Safety Instructions
Solicap S  FTI77

II 1 D Ex ia IIIC T80°C T₂₀₀ 130°C Da
II 1/2 D Ex ia IIIC T80°C T₂₀₀ 130°C Da/Db
II 1/2 D Ex ia/tb IIIC T90°C Da/Db
## Solicap S FTI77

### Table of contents

- Associated documentation ........................................ 4
- Supplementary documentation ......................................... 4
- Manufacturer's certificates ........................................... 4
- Manufacturer address .................................................. 4
- Other standards .......................................................... 4
- Extended order code ..................................................... 5
- Safety instructions: General ........................................... 8
- Safety instructions: Special conditions ............................... 8
- Safety instructions: Installation ....................................... 9
- Safety instructions: Zone 20 .......................................... 11
- Temperature tables ...................................................... 12
- Connection data ........................................................ 15
Associated documentation

This document is an integral part of the following Operating Instructions:
BA00381F/00

Supplementary documentation

Explosion-protection brochure: CP00021Z/11

The Explosion-protection brochure is available:
- In the download area of the Endress+Hauser website:
  www.endress.com -> Downloads -> Brochures and Catalogs ->
  Text Search: CP00021Z
- On the CD for devices with CD-based documentation

Manufacturer's certificates

UK Declaration of Conformity

Declaration Number:
UK_00228

The UK Declaration of Conformity is available:
In the download area of the Endress+Hauser website:
www.endress.com -> Downloads -> Declaration ->
Type: UKCA Declaration -> Product Code: ...

UKCA type-examination certificate

Certificate number:
CML 21UKEX2457

List of applied standards: See UK Declaration of Conformity.

Manufacturer address

Endress+Hauser SE+Co. KG
Hauptstraße 1
79689 Maulburg, Germany

Address of the manufacturing plant: See nameplate.

Other standards

Among other things, the following standards shall be observed in their current version for proper installation:
- IEC/EN 60079-14: "Explosive atmospheres - Part 14: Electrical installations design, selection and erection"
- EN 1127-1: "Explosive atmospheres - Explosion prevention and protection - Part 1: Basic concepts and methodology"
The extended order code is indicated on the nameplate, which is affixed to the device in such a way that it is clearly visible. Additional information about the nameplate is provided in the associated Operating Instructions.

### Structure of the extended order code

```
FTI77   -   *************   +   A*B*C*D*E*F*G*..
(Device type)   (Basic specifications)   (Optional specifications)
```

* = Placeholder

At this position, an option (number or letter) selected from the specification is displayed instead of the placeholders.

### Basic specifications

The features that are absolutely essential for the device (mandatory features) are specified in the basic specifications. The number of positions depends on the number of features available.

The selected option of a feature can consist of several positions.

### Optional specifications

The optional specifications describe additional features for the device (optional features). The number of positions depends on the number of features available. The features have a 2-digit structure to aid identification (e.g. JA). The first digit (ID) stands for the feature group and consists of a number or a letter (e.g. J = Test, Certificate). The second digit constitutes the value that stands for the feature within the group (e.g. A = 3.1 material (wetted parts), inspection certificate).

More detailed information about the device is provided in the following tables. These tables describe the individual positions and IDs in the extended order code which are relevant to hazardous locations.

### Extended order code: Solicap S

The following specifications reproduce an extract from the product structure and are used to assign:
- This documentation to the device (using the extended order code on the nameplate).
- The device options cited in the document.

**Device type**

FTI77
## Basic specifications

### Position 1 (Approval)

<table>
<thead>
<tr>
<th>Selected option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FTI77 B</td>
<td>ATEX Ex ia/tc III C T90°C Da/Dc</td>
</tr>
<tr>
<td>FTI77 C</td>
<td>ATEX Ex ia/tb III C T90°C Da/Db</td>
</tr>
<tr>
<td>FTI77 F</td>
<td>ATEX II 1 D, II 1/2 D, II 1/3 D Ex ia III C T80°C T200 130°C Da, Da/Db, Da/Dc</td>
</tr>
</tbody>
</table>

### Position 2 (Application)

<table>
<thead>
<tr>
<th>Selected option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FTI77 1</td>
<td>Solid, fine-grained</td>
</tr>
<tr>
<td>FTI77 2</td>
<td>Solid, coarse-solids</td>
</tr>
</tbody>
</table>

### Position 3 (Inactive Length L3)

<table>
<thead>
<tr>
<th>Selected option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FTI77 A</td>
<td>Not selected</td>
</tr>
<tr>
<td></td>
<td>B, C, L, M</td>
</tr>
<tr>
<td></td>
<td>E, F, G, N, P, R</td>
</tr>
<tr>
<td></td>
<td>H, S</td>
</tr>
<tr>
<td></td>
<td>..... mm/in, steel</td>
</tr>
<tr>
<td></td>
<td>..... mm/in, 316L</td>
</tr>
<tr>
<td></td>
<td>..... mm/in, 316L+125mm/5in active build-up protection, 316L</td>
</tr>
</tbody>
</table>

### Position 4, 5 (Active Probe Length L1)

<table>
<thead>
<tr>
<th>Selected option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FTI77 Ax, Ex</td>
<td>..... mm/in, sword, steel</td>
</tr>
<tr>
<td>FTI77 Bx, Fx</td>
<td>..... mm/in, sword, 316L</td>
</tr>
<tr>
<td>FTI77 Cx, Gx</td>
<td>..... mm/in, ..... mm/in rope, steel zinc coated, tension weight steel</td>
</tr>
<tr>
<td>FTI77 Dx, Hx</td>
<td>..... mm/in, ..... mm/in rope, 316, tension weight 316L</td>
</tr>
</tbody>
</table>
### Position 9 (Electronics, Output)

<table>
<thead>
<tr>
<th>Selected option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FTI77 A&lt;sup&gt;1)&lt;/sup&gt;</td>
<td>FEI51; 2-wire 19-253VAC + UK marking</td>
</tr>
<tr>
<td>FTI77 C&lt;sup&gt;1)&lt;/sup&gt;</td>
<td>FEI52; 3-wire PNP 10-55VDC + UK marking</td>
</tr>
<tr>
<td>FTI77 E&lt;sup&gt;1)&lt;/sup&gt;</td>
<td>FEI54; relay DPDT, 19-253VAC, 19-55VDC + UK marking</td>
</tr>
<tr>
<td>FTI77 F</td>
<td>FEI55; 8/16mA, 11-35VDC + UK marking</td>
</tr>
<tr>
<td>FTI77 G&lt;sup&gt;2)&lt;/sup&gt;</td>
<td>FEI57S; 2-wire PFM + UK marking</td>
</tr>
<tr>
<td>FTI77 H&lt;sup&gt;2)&lt;/sup&gt;</td>
<td>FEI58; NAMUR+test button (H-L signal) + UK marking</td>
</tr>
<tr>
<td>FTI77 Y</td>
<td>Special version: FEI50H</td>
</tr>
</tbody>
</table>

<sup>1)</sup> Only in connection with supply circuit 'Non-intrinsically safe'

<sup>2)</sup> Only in connection with supply circuit 'Intrinsically safe Ex ia'

### Position 10 (Housing)

<table>
<thead>
<tr>
<th>Selected option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FTI77 1</td>
<td>F15 316L hygiene IP66/67 NEMA4X</td>
</tr>
<tr>
<td>FTI77 3</td>
<td>F17 Alu IP66/67 NEMA4X</td>
</tr>
<tr>
<td>FTI77 4</td>
<td>F13 Alu IP66 NEMA4X + gas-tight probe seal</td>
</tr>
<tr>
<td>FTI77 5</td>
<td>T13 Alu IP66 NEMA4X + gas-tight probe seal + separate conn. compartment</td>
</tr>
<tr>
<td>FTI77 6</td>
<td>F27 316L IP66/67 NEMA6P + gas-tight probe seal</td>
</tr>
</tbody>
</table>

### Position 12 (Type of probe)

<table>
<thead>
<tr>
<th>Selected option</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>FTI77 1</td>
<td>Compact</td>
</tr>
<tr>
<td>FTI77 2, 3, 4, 5</td>
<td>..... mm/in L4 cable &gt; separate enclosure</td>
</tr>
</tbody>
</table>

**Optional specifications**

No options specific to hazardous locations are available.
Safety instructions:
General
- Staff must meet the following conditions for mounting, electrical installation, commissioning and maintenance of the device:
  - Be suitably qualified for their role and the tasks they perform
  - Be trained in explosion protection
  - Be familiar with national regulations
  - Install the device according to the manufacturer's instructions and national regulations.
  - Do not operate the device outside the specified electrical, thermal and mechanical parameters.
  - Avoid electrostatic charging:
    - Of plastic surfaces (e.g. enclosure, sensor element, special varnishing, attached additional plates, ..)
    - Of isolated capacities (e.g. isolated metallic plates)

Safety instructions:
Special conditions
Permitted ambient temperature range at the electronics enclosure, permitted process temperature:
$-50 \, ^\circ C \leq T_a \leq +70 \, ^\circ C$
- Observe the information in the temperature tables.
- In the event of additional or alternative special varnishing on the enclosure or other metal parts:
  - Observe the danger of electrostatic charging and discharge.
  - Do not rub surfaces with a dry cloth.

*Basic specification, Position 10 = 4, 5 and covers with glass window*
Restriction to $-40 \, ^\circ C \leq T_a \leq +70 \, ^\circ C$. 
Safety instructions: Installation

Supply circuit "Intrinsically safe Ex ia"

1
A  Zone 20, Zone 21, Zone 22
B  Zone 20
1  Strut or rope with tensioning weight
2  Probe
3  Adapter
4  Electronic insert
5  Enclosure
6  Certified associated apparatus
Supply circuit "Non-intrinsically safe"

- Do not open in a potentially explosive dust atmosphere.
- Observe the maximum process conditions according to the manufacturer's Operating Instructions.
- At high medium temperatures, note flange pressure load capacity as a factor of temperature.
- To maintain the ingress protection of the enclosure:
  - Screw the cover tight.
  - Mount the cable entry correctly.
- After aligning (rotating) the enclosure, retighten the fixing screw (see Operating Instructions).

A  Zone 21, Zone 22
B  Zone 20
1  Strut or rope with tensioning weight
2  Probe
3  Adapter
4  Electronic insert
5  Enclosure
6  Power supply
- Connect the device using suitable cable and wire entries of protection type "Equipment dust ignition protection by enclosure (Ex t)" or "Increased safety (Ex e)" (ingress protection of at least IP65). Lay connecting cable and secure.
- Seal unused entry glands with approved sealing plugs that correspond to the type of protection.
- Install the device to exclude any mechanical damage or friction during the application. Pay particular attention to flow conditions and tank fittings.
- Mechanically fix probes which are more than 3 m (e.g. using guy ropes).
- Maximum rope tensile load:
  - Fine-grained bulk solids: 7.5 kN
  - Coarse-grained bulk solids: 20 kN
- Maximum lateral load including strut:
  - Fine-grained bulk solids: 250 Nm
  - Coarse-grained bulk solids: 800 Nm

_basic specification, Position 10 = 1_
Before operation:
- Screw in the cover all the way.
- Tighten the securing clamp on the cover.

_basic specification, Position 10 = 3, 4, 5, 6_
Tighten the cover with torque 12 Nm.

Intrinsic safety
Observe the pertinent guidelines when interconnecting intrinsically safe circuits.

Potential equalization
Install potential equalization between the certified associated apparatus (non-hazardous area, \(\text{\textbullet}\)) and the device (explosion-hazardous area, \(\text{\textbullet}\)).

Safety instructions: Zone 20
- In the event of potentially explosive dust/air mixtures, only operate the device under atmospheric conditions.
  - Temperature: \(-20\) to \(+60\) °C
  - Pressure: 80 to 110 kPa (0.8 to 1.1 bar)
  - Air with normal oxygen content, usually 21 % (V/V)
- If no potentially explosive mixtures are present, or if additional protective measures have been taken, the device may also be operated under non-atmospheric conditions in accordance with the manufacturer's specifications.
Temperature tables

<table>
<thead>
<tr>
<th>Max. surface temperature at an ambient temperature of 70 °C</th>
<th>Probe and electronics enclosure in Zone 20</th>
<th>Connection to certified intrinsically safe power circuits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>80 °C</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Deposited material with a layer of 200 mm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$T_{200} \leq 130 °C$</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Max. surface temperature at an ambient temperature of 70 °C</th>
<th>Probe in Zone 20</th>
<th>Electronics enclosure in Zone 21, Zone 22</th>
<th>Connection to certified intrinsically safe power circuits</th>
<th>Connection to non-intrinsically safe power circuits</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>70 °C</td>
<td>80 °C</td>
<td>90 °C</td>
<td></td>
</tr>
</tbody>
</table>

The compact version can also be used for process temperatures between +70 to +400 °C if it can also be ensured that the ambient temperature at the electronics enclosure does not exceed the values as indicated in the temperature graphic.

|                                                           | 400 °C          | 40 °C                                    | 40 °C                                                    |
Compact version
Strut and rope version, partially insulated

$T_a$  Ambient temperature in °C
$T_p$  Process temperature in °C
Version with separate enclosure

Temperature at the separate enclosure: $-40 \, ^\circ C \leq T_a \leq +70 \, ^\circ C$
Connection data

Connection to certified intrinsically safe circuits Ex ia (Zone 20)

<table>
<thead>
<tr>
<th>Basic specification, Position 9</th>
<th>Electrical data</th>
</tr>
</thead>
</table>
| F                               | $U_i \leq 35 \text{ V}$  
|                                 | $I_i \leq 100 \text{ mA}$  
|                                 | $P_i \leq 1 \text{ W}$  
|                                 | $C_i \leq 2.4 \text{ nF}$  
|                                 | $L_i \leq 0$  |
| G                               | $U_i \leq 16.1 \text{ V}$  
|                                 | $I_i \leq 100 \text{ mA}$  
|                                 | $P_i \leq 1 \text{ W}$  
|                                 | $C_i \leq 2.4 \text{ nF}$  
|                                 | $L_i \leq 0$  |
| H                               | $U_i \leq 18 \text{ V}$  
|                                 | $I_i \leq 52 \text{ mA}$  
|                                 | $P_i \leq 170 \text{ mW}$  
|                                 | $C_i/L_i \leq 0$  |
| Y                               | $U_i \leq 30 \text{ V}$  
|                                 | $I_i \leq 120 \text{ mA}$  
|                                 | $P_i \leq 1 \text{ W}$  
|                                 | $C_i \leq 2.4 \text{ nF}$  
|                                 | $L_i \leq 0$  |

Connection to non-intrinsically safe circuits (Zone 20/21 or Zone 20/22)

<table>
<thead>
<tr>
<th>Basic specification, Position 9</th>
<th>Electrical data</th>
</tr>
</thead>
<tbody>
<tr>
<td>F ¹)</td>
<td>$U \leq 35 \text{ V}_{\text{DC}}$</td>
</tr>
<tr>
<td>Y ¹)</td>
<td>$U \leq 35 \text{ V}_{\text{DC}}$</td>
</tr>
</tbody>
</table>

¹) With Basic specification, Position 10 = 5 only with limiting module

<table>
<thead>
<tr>
<th>Basic specification, Position 9</th>
<th>Power supply</th>
<th>Relay circuit</th>
</tr>
</thead>
<tbody>
<tr>
<td>B</td>
<td>19 to 253 $V_{\text{AC}}$</td>
<td>$- \text{ }$</td>
</tr>
<tr>
<td>C</td>
<td>10 to 55 $V_{\text{DC}}$</td>
<td>$- \text{ }$</td>
</tr>
</tbody>
</table>
| E                               | 19 to 253 $V_{\text{AC}}$ | $253 V_{\text{AC}} / 6 \text{ A}$  
|                                 |               | $1500 \text{ VA} / \cos \phi = 1$  
|                                 |               | $750 \text{ VA} / \cos \phi > 0.7$  
|                                 | 19 to 55 $V_{\text{DC}}$ | $30 V_{\text{DC}} / 4 \text{ A}$  
|                                 |               | $125 V_{\text{DC}} / 0.2 \text{ A}$  |
Cable entry parameters

<table>
<thead>
<tr>
<th>Thread</th>
<th>Clamping range</th>
<th>Material</th>
<th>Sealing insert</th>
<th>O-ring</th>
</tr>
</thead>
<tbody>
<tr>
<td>M20x1.5</td>
<td>ø 8 to 10.5 mm&lt;sup&gt;1)&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>ø 6.5 to 13 mm&lt;sup&gt;2)&lt;/sup&gt;</td>
<td>Ms, nickel-plated</td>
<td>Silicone</td>
<td>EPDM (ø 17x2)</td>
</tr>
</tbody>
</table>

1) Standard  
2) Separate clamping inserts available

- The tightening torque refers to cable glands installed by the manufacturer:
  - Recommended torque to connect the cable gland into the enclosure: 3.75 Nm  
  - Recommended torque to tighten the cable into the cable gland: 3.5 Nm  
  - Maximum torque to tighten the cable into the cable gland: 10 Nm  
- This value may be different depending on the type of cable. However, the maximum value must not be exceeded.
- Only suitable for fixed installation. The operator must pay attention to a suitable strain relief of the cable.
- To maintain the ingress protection of the enclosure: Install the enclosure cover, cable glands and blind plugs correctly.