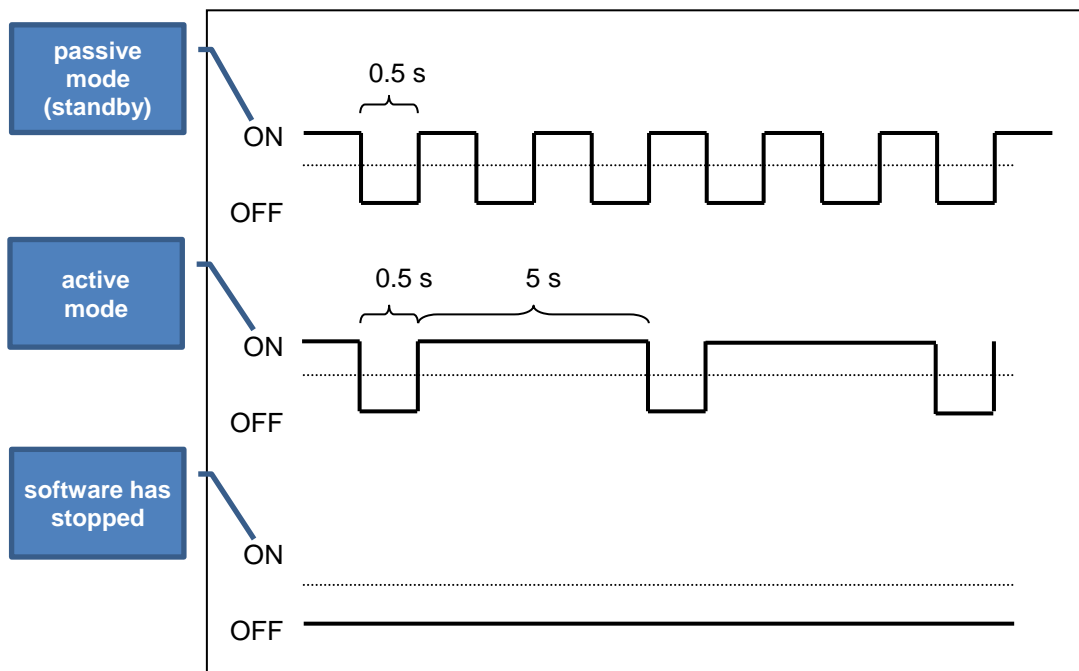


Figure 16: CPU LED display

## 3.2 PROFIBUS



Figure 17: PROFIBUS LEDs

The RX LED indicates the incoming PROFIBUS data flow.

If the PWR LED is lit, the PROFIBUS module and the DB9 connector (for optional termination) are supplied with voltage.

If the OP LED (operation) lights up, the PROFIBUS interface has been opened for reading by the software.

## 3.3 DIGITAL INPUT/OUTPUT

### 3.3.1 Digital Inputs

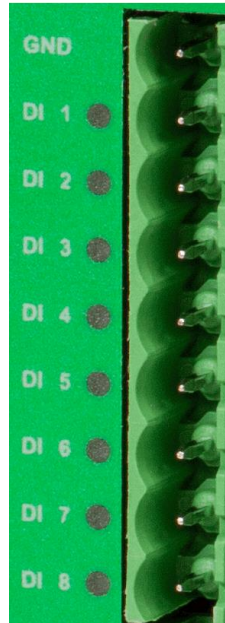


Figure 18: LEDs for digital inputs

When the input level "high" is reached, the diagnostic LEDs DI 1 to DI 8 light up green.

### 3.3.2 Digital Outputs

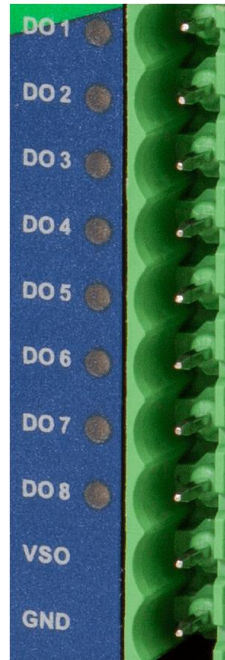


Figure 19: LEDs for digital outputs

If a digital output is activated ( $U_{VSO}$  switched to output), this is indicated by the green diagnostic LED DO 1 to DO 8. In case of a fault, the respective digital output changes to a high-impedance state and the LED turns red.

## 4 Technical Data

### 4.1.1 SEC3 / SEC3-SA

#### Processor / Memory / Mass Storage

CPU	ARM Cortex-A8 1 GHz
RAM	256 MB DDR3L
Flash	512 MB SLC NAND

#### Power Supply

Voltage	$U_{PWR1/2}$ : 12 / 24 / 48 V DC (9 – 60 V DC)
Power consumption	Max. 10 W (typ. 4 W without USB)
Line cross-section	0.129 – 3.31 mm <sup>2</sup> (AWG 26...12, solid or stranded wire)
Features	Redundant power supply with fault contact

#### Interfaces

Ethernet interface	2x RJ45 10/100BASE-T
Serial interface	2x RJ45 RS232 / RS422 / RS485 Baud Rate: 300 – 115200 Baud
USB interface	2 x USB 2.0 up to 480 Mbps "high speed"

#### Diagnostics (Status LEDs)

PWR	Power LED
USR	LED freely configurable by software
CPU	LED to show different software conditions
COM1 / COM2	Send and receive LED for serial interfaces
ETH0 / ETH1	Link and activity LED for Ethernet interfaces

#### Additional Functions and Features

Battery buffered real time clock	Supported by a lithium battery (CR2032)
State relay "FAIL"	Changeover switch controlled by software
Hardware watchdog	
Temperature monitoring	
Power supply monitoring	
Overvoltage protection	The power supply and all interfaces are ESD, surge, and burst protected (see EMC)



## Operating Environment

Operating temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5% to 95% non-condensing

## Housing

Body material	Steel chassis
Mounting	35 mm DIN-Rail
International Protection	IP30
Rotating parts	None
Dimensions (W x H x D)	approx. 50 mm x 124 mm x 122 mm
Weight	approx. 0.4 kg

## Approval, Standards, and Conformity

Approval	CE (Industrial)
Standards	EN 61000-6-2: 2005 EN 61000-6-3: 2007+ A1:2011 EN 61850-3: 2014 <sup>1)</sup> (SEC3-SA only)
Conformity	RoHS REACH WEEE

## Electromagnetic Compatibility (EMC) – Emission Requirements

EN 55016-2-1:2014	Conducted emission on power supply lines in the frequency range 150 kHz - 30 MHz
EN 55016-2-1:2014	Conducted emission on telecommunication lines in the frequency range 150 kHz - 30 MHz
EN 55016-2-3:2010 + A1:2010 + AC:2013 + A2:2014	Radiated emission in the frequency range 30 MHz - 1 GHz
EN 55016-2-3:2010 + A1:2010 + AC:2013 + A2:2014	Radiated emission in the frequency range 1 GHz – 6 GHz

## Electromagnetic Compatibility (EMC) – Immunity Requirements

EN 61000-4-2: 2009	Electrostatic discharge (ESD) - Contact discharge $\pm 6$ kV - Air discharge $\pm 8$ kV
EN 61000-4-3: 2006 + A1:2008 + A2:2010	Immunity to RF electromagnetic fields in the frequency range 80 – 3000 MHz, Test level 10 V/m
EN 61000-4-4: 2012	Immunity to fast transients (Burst) - DC power port $\pm 2$ kV - Signal lines $\pm 2$ kV
EN 61000-4-5: 2014	Immunity to surges on power supply lines (Surge) - DC power port: line $\leftrightarrow$ ground $\pm 1.2$ kV - DC power port: line $\leftrightarrow$ line $\pm 1$ kV
EN 61000-4-5: 2014	Immunity to surges on shielded signal lines (Surge) - Shielded lines $\pm 1$ kV
EN 61000-4-6: 2014	Immunity to conducted interference induced by radio-frequency fields in the frequency range 150 kHz – 80 MHz, Test level 10 V
EN 61000-4-12: 1995 + A1:2001	Immunity to ring wave - Frequency 100 kHz / 1MHz - Power port DC $\pm 1.25$ kV line to line - Data lines $\pm 2.5$ kV line to ground
EN 61000-4-16: 1998 + A:2004 + A2:2011	Immunity to conducted interference induced by low-frequency fields - Short (1s)                    16 $\frac{2}{3}$ Hz / 50 Hz / 60 Hz – 100 V - Continuous                    16 $\frac{2}{3}$ Hz / 50 Hz / 60 Hz – 10 V - 15 Hz – 150 Hz:            10 to 1 V - 150 Hz – 1.5 kHz:        1 V - 1.5 kHz – 15 kHz:        1 to 10 V - 15 kHz – 150 kHz:        10 V
EN 61000-4-17: 1999 + A2:2009	Immunity to ripple on DC input power port - DC 10% Un
EN 61000-4-18: 2007 + A1:2010	Immunity to damped oscillatory waves - Frequency 100 kHz / Repetition rate 40 s - Frequency 1 MHz / Repetition rate 400 s - Power port DC DC $\pm 1.25$ kV line to line DC $\pm 2.5$ kV line to ground - Data lines $\pm 2.5$ kV line to ground
EN 61000-4-29: 2000 <sup>1)</sup>	Immunity to voltage dips and interruptions on DC input power port - 0 % Un on PWR1 – 0.05 s

## SEC3-SA; IEC 61850-3; EN 61850-3: 2014

The SEC3-SA hardware model meets the special requirements for electromagnetic compatibility and power supply described in Part 3 of the IEC 61850 standard.

<sup>1)</sup> Only with the hardware model SEC3-SA.

## 4.1.2 SEC3PB

### Processor / Memory / Mass Storage

CPU	ARM Cortex-A8 1 GHz
RAM	256 MB DDR3L
Flash	512 MB SLC NAND

### Power Supply

Voltage	$U_{PWR1/2}$ : 12 / 24 / 48 V DC (9 – 60 V DC)
Power consumption	Max. 10 W (typ. 4 W without USB)
Line cross-section	0.129 – 3.31 mm <sup>2</sup> (AWG 26...12, solid or stranded wire)
Features	Redundant power supply with fault contact

### Interfaces

Ethernet interface	2x RJ45 10/100BASE-T
Serial interface	2x RJ45 RS232 / RS422 / RS485 Baud Rate: 300 – 115200 Baud
PROFIBUS interface	1x PROFIBUS interface DB9 female (DPV0, RS485 9600 to 12M Baud, passive)
USB interface	1 x USB 2.0 up to 480 Mbps "high speed"

### Diagnostics (Status LEDs)

PWR	Power LED
USR	LED freely configurable by software
CPU	LED to show different software conditions
COM1 / COM2	Send and receive LED for serial interfaces
ETH0 / ETH1	Link and activity LED for Ethernet interfaces
PROFIBUS RX	Receive LED
PROFIBUS PWR	Power LED for PROFIBUS interface
PROFIBUS OP	Operation LED

## Additional Functions and Features

Battery buffered real time clock	Supported by a lithium battery (CR2032)
State relay "FAIL"	Changeover switch controlled by software
Hardware watchdog	
Temperature monitoring	
Power supply monitoring	
Overvoltage protection	The power supply and all interfaces are ESD, surge, and burst protected (see EMC)

## Housing

Body material	Steel chassis
Mounting	35 mm DIN-Rail
International Protection	IP30
Rotating parts	None
Dimensions (W x H x D)	approx. 65 mm x 124 mm x 129 mm
Weight	approx. 0.6 kg

## Operating Environment

Operating temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5% to 95% non-condensing

## Approval, Standards, and Conformity

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EN 55016-2-3:2010 + A1:2010 + AC:2013 + A2:2014	Radiated emission in the frequency range 1 GHz – 6 GHz

## Electromagnetic Compatibility (EMC) – Immunity Requirements

EN 61000-4-2: 2009	Electrostatic discharge (ESD) <ul style="list-style-type: none"><li>- Contact discharge <math>\pm 6</math> kV</li><li>- Air discharge <math>\pm 8</math> kV</li></ul>
EN 61000-4-3: 2006 + A1:2008 + A2:2010	Immunity to RF electromagnetic fields in the frequency range 80 – 2700 MHz, Test level 10 V/m
EN 61000-4-4: 2012	Immunity to fast transients (Burst) <ul style="list-style-type: none"><li>- DC power port <math>\pm 4</math> kV</li><li>- Signal lines <math>\pm 2</math> kV</li></ul>
EN 61000-4-5: 2014	Immunity to surges on power supply lines (Surge) <ul style="list-style-type: none"><li>- DC power port: line <math>\leftrightarrow</math> ground <math>\pm 2</math> kV</li><li>- DC power port: line <math>\leftrightarrow</math> line <math>\pm 2</math> kV</li></ul>
EN 61000-4-5: 2014	Immunity to surges on shielded signal lines (Surge) <ul style="list-style-type: none"><li>- Shielded lines <math>\pm 2</math> kV</li></ul>
EN 61000-4-6: 2014	Immunity to conducted interference induced by radio-frequency fields in the frequency range 150 kHz – 80 MHz, Test level 10 V

### 4.1.3 SEC3IO / SEC3IO-SA

#### Processor / Memory / Mass Storage

CPU	ARM Cortex-A8 1 GHz
RAM	256 MB DDR3L
Flash	512 MB SLC NAND

#### Power Supply

Voltage	$U_{PWR1/2}$ : 12 / 24 / 48 V DC (9 – 60 V DC)
Power consumption	Max. 10 W (typ. 4 W without USB)
Line cross-section	0.129 – 3.31 mm <sup>2</sup> (AWG 26...12, solid or stranded wire)
Features	Redundant power supply with fault contact

#### Interfaces

Ethernet interface	2x RJ45 10/100BASE-T
Serial interface	2x RJ45 RS232 / RS422 / RS485 Baud Rate: 300 – 115200 Baud
USB interface	2 x USB 2.0 up to 480 Mbps "high speed"
Digital input	8x Digital input Input voltage: 0 – 24 V DC ( $U_{DI1-8\_max}$ : 30 V DC) Input level low: $\leq 2.96$ V DC $\pm 1\%$ Input level high: $\geq 3.49$ V DC $\pm 1\%$ Input impedance: 1.28 M $\Omega$ $\pm 2\%$ Sampling rate: max. 500 Hz $\pm 5\%$  Line cross-section: 0.129 – 3.31 mm <sup>2</sup> (AWG 26...12, solid or stranded wire)
Digital output	8x Digital output (MOSFET P-Channel high side) Input voltage $V_{SO}$ : 9 – 24 V DC - $U_{VSO\_max}$ : 30 V DC - $I_{VSO\_max}$ : 4 A Output voltage: $U_{DO1-8} = V_{SO} - \{0.4 \text{ V @ } 0 \text{ A} .. 1 \text{ V @ } 0.5 \text{ A}\}$ Max. output current: 500 mA Max. switching frequency: $t_{impulse} \leq 2$ kHz $\pm 25\%$ Overcurrent protection - switchover to high-impedance state in the event of a fault: - if 500 mA limit is exceeded - when switching on load $\geq 350$ mA - switch-off time in case of error: 65 $\mu$ s $\pm 5\%$ (with 22 $\Omega$ and $U_{VSO} = 24$ V DC) - deactivation switch-off of outputs can be reset by software  Line cross-section: 0.129 – 3.31 mm <sup>2</sup> (AWG 26...12, solid or stranded wire)

## Diagnostics (Status LEDs)

PWR	Power LED
USR	LED freely configurable by software
CPU	LED to show different software conditions
COM1 / COM2	Send and receive LED for serial interfaces
ETH0 / ETH1	Link and activity LED for Ethernet interfaces
DI 1 – 8	Status LED for digital input <i>(green if high level)</i>
DO 1 – 8	Status LED for digital output <i>(green if output active; red if output deactivated due to error)</i>

## Additional Functions and Features

Battery buffered real time clock	Supported by a lithium battery (CR2032)
State relay "FAIL"	Changeover switch controlled by software
Hardware watchdog	
Temperature monitoring	
Power supply monitoring	
Overvoltage protection	The power supply and all interfaces are ESD, surge, and burst protected (see EMC)

## Housing

Body material	Steel chassis
Mounting	35 mm DIN-Rail
International Protection	IP30
Rotating parts	None
Dimensions (W x H x D)	approx. 65 mm x 124 mm x 139 mm
Weight	approx. 0.65 kg

## Operating Environment

Operating temperature	-20 °C to 60 °C
Storage temperature	-40 °C to 85 °C
Relative humidity	5% to 95% non-condensing

## Approval, Standards, and Conformity

Approval	CE (Industrial)
Standards	EN 61000-6-2: 2005 EN 61000-6-3: 2007+ A1:2011 EN 61850-3: 2014 <sup>1)</sup> (SEC3IO-SA only)
Conformity	RoHS REACH WEEE

## Electromagnetic Compatibility (EMC) – Emission Requirements

EN 55016-2-1:2014	Conducted emission on power supply lines in the frequency range 150 kHz - 30 MHz
EN 55016-2-1:2014	Conducted emission on telecommunication lines in the frequency range 150 kHz - 30 MHz
EN 55016-2-3:2010 + A1:2010 + AC:2013 + A2:2014	Radiated emission in the frequency range 30 MHz - 1 GHz
EN 55016-2-3:2010 + A1:2010 + AC:2013 + A2:2014	Radiated emission in the frequency range 1 GHz – 6 GHz



## Electromagnetic Compatibility (EMC) – Immunity Requirements

EN 61000-4-2: 2009	Electrostatic discharge (ESD) - Contact discharge $\pm 6$ kV - Air discharge $\pm 8$ kV
EN 61000-4-3: 2006 + A1:2008 + A2:2010	Immunity to RF electromagnetic fields in the frequency range 80 – 3000 MHz, Test level 10 V/m
EN 61000-4-4: 2012	Immunity to fast transients (Burst) - DC power port $\pm 2$ kV - Signal lines $\pm 2$ kV
EN 61000-4-5: 2014	Immunity to surges on power supply lines (Surge) - DC power port: line $\leftrightarrow$ ground $\pm 1.2$ kV - DC power port: line $\leftrightarrow$ line $\pm 1$ kV
EN 61000-4-5: 2014	Immunity to surges on shielded signal lines (Surge) - Shielded lines $\pm 1$ kV
EN 61000-4-5: 2014	Immunity to surges on unshielded signal lines (Surge) - Unshielded lines $\pm 1$ kV
EN 61000-4-6: 2014	Immunity to conducted interference induced by radio-frequency fields in the frequency range 150 kHz – 80 MHz, Test level 10 V
EN 61000-4-12: 1995 + A1:2001	Immunity to ring wave - Frequency 100 kHz / 1MHz - Power port DC $\pm 1.25$ kV line to line - Data lines $\pm 2.5$ kV line to ground
EN 61000-4-16: 1998 + A:2004 + A2:2011	Immunity to conducted interference induced by low-frequency fields - Short (1s)                    16 $\frac{2}{3}$ Hz / 50 Hz / 60 Hz – 100 V - Continuous                    16 $\frac{2}{3}$ Hz / 50 Hz / 60 Hz – 10 V - 15 Hz – 150 Hz:            10 to 1 V - 150 Hz – 1.5 kHz:        1 V - 1.5 kHz – 15 kHz:        1 to 10 V - 15 kHz – 150 kHz:        10 V
EN 61000-4-17: 1999 + A2:2009	Immunity to Ripple on DC input power port - DC 10% Un
EN 61000-4-18: 2007 + A1:2010	Immunity to damped oscillatory waves - Frequency 100 kHz / Repetition rate 40 s - Frequency 1 MHz / Repetition rate 400 s - Power port DC $\pm 1.25$ kV line to line DC $\pm 2.5$ kV line to ground - Data lines $\pm 2.5$ kV line to ground
EN 61000-4-29: 2000 <sup>1)</sup>	Immunity to voltage dips and interruptions on DC input power port - 0 % Un on PWR1 – 0.05 s

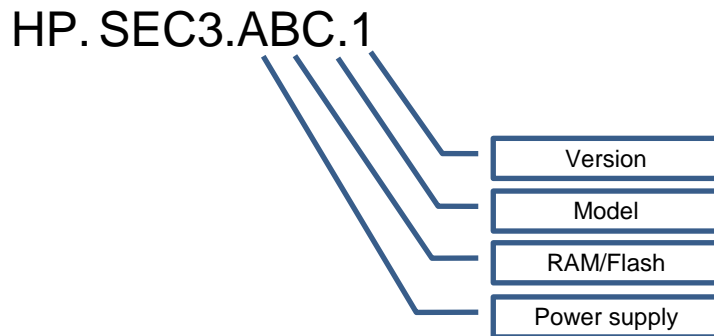
## SEC3IO-SA; IEC 61850-3; EN 61850-3: 2014

The SEC3IO-SA hardware model meets the special requirements for electromagnetic compatibility and power supply described in Part 3 of the IEC 61850 standard.

<sup>1)</sup> Only with the hardware model SEC3IO-SA.

## 5 Nomenclature of SEC3x Item Code

The SEC3x item code provides information about the gateway configuration.



### Power supply

Value	Description
E	9 – 60 V DC

### RAM/Flash

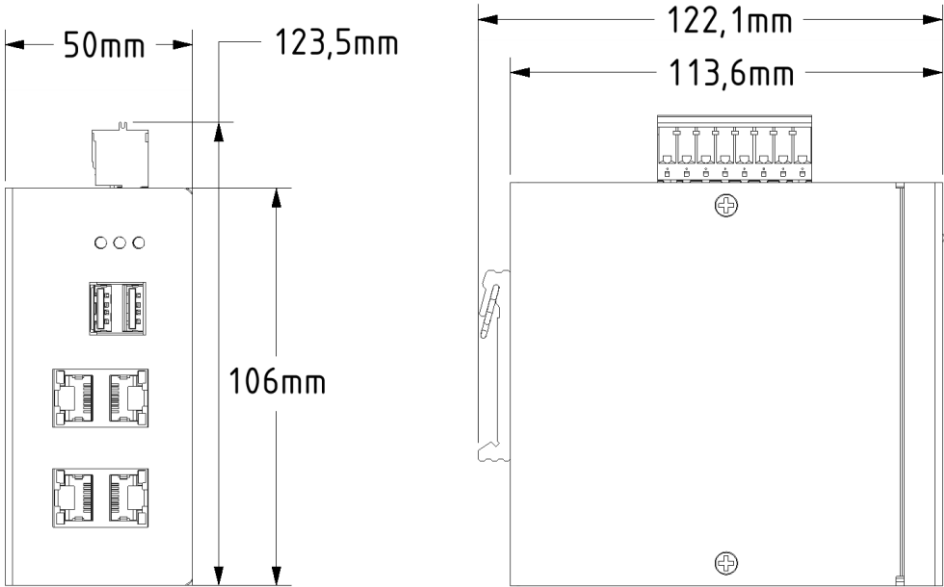
Value	Description
A	256 MB / 512 MB Flash

### Model

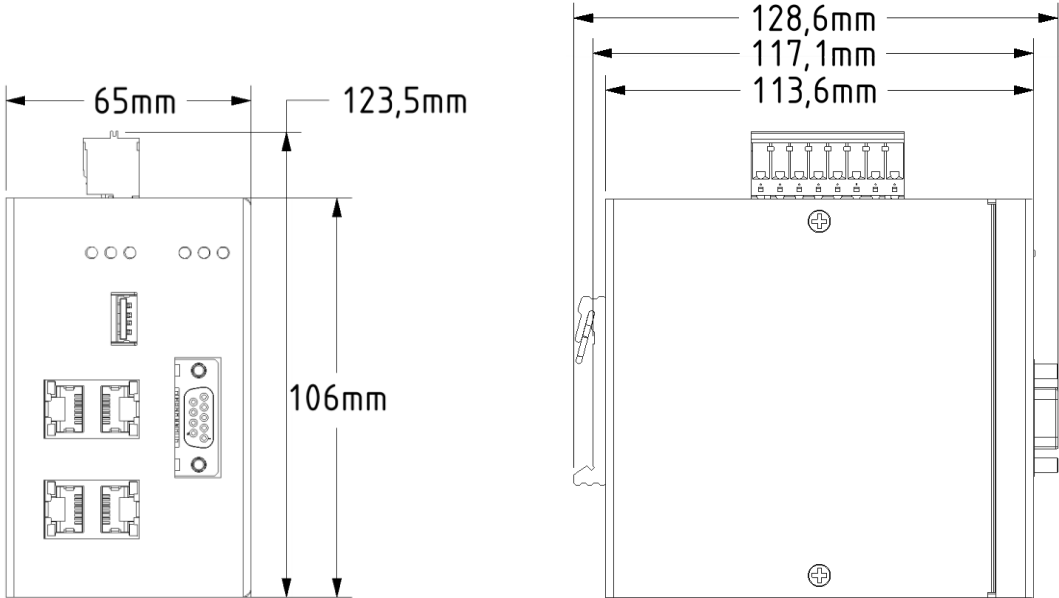
Value	Description
A	SEC3 - The base model
B	SEC3PB - The PROFIBUS Sniffer
C	SEC3IO - The I/O Controller
D	SEC3-SA - The base model (IEC 61850-3)
E	SEC3IO-SA - The I/O Controller (IEC 61850-3)

# 6 SEC3x Dimensions

## 6.1.1 SEC3



## 6.1.2 SEC3PB



### 6.1.3 SEC3IO

