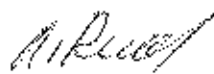


# ПРИЛОЖЕНИЕ №9



## SIEMENS SIPROTEC 5 ТЕХНИЧЕСКИ ДАНИИ





## SIPROTEC 5 Hardware

Technical Data

Extract from manual C53000-G5040-C002-B, chapter 6

Energy Automation

SIEMENS

*A. Reilly*



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**NOTE**

For your own safety, observe the warnings and safety instructions contained in this document, if available.

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Version of the product described: V7.30 and higher

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# Preface



## Purpose of the Manual

This manual describes the hardware of the SIPROTEC 5 device family and provides general information on the product structure, the modules and technical data.

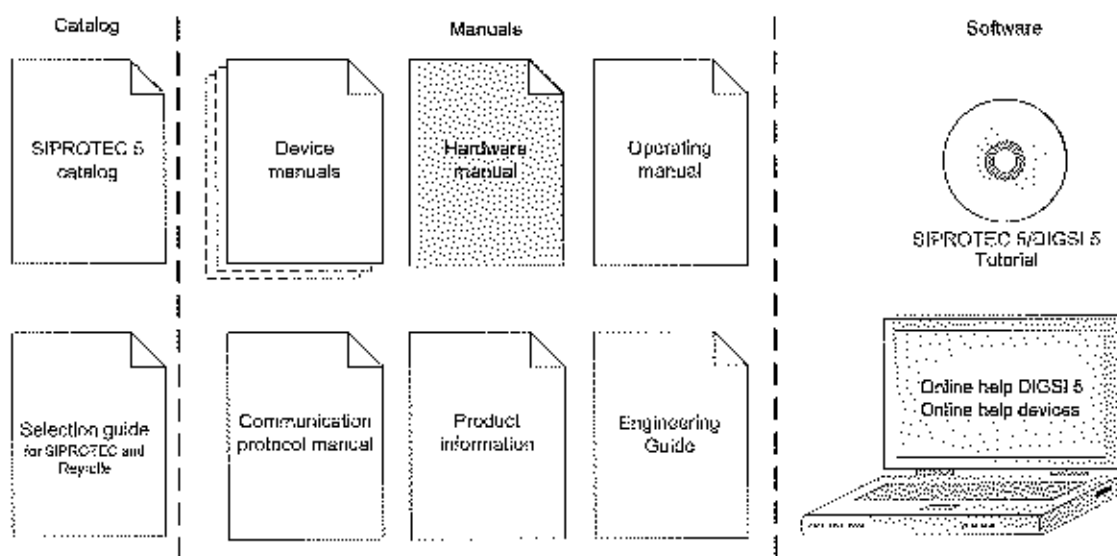
## Target Audience

Protection system engineers, commissioning engineers, persons entrusted with the setting, testing and maintenance of automation, selective protection and control equipment, and operational crew in electrical installations and power plants.

## Scope

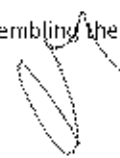
This manual applies to the SIPROTEC 5 device family.

## Further Documentation



[Illustration 221012-01.01, 5. ed. LS]

- **Device manuals**  
Each Device manual describes the functions and applications of a specific SIPROTEC 5 device. The printed manual and the online help for the device have the same informational structure.
- **Hardware manual**  
The Hardware manual describes the hardware building blocks and device combinations of the SIPROTEC 5 device family.
- **Operating manual**  
The Operating manual describes the basic principles and procedures for operating and assembling the devices of the SIPROTEC 5 range.



- **Communication protocol manual**  
The Communication protocol manual contains a description of the protocols for communication within the SIPROTEC 5 device family and to higher-level network control centers.
- **Product information**  
The Product information includes general information about device installation, technical data, limiting values for input and output modules, and conditions when preparing for operation. This document is provided with each SIPROTEC 5 device.
- **Engineering Guide**  
The Engineering Guide describes the essential steps when engineering with DIGSI 5. In addition, the Engineering Guide shows you how to load a planned configuration to a SIPROTEC 5 device and update the functionality of the SIPROTEC 5 device.
- **DIGSI 5 online help**  
The DIGSI 5 online help contains a help package for DIGSI 5 and CFC.  
The help package for DIGSI 5 includes a description of the basic operation of software, the DIGSI principles and editors. The help package for CFC includes an introduction to CFC programming, basic examples of working with CFC, and a reference chapter with all the CFC blocks available for the SIPROTEC 5 range.
- **SIPROTEC 5/DIGSI 5 Tutorial**  
The tutorial on the DVD contains brief information about important product features, more detailed information about the individual technical areas, as well as operating sequences with tasks based on practical operation and a brief explanation.
- **SIPROTEC 5 catalog**  
The SIPROTEC 5 catalog describes the system features and the devices of SIPROTEC 5.
- **Selection guide for SIPROTEC and Reyrolle**  
The selection guide offers an overview of the device series of the Siemens protection devices, and a device selection table.

**Indication of Conformity**



This product complies with the directive of the Council of the European Communities on harmonization of the laws of the Member States relating to electromagnetic compatibility (EMC Directive 2014/30/EU) and concerning electrical equipment for use within specified voltage limits (Low Voltage Directive 2014/35/EU).  
This conformity has been proved by tests performed according to the Council Directive in accordance with the product standard EN 60255-26 (for EMC directive) and with the product standard EN 60255-27 (for Low Voltage Directive) by Siemens AG.  
The device is designed and manufactured for application in an industrial environment.  
The product conforms with the international standards of IEC 60255 and the German standard VDE 0435.

**Other Standards**

IEEE Std C 37.90  
The technical data of the product is approved in accordance with UL.  
For more information about the UL database, see [certified.ul.com](http://certified.ul.com)  
Select **Online Certifications Directory** and enter **E194016** as **UL File Number**.



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Siemens AG



**Additional Support**

For questions about the system, please contact your Siemens sales partner.

**Support**

Our Customer Support Center provides a 24-hour service.

Phone: +49 (180) 524-7000  
 Fax: +49 (180) 524-2471  
 E-Mail: [support.energy@siemens.com](mailto:support.energy@siemens.com)

**Training Courses**

Inquiries regarding individual training courses should be addressed to our Training Center:

Siemens AG  
 Siemens Power Academy TD

Humboldtstraße 59  
 90459 Nürnberg  
 Germany

Phone: +49 (911) 433-7415  
 Fax: +49 (911) 433-7929  
 E-Mail: [poweracademy@siemens.com](mailto:poweracademy@siemens.com)  
 Internet: [www.siemens.com/poweracademy](http://www.siemens.com/poweracademy)

**Notes on Safety**

This document is not a complete index of all safety measures required for operation of the equipment (module or device). However, it comprises important information that must be followed for personal safety, as well as to avoid material damage. Information is highlighted and illustrated as follows according to the degree of danger:

**DANGER**

**DANGER** means that death or severe injury will result if the measures specified are not taken.

- ❖ Comply with all instructions, in order to avoid death or severe injuries.

**WARNING**

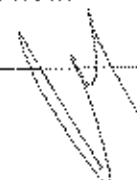
**WARNING** means that death or severe injury may result if the measures specified are not taken.

- ❖ Comply with all instructions, in order to avoid death or severe injuries.

**CAUTION**

**CAUTION** means that medium-severe or slight injuries can occur if the specified measures are not taken.

- ❖ Comply with all instructions, in order to avoid moderate or minor injuries.



## NOTICE

NOTICE means that property damage can result if the measures specified are not taken.

- ◆ Comply with all instructions, in order to avoid property damage.



## NOTE

Important information about the product, product handling or a certain section of the documentation which must be given particular attention.

### Qualified Electrical Engineering Personnel

Only qualified electrical engineering personnel may commission and operate the equipment (module, device) described in this document. Qualified electrical engineering personnel in the sense of this manual are people who can demonstrate technical qualifications as electrical technicians. These persons may commission, isolate, ground and label devices, systems and circuits according to the standards of safety engineering.

### Proper Use

The equipment (device, module) may be used only for such applications as set out in the catalogs and the technical description, and only in combination with third-party equipment recommended and approved by Siemens.

Problem-free and safe operation of the product depends on the following:

- Proper transport
- Proper storage, setup and installation
- Proper operation and maintenance

When electrical equipment is operated, hazardous voltages are inevitably present in certain parts. If proper action is not taken, death, severe injury or property damage can result:

- The equipment must be grounded at the grounding terminal before any connections are made.
- All circuit components connected to the power supply may be subject to dangerous voltage.
- Hazardous voltages may be present in equipment even after the supply voltage has been disconnected (capacitors can still be charged).
- Operation of equipment with exposed current-transformer circuits is prohibited. Before disconnecting the equipment, ensure that the current-transformer circuits are short-circuited.
- The limiting values stated in the document must not be exceeded. This must also be considered during testing and commissioning.



## Open Source Software

The product contains, among other things, Open Source Software developed by third parties. The Open Source Software used in the product and the license agreements concerning this software can be found in the `Readme_OSS`. These Open Source Software files are protected by copyright. Your compliance with those license conditions will entitle you to use the Open Source Software as foreseen in the relevant license. In the event of conflicts between Siemens license conditions and the Open Source Software license conditions, the Open Source Software conditions shall prevail with respect to the Open Source Software portions of the software. The Open Source Software is licensed royalty-free. Insofar as the applicable Open Source Software License Conditions provide for it you can order the source code of the Open Source Software from your Siemens sales contact - against payment of the shipping and handling charges - for a period of at least 3 years since purchase of the Product. We are liable for the Product including the Open Source Software contained in it pursuant to the license conditions applicable to the Product. Any liability for the Open Source Software beyond the program flow intended for the Product is explicitly excluded. Furthermore any liability for defects resulting from modifications to the Open Source Software by you or third parties is excluded. We do not provide any technical support for the Product if it has been modified.

When using DIGSI 5 in online mode, you are provided with the option to go to the main menu **Show Open source information** and read and display the `Readme_OSS` file containing the original license text and copyright information.

To do this, the following steps are necessary:

- Switch to online mode.
- Select the device.
- Select **online** in the menu bar.
- Click **Show Open source information**.



### NOTE

To read the `Readme_OSS` file, a PDF viewer must be installed on the computer. In order to operate SIPROTEC 5 devices, a valid DIGSI 5 license is required.







## 6 Technical Data

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## 6.1 Analog Inputs

### Current Inputs

All current, voltage, and power data are specified as RMS values.			
Rated frequency $f_{rated}$	50 Hz, 60 Hz 16.7 Hz (for rail protection devices only)		
Protection-class current transformers	Rated current $I_{rated}$	Measuring range of the modular devices	Measuring range of the non-modular devices
	5 A 1 A	0 A to 500 A 0 A to 100 A	0 A to 250 A 0 A to 50 A
Instrument transformers	5 A 1 A	0 A to 8 A 0 A to 1.6 A	0 A to 8 A 0 A to 1.6 A
	Power consumption per current circuit at rated current	Approx. 0.1 VA	
Thermal rating (protection and instrument transformers)	500 A for 1 s		
	150 A for 30 s		
	20 A continuously		
	25 A for 3 min		
	30 A for 2 min		
Dynamic load-carrying capacity	1250 A one half wave		

### Voltage Input

All current, voltage, and power data are specified as RMS values.		
Rated frequency $f_{rated}$	50 Hz, 60 Hz 16.7 Hz (for rail devices only)	
Input and output modules	IO202, IO208, IO211, IO214	IO215
Measuring range	0 V to 200 V	0 V to 7.07 V
Input impedance	< 0.1 VA	< 0.01 VA
Thermal rating	230 V continuously	20 V continuously

### Measuring-Transducer Inputs (via Module ANAI-CA-4EL)

Insulation class	SELV (Safety Extra Low Voltage) (according to IEC 60255-27)
Connector type	8-pin multiple contact strip
Differential current input channels	4
Measuring range	DC -24 mA to +24 mA
Fault	< 0.5 % of the measuring range
Input impedance	140 $\Omega$
Conversion principle	Delta-sigma (16 bit)
Permissible potential difference between channels	DC 20 V
Galvanic separation from ground/housing	DC 700 V
Permissible overload	DC 100 mA continuously
Measurement repetition	200 ms

### Measuring-Transducer Inputs (via Module ARC-CD-3FO)

Connector type	AVAGO AFBR-1526Z
Number of transceivers	3

Fiber type	Polymer Optical Fiber (POF) 1 mm
<b>Receiver</b>	
Maximum	-10 dBm ± 2 dBm
Minimum	-40 dBm ± 2 dBm
Spectrum	400 nm to 1100 nm
Attenuation	In the case of plastic optical fibers, you can expect a path attenuation of 0.2 dB/m. Additional attenuation comes from the plug and sensor head.
Optical budget <sup>1</sup>	Maximal 25 dB
Analog sampling rate	16 kHz
ADC type	10-bit successive approximation
<b>Transmitter</b>	
Type	LED
Wavelength	$\lambda = 650 \text{ nm}$
Transmit power	Minimum 0 dBm Maximum 2 dBm
Numerical aperture	0.5 <sup>2</sup>
Signal rate connection test	1 pulse per second
Pulse duration connection test	11 $\mu\text{s}$
Comment:	
<sup>1</sup> All values in combination with sensors approved by Siemens.	
<sup>2</sup> Numerical aperture (NA = sin $\theta$ (launch angle))	

#### High-Speed Measuring-Transducer Inputs, Voltage/Current (via IO210, IO212)



#### NOTE

Current and voltage must not be connected to a measuring-transducer input at the same time; only either current or voltage may be connected. Due to EMC, no line may be connected to an input that is not used (current or voltage).

Use shielded cables.

Table 6-1 High-Speed Measuring-Transducer Inputs, Voltage

Differential voltage input channels	IO210: 4 <sup>2</sup> IO212: 8 <sup>1</sup>
Measuring range	DC -10 V to +10 V
Fault	< 0.5 % of the measuring range
Input impedance	48 k $\Omega$
Conversion principle	Delta-sigma (16 bit)
Insulation test voltage between the channels	DC 3.5 kV
Insulation test voltage with respect to ground/housing	DC 3.5 kV
Max. permissible voltage with respect to ground on the measuring inputs	300 V
Permissible overload	DC 20 V continuously DC 60 V continuously (IO210 MT3 terminal point C9)

<sup>2</sup> The IO210 has 4 high-speed measuring-transducer inputs. They can be used either as a voltage or as a current input.

<sup>1</sup> The IO212 has 8 high-speed measuring-transducer inputs. They can be used either as a voltage or as a current input.

*Handwritten signature*

6.1 Analog Inputs

Measurement repetition	62.5 $\mu$ s
Insulation class IO210	ELV (Extra Low Voltage) (according to IEC 60255-27)
Insulation class IO212	SELV (according to IEC 60255-27)

Table 6-2 High-Speed Measuring-Transducer Inputs, Current

Differential current input channels	IO210: 4 <sup>4</sup> IO212: 8 <sup>5</sup>
Measuring range	DC -20 mA to +20 mA
Fault	< 0.5 % of the measuring range
Input impedance, current	12 $\Omega$
Conversion principle	Delta-sigma (16 bit)
Permissible potential difference between channels	DC 3.5 kV
Galvanic separation from ground/ housing	DC 3.5 kV
Permissible current overload	DC 100 mA continuously
Measurement repetition	62.5 $\mu$ s

<sup>4</sup>The IO210 has 4 high-speed measuring-transducer inputs. They can be used either as a voltage or as a current input.


<sup>5</sup>The IO212 has 8 high-speed measuring-transducer inputs. They can be used either as a voltage or as a current input.

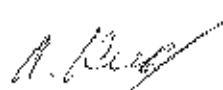
*H. Repp*

*M*

## 6.2 Supply Voltage

<b>Integrated Power Supply</b>			
For modular devices, the following printed circuit-board assemblies have a power supply:			
PS201 – Power supply of the base module and of the 1st device row			
PS203 – Power supply of the 2nd device row			
CB202 – Plug-in module assembly with integrated power supply, for example, to accommodate communication modules			
Permissible voltage ranges (PS201, PS203, CB202)	DC 19 V to DC 60 V	DC 48 V to DC 300 V AC 80 V to AC 265 V, 50 Hz/60 Hz	
Auxiliary rated voltage $V_H$ (PS201, PS203, CB202)	DC 24 V/DC 48 V	DC 60 V/DC 110 V/DC 125 V/DC 220 V/ DC 250 V or AC 100 V/AC 115 V/AC 230 V, 50 Hz/60 Hz	
Permissible voltage ranges (PS101)	DC 19 V to DC 60 V	DC 48 V to 150 V	DC 88 V to DC 300 V AC 80 V to AC 265 V, 50 Hz/60 Hz
Auxiliary rated voltage $V_H$ (PS101)	DC 24 V/DC 48 V	DC 60 V/DC 110 V/ DC 125 V	DC 110 V/DC 125 V/ DC 220 V/DC 250 V or AC 100 V/AC 115 V/ AC 230 V, 50 Hz/60 Hz
Superimposed alternating voltage, peak-to-peak, IEC 60255-11	< 15% of the DC auxiliary rated voltage (applies only to direct voltage)		
Inrush current	≤ 18 A		
Recommended external protection	Miniature circuit breaker 6 A, characteristic C according to IEC 60898		
<b>Internal fuse</b>			
–	DC 24 V to DC 48 V	DC 60 V to DC 125 V	DC 24 V to DC 48 V AC 100 V to AC 230 V
PS101	4 A inert, AC 250 V, DC 150 V, UL recognized SIBA type 179200 or Schurter type SPT 5x20	2 A time-lag, AC 250 V, DC 300 V, UL recognized SIBA type 179200 or Schurter type SPT 5x20	
PS203, PS203, CB202	2 A time-lag, AC 250 V, DC 300 V, UL recognized SIBA type 179200 or Schurter type SPT 5x20		
<b>Power consumption (life relay active)</b>			
–	DC	AC 230 V/50 Hz	AC 115 V/50 Hz
1/3 base module, non-modular Without plug-in modules	7.0 W	16 VA	12.5 VA
1/3 base module, modular Without plug-in modules	13 W	33 VA	24 VA
1/6 expansion module	3 W	6 VA	6 VA
1/6 plug-in module assembly without plug-in modules (modules CB202)	3.5 W	11 VA	7 VA

Integrated Power Supply			
Plug-in module for base module or plug-in module assembly (for example, communication module)	< 5 W	< 6 VA	< 6 VA 
Stored-energy time for auxiliary voltage outage or short circuit, modular devices	For V ≥ DC 24 V ≥ 50 ms For V ≥ DC 110 V ≥ 50 ms For V ≥ AC 115 V ≥ 50 ms		
Stored-energy time for auxiliary voltage outage or short circuit, non-modular devices	For V ≥ DC 24 V ≥ 20 ms For V ≥ DC 60 V/DC 110 V ≥ 50 ms For V ≥ AC 115 V ≥ 200 ms		

## 6.3 Binary Inputs

Rated voltage range	DC 24 V to 250 V The binary inputs of SIPROTEC 5 are bipolar with the exception of the binary inputs on the IO230 and the IO231.	
Current consumption, excited	Approx. DC 0.6 mA to 1.8 mA (independent of the control voltage)	
Power consumption, max.	0.6 VA	
Pickup time	Approx. 3 ms	
Dropout time <sup>6</sup>	Capacitive load (supply-line capacitance)	Dropout time
	< 5 nF	< 4 ms
	< 10 nF	< 6 ms
	< 50 nF	< 10 ms
	< 220 nF	< 35 ms
Control voltage	Adapt the binary-input threshold to be set in the device to the control voltage.	
	Range 1 for 24 V, 48 V, and 60 V Control voltage	$V_{low} \leq DC 10 V$ $V_{high} \geq DC 19 V$
	Range 2 for 110 V and 125 V Control voltage	$V_{low} \leq DC 44 V$ $V_{high} \geq DC 88 V$
	Range 3 for 220 V and 250 V Control voltage	$V_{low} \leq DC 88 V$ $V_{high} \geq DC 176 V$
Maximum permitted voltage	DC 300 V	
The binary inputs contain interference suppression capacitors. In order to ensure EMC immunity, use the terminals shown in the terminal diagrams/connection diagrams to connect the binary inputs to the common potential.		

<sup>6</sup>For time-critical applications with low-active signals, consider the specified dropout times. If necessary, provide for active discharge of the binary input (for example, a resistor in parallel to the binary input or using a change-over contact).





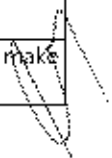
## 6.4 Relay Outputs

### Standard Relay (Type S)

Switching capacity	On: 1000 WVA Off: 30 VA; 40 W ohmic; 30 WVA at L/R ≤ 40 ms
AC and DC contact voltage	250 V
Permissible current per contact (continuous)	5 A
Permissible current per contact (switching on and holding)	30 A for 1 s (make contact)
Short-time current across closed contact	250 A for 30 ms
Total permissible current for contacts connected to common potential	5 A
Switching time OOT (Output Operating Time) Additional delay of the output medium used	Make time: typical: 8 ms; maximum: 10 ms Break time: typical: 2 ms; maximum: 5 ms
Max. rated data of the output contacts in accordance with UL certification:	DC 24 V, 8 A, General Purpose DC 48 V, 0.8 A, General Purpose DC 240 V, 0.1 A, General Purpose AC 240 V, 5 A, General Purpose AC 120 V, 1/3 hp AC 250 V, 1/2 hp B300 R300
Interference suppression capacitors across the contacts	4.7 nF, ± 20 %, AC 250 V

### Fast Relay (Type F)

Switching capacity	On: 1000 WVA Off: 30 VA; 40 W ohmic; 30 WVA at L/R ≤ 40 ms
AC and DC contact voltage	250 V
Permissible current per contact (continuous)	5 A
Permissible current per contact (switching on and holding)	30 A for 1 s (make contact)
Short-time current across closed contact	250 A for 30 ms
Total permissible current for contacts connected to common potential	5 A
Switching time OOT (Output Operating Time) Additional delay of the output medium used	Make time: typical: 4 ms; maximum: 5 ms Break time: typical: 2 ms; maximum: 5 ms
Rated data of the output contacts in accordance with UL certification	AC 120 V, 8.5 A, General Purpose AC 277 V, 6 A, General Purpose AC 277 V, 0.7 hp AC 347 V, 4.5 A, General Purpose B300 R300
Interference suppression capacitors across the contacts	4.7 nF, ± 20 %, AC 250 V
Supervision	2-channel activation with cyclic testing (only for make contact)



*A. Rieger*

**High-Speed Relay with Semiconductor Acceleration (Type H5)**

Switching capacity	On/Off: 1000 WVA
Contact voltage	AC 200 V, DC 250 V
Permissible current per contact (continuous)	5 A
Permissible current per contact (switching on and holding)	30 A for 1 s (make contact)
Short-time current across closed contact	250 A for 30 ms
Total permissible current for contacts connected to common potential	5 A
Switching time OOT (Output Operating Time) Additional delay of the output medium used	Make time, typical: 0.2 ms; maximum: 0.2 ms Break time, typical: 9 ms; maximum: 9 ms
Rated data of the output contacts in accordance with UL certification	B150 Q300

**Power Relay (for Direct Control of Motor Switches)**

Switching capacity for permanent and periodic operation		
250 V/4.0 A	1000 W	In order to prevent any damage, the external protection circuit must switch off the motor in case the rotor is blocked.
220 V/4.5 A	1000 W	
110 V/5.0 A	550 W	
60 V/5.0 A	300 W	
48 V/5.0 A	240 W	
24 V/5.0 A	120 W	
Turn on switching power for 30 s, recovery time until switching on again is 15 minutes. For short-term switching operations, an impulse/pause ratio of 3 % must be considered.		
100 V/9.0 A	1000 W	Continuous and inching operation is not permitted. In order to prevent any damage, the external protection circuit must switch off the motor in case the rotor is blocked.
60 V/10.0 A	600 W	
48 V/10.0 A	480 W	
24 V/10.0 A	240 W	
AC and DC contact voltage	250 V	
Permissible continuous current per contact	5 A	
Permissible current per contact (switching on and holding)	30 A for 1 s	
Short-time current across closed contact	250 A for 30 ms	
Total permissible current for contacts connected to common potential	5 A	
Switching time OOT (Output Operating Time) Additional delay of the output medium used	≤ 16 ms	
Rated data of the output contacts in accordance with UL certification	DC 300 V, 10 A, Resistive DC 250 V, 1 hp motor - 30 s ON, 15 min OFF DC 110 V, 3/4 hp motor - 30 s ON, 15 min OFF DC 60 V, 1/2 hp motor - 30 s ON, 15 min OFF DC 48 V, 1/3 hp motor - 30 s ON, 15 min OFF DC 24 V, 1/6 hp motor - 30 s ON, 15 min OFF	
Interference suppression capacitors across the contacts	4.7 nF, ± 20 %, AC 250 V	
The power relays operate in interlocked mode, that is, only one relay of each switching pair picks up at a time thereby avoiding a power-supply short circuit.		

*A. Reber*

## 6.5 Light-Emitting Diodes in the On-Site Operation Panel

### Base Module

Status	Color	Quantity
RUN	Green	1
ERROR	Red	1
Routable (adjustable with DIGSI 5) Only the defined color can be used in operation.	2-colored: red or green	16


### Expansion Module

Status	Color	Quantity
Routable	Red	16 optional

## 6.6 Communication Interfaces

### User Interface, Front Side

You can find a USB connection of type B for the connection to a laptop computer or to a PC on the front side of the device. A protection cover protects this USB connection against pollution and humidity.

USB	User interface
Connection	USB type B 
Insulation class	PELV (Protective Extra Low Voltage) (according to IEC 60255-27)

### Time-Synchronization Interface (Port G)

The terminal for time synchronization is located on the D-sub 9 interface (position G). Time synchronization signals for DC 5 V, DC 12 V, and DC 24 V can be processed as an option.

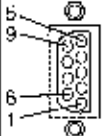
Time Synchronization	External synchronization sources, for example, DCF77 IRIG B signal Internal RTC (real time)
Connection	Rear D-sub 9 
Rated signal voltages	DC 5 V, DC 12 V, or DC 24 V (optional)
Test voltage	AC 500 V at 50 Hz
Insulation class	SELV (according to IEC 60255-27)

Table 6-3 Time-Synchronization Connection

Pin	Signal	Signal Description
1	P24-TSIG	DC 24 V input
2	P5-TSIG	DC 5 V input
3	M-TSIG	Return line Pxx-TSIG
4	M-TSYNC /	Return line for P-TSYNC
5	Screen	Shield potential
6	-	-
7	P12-TSIG	DC 12 V input
8	P-TSYNC	DC 24 V input
9	Screen	Shield potential

/ Only for the PPS signal (GPS)

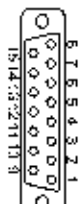
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Signal Levels/ Burdens	Signal Rated Input Voltage, DC		
	5 V	12 V	24 V
$V_{H-high}$	6.0 V	15.8 V	31.0 V
$V_{H-low}$	1.0 V at $I_{H-low} = 0.25 \text{ mA}$	1.4 V at $I_{H-low} = 0.25 \text{ mA}$	1.9 V at $I_{H-low} = 0.25 \text{ mA}$
$I_{H-high}$	4.5 mA to 9.4 mA	4.5 mA to 9.3 mA	4.5 mA to 8.7 mA
$R_i$	890 $\Omega$ at $V_i = 4 \text{ V}$	1930 $\Omega$ at $V_i = 8.7 \text{ V}$	3780 $\Omega$ at $V_i = 17 \text{ V}$
	640 $\Omega$ at $V_i = 6 \text{ V}$	1700 $\Omega$ at $V_i = 15.8 \text{ V}$	3560 $\Omega$ at $V_i = 31 \text{ V}$

**On-Site Operation Panel for Surface-Mounting Housing (Port H) (Available only for Modular Devices)**

The terminal for the on-site operation panel of surface-mounted devices is located on the D-sub 15 interface (position H). The on-site operation panel of surface-mounted devices with integrated or detached on-site operation panel is connected to this interface.

User interface	Detached on-site operation panel
Connection	On the rear side D-sub 15 
Insulation class	PELV (according to IEC 60255-27)

**Integrated Ethernet Interface (Port J)**

This terminal is used to load the device with DIGSI 5 using Ethernet. This terminal also enables IEC 61850 Ethernet communication or communication with another protocol via Ethernet, for example, for connecting an external RTD unit.

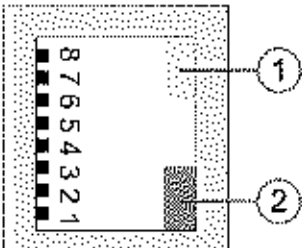
Ethernet	Integrated Ethernet interface
Connection	RJ45   (1) LED 1: Yellow (2) LED 2: Green
Insulation class	SELV (according to IEC 60255-27)

Table 6-4 Connection

Pin	Signal	Signal Description
1	ETH_TX_P	Transmit Data +
2	ETH_TX_N	Transmit Data -
3	ETH_RX_P	Receive Data +
4	-	-
5	-	-
6	ETH_RX_N	Receive Data -
7	-	-
8	-	-
	Screen	Shield potential

#### LEDs of the RJ45 Terminals – Integrated Ethernet Interface (Port J)

The light-emitting diodes (LEDs) signal the operating state of the communication link. The operating states are explained in the following table:

Integrated Ethernet Interface (RJ45)	Signal	Color	Operating Status
LED 1	ETH_LED1_N	Yellow	Continuously lit: 100 Mbits Not lit: 10 Mbits
LED 2	ETH_LED0_N	Green	Flashing: Telegram reception Continuously lit: No communication

#### Ethernet COM Link (Port K) (Available only for Modular Devices)

The Ethernet connection to the CB202 PCB assembly (plug-in module assembly with integrated power supply) is realized using the RJ45 interface.

The RJ45 interface can be used exclusively for the connection of the CB202 module. This terminal is left unused when no CB202 module is in use.

The light-emitting diodes (LEDs) signal the operating state of the communication connection. The operating states are explained in the following table:

COM Link (RJ45)	Signal	Color	Operating State
LED 1	CL2_LED0_N	Yellow	Flashes when a communication module is inserted in plug-in module position P.
LED 2	CL3_LED0_N	Green	Flashes when a communication module is inserted in plug in module position N.

Table 6-5 Connection

Pin	Signal	Signal Description
	Siemens-specific assignment	Connection using a special cable. Is part of the device delivery.
insulation class	SELV (according to IEC 60255-27)	

#### Plug-in Modules

You can find the Technical data for plug-in modules in chapter 4 *Plug-in Modules*.

## 6.7 Electrical Tests

### Standards

IEC 60255 (product standard)  
IEEE Std C37.90  
UL 508  
Additional standards are listed for the individual tests.

### Installation Requirements

Overvoltage category	III
Degree of pollution	2
Protection class	1

### Voltage-Immunity and Safety Tests


Standards	IEC 60255-27
Voltage test (routine test), current measurement inputs, voltage measurement inputs, relay outputs	AC 2.5 kV 50 Hz
Voltage test (routine test), Auxiliary voltage, binary inputs	DC 3.5 kV
Voltage test (routine test), only isolated communication and time-synchronization interfaces and analog inputs (module position E, F, M, N, and P)	DC 700 V
Surge immunity test (type testing), all circuits except communication and time-synchronization interfaces and analog inputs, class III	5 kV (peak value) 1.2 µs/50 µs 0.5 J 3 positive and 3 negative impulses at intervals of 1 s
Insulation resistance	> 100 MΩ @ DC 500 V
Resistor of protective-equipotential-bonding	< 0.1 Ω @ DC 12 V, 30 A after 1 min.

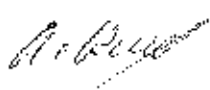
### EMC Immunity Tests (Type Tests, Test under Mounting Conditions)

Standards	IEC 60255-1 and -26 (product standards) EN 61000-6-2 (generic standard)
Electrostatic discharge test IEC 61000-4-2	Contact discharge: <ul style="list-style-type: none"> <li>• Front-side modular and non-modular devices 8 kV</li> <li>• Back-side modular devices 8 kV</li> <li>• Back-side non-modular devices 6 kV</li> </ul> Air discharge 15 kV Both polarities 150 pF RI = 330 Ω
Radiated electromagnetic field immunity Frequency sweep IEC 61000-4-3	20 V/m, 80 MHz to 1 GHz 10 V/m, 1 GHz to 6 GHz 80 % AM 1 kHz


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Radiated electromagnetic field immunity Spot frequencies IEC 61000-4-3	20 V/m, 80 MHz/160 MHz/380 MHz/450 MHz/900 MHz 10 V/1.85 GHz/2.15 GHz 80 % AM 1 kHz Dwell time $\geq 10$ s	
Electrical fast transient/burst immunity IEC 61000-4-4	4 kV 5 ns/50 ns 5 kHz Burst length 15 ms Repetition rate 300 ms Both polarities Ri = 50 $\Omega$ Test duration $\geq 5$ min	
High-energy surge voltages IEC 61000-4-5	Pulse: 1.2 $\mu$ s/50 $\mu$ s	
	Auxiliary voltage	Common mode: 4 kV, 12 $\Omega$ , 9 $\mu$ F Differential mode: 1 kV, 2 $\Omega$ , 18 $\mu$ F
	Measuring inputs, binary inputs, and relay outputs	Common mode: 4 kV, 42 $\Omega$ , 0.5 $\mu$ F Differential mode: 2 kV, 42 $\Omega$ , 0.5 $\mu$ F or varistor
Conducted RF, amplitude-modulated IEC 61000-4-6		10 V, 150 kHz to 80 MHz, 80 % AM, 1 kHz
Conducted RF, amplitude modulated IEC 61000-4-6 Spot frequencies		27 MHz/68 MHz at 10 V, dwell time $\geq 10$ s 80 % AM, 1 kHz
Power frequency magnetic field immunity test IEC 61000-4-8	100 A/m (continuous) 1000 A/m for 3 s	
Pulsed magnetic field IEC 61000-4-9	1500 A/m, 6.4 $\mu$ s/16 $\mu$ s	
Standard for Surge Withstand Capability (SWC) IEEE Std C37.90.1	2.5 kV (peak value) 1 MHz $\tau = 15$ $\mu$ s 400 impulses per s Test duration $\geq 10$ s Ri = 200 $\Omega$ Common mode and differential mode test	
Standard for Fast Transient Surge Withstand Capability IEEE Std C37.90.1	4 kV 5 ns/50 ns 5 kHz Burst length 15 ms Repetition rate 300 ms Both polarities Ri = 50 $\Omega$ Test duration 60 s Common mode and differential mode test	

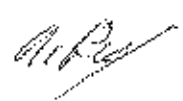





Standard for Withstand Capability or Relay Systems to Radiated Electromagnetic Interference from Transceivers (Keying Test) IEEE Std C37.90.2	20 V/m 80 MHz to 1 GHz Pulse modulation	
Ring wave immunity test IEC 61000-4-12	100 kHz (2.5 kV peak value) Common-mode and differential-mode test Test duration > 60 s, both polarities	
Damped oscillatory wave immunity test IEC 61000-4-18	100 kHz, 1 MHz, 2.5 kV (peak value) 3 MHz, 10 MHz, 30 MHz, 2 kV (peak value) Test duration > 60 s	
Power-frequency disturbance test IEC 61000-4-16	Zone A 150 V (differential mode) 300 V (common mode)	

**EMC Electromagnetic Emission Tests (Type Tests, Test under Mounting Conditions)**

Standards	IEC 60255-26 (product standard) IEC 61000-6-4 (generic standard)
Conducted emission on auxiliary-voltage lines CISPR 22	150 kHz to 30 MHz limit class A
Radiated emission	CISPR 11 30 MHz to 1 000 MHz limit class A
	CISPR 22 1 GHz to 6 GHz limit class A
Loading effect in electricity-supply systems, harmonics Harmonic current emissions	Does not apply! (see EN 61000-3-2, section 7, power consumption < 75 W)
Loading effect in electricity-supply systems, voltage fluctuations Flicker	Does not apply! (see EN 61000-3-3, section 6, no significant voltage fluctuations)



## 6.8 Mechanical Tests

### Vibration and Shock Stress in Stationary Use

Standards	IEC 60255-21 and IEC 60068
Vibration Test (sinusoidal) IEC 60255-21-1, class 2 <sup>8</sup> and IEC 60068-2-6	Sinusoidal 10 Hz to 60 Hz: $\pm 0.075$ mm amplitude 60 Hz to 150 Hz: 10 m/s <sup>2</sup> acceleration Frequency sweep 1 octave/min 20 cycles in 3 axes perpendicular to one another
Shock Test IEC 60255-21-2, class 1	Semi-sinusoidal Acceleration 50 m/s <sup>2</sup> Duration 11 ms 3 shocks each in both directions of the 3 axes
Seismic Tests IEC 60255-21-3, class 2 and IEC 60068-3-3	Sinusoidal 3 Hz <sup>9</sup> to 35 Hz: Frequency sweep 1 octave/min 1 cycle in 3 axes perpendicular to one another 3 Hz to 8 Hz: $\pm 7.5$ mm amplitude (horizontal axes) 3 Hz to 8 Hz: $\pm 3.5$ mm amplitude (vertical axis) 8 Hz to 35 Hz: 20 m/s <sup>2</sup> acceleration (horizontal axes) 8 Hz to 35 Hz: 10 m/s <sup>2</sup> acceleration (vertical axis)

### Vibration and Shock Stress During Transport

Standards	IEC 60255-21 and IEC 60068
Vibration Test (sinusoidal) IEC 60255-21-1, class 2 <sup>10</sup> and IEC 60068-2-6	Sinusoidal 5 Hz to 8 Hz: $\pm 7.5$ mm amplitude 8 Hz to 150 Hz: 20 m/s <sup>2</sup> acceleration Frequency sweep 1 octave/min 20 cycles in 3 axes perpendicular to one another
Shock Test IEC 60255-21-2, class 1 and IEC 60068-2-27	Semi-sinusoidal Acceleration 150 m/s <sup>2</sup> Duration 11 ms 3 shocks each in both directions of the 3 axes
Continuous shock IEC 60255-21-2, class 1 and IEC 60068-2-27	Semi-sinusoidal Acceleration 100 m/s <sup>2</sup> Duration 16 ms 1000 shocks each in both directions of the 3 axes

<sup>8</sup> The non-modular devices in the assembly frame meet class 1.

<sup>9</sup> For technical reasons, the frequency range is raised from 3 Hz to 3 Hz at the lower limit.

<sup>10</sup> The non-modular devices in the assembly frame meet class 1.



*M. P. P.*

## 6.9 Environmental Conditions

### Temperatures

Type test, in operation (in compliance with IEC 60068-2-1 and IEC 60068-2-2, test Ad for 16 h and test Bd for 16 h)	-25 °C to +85 °C
Temporarily permissible during operation (tested for 96 h)	-20 °C to +70 °C Load conditions for the non-modular devices: With surrounding temperatures above 55 °C, no more than 50 % of the binary inputs and relay outputs per assembly are allowed to be continuously active. Readability of the display may be impaired below 10 °C and above +55 °C.
Recommended for uninterrupted duty (in compliance with IEC 60255-1)	-10 °C to +55 °C
Temperatures for continuous storage	-25 °C to +55 °C
Type test, transport and storage for 96 h	-40 °C to +70 °C

Heat-related limitations for the binary inputs on the IO230 input module (modular devices)			
Switching thresholds	Up to 40 °C	Up to 55 °C	Up to 70 °C
Range 1 for 24 V, 48 V, and 60 V operating voltage	All 48 binary inputs usable for uninterrupted duty	All 48 binary inputs usable for uninterrupted duty	All 48 binary inputs usable for uninterrupted duty
Range 2 for 110 V and 125 V operating voltage	All 48 binary inputs usable for uninterrupted duty	All 48 binary inputs usable for uninterrupted duty	36 binary inputs usable for uninterrupted duty (max. 3 in each group of 4 at the same time)
Range 3 for 220 V and 250 V operating voltage	36 binary inputs usable for uninterrupted duty (max. 3 in each group of 4 at the same time)	24 binary inputs usable for uninterrupted duty (max. 2 in each group of 4 at the same time)	12 binary inputs usable for uninterrupted duty (max. 1 in each group of 4 at the same time)



#### NOTE

At an ambient temperature of 55 °C to 70 °C, a maximum of 36 relays per row may be switched on simultaneously.

Heat-related limitations for the binary inputs on the IO231 input module (modular devices)			
Switching thresholds	Up to 40 °C	Up to 55 °C	Up to 70 °C
Range 1 for 24 V, 48 V, and 60 V operating voltage	All 24 binary inputs usable for uninterrupted duty	All 24 binary inputs usable for uninterrupted duty	All 24 binary inputs usable for uninterrupted duty
Range 2 for 110 V and 125 V operating voltage	All 24 binary inputs usable for uninterrupted duty	All 24 binary inputs usable for uninterrupted duty	18 binary inputs usable for uninterrupted duty (max. 3 in each group of 4 at the same time)
Range 3 for 220 V and 250 V operating voltage	18 binary inputs usable for uninterrupted duty (max. 3 in each group of 4 at the same time)	12 binary inputs usable for uninterrupted duty (max. 2 in each group of 4 at the same time)	6 binary inputs usable for uninterrupted duty (max. 1 in each group of 4 at the same time)

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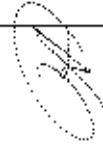
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**Humidity**

Permissible humidity stress (according to IEC 60068-2-30)	<p>≤ 75 % relative humidity on the annual average Up to 93 % relative humidity on 56 days a year</p>
	<p>Devices subjected to condensation are not to be operated! Arrange the devices so that they are not exposed to direct sunlight or extreme temperature changes. This will prevent condensation in the device.</p>
Constant humid heat, 56 days	40 °C, 93 % relative humidity
Humid heat, cyclical	12 h + 12 h cycles 25 °C/55 °C/95 % relative humidity

**Other Environmental Information**

Maximum altitude above sea level	2000 m (6561.68 ft)
Minimum admissible atmospheric pressure	783.8 hPa

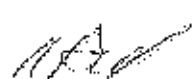


## 6.10 Operating Conditions

The protection device is designed for flush mounting in conventional relay rooms and systems such that electromagnetic compatibility (EMC) is ensured with proper flush mounting.

Siemens additionally recommends:

- Use contactors and relays that work within the same cabinet or the same relay panel with digital protection equipment, only with suitable quenching equipment.
- With switchgear rated at 100 kV or higher, provide external connecting lines with shielding grounded at both ends that is capable of carrying current. No special measures are necessary in medium-voltage systems.
- Removing or plugging in individual modules under live voltage is prohibited. Some components are electrostatically sensitive in the removed state. Pay attention to the ESD specifications (Electrostatically Sensitive Devices). There is no danger for the components when they are installed.



## 6.1.1 Reference Conditions and Influencing Variables

### Reference Conditions

Measurand current $I$	$I_{\text{rated}} \pm 1\%$
Measurand voltage $V$	$V_{\text{rated}} \pm 1\%$
Frequency $f$	$f_{\text{rated}} \pm 1\%$
Sine waveform, total harmonic distortion	$\leq 5\%$
Ambient temperature $t_a$	$23\text{ °C} \pm 1\text{ °C} / 73.4\text{ °F} \pm 2\text{ °F}$
Auxiliary voltage $V_a$	$V_{\text{calibrated}} \pm 1\%$
Warmup time	$\geq 15\text{ min}$
External fields/external influences	None

### Variables Influencing Pickup and Dropout Thresholds (Protection)

Auxiliary voltage: $0.8 V_{ar}$ to $1.2 V_{ar}$	$\leq 0.2\%$
Ambient temperature: $-10\text{ °C}$ to $55\text{ °C}$	$\leq 0.5\%/10\text{ K}$
Frequency: $45\text{ Hz}$ to $65\text{ Hz}$	$\leq 1\%$
Harmonics	
• Up to 10 % of 3rd harmonics	$\leq 1\%$
• Up to 10 % of 5th harmonics	$\leq 1\%$
Warmup	$\leq 0.3\%$
Transient excess pickup in fundamental component measurement method for $\tau > 100\text{ ms}$ (with complete unbalance)	$\leq 5\%$
EMC interference	$\leq 5\%$

### Variables Influencing the Measured Values (Fault Recorders)

Auxiliary voltage: $0.8 V_{ar}$ to $1.2 V_{ar}$	$\leq 0.2\%$
Ambient temperature: $-10\text{ °C}$ to $55\text{ °C}$	$\leq 0.5\%/10\text{ K}$
Frequency: $45\text{ Hz}$ to $65\text{ Hz}$	$\leq 1\%$
Harmonics	
• Up to 10 % of 3rd harmonics	$\leq 1\%$
• Up to 10 % of 5th harmonics	$\leq 1\%$
Warmup	$\leq 0.3\%$
Transient excess pickup in fundamental component measurement method for $\tau > 100\text{ ms}$ (with complete unbalance)	$\leq 5\%$
EMC interference <sup>1)</sup>	$\leq 1.5\%$

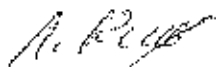
<sup>1)</sup> Use shielded cables for the current and voltage measuring inputs on the fault recorder.

## 6.12 Approvals



### UL-Listed/UL-Approved

Base module and 1/3 base module	IND. CONT. EQ. 69CA
Expansion module	IND. CONT. EQ. 69CA



## 6.13 Design Data

### Masses

	Device Size				
	Weight of the Modular Devices				
Type of construction	1/3	1/2	2/3	5/6	1/1
Flush-mounting device	4.8 kg	8.1 kg	11.4 kg	14.7 kg	18.0 kg
Surface-mounted device with integrated on-site operation panel	7.8 kg	12.6 kg	17.4 kg	22.2 kg	27.0 kg
Surface-mounted device with detached on-site operation panel	5.1 kg	8.7 kg	12.3 kg	15.9 kg	19.5 kg

	Size	Weight
Detached on-site operation panel	1/3	1.9 kg
Detached on-site operation panel	1/6	1.1 kg

	Device Size	
	Weight of the Non-Modular Devices 7xx82	
Type of construction	1/3	
Flush-mounting device	3.7 kg	
Bracket for non-modular surface-mounting variant	1.9 kg	

### Dimensions of the Basic and 1/3 Modules

Type of Construction (Maximum Dimensions)	Width over all x Height over all x Depth <sup>12</sup> (in Inches)
Flush-mounting device	150 mm x 268 mm x 229 mm (5.91 x 10.55 x 9.02)
Surface-mounted device with integrated on-site operation panel	150 mm x 314 mm x 337 mm (5.91 x 12.36 x 13.27)
Surface-mounted device with detached on-site operation panel	150 mm x 314 mm x 230 mm (5.91 x 12.36 x 9.06)

### Dimensions of Device Rows


Type of Construction (Maximum Dimensions)	Width over all x Height over all x Depth <sup>13</sup> (in Inches)				
	1/3	1/2	2/3	5/6	1/1
Flush-mounting device	150 mm x 268 mm x 229 mm (5.91 x 10.55 x 9.02)	225 mm x 268 mm x 229 mm (8.86 x 10.55 x 9.02)	300 mm x 268 mm x 229 mm (11.81 x 10.55 x 9.02)	375 mm x 268 mm x 229 mm (14.76 x 10.55 x 9.02)	450 mm x 268 mm x 229 mm (17.72 x 10.55 x 9.02)
Surface-mounted device with integrated on-site operation panel	150 mm x 314 mm x 337 mm (5.91 x 12.36 x 13.27)	225 mm x 314 mm x 337 mm (8.86 x 12.36 x 13.27)	300 mm x 314 mm x 337 mm (11.81 x 12.36 x 13.27)	375 mm x 314 mm x 337 mm (14.76 x 12.36 x 13.27)	450 mm x 314 mm x 337 mm (17.72 x 12.36 x 13.27)

<sup>12</sup>Width and depth rounded to whole numbers in mm

<sup>13</sup>Width and depth rounded to whole numbers in mm



Type of Construction (Maximum Dimensions)	Width over all x Height over all x Depth <sup>13</sup> (in Inches)				
	Surface-mounted device with detached on-site operation panel	150 mm x 314 mm x 230 mm (5.91 x 12.36 x 9.06)	225 mm x 314 mm x 230 mm (8.86 x 12.36 x 9.06)	300 mm x 314 mm x 230 mm (11.81 x 12.36 x 9.06)	375 mm x 314 mm x 230 mm (14.76 x 12.36 x 9.06)



#### Expansion Module Dimensions

Type of Construction (Maximum Dimensions)	Width x Height x Depth <sup>14</sup> (In Inches)
Flush mounting device	75 mm x 268 mm x 229 mm (2.95 x 10.55 x 9.02)
Surface-mounted device with integrated on-site operation panel	75 mm x 314 mm x 337 mm (2.95 x 12.36 x 13.27)
Surface-mounted device with detached on-site operation panel	75 mm x 314 mm x 230 mm (2.95 x 12.36 x 9.06)

#### Plug-In Module Dimensions

Type of Construction (Maximum Dimensions)	Width x Height x Depth (in Inches)
USART-Ax-xEL, ETH-Bx-xEL	61 mm x 45 mm x 120,5 mm (2,4 x 1,77 x 4,74)
USART-Ax-xFO, ETH-Bx-xFO (without protection cover)	61 mm x 45 mm x 132,5 mm (2,4 x 1,77 x 5,22)
ANA-CA-4EL	61 mm x 45 mm x 119,5 mm (2,4 x 1,77 x 4,7)
ARC-CD-3FO	61 mm x 45 mm x 120,5 mm (2,4 x 1,77 x 4,74)

#### Minimum Bending Radii of the Connecting Cables Between the On-Site Operation Panel and the Base Module

Fiber-optic cable	R = 50 mm Pay attention to the length of the cable protection sleeve, which you must also include in calculations.
D-Sub cable	R = 50 mm (minimum bending radius)

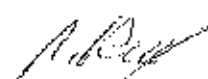
#### Degree of Protection According to IEC 60529

For equipment in the surface-mounting housing	IP54 <sup>15</sup> for front
For equipment in the flush-mounting housing	IP54 <sup>15</sup> for front
For operator protection (back side)	IP2x for current terminal (installed) IP2x for voltage terminal (installed)
Degree of pollution, IEC 60255-27	2
Maximum altitude above sea level	2000 m (6561,68 ft)

#### UL Note

Type 1 if mounted into a door or front cover of an enclosure. When expanding the device with the 2nd device row, then they must be mounted completely inside an enclosure.
---

<sup>13</sup> Width and depth rounded to whole numbers in mm  
<sup>14</sup> Width and depth rounded to whole numbers in mm  
<sup>15</sup> The provided plug-in label must be used for expansion modules with LEDs.




**Tightening Torques for Terminal Screws**

Type of Line	Current Terminal (also see Figure 5-22)	Voltage Terminal with Spring-Loaded Terminals (also see Figure 5-22)	Voltage Terminal with Screw Connection (also see Figure 5-23)
Stranded wires with ring-type lug	2.7 Nm	No ring-type lug	No ring-type lug
Stranded wires with boot-face ferrites or pin-type lugs	2.7 Nm	1.0 Nm	0.6 Nm
Solid conductor, bare (2 mm <sup>2</sup> )	2.0 Nm	1.0 Nm	-



**NOTE**

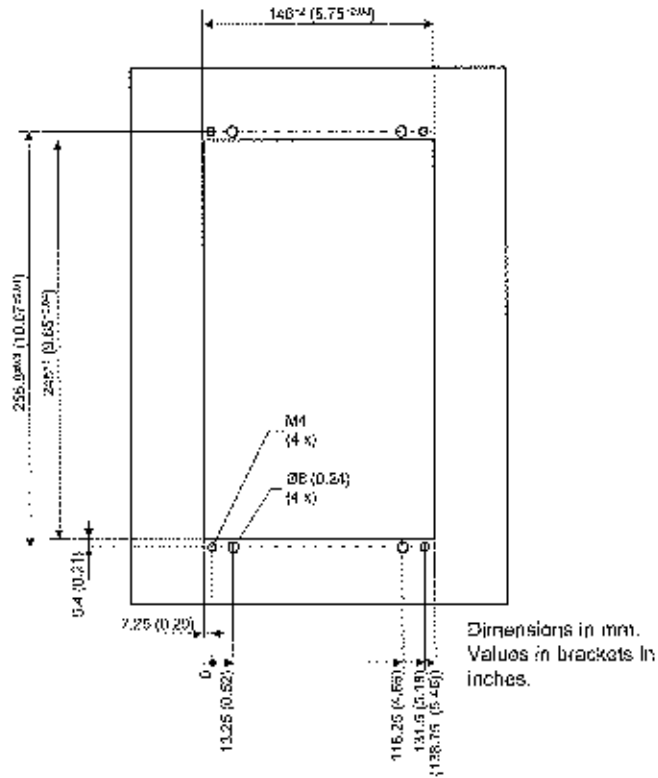
Use copper cables only.

**Torques for Other Screw Types**

Screw Type	Torque
M4 x 20	1.2 Nm
M4 x 8	1.2 Nm
M2.5 x 6	0.39 Nm
Countersunk screw, M2.5 x 6	0.39 Nm
Countersunk screw, M2.5 x 8	0.39 Nm
Collar screw, M4 x 20	0.7 Nm

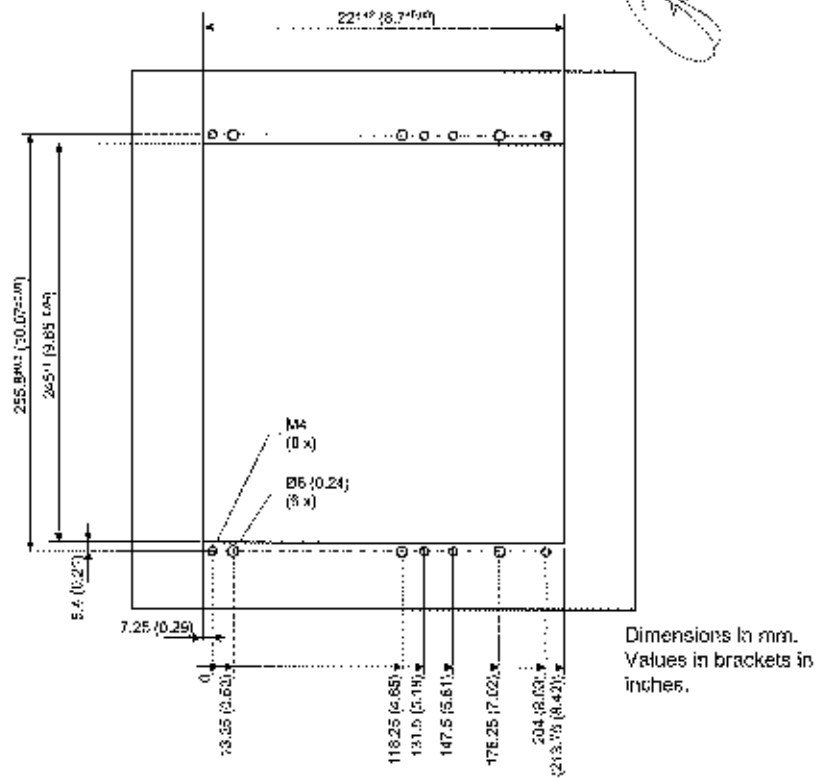
## 6.14 Assembly Dimensions

### Flush-Mounting Device



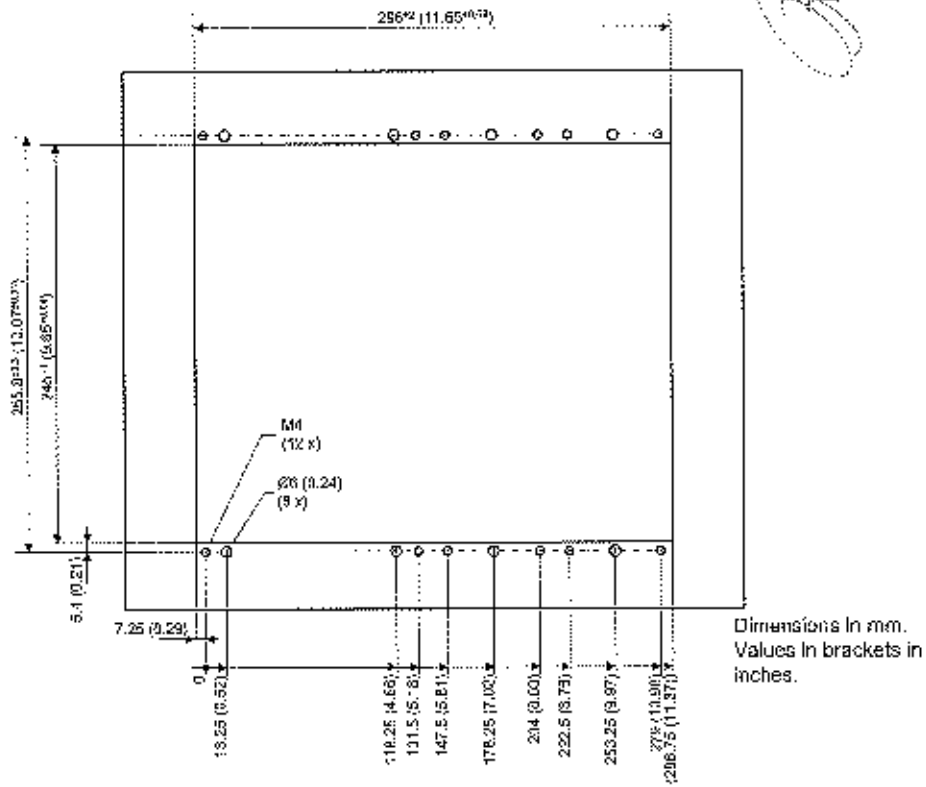
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Figure 6-1 Cut-Out Widths and Drilling Pattern - 1/3 Device, 1st Device Row



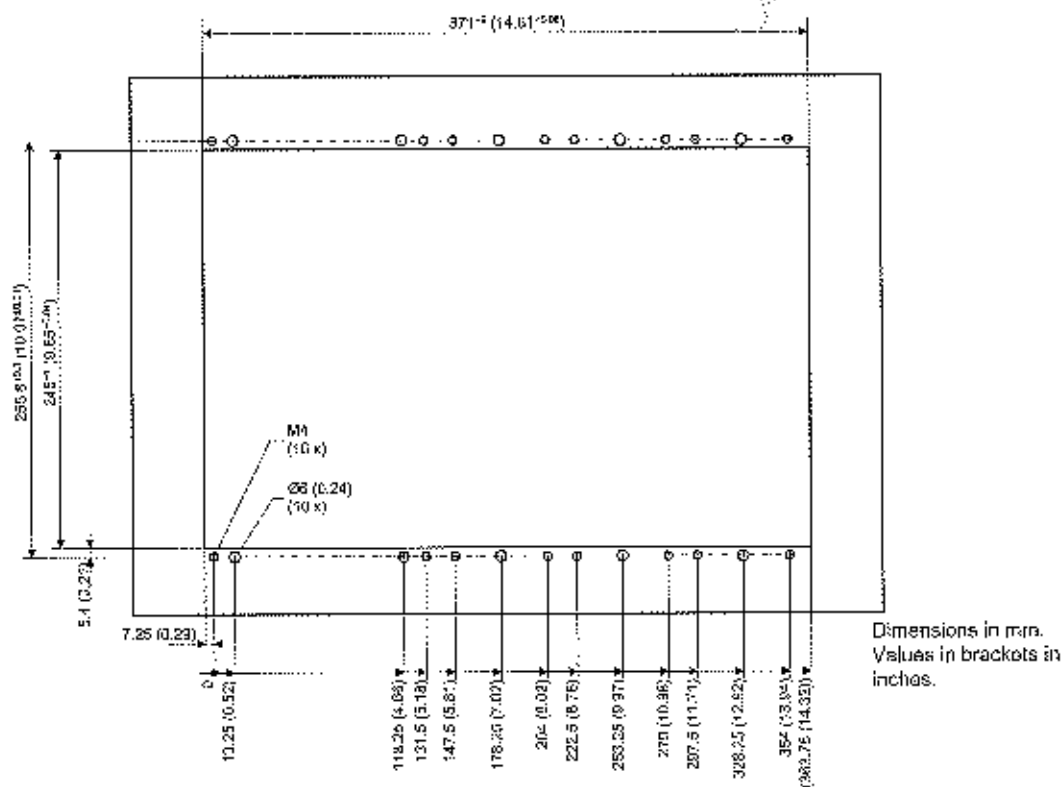
Idw 21.1/2, 2.en LSI

Figure 6-2 Cut-Out Widths and Drilling Pattern - 1/2 Device, 1st Device Row



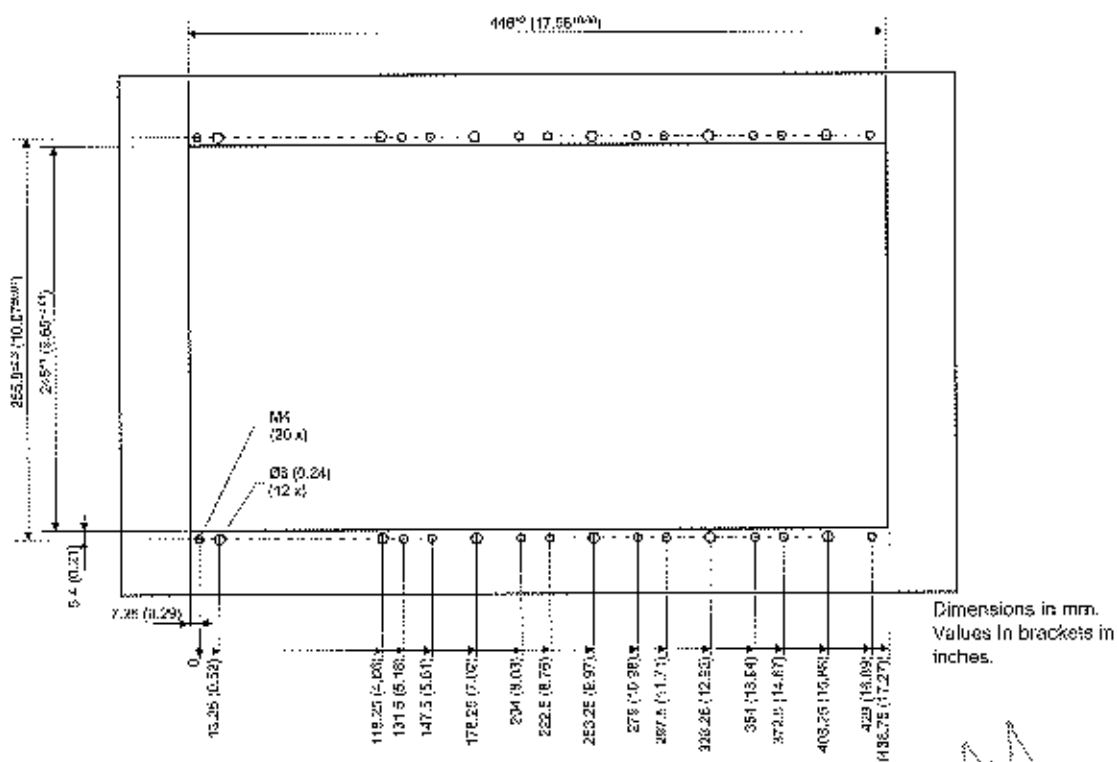
Rev. 3: 2.3, 2. on LS

Figure 6-3 Cut-Out Widths and Drilling Pattern - 2/3 Device, 1st Device Row



Rev 21 05.2. en US

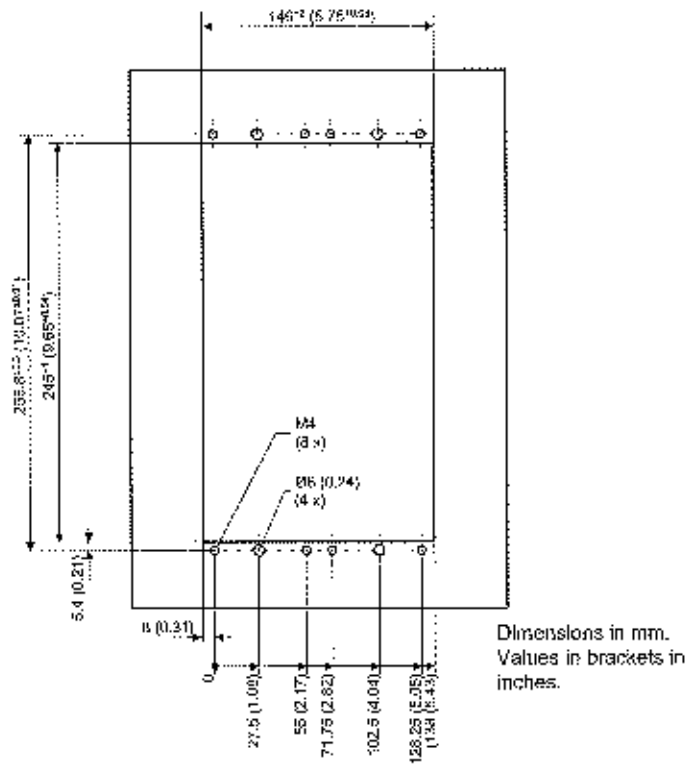
Figure 6-4 Cut-Out Widths and Drilling Pattern - 5/6 Device, 1st Device Row



Rev 21 04.2. en US

Figure 6-5 Cut-Out Widths and Drilling Pattern - 1/1 Device, 1st Device Row

All drillings in the area of the specific device cut-out widths (see Table 6-6) must comply with the dimensions in the corresponding figures.



Rev. 2, 2-6-2, v. 351

Figure 6-6 Cut-Out Widths and Drilling Pattern - 1/3 Device, 2nd Device Row

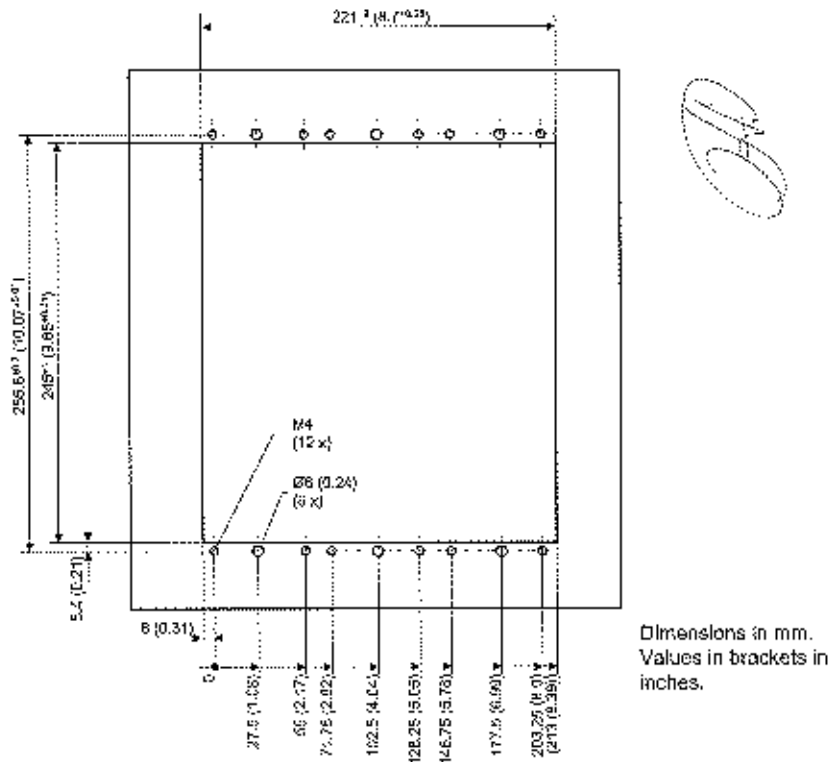


Figure 6-7 Cut-Out Widths and Drilling Pattern - 1/2 Device, 2nd Device Row

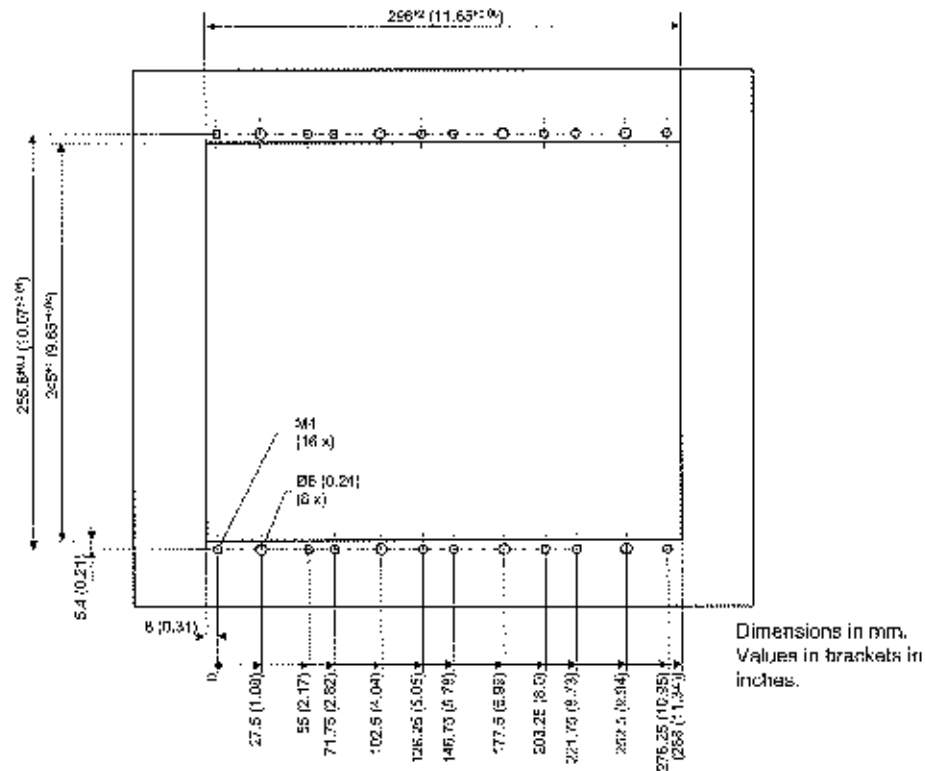
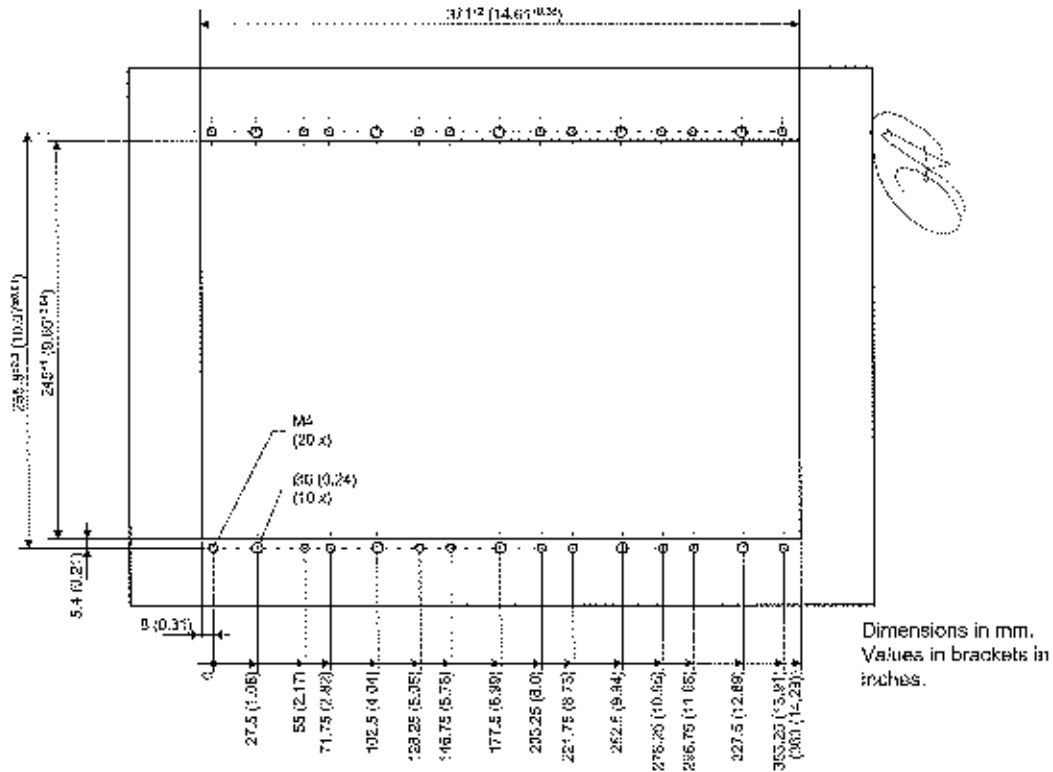
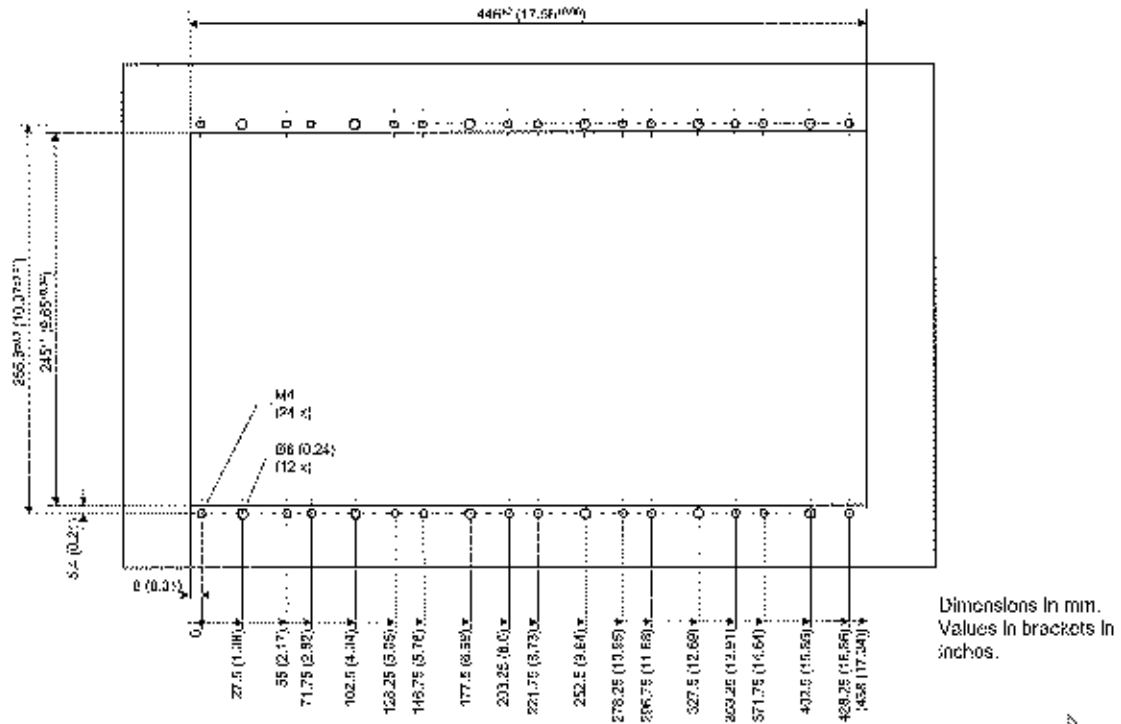


Figure 6-8 Cut-Out Widths and Drilling Pattern - 2/3 Device, 2nd Device Row



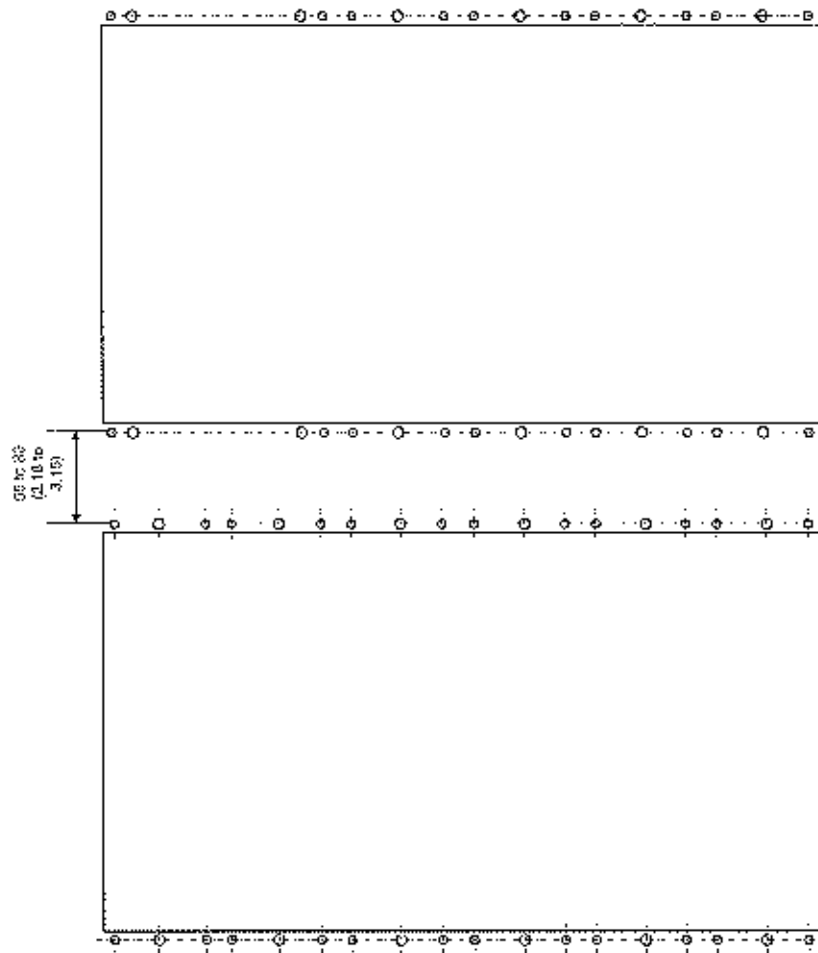


Fig\_6-9\_5-6\_2\_01\_LSI  
Figure 6-9 Cut-Out Widths and Drilling Pattern - 5/6 Device, 2nd Device Row



Fig\_6-10\_1-1\_2\_01\_LSI  
Figure 6-10 Cut-Out Widths and Drilling Pattern - 1/1 Device, 2nd Device Row

*A. P.*

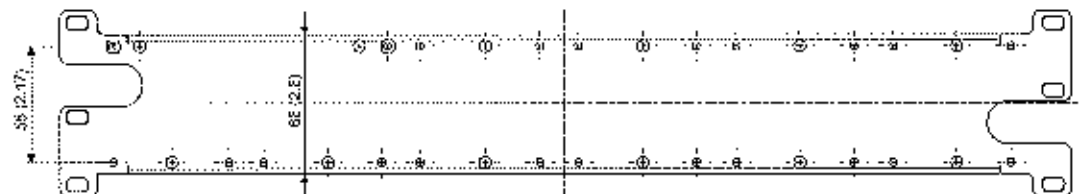


Dimensions in mm.  
Values in brackets in  
inches.

low\_list and record revision: 1, rev: 1/1

Figure 6-13 Drilling Pattern of 1/1 Devices of the 1st and 2nd Device Row

Siemens recommends a drilling space of at least 55 mm (2.17 in) between the 1st and the 2nd device row. Due to the connecting-cable length, the maximum space may be approx. 80 mm (3.15 in).



Dimensions in mm. Values in brackets in  
inches.

low\_angle rail, v. rev: 1/1

Figure 6-12 Angle Rail for the Connection of 1st and 2nd Device Row

Table 6-6 Cist-Out Widths

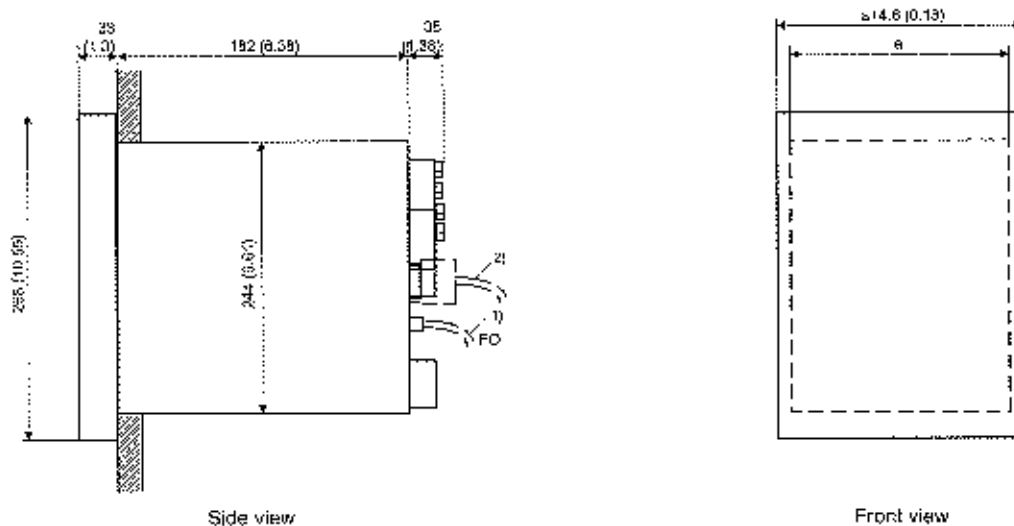
	Width of the Assembly Opening in mm (in Inches)
1/3 device (base module)	146 <sup>+2</sup> mm (5.75 <sup>+0.08</sup> )
1/2 device (base module with one expansion module)	221 <sup>+2</sup> mm (8.7 <sup>+0.08</sup> )

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	Width of the Assembly Opening in mm (in Inches)
2/3 device (base module with 2 expansion modules)	296 <sup>+2</sup> mm (11.65 <sup>-0.08</sup> )
5/6 device (base module with 3 expansion modules)	371 <sup>+2</sup> mm (14.61 <sup>+0.08</sup> )
1/1 device (base module with 4 expansion modules)	446 <sup>+2</sup> mm (17.56 <sup>+0.08</sup> )

Table 6-7 Variable Housing Widths

	Dimension a Housing Widths in mm (in Inches) (Total Width: Housing Width + 4.6 mm (0.18 in))
1/3 device	145 (5.71)
1/2 device	220 (8.66)
2/3 device	295 (11.61)
5/6 device	370 (14.57)
1/1 device	445 (17.52)



Dimensions in mm. Values in brackets in Inches.

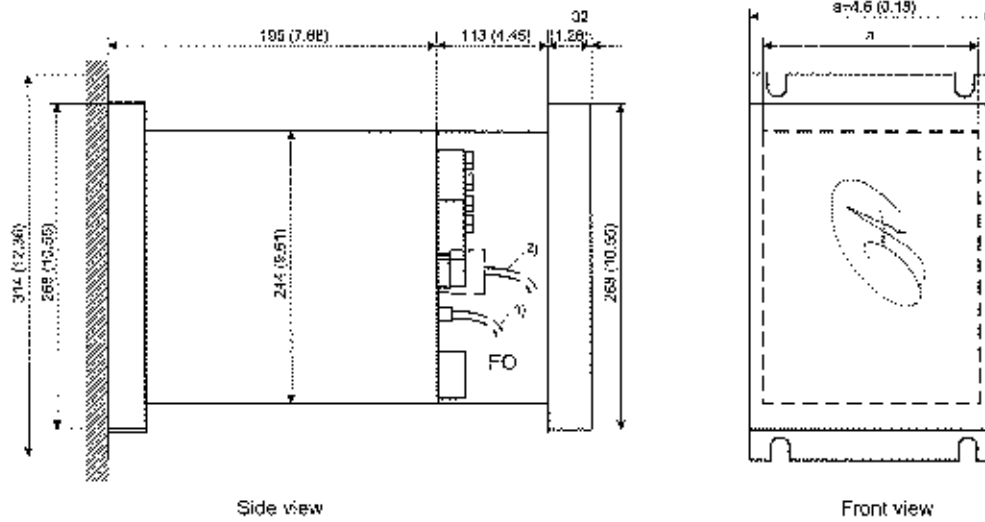
Attention!

- <sup>1)</sup> For FO cables, a minimum bending radius  $R = 50$  mm (1.97 Inch) must be considered according to the type.
- <sup>2)</sup> For D-sub connector plugs, the axial length of the plug + cable bending radius must be considered.  
Minimum bending radius  $R = 50$  mm (1.97 inch)

lib\_surface\_mounting\_r5\_1\_wj\_ME

Figure 6-13 Flush-Mounting Devices, Dimensions from the Side and Front Views

Surface-Mounting Devices with Integrated On-Site Operation Panel (Modular Device)



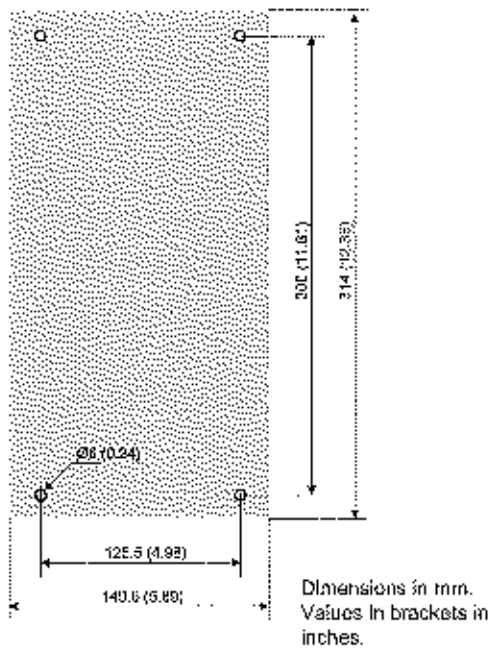
Dimensions in mm. Values in brackets in inches.

Attention!

- <sup>1)</sup> For FO cables, a minimum bending radius  $R = 50 \text{ mm}$  (1.97 inch) must be considered according to the type.
- <sup>2)</sup> For D-sub connector plugs, the axial length of the plug + cable bending radius must be considered. Minimum bending radius  $R = 50 \text{ mm}$  (1.97 Inch)

[hwscapn-200211-01.01 2\_en\_US]

Figure 6-14 1/3-Surface-Mounting Device with Integrated On-Site Operation Panel, Dimensions from the Side and Front Views

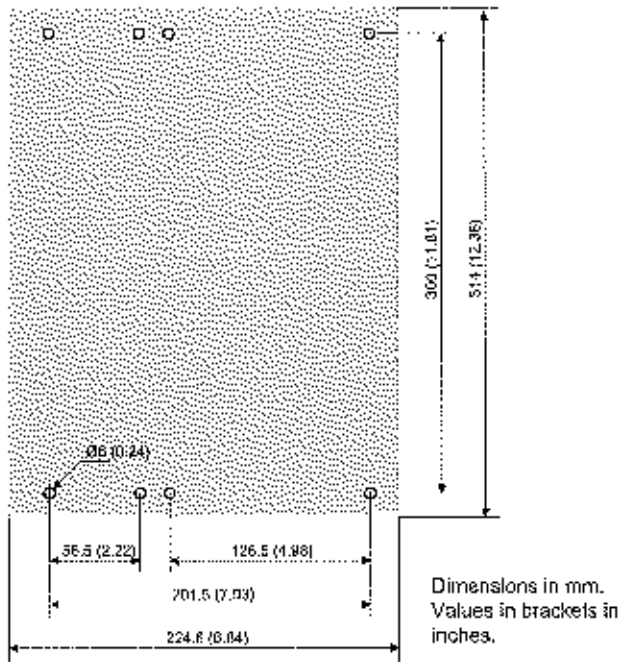


[hwscapn-200211-01.01 2\_en\_US]

Figure 6-15 Drilling Pattern of a 1/3 Surface-Mounting Device – 1st Device Row

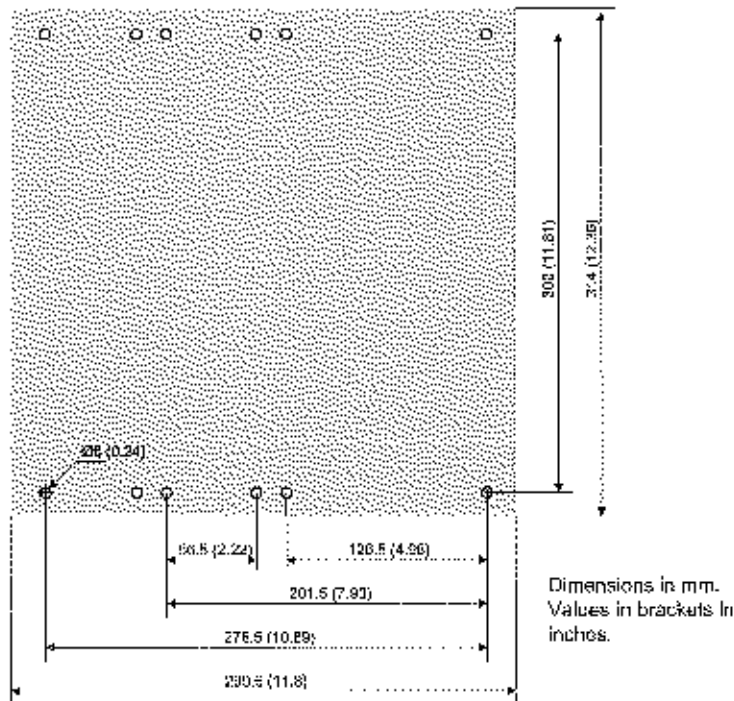
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*Handwritten signature*



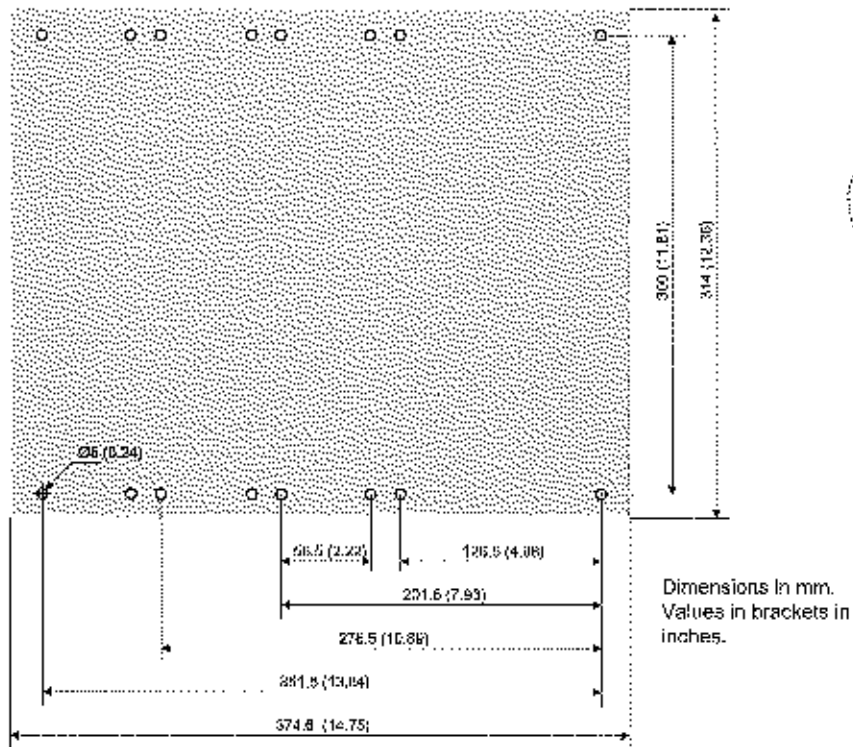
[Drawing 1, 2, rev. 1, en, US]

Figure 6-16 Drilling Pattern of a 1/2 Surface-Mounting Device – 1st Device Row



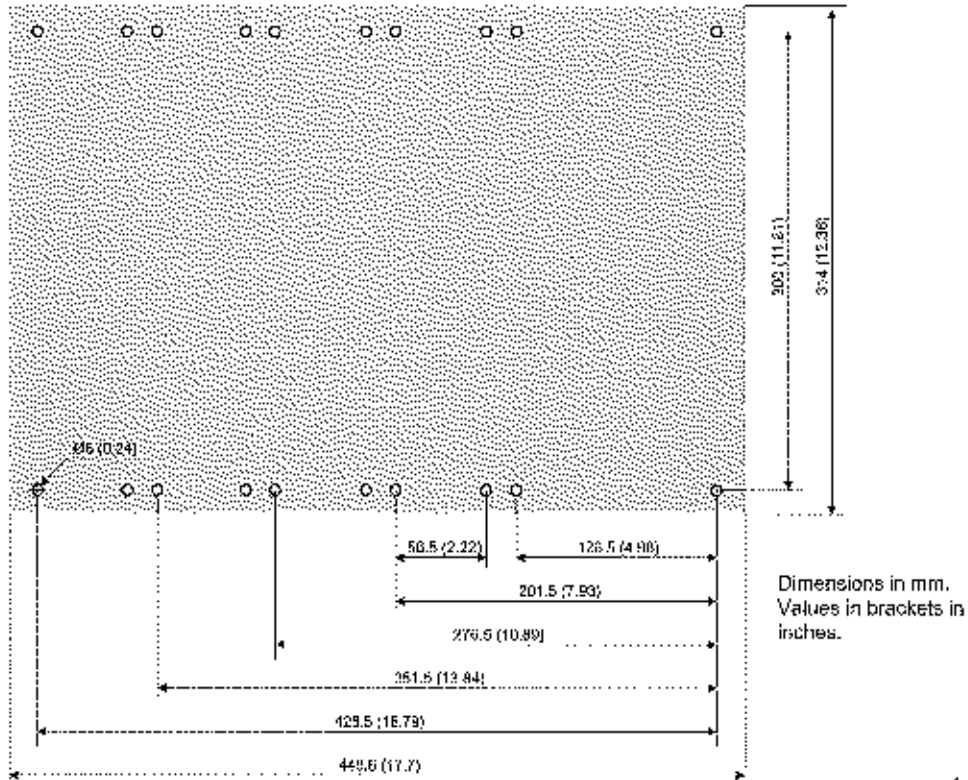
[Drawing 2, 3, rev. 1, en, US]

Figure 6-17 Drilling Pattern of a 2/3 Surface-Mounting Device – 1st Device Row



l:\svchnc\5\vol\_1\_en\_1\61

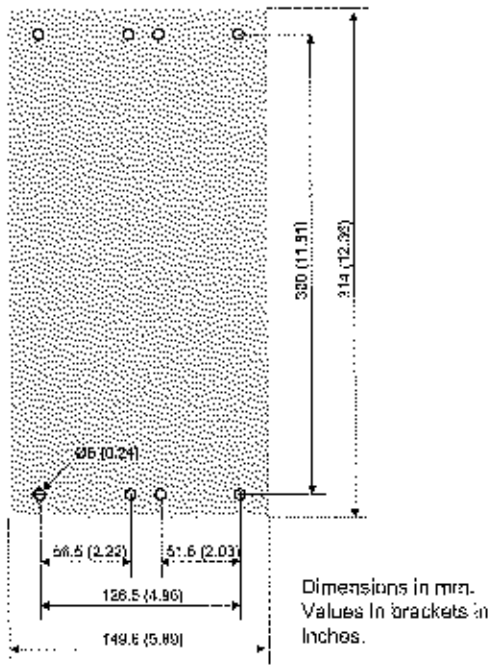
Figure 6-18 Drilling Pattern of a 5/6 Surface-Mounting Device – 1st Device Row



l:\svchnc\002110\en\_1\2\_en\_1\61

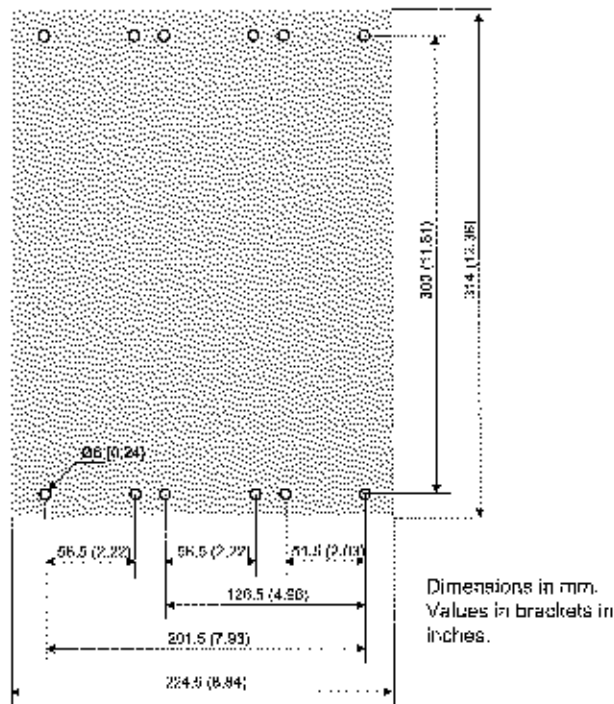
Figure 6-19 Drilling Pattern of a 1/1 Surface-Mounting Device – 1st Device Row

6.14 Assembly Dimensions



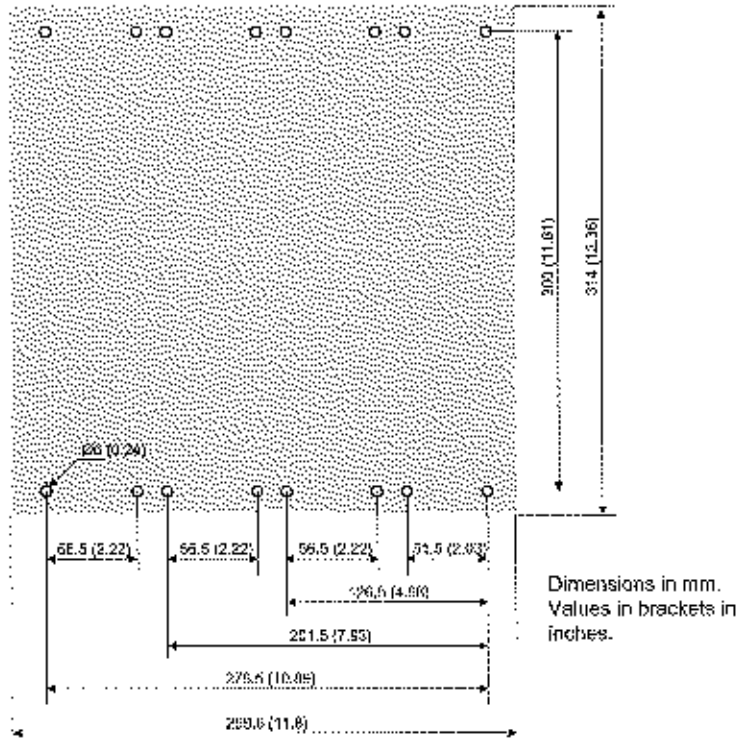
[3x\_12\_b2r\_13.dwg, 1.en\_US]

Figure 6-20 Drilling Pattern of a 1/3 Surface Mounting Device - 2nd Device Row



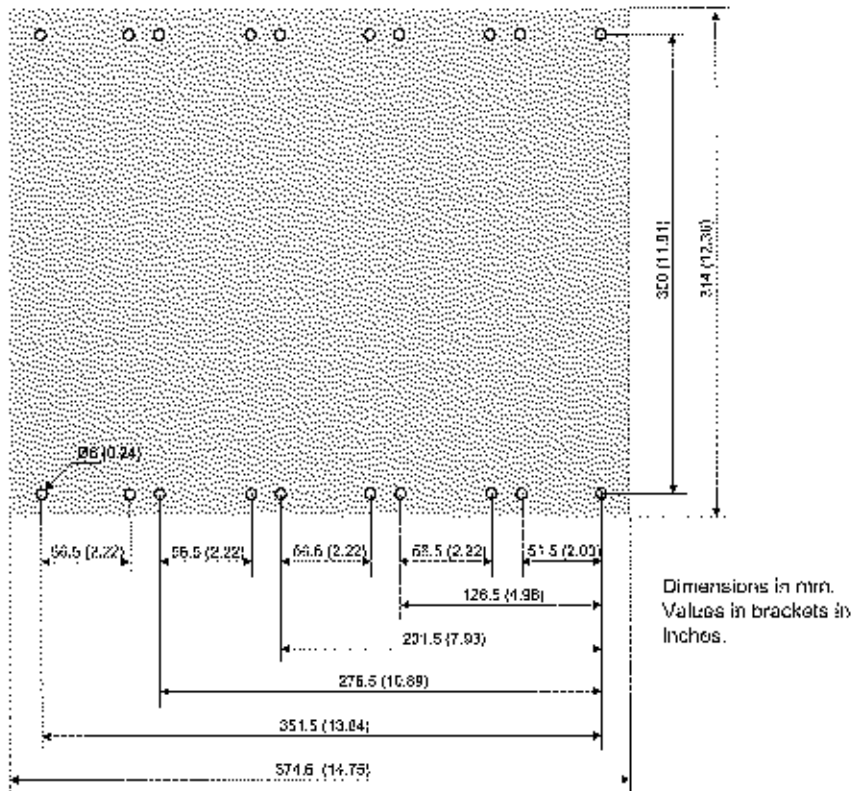
[3x\_12\_b2r\_1-2.dwg, 1.en\_US]

Figure 6-21 Drilling Pattern of a 1/2 Surface-Mounting Device – 2nd Device Row



File: 2\_Jury\_2-Row\_1\_en\_US

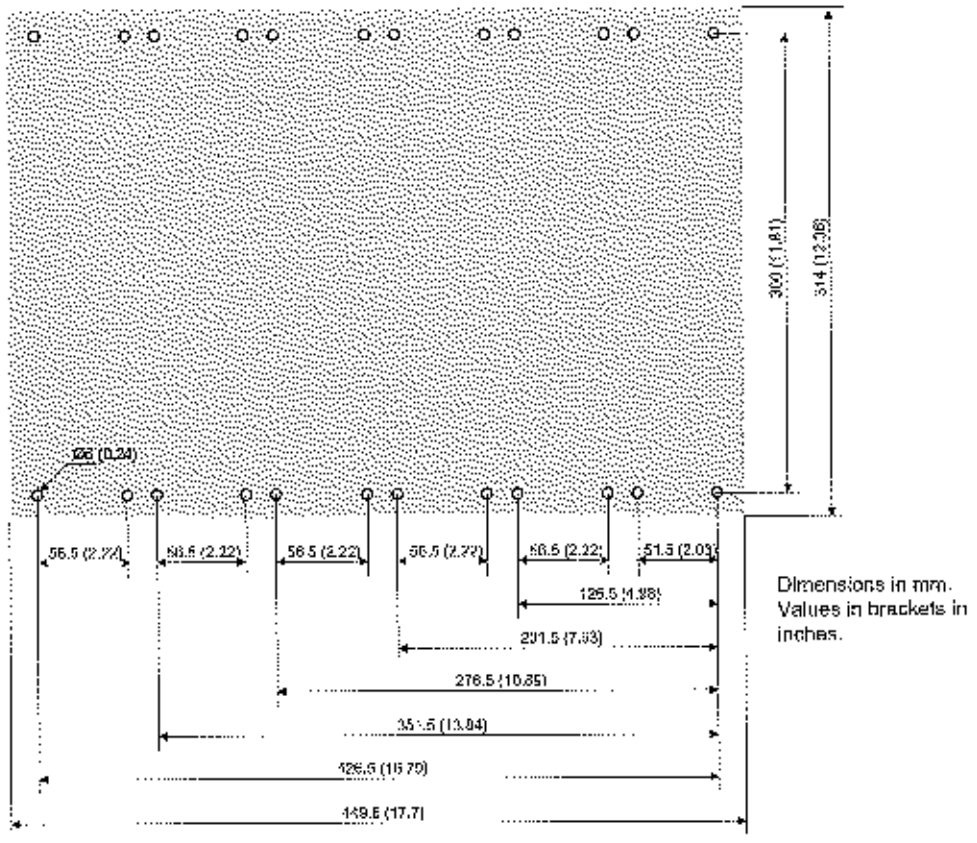
Figure 6-22 Drilling Pattern of a 2/3 Surface-Mounting Device – 2nd Device Row



File: 2\_Jury\_5-Row\_1\_en\_US

Figure 6-23 Drilling Pattern of a 5/6 Surface-Mounting Device – 2nd Device Row





low\_02\_0022\_1-1\_00\_1-01\_05

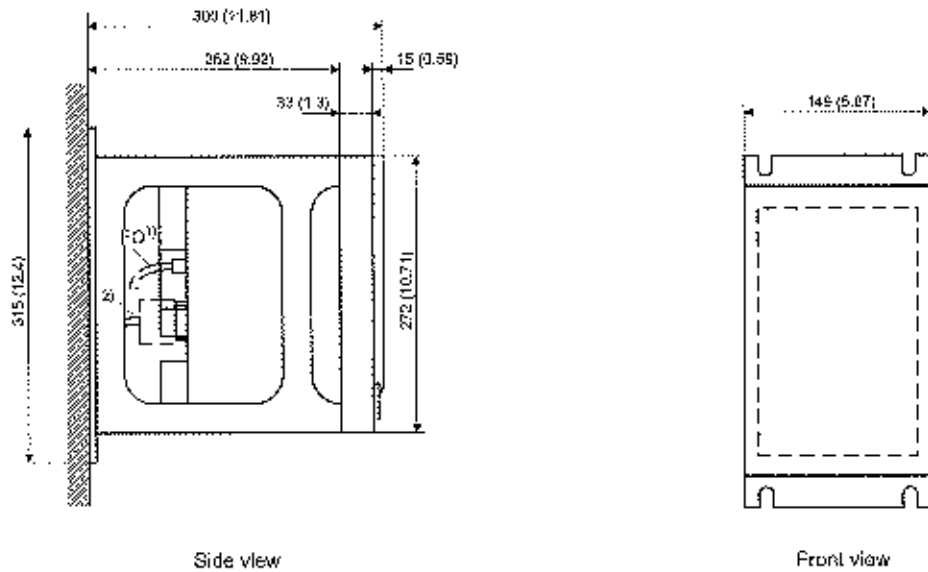
Figure 6-24 Drilling Pattern of a 1/1 Surface-Mounting Device – 2nd Device Row

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*Handwritten signature*

Surface-Mounting Devices with Integrated On-Site Operation Panel (Non-Modular Device)



Dimensions in mm. Values  
in brackets in inches.

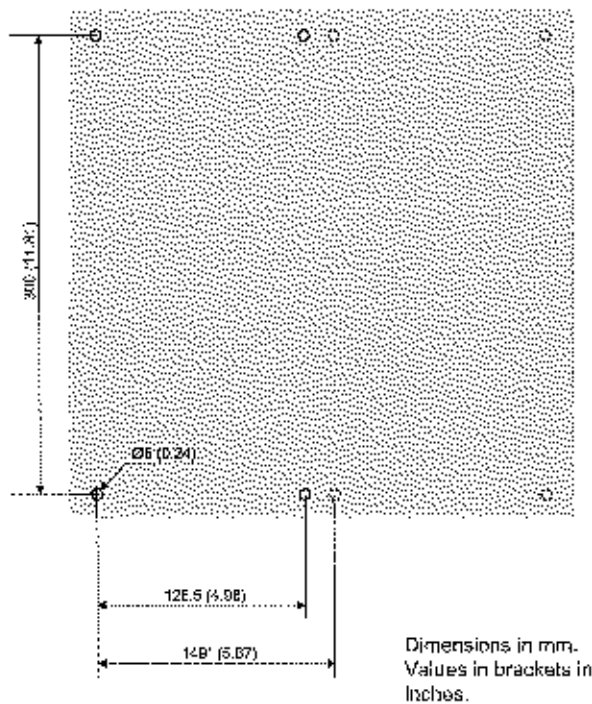
Attention!

- 1) For FO cables, a minimum bending radius  $R = 50$  mm (1.97 inch) must be considered according to the type.
- 2) For D-sub connector plugs, the axial length of the plug + cable bending radius must be considered.  
Minimum bending radius  $R = 50$  mm (1.97 inch)

1996-2006, 2017, 2018, 2019, 2020, 2021, 2022

Figure 6-25 Non-Modular Surface-Mounting Device with Integrated On-Site Operation Panel, Dimensions from the Side and Front Views

Surface-Mounting Devices with Integrated On-Site Operation Panel (Non-Modular Device)



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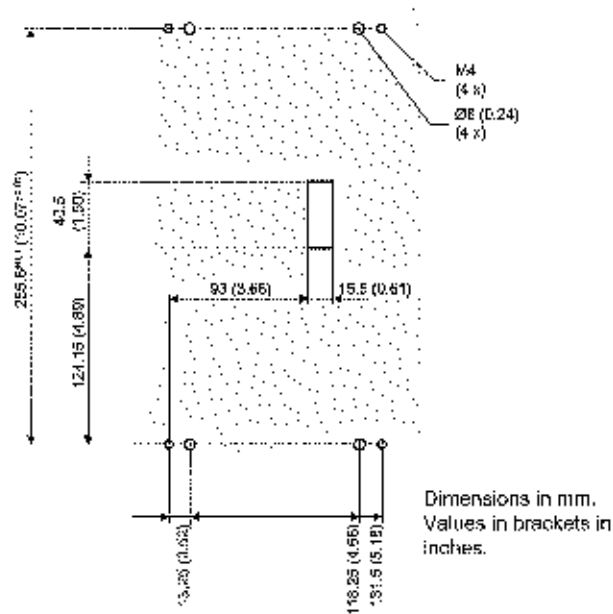
(DW: drilling non-modular surface-mounting with several consoles.), on\_US

Figure 6-26 Drilling Pattern of a Non-Modular Surface-Mounting Device - Several Consoles

\* The 149 mm are valid if several mounted consoles are to be mounted next to each other.

Surface-Mounting Devices with Detached On-Site Operation Panel

You can find more information on the drilling patterns for the devices in section *Surface Mounting Devices with Integrated On-Site Operation Panel (Modular Device)*, Page 211.

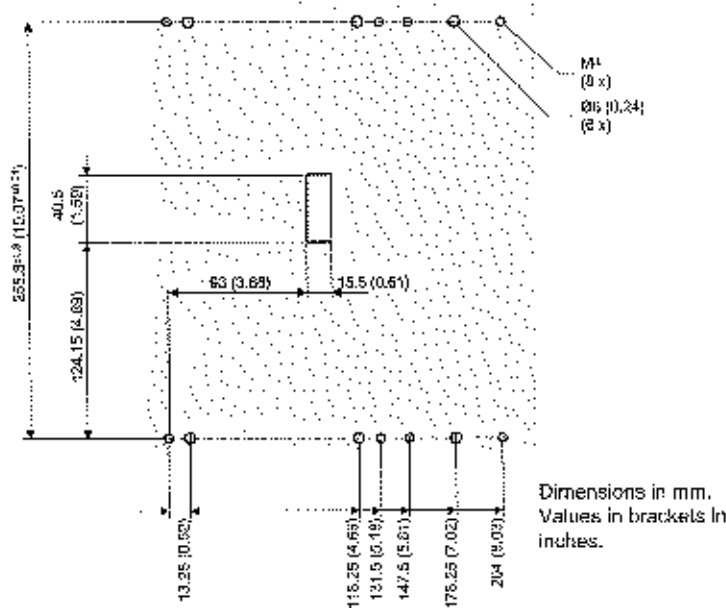


(DW: 21\_00ep\_1\_3\_1\_), on\_US

Figure 6-27 Drilling Pattern of the On-Site Operation Panel of the 1/3 Device

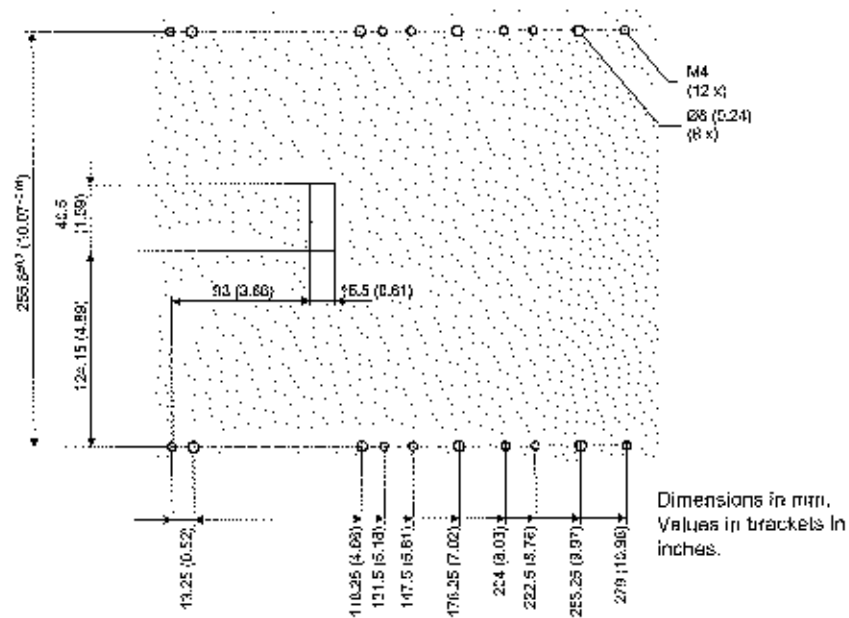
*Handwritten signature*

*Handwritten signature*



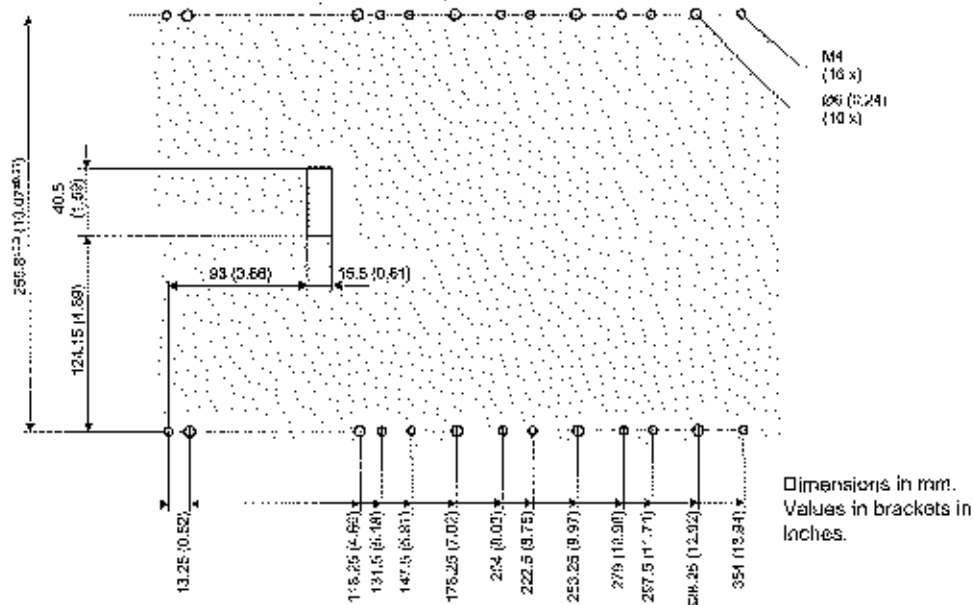
Idw 21-essop 1-2 1.01.15

Figure 6-28 Drilling Pattern of the On-Site Operation Panel of the 1/2 Device



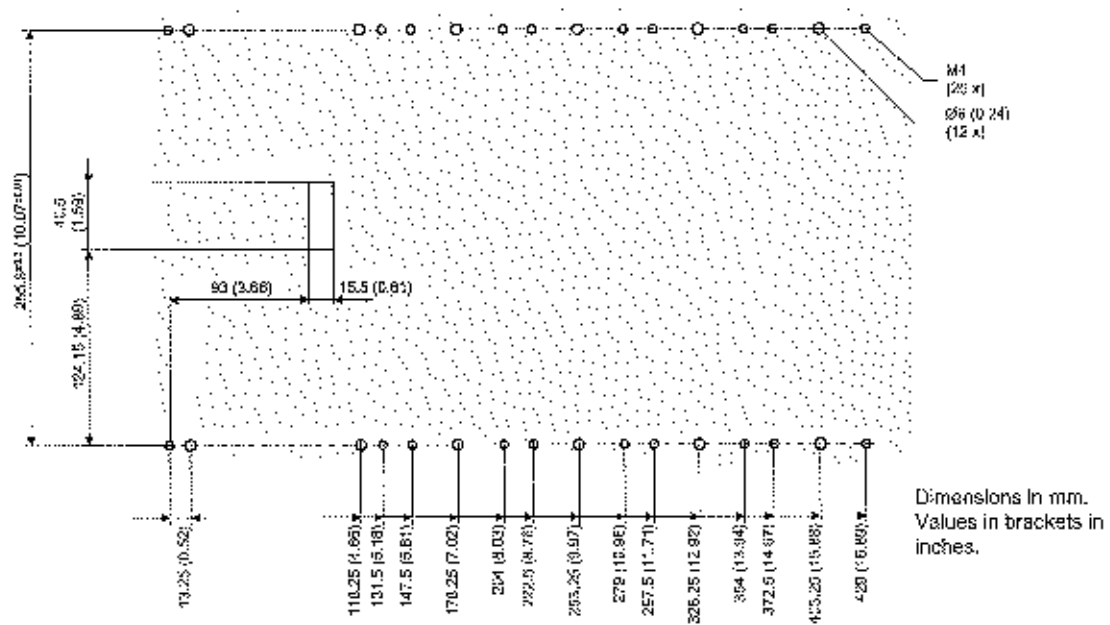
Idw 21-essop 23 1.01.15

Figure 6-29 Drilling Pattern of the On-Site Operation Panel of the 2/3 Device



low\_01\_000 5.6.1.en.05

Figure 6-30 Drilling Pattern of the On-Site Operation Panel of the 5/6 Device

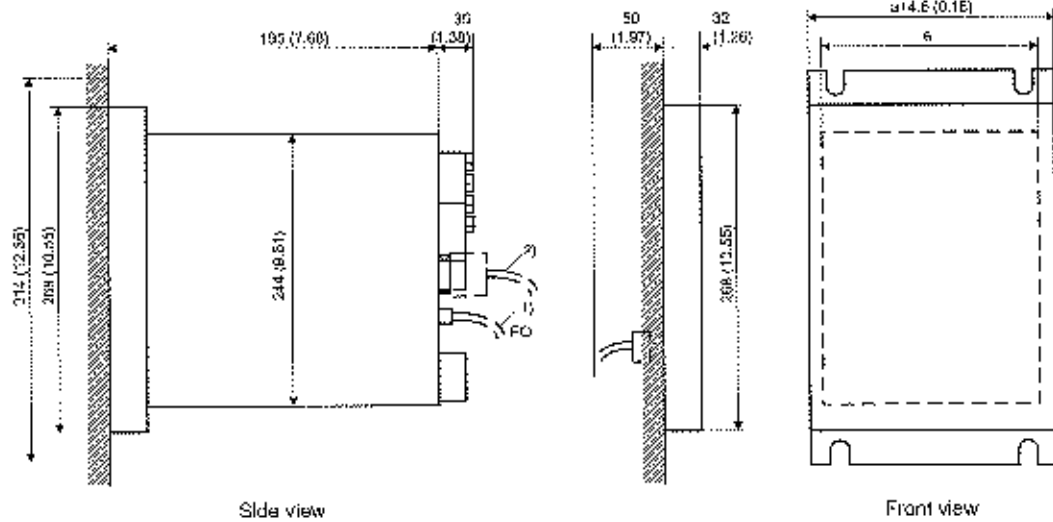


low\_01\_000 5.6.1.en.05

Figure 6-31 Drilling Pattern of the On-Site Operation Panel of the 1/1 Device

*AK*

*AK*



Dimensions in mm. Values in brackets in inches.

**Attention!**

- <sup>1)</sup> For FO cables, a minimum bending radius  $R = 50$  mm (1.97 inch) must be considered according to the type.
- <sup>2)</sup> For D-sub connector plugs, the axial length of the plug + cable bending radius must be considered.  
Minimum bending radius  $R = 50$  mm (1.97 inch)

[Drawing: 07031 01.01.2, en\_US]

Figure 6-32 Surface Mounting Device with Detached On-Site Operation Panel, Dimensions in the Side and Front Views















Refer to Table 6-7, for the variable dimension  $a$ .

The drilling patterns correspond to the figures Figure 6-15 to Figure 6-24.

The cable length for the detached operation panel is up to 5 m (196.85 in).

## 6.15 Modular Device Name Plate

In the following table, the name plate of a modular device is explained as an example. The name plate is located on the device.

<p>Made in Germany</p> <p style="text-align: center;"><b>SIEMENS</b></p> <p><b>7SJ85 Overcurrent Protection</b></p> <p> <math>I_{rated} = 1 A / 5 A \sim</math>      <math>I_{load} = 5 A / 240 V \sim</math>  <math>U_{rated} = 100 V - 125 V \sim</math>      <math>U_{aux} = 60 V - 250 V \sim</math>  <math>f_{rated} = 50 Hz / 60 Hz</math>      <math>U_{aux} = 100 V - 230 V \sim 45 - 65 Hz</math> </p> <p> <b>P1JXXXXXXXXXX</b>            Humboldtstr. 59      00  BMXXXXXXXXXX      90459 Nuremberg  Germany </p> <div style="float: right; text-align: right;">   BI    E, F  M, N, P    </div>	
7SJ85	Device type or, in the case of extension modules, designation of the module
Overcurrent Protection	Product group
$I_{rated}$ , $V_{rated}$ , $f_{rated}$	Rated values (which are specified when current and/or voltage transformers are placed on the printed circuit board assembly.)
$I_{load}$	This value is specified when relays are placed on the module.
$V_{aux}$	Values for the power supply
P1JXXXXXXXXXX	Technical Numbering System (TNS), maximum 18 digits
BMXXXXXXXXXX	Serial number
	QR code
	Insulation test of the voltage inputs, current inputs, and binary outputs with AC 2.5 kV
	Insulation test of the power supply ( $V_{aux}$ ) and binary inputs (BI) with DC 3.5 kV
	Insulation testing of all sealed-off interfaces with DC 700 V
E, F, M, N, P	Designation of the parts into which the plug-in modules are plugged.
	5 kV impulse voltage test (type test) in compliance with Class III
	European conformity mark
	Pay attention to the overall documentation for the device (Product information, Device manual, Hardware manual, Operating manual, and Communication protocol manuals)

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## 6.16 Name Plate of Non-Modular Devices (7xx82)

In the following table, the name plate of a non-modular device is explained as an example. The name plate is located on the device.

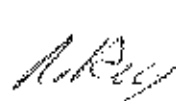
/SJ82	Device type
Overcurrent Protection	Product group
IO110 IO102	Designation of the I/O printed circuit board assemblies
$I_{\text{rated}}, V_{\text{rated}}, f_{\text{rated}}$	Rated values (which are specified when current and/or voltage transformers are placed on the printed circuit board assembly.)
$I_{\text{load}}$	This value is specified when relays are placed on the module.
$V_{\text{aux}}$	Values for the power supply
P1JXXXXXXXXXX	Technical Numbering System (TNS), maximum 18 digits
BMXXXXXXXXXX	Serial number
	QR code
	Insulation test of the voltage inputs, current inputs, and binary outputs with AC 2.5 kV
	Insulation test of the power supply ( $V_{\text{aux}}$ ) and binary inputs (BI) with DC 3.5 kV
	Insulation testing of all sealed-off interfaces with DC 700 V
E, F	Designation of the ports into which the plug-in modules are plugged.
	5 kV impulse voltage test [type test] in compliance with Class III
	European conformity mark
	Pay attention to the overall documentation for the device (Product information, Device manual, Hardware manual, Operating manual, and Communication protocol manuals)



### 6.17 Name Plate, UL Approval, Base Module and 1/3 Base Module

 <p>IND. CONT. EQ. 69CA  <math>T_{sur}</math>: max. 70°C normal op.  <math>P_{max}</math>: max. 100 VA                  Binary input <math>U_{max}</math> DC 250 V</p> <p>For additional output ratings see product information.</p>	
	UL approved for Canada and the USA
IND. CONT. EQ.	Industrial controller
69CA	Approval number
$T_{sur}$ : max. 70 °C normal op.	The ambient temperature must not exceed 70 °C or 158 °F during normal operation.
$P_{max}$ : max. 100 VA	Maximum power consumption of the device
For additional output ratings see product information	For additional output ratings see Product information.





### 6.18 Name Plate, UL Approval, Expansion Module

<p>IND. CONT. EQ. 69CA t<sub>surf</sub>: max. 70°C normal op.</p> <p>Listed accessory for use with manufacturer's protective relay.</p>	
	UL approved for Canada and the USA
IND. CONT. EQ.	Industrial controller
69CA	Approval number
t <sub>surf</sub> : max. 70 °C normal op.	The ambient temperature must not exceed 70 °C or 158 °F during normal operation.
Listed accessory for use with manufacturer's protection relay.	Approved accessory for use with a protection device from Siemens

## 6.19 Battery

Type	CR2032 Button cell Lithium
Voltage	3 V
Capacity	230 mAh
Average service life of the battery, unpowered after removal of protective film	At least 6 months
Service life of the battery in the activated state with protective film removed	10 years



### NOTE

After the **Battery fault** indication, you must replace the battery within 2 weeks. If ignored, data loss may occur.

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## 6.20 SDHC Memory Card



### NOTE

You can use only Siemens SDHC memory cards.

Capacity	16 GB <sup>16</sup>
Performance class	≥ Class 10
Temperature range	-40 °C to +85 °C
Flash type	SLC

### Dimensions

	Width x Height x Depth (in Inches)
SDHC memory card	24 mm x 32 mm x 2,1 mm (0.94 x 1.26 x 0.08)

<sup>16</sup> Usable capacity: Approx. 15 GB

## 6.21 Display Resolution

LCD Graphic Display (Liquid Crystal Display) Small	192 x 128 pixels
LCD Graphic Display (Liquid Crystal Display) Large	240 x 320 pixels

