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SIMATIC

Distributed I/O
Distributed I/O device 6DL2804-xxxxx

Hardware Installation Manual

08/2009
ASE00378896F-02
Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

![DANGER]
indicates that death or severe personal injury will result if proper precautions are not taken.

![WARNING]
indicates that death or severe personal injury may result if proper precautions are not taken.

![CAUTION]
with a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken.

![CAUTION]
without a safety alert symbol, indicates that property damage can result if proper precautions are not taken.

![NOTICE]
indicates that an unintended result or situation can occur if the corresponding information is not taken into account.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by personnel qualified for the specific task in accordance with the relevant documentation for the specific task, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

![WARNING]
Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be adhered to. The information in the relevant documentation must be observed.

Trademarks

All names identified by ® are registered trademarks of the Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.
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Introduction

1.1 Purpose of this documentation

This manual contains all the information that you will require to install and use the device. It is intended for persons who install the device mechanically, connect it electrically, set parameters and commission it, as well as for service and maintenance technicians.

1.2 History

The most important changes in the documentation compared with the previous edition are shown in the following table.

<table>
<thead>
<tr>
<th>Edition</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>01/2008</td>
<td>First edition</td>
</tr>
<tr>
<td>08/2009</td>
<td>• Troubleshooting</td>
</tr>
<tr>
<td></td>
<td>• New functions (see technical specifications)</td>
</tr>
<tr>
<td></td>
<td>• Update owing to new standards</td>
</tr>
</tbody>
</table>
1.2 History
2

Safety information

2.1 General information

This device left the factory in a perfect state with regard to safety. To maintain this status and to ensure safe operation of the device, note and follow the instructions and warnings in this manual.

2.2 Laws and directives

Observe the provisions of the test certification valid for your country.

Electrical connection in potentially explosive atmospheres

When making electrical connections, observe the national regulations and laws for hazardous areas valid for your country. In Germany, for example, the following apply:

- Ordinance on Industrial Safety and Health
- Standard relating to the installation of electrical systems in hazardous areas DIN EN 60079-14 (previously VDE 0165, T1)

2.3 Qualified personnel

Qualified personnel are people who are familiar with the installation, mounting, commissioning, and operation of the product. These people have the following qualifications:

- They are authorized, trained or instructed in operating and maintaining devices and systems according to the safety regulations for electrical circuits, high pressures and aggressive as well as dangerous media.
- For devices intended for use in explosive atmospheres: They are authorized, trained, or instructed in working on electrical circuits for systems in potentially explosive atmospheres.
- They are trained or instructed in maintenance and use of appropriate safety equipment according to the safety regulations.
- They should be trained in first aid.
2.4 Measures

For safety reasons, the following precautions must be observed:

---

### WARNING

**Type of protection "pressure-resistant encapsulation"**

Devices with "pressure-resistant encapsulation" protection may only be opened when the power has been disconnected.

**"Intrinsically safe" protection type**

"Intrinsically-safe" devices lose their certification as soon as they are operated on circuits which do not correspond with the test certification valid in your country.

**Type of protection "increased safety "e""**

Devices with the "increased safety "e"" type of protection must not produce sparks or electric arcs during operation under normal conditions. Electrical equipment and parts must not exceed a rated voltage of 11 kV.

**Protection type "energy-limited" nL (zone 2)**

Devices with the "energy-limited" type of protection may be connected and disconnected while in operation.

**Protection type "non-sparking" nA (zone 2)**

Devices with the "non-sparking" type of protection may only be connected and disconnected when the power is disconnected.

---

### WARNING

**Use in environments with aggressive and dangerous media**

The device can be operated both at high pressure and with aggressive and dangerous media. Therefore, improper use of this device may lead to serious injury and or considerable damage to property. Above all, it must be noted when the device has been in use and needs to be replaced.

---

### CAUTION

**Electrostatic sensitive devices**

This device contains electrostatic sensitive devices. ESD devices can be destroyed by voltages well below the threshold of human perception. These static voltages develop when you touch a component or electrical connection of a device without having discharged the static charges present on your body. The damage to a module as a result of overvoltage cannot usually be detected immediately. It may only become apparent after a long period of operation.
3 Description

3.1 Overview

The device is used as control, switch and distribution unit in hazardous areas (gas: zones 1, 2; dust: 21, 22; mining M2). The product satisfies the requirements of the following standards:

- EN/IEC 60079-0 General requirements,
- EN/IEC 60079-7 Increased safety,
- EN/ICE 60079-11 Intrinsic safety,
- EN/ICE 60079-18 Encapsulation,
- EN/IEC 61241-0 General requirements,
- EN/ICE 61241-1 Protection by means of enclosure.

The device consists of the wall-mounted enclosure and the components installed in it, for each of which there are separate certificates. The installed components include in particular:

- ET200iSP components
- FO coupler
- Control and signaling devices
- Fuses
- Heating
- Lightning protection components
- Temperature transducer
- electro-pneumatic components from the firm Bürkert)
3.2 Area of application

- The distributed I/O device is suitable for installation and operation of distributed I/O, for example ET 200iSP in hazardous areas of Zone 1 + 2 (gas), Zones 21 + 22 (dust), and in mining (M2).
- The device consists of the wall-mounted enclosure (6DL2804-0xxxx) and the installed electronic components.
- The device has been tested and certified for use in these hazardous areas.

Note
Product information on the Internet
You will find further information on installing and connecting the electronic components, for example in:
- The ET 200iSP manual (A5E00247482);
- Principle of explosion protection manual (6ES7398-8RA00-8BA0).

This information is available on the Internet on the Siemens home page.

3.3 Product features

The device consists of a separately certified wall-mounted enclosure (6DL2804-0xxxx). The enclosure is made of stainless steel, has degree of protection IP65 and is intended for wall mounting.

The device is intended for the installation of control and measuring devices such as:

- Distributed I/O systems:
  - ET 200iSP for use in Zones 1 and 2 (gas), Zones 21 and 22 (dust), and M2 (mining).
  - ET 200S and ET 200M for use in Zone 2 and Zone 22,
- Modular electro-pneumatic automation system AirLine Ex (type 8650, from the firm Bürkert),
- Buffer stages and safety barriers
- Relays, buffer elements and circuit breakers,
- Separate terminals for intrinsically safe and non-intrinsically safe circuits,
- Command and signaling devices,
- Temperature sensors,
- Heating and thermostat,
- Lightning protection components.
- FO coupler
3.4 Structure of the type designation

The device has type designation:

6DL2804 - xxxxx

- = 0 Permissible operating temperature range -20°C or higher KLE plastic, black
- = 1 permissible operating temperature range -40°C or higher KLE metal
- = 2 permissible operating temperature range -20°C or higher KLE plastic, blue
- = 6 permissible operating temperature range -20°C or higher KLE metal, for mining

- = 1 with 1 row KLE (mining)
- = 2 with 2 rows KLE (mining)
- = 3 with 3 rows KLE M16
- = 4 with 3 rows KLE M20
- = 5 with 5 rows KLE M16
- = 6 with 5 rows KLE M20

- = D Size 650 x 450 x 230 mm (W x H x D)
- = E Size 950 x 450 x 230 mm (W x H x D)

- = A Zone 1 + 2
- = D Zone 21 + 22
- = M Mining M2

- = 1 Installation of components without electro-pneumatic system
- = 2 Installation of components without electro-pneumatic system (firm Bürkert)
3.5 Details of the enclosure

Wall supports
The wall supports are screwed to the enclosure with M6 screws. These ship with the enclosure. To secure the enclosure, use screws and retaining washers with an 8 mm diameter.

Grounding connection
The grounding connection screw M6 is used to connect the protective cable; here a cable with a cable lug (suitable for M6 screws) must be used. Depending on the cable lug, cable cross-sections up to 25 mm² can be connected. To avoid the screw becoming loose, make sure that you use the retaining washer. Connecting the grounding cable avoids static charge which is important, in particular, for dust explosion protection.

Cable and wiring entries (CWE)
- Ex-certified cable and wiring entries (degree of protection at least IP65) from various manufacturers and in various sizes can be fitted.
- The manufacturer's instructions regarding the tightening torque must be observed (see description of manufacturer in enclosure)
- Use the torque of the clamping screw when connecting the terminal of the cable.
- For additional information and technical specifications, refer to the respective manufacturer documentation, in particular:
  - Technical specifications regarding clamping ranges for cable
  - Notes on use, installation, mounting, commissioning and maintenance

**NOTICE**
Use the supplied red dummy plugs to close any cable glands not in use. Only then is it ensured that the degree of protection is retained.

Equipotential bonding rail
The equipotential bonding rail (10 x 3 mm) with terminals (up to 4 mm²) is used to contact the cable shields. Alternatively, other terminals can also be used here, for example, KLBüCo of the firm Weidmüller (not included in the scope of delivery)
Connect the equipotential bonding wire to the bonding terminal (0.75 to 35 mm²).
Short lines connect the equipotential bonding rail to the enclosure. In cases where the ground and equipotential bonding conductor are installed separately, this connection can be disconnected.
4.1 Transport and storage

Pack and store the enclosure for transport or storage so that there can be no undue strain on the enclosure, particularly on its top cover. If there is too much strain on the top cover of the enclosure, this can damage the seal.

The transport locks between cover and enclosure are no longer needed after the assembly of the enclosure.
4.2 Mounting the enclosure

The enclosure is intended for wall mounting and should be secured with the wall supports supplied with it. Use the following template for the drilling.

![Drilling template for securing the device](image)

- B = 950 mm for 6DL2804-xxDxx
- B = 650 mm for 6DL2804-xxExx

**Figure 4-1** Drilling template for securing the device

---

**NOTICE**

**Reduction of the degree of protection**

If the device is not installed horizontally, this may lead to a reduction in the degree of protection. Furthermore, the operating ambient temperature is 30°C lower with vertical installation than with horizontal installation. The temperature information on the type plate always applies to horizontal installation. Therefore, always install the device horizontal, in such a way that the cable entries face downward.

---

**NOTICE**

- Remember the maximum thermal load on the cables and wiring. The degree of protection is only ensured when suitable cables and wires are used and correctly installed.
- Note that it is only permitted to connect and disconnect the cables to the power supply module if the module has been powered down.
4.3 Installing the enclosure outdoors

Under normal environmental conditions, degree of protection IP65 prevents ingress of dust or water into the interior of the enclosure. Take the following additional protective measures depending on the environment of the installation location:

- Avoid subjecting the enclosure permanently to water (for example, snow).
- Remember that direct sunlight can cause excessive temperatures in the interior of the enclosure. In locations where this can occur, provide additional protection with some form of roofing.
- Remember that opening the enclosure at ambient temperatures below 0 °C can damage the seal.
- If you want to use the device in an aggressive environment, check whether this is possible with the material in question.
4.4 Optional installation components

The following separately certified components can be installed optionally:

- **Terminals:**
  - Ex e for the connection of cable cross-sections >4 mm,
  - Ex i for wiring of intrinsically safe signals (blue); these may only be used for Ex i signals.

- **Temperature sensors:**
  For monitoring the temperature inside the enclosure,

- **Relays, disconnectors and fuses:**
  For interrupting, switching or protecting individual signal circuits.

- **Command and signaling devices:**
  For manual switching (control switch) or optical display (indicator lamps) in the enclosure wall.

- **FO couplers:**
  For connecting the PROFIBUS of the ET 200iSP by means of FO cable

- **Lightning protection components:**
  For protecting the ET 200iSP components from lighting strikes when the enclosure is installed in exposed locations.

- **Heating:**
  To prevent condensation at low temperatures or to allow use in temperatures down to -30 °C,

**Note**

Note that if the enclosure is switched at temperatures in the region of -30°C, this can only be re-started after approx. 1 hour. The heating requires this period to heat the enclosure up to over -20°C, so that the installed components can be operated within their operating temperature range.

- **Modular electro-pneumatic automation system AirLine Ex (type 8650, from the firm of Bürkert):**
  Connected to the ET 200iSP components to form an automation system for processing electrical and pneumatic variables.

**Note**

If components with a supply voltage of 120 / 230 VAC are installed, you must secure these devices according to DIN 41571 and/or IEC 60127.
 Maintenance and servicing

- Select maintenance cycles so that problems can be recognized in good time. Check the following:
  - The device for visible damage
  - That the permitted temperatures are not exceeded
  - That the cables are securely connected,
  - Damage to cable and wiring entries
  - Enclosure gaskets for cracks and damage
  - Adhesion of the gasket to the enclosure cover

- If there is damage to the enclosure, there is a risk that the degree of protection is no longer valid. In some cases, this might necessitate replacement of the enclosure.

- If there is damage to cable and wiring entries, only replacement with original parts is permitted.

- Check regularly, once a year, that the cable and line entries are securely in place and properly sealed. Check the tightening torques.
  If necessary, re-tighten the glands to the torques specified by the manufacturer. For information on the torques, refer to the respective manufacturer documentation.
## Technical specifications

<table>
<thead>
<tr>
<th>6DL2804-</th>
<th>1/2xDxx</th>
<th>1/2xExx</th>
<th>1/2xDxx</th>
<th>1/2xDxx</th>
<th>1MDxx</th>
<th>1MExx</th>
</tr>
</thead>
<tbody>
<tr>
<td>Test certificate type of protection &quot;e&quot;</td>
<td>BVS 04 ATEX E 157 II 2(1) G Ex e d [ib/ia] IIB/IIC T4 and/or II 2(1) G Ex e d m [ib/ia] IIB/IIC T4 II 2 D Ex tD A21 IP 65 T130°C</td>
<td>BVS 04 ATEX E 157 I M2 Ex e d [ib/ia] l and/or I M2 Ex e d m [ib/ia] l</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Degree of protection</td>
<td>IP65</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dimensions: W x H x D</td>
<td>650 x 450 x 230</td>
<td>950 x 450 x 230</td>
<td>650 x 450 x 230</td>
<td>950 x 450 x 230</td>
<td>650 x 450 x 230</td>
<td>950 x 450 x 230</td>
</tr>
<tr>
<td>Material</td>
<td>Stainless steel: DIN 1.4404 1.5 mm</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight</td>
<td>30 kg</td>
<td>43 kg</td>
<td>31 kg</td>
<td>43 kg</td>
<td>35 kg</td>
<td>39 kg</td>
</tr>
<tr>
<td>Cover seal</td>
<td>Silicone rubber (or PU foam)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cable entries for</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Voltage (cable-Ø in mm)</td>
<td>2 M32 Ex e (13 to 21)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bus (cable-Ø in mm)</td>
<td>4 M20 Ex e (6 to 13)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Signals (cable-Ø in mm)</td>
<td>M16 (4 to 9)</td>
<td>M16 (4 to 9)</td>
<td>M20 (6 to 13)</td>
<td>M20 (6 to 13)</td>
<td>M32 (18 to 21)</td>
<td>M32 (18 to 21)</td>
</tr>
<tr>
<td>3 / 1 row (1Mxxx)</td>
<td>39</td>
<td>66</td>
<td>36</td>
<td>57</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>5 / 2 rows (1Mxxx)</td>
<td>65</td>
<td>110</td>
<td>60</td>
<td>95</td>
<td>12</td>
<td>18</td>
</tr>
<tr>
<td>Equipotential bonding rail</td>
<td>3 x 10 mm Cu</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bonding terminals</td>
<td>0.75-35mm² Ex e for equipotential bonding wire, 4mm² for shield connection</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other terminals</td>
<td>Up to max. 240mm² depending on the type of terminal used</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ground conductor</td>
<td>M6 screw, at least 16mm²</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated voltage</td>
<td>These values depend on the installed components.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rated current</td>
<td>These values depend on the installed components.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating temperature range</td>
<td>-20°C to +xx°C ²)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6DT2804-1/2xxxx Enclosure with installation ET200iSP/ electro-pneumatic System</td>
<td>-20°C to +xx°C ²)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6DT2804-1/2xxx1 Enclosure with installation and heating (option)</td>
<td>-30°C to +xx°C ²)³)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Permissible humidity</td>
<td>max. 95%</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Distributed I/O device 6DL2804-xxxxx
Hardware Installation Manual, 08/2009, A5E00378896F-02
1) The actual electrical values depend on the electrical equipment installed. The manufacturer specifies the final values within the framework of these limit values.

2) The specific permissible operating temperature range is valid only if the enclosure is installed horizontally. A vertical installation can reduce the maximum permissible temperature (for information on this refer also to the ET200iSP manual). The maximum operating temperature is determined depending on the power loss of the installed components and specified on the type plate (see heat observation to this).

Not that the operating temperature of the overall installation will have to be checked again if additional components are fitted subsequently.

3) The temperature range of -30°C is valid only for the enclosure types 6DL2804-1/2xxx1 (cable entries of metal). It is necessary to install a heating ≥50 W for this.
Ground points in the enclosure

Figure 7-1  Fixed and detachable connections to ground and equipotential bonding rail
Ground points in the enclosure
8.1 Installation: ET200iSP components

Figure 8-1 Distributed I/O device 6DL2804-xxxxx with installation of ET 200iSP
8.2 Installation: Heating

1. Heating at least 50W, type and size to be determined depending on requirement
2. Thermostat
3. Supply terminals for heating AC230V (AC110V)
   - external protection 16A according to DIN 41571 and/or IEC 60127

Figure 8-2  Distributed I/O device with installation of heating
8.3 Installation: FO conductor

† FO coupler, for example of firm Bartec or firm Stahl
‡ Terminals for supply and distribution, size depends on external connection cable

Figure 8-3 Distributed I/O device with installation of FO coupler
Dimension drawings

8.3 Installation: FO conductor
ESD Guidelines

What does ESD mean?

All electronic modules are equipped with large-scale integrated ICs or components. Due to their design, these electronic elements are highly sensitive to overvoltage, and thus to any electrostatic discharge.

The electrostatic sensitive components/modules are commonly referred to as ESD devices. This is also the international abbreviation for such devices.

ESD modules are identified by the following symbol:

<table>
<thead>
<tr>
<th>CAUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ESD devices can be destroyed by voltages well below the threshold of human perception. These static voltages develop when you touch a component or electrical connection of a device without having discharged the static charges present on your body. The electrostatic discharge current may lead to latent failure of a module, that is, this damage may not be significant immediately, but in operation may cause malfunction.</td>
</tr>
</tbody>
</table>
Electrostatic charging

Every person without a conductive connection to the electrical potential of his/her surroundings can be electrostatically charged.

The figure below shows the maximum electrostatic charge that can build up on a person coming into contact with the materials indicated. These values correspond to IEC 801-2 specifications.

![Electrostatic voltages on an operator](image)

Figure 9-1 Electrostatic voltages on an operator

Basic protective measures against electrostatic discharge

- **Ensure good equipotential bonding:**
  When handling electrostatic sensitive devices, ensure that your body, the workplace and packaging are grounded. This prevents electrostatic charge.

- **Avoid direct contact:**
  As a general rule, only touch electrostatic sensitive devices when this is unavoidable (e.g. during maintenance work). Handle the modules without touching any chip pins or PCB traces. In this way, the discharged energy can not affect the sensitive devices.

Discharge your body before you start taking any measurements on a module. Do so by touching grounded metallic parts. Always use grounded measuring instruments.
Service and support

Local information
If you have questions about the products described in this document, you can find help at:
http://www.siemens.com/automation/partner

Technical documentation for SIMATIC products
Further documentation for SIMATIC products and systems can be found at:
http://www.siemens.de/simatic-tech-doku-portal

Easy shopping with the A&D Mall
Catalog & online ordering system: http://www.siemens.com/automation/mall

Training
All the training options are listed at: http://www.siemens.com/sitrain
Find a contact at: Phone: +49(911) 895-3200

Technical support
Tel +49 180 5050 222
Fax +49 180 5050 223
http://www.siemens.com/automation/service
You will find support request web form at:
http://www.siemens.de/automation/support-request
If you contact customer support, please have the following information available for the technician:
• Order No. (MLFB) of the device

Online support
Product information, support and service, right through to the technical forum, can be found at:
http://www.siemens.com/automation/service&partner
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