SCP-*** Surge Protection Module

HAZARDOUS LOCATION OR NON-HAZARDOUS LOCATION

Power source:
- Intrinsically safe circuit, non-incendive circuit, energy limited circuit or non-arcing circuit

SCP-*** Surge Protection Module

Spur

ACC-LBF-EB***
Electrical earth bonding bar

≥ 4mm² earth cable

EQUIPOTENTIAL BONDING

HAZARDOUS LOCATION OR NON-HAZARDOUS LOCATION

Output parameters Uo, Io, Po, Lo, Co of the surge protection module are defined below.

The output classification of the surge protection module depends on the classification of the power source.

Class I, Div 1, GP A, B, C, D or Class II, Div 1, GP E, F, G or Class III, Div 1 or Class I, Zone 0, GP IIC IIB IIA or Class I, Zone 1, GP IIC IIB IIA:

For connection to a certified intrinsically safe circuit:

Maximum allowed input values of the surge protection module:

- U_i ≤ 24 V
- I_i ≤ 500 mA

or

maximum allowed input values of the surge protection module, if connected to a FISCO circuit:

- U_i ≤ 17.5 V
- I_i ≤ 380 mA
- P_i ≤ 5.32 W

Maximum output values of the surge protection module:

- U_o = U_o (power source)
- I_o = I_o (power source)
- P_o = P_o (power source)
- L_o = L_o (power source) – 100 nH
- C_o = C_o (power source) – 2 nF

Class I, Zone 2, GP IIC IIB IIA (Ex ic or Ex nL):

For connection to a certified intrinsically safe circuit:

Maximum allowed input values of the surge protection module:

- U_i ≤ 33 V
- I_i ≤ 600 mA

Maximum output values of the surge protection module:

- U_o = U_o (power source)
- I_o = I_o (power source)
- P_o = P_o (power source)
- L_o = L_o (power source) – 100 nH
- C_o = C_o (power source) – 2 nF

Class I, Div 2, GP A, B, C, D or Class II, Div 2, GP E, F, G or Class III, Div 2 or Class I, Zone 2, GP IIC IIB IIA (Ex nA):

Maximum allowed input values of the surge protection module:

- U_i ≤ 33 V
- I_i ≤ 600 mA

Other parameters are defined as follows:

- Class I, Div 1, GP A, B, C, D:
- Class I, Zone 0, GP IIC IIB IIA:
- Class I, Zone 1, GP IIC IIB IIA:
- Class I, Zone 0, GP IIC IIB IIA:
- Class I, Zone 1, GP IIC IIB IIA:
- Class I, Zone 2, GP IIC IIB IIA:

These numbers are not actual values and are for illustrative purposes only.
TPH-*** Surge Protection Module

HAZARDOUS LOCATION OR NON-HAZARDOUS LOCATION

Power source:
- Intrinsically safe circuit, non-incendive circuit, energy limited circuit or non-arcing circuit

TPH-*** Surge Protection Module

Input parameters $U_i$, $I_i$ and $P_i$ of the surge protection module are defined below.

**HAZARDOUS LOCATION OR NON-HAZARDOUS LOCATION**

Output parameters $U_o$, $I_o$, $P_o$, $L_o$, $C_o$ of the surge protection module are defined below.

The output classification of the surge protection module depends on the classification of the power source.

**HAZARDOUS LOCATION OR NON-HAZARDOUS LOCATION**

Input parameters $U_i$, $I_i$ and $P_i$ of the surge protection module are defined below.

**HAZARDOUS LOCATION OR NON-HAZARDOUS LOCATION**

Output parameters $U_o$, $I_o$, $P_o$, $L_o$, $C_o$ of the surge protection module are defined below.

The output classification of the surge protection module depends on the classification of the power source.

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**CONFIDENTIAL acc. to ISO 16016 Only valid as long as released in EDM!**

6th March 2013

PEPPERL+FUCHS
Installation Drawing
Surge Protection Modules for Fieldbus Products

Worldwide

116-0365

sheet 2 of 6
TCP-*** Surge Protection Module

Input parameters $U_i$, $I_i$, and $P_i$ of the surge protection module are defined below.

Power source:
- Intrinsically safe circuit
- Non-incendive circuit
- Energy limited circuit
- Non-arcing circuit

Output parameters $U_o$, $I_o$, $P_o$, $L_o$, $C_o$ of the surge protection module are defined below.

The output classification of the surge protection module depends on the classification of the power source.

Class I, Div 1, GP A, B, C, D or Class II, Div 1, GP E, F, G or Class III, Div 1 or Class I, Zone 0, GP IIC IIB IIA or Class I, Zone 1, GP IIC IIB IIA:

For connection to a certified intrinsically safe circuit:
- Maximum allowed input values of the surge protection module:
  - $U_i \leq 24$ V
  - $I_i \leq 500$ mA
- or
- Maximum allowed input values of the surge protection module, if connected to a FISCO circuit:
  - $U_i \leq 17.5$ V
  - $I_i \leq 380$ mA
  - $P_i \leq 5.32$ W

Maximum output values of the surge protection module:
- $U_o = U_o$ (power source)
- $I_o = I_o$ (power source)
- $P_o = P_o$ (power source)
- $L_o = L_o$ (power source) – 100 nH
- $C_o = C_o$ (power source) – 2 nF

Class I, Zone 2, GP IIC IIB IIA (Ex ic or Ex nL):

For connection to a certified intrinsically safe circuit:
- Maximum allowed input values of the surge protection module:
  - $U_i \leq 33$ V
  - $I_i \leq 600$ mA
- Maximum output values of the surge protection module:
  - $U_o = U_o$ (power source)
  - $I_o = I_o$ (power source)
  - $P_o = P_o$ (power source)
  - $L_o = L_o$ (power source) – 100 nH
  - $C_o = C_o$ (power source) – 2 nF

Class I, Div 2, GP A, B, C, D or Class II, Div 2, GP E, F, G or Class III, Div 2 or Class I, Zone 2, GP IIC IIB IIA (Ex nAc or Ex nA):

Maximum allowed input values of the surge protection module:
- $U_i \leq 33$ V
- $I_i \leq 600$ mA
A) General (for IS Systems)

- The Entity Concept allows interconnection of intrinsically safe apparatus with associated apparatus not specifically examined in combination as a system when the approved values of \( U_0 \), \( I_0 \) and \( P_0 \) for the associated apparatus are less than or equal to \( U_i \), \( I_i \) and \( P_i \) for the intrinsically safe apparatus and the approved values of \( C_0 \) and \( L_0 \) for the associated apparatus are greater than \( C_i + C_{\text{cable}} \) and \( L_i + L_{\text{cable}} \), respectively, for the intrinsically safe apparatus.

The parameters for \( L_0 \) and \( C_0 \) provided on pages 1 to 3 apply when one of the two conditions below is given:
- The total \( L_i \) of the external circuit (excluding the cable) is \( \leq 1 \% \) of the \( L_0 \) value or
- The total \( C_i \) of the external circuit (excluding the cable) is \( \leq 1 \% \) of the \( C_0 \) value.

The parameters for \( L_0 \) and \( C_0 \) provided on pages 1 to 3 are reduced to 50 \% when both of the two conditions below are given:
- The total \( L_i \) of the external circuit (excluding the cable) is \( > 1 \% \) of the \( L_0 \) value and
- The total \( C_i \) of the external circuit (excluding the cable) is \( > 1 \% \) of the \( C_0 \) value.

*Note: The reduced capacitance of the external circuit (including cable) shall not be greater than 1 \( \mu \)F for C, D (IIA, IIB) and 600 nF for A, B (IIC).*

The Entity Parameters of the Surge Protection Devices are provided on pages 1 to 3.

- Simple Apparatus: An electrical component or combination of components of simple construction with well-defined electrical parameters that does not generate more than 1.5 volts, 100 milliamps, and 25 milliwatts, or a passive component that does not dissipate more than 1.3 watts and is compatible with the intrinsic safety of the circuit in which it is used (USA). A switch or non-inductive resistive device or thermocouple (Canada).

B) Special Conditions for Safe Use

- Pay attention to avoid electrostatic discharges while operating the installed device. Avoid electrostatic charge.
- Intrinsically safe circuits must be suitable for the ambient temperature and be wired and separated in accordance with the wiring methods of National Electrical Code ANSI/NFPA 70, Canadian Electrical Code C22.1 or in accordance with the authority having jurisdiction.
- The Surge Protection Devices are open type devices and shall be installed in a tool-secured enclosure suitable for the application in accordance with the National Electrical Code ANSI/NFPA 70, the Canadian Electrical Code C22.1 or in accordance with the authority having jurisdiction.

Class I, Division 1

- The Surge Protection Devices do not meet the requirement of CAN/CSA-C22.2 No. 157-92 or UL913 (ANSI/UL 60079-11), Dielectric Strength Requirements, between the intrinsically safe circuit and the parts that may be earthed, due to presence of Gas Discharge Tubes.

Class I, Zone 0

- Equipment shall be installed in accordance with IEC 60079-25 or ISA 60079-25 (12.02.05), clause 12, ‘Protection against lightning and other electrical surges’.
Class I, Zone 1, Intrinsic safety ‘ia’ and ‘ib’

- The Surge Protection Devices do not meet the requirement of CAN/CSA-C22.2 No. 60079-11 or ANSI/UL 60079-11, Dielectric Strength Requirements, between the intrinsically safe circuit and the parts that may be earthed, due to presence of Gas Discharge Tubes.

- Equipment shall be installed in accordance with IEC 60079-25 or ISA 60079-25 (12.02.05), clause 12, ‘Protection against lightning and other electrical surges’.

Class I, Zone 2, Intrinsic safety ‘ic’

- The Surge Protection Devices do not meet the requirement of CAN/CSA-C22.2 No. 60079-11 or ANSI/UL 60079-11, Dielectric Strength Requirements, between the intrinsically safe circuit and the parts that may be earthed, due to presence of Gas Discharge Tubes.

- The Surge Protection Devices shall be fitted in a protective enclosure providing a degree of protection of at least IP54, which shall comply with CAN/CSA-C22.2 No. 60079-0 or ANSI/UL 60079-0.

- Equipment shall be installed in accordance with IEC 60079-25 or ISA 60079-25 (12.02.05), clause 12, ‘Protection against lightning and other electrical surges’.

Class I, Zone 2, Non incendive ‘nAc’ and ‘nA’

- The Surge Protection Devices do not meet the requirement of CAN/CSA-C22.2 No. 60079-15 or ANSI/UL 60079-15, Electric Strength, Insulation from Earth or Frame, due to presence of Gas Discharge Tubes.

- The Surge Protection Devices shall be fitted in a protective enclosure providing a degree of protection of at least IP54, which shall comply with CAN/CSA-C22.2 No. 60079-0 or ANSI/UL 60079-0 and CAN/CSA-C22.2 No. 60079-15 or ANSI/UL 60079-15.

- Connection or disconnection of energized non-intrinsically safe circuits is only permitted in the absence of hazardous atmosphere.

- The field wiring connections shall either be mechanically secured or shall require a separation force of at least 15 N.

- Equipment shall be installed in accordance with IEC 60079-25 or ISA 60079-25 (12.02.05), clause 12, ‘Protection against lightning and other electrical surges’.

Class I, Zone 2, Energy Limited ‘nL’

- The Surge Protection Devices do not meet the requirement of CAN/CSA-C22.2 No. 60079-15 or ANSI/UL 60079-15, Electric Strength, Insulation from Earth or Frame, due to presence of Gas Discharge Tubes.

- The Surge Protection Devices shall be fitted in a protective enclosure providing a degree of protection of at least IP54, which shall comply with CAN/CSA-C22.2 No. 60079-0 or ANSI/UL 60079-0 and CAN/CSA-C22.2 No. 60079-15 or ANSI/UL 60079-15.

- Equipment shall be installed in accordance with IEC 60079-25 or ISA 60079-25 (12.02.05), clause 12, ‘Protection against lightning and other electrical surges’.
C) **FISCO**

The FISCO concept allows interconnection of intrinsically safe apparatus to associated apparatus not specifically examined in such combinations as defined in ANSI/ISA-60079-27 (12.02.04)-2006.

The criteria for the interconnection is that the voltage $U_i$, $I_i$ and $P_i$ which intrinsically safe apparatus can receive and remain intrinsically safe, considering faults, must be equal or greater than the voltage $U_o$, the current $I_o$ and the power $P_o$ levels which can be delivered by the associated apparatus, considering faults and application factors. In addition, the maximum unprotected capacitance ($C_i$) and inductance ($L_i$) of each apparatus (other than the termination) connected to the Fieldbus must be less than or equal to $10 \, \mu H$ and 5 nF respectively.

In each segment only one active device, normally the associated apparatus is allowed to provide the necessary energy for the Fieldbus system. The voltage $U_o$ of the associated apparatus has to be limited to the range 14 to 17.5 Vdc. All other equipment connected to the bus cable has to be passive meaning that they are not allowed to provide energy to the system, except for a leakage current of 50 μA for each connected device. Separately powered equipment needs a galvanic isolation to assure that the intrinsically safe Fieldbus circuit remains passive.

The cable used to connect the devices needs to have the parameters in the following range:

- Loop Resistance $R_c$: 15 to 150 Ω/km
- Inductance per unit length $L_c$: 0.4 to 1.0 mH/km
- Capacitance per unit length $C_c$: 45 to 200 nF/km

For the calculation of the total capacitance $C'$:

- If both lines are floating: $C' = C'_\text{line/line} + 0.5' \text{line/screen}$
- If the screen is connected to one line: $C' = C'_\text{line/line} + C'_\text{line/screen}$

Length of Spur Cable: ≤ 60 m
Length of Trunk cable: ≤ 1 km

At each end of the trunk cable, an approved termination with the following parameters is suitable:

- $R \geq 90 \, \Omega$ and $C \leq 2.2 \, \mu F.$

The number of passive devices connected to the bus segment is limited to a maximum of 32 devices. If the above rules are respected, up to a total length of 1,000 m (sum of the trunk cable and all spur cables), the inductance and capacitance of the cable will not impair the intrinsic safety of the installation.

The inductance and capacitance of each Simple Apparatus connected to a FISCO system shall not be greater than $10 \, \mu H$ and 5 nF respectively.

**WARNING**: Substitution of components may impair intrinsic safety and suitability for hazardous (classified) locations.