

■ Connections

**Assignment of model types to diagrams on following sheets:**

Type Code				Cl I, Zn 0 <sup>1</sup>	
				Cl II, III Zn 20 <sup>2</sup>	
				see sheet	
NCN3	-F31K2M	-N4	-B13...	2	
			-B23...	2	
		-N5	-B13...	3	
			-B23...	3	
	-F31K2...	-N4	-B13...	4	-
			-B23...	4	-
			-B33...	6	-
		-N5	-B13...	5	-
			-B23...	5	-
			-B33...	7	-


Legend:

... any combination of digits

Footnotes:

<sup>1</sup> Class I, Division 1, Groups A, B, C, D or Class I, Zone 0 IIC

<sup>2</sup> Class II, Division 1, Groups E, F, G; Class III, Division 1 or Zone 20 IIIC

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 <b>PEPPERL+FUCHS</b> Global	Control Drawing Valve position sensors NCN3-F31K2...-N...	<b>116-0455</b>
		sheet 1 of 11

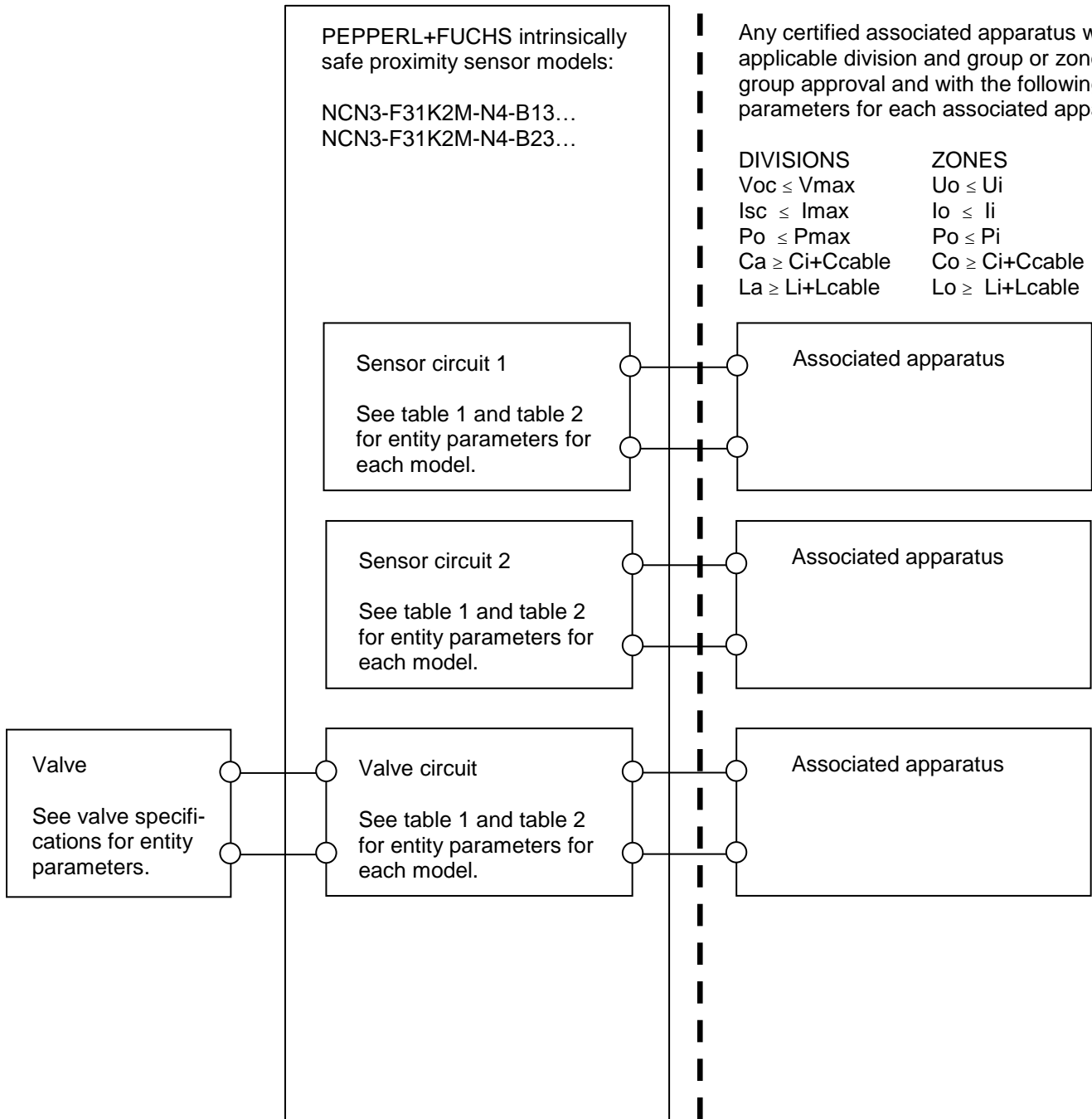
## HAZARDOUS LOCATION

Class I, Division 1, Groups A, B, C, D  
 Class II, Division 1, Groups E, F, G  
 Class III, Division 1  
 or  
 Class I, Zone 0 IIC  
 Zone 20 IIIC

## NON-HAZARDOUS LOCATION

Any certified associated apparatus with applicable division and group or zone and group approval and with the following entity parameters for each associated apparatus:

DIVISIONS	ZONES
$V_{oc} \leq V_{max}$	$U_o \leq U_i$
$I_{sc} \leq I_{max}$	$I_o \leq I_i$
$P_o \leq P_{max}$	$P_o \leq P_i$
$C_a \geq C_i + C_{cable}$	$C_o \geq C_i + C_{cable}$
$L_a \geq L_i + L_{cable}$	$L_o \geq L_i + L_{cable}$



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## HAZARDOUS LOCATION

Class I, Division 1, Groups A, B, C, D  
 Class II, Division 1, Groups E, F, G  
 Class III, Division 1  
 or  
 Class I, Zone 0 IIC  
 Zone 20 IIIC

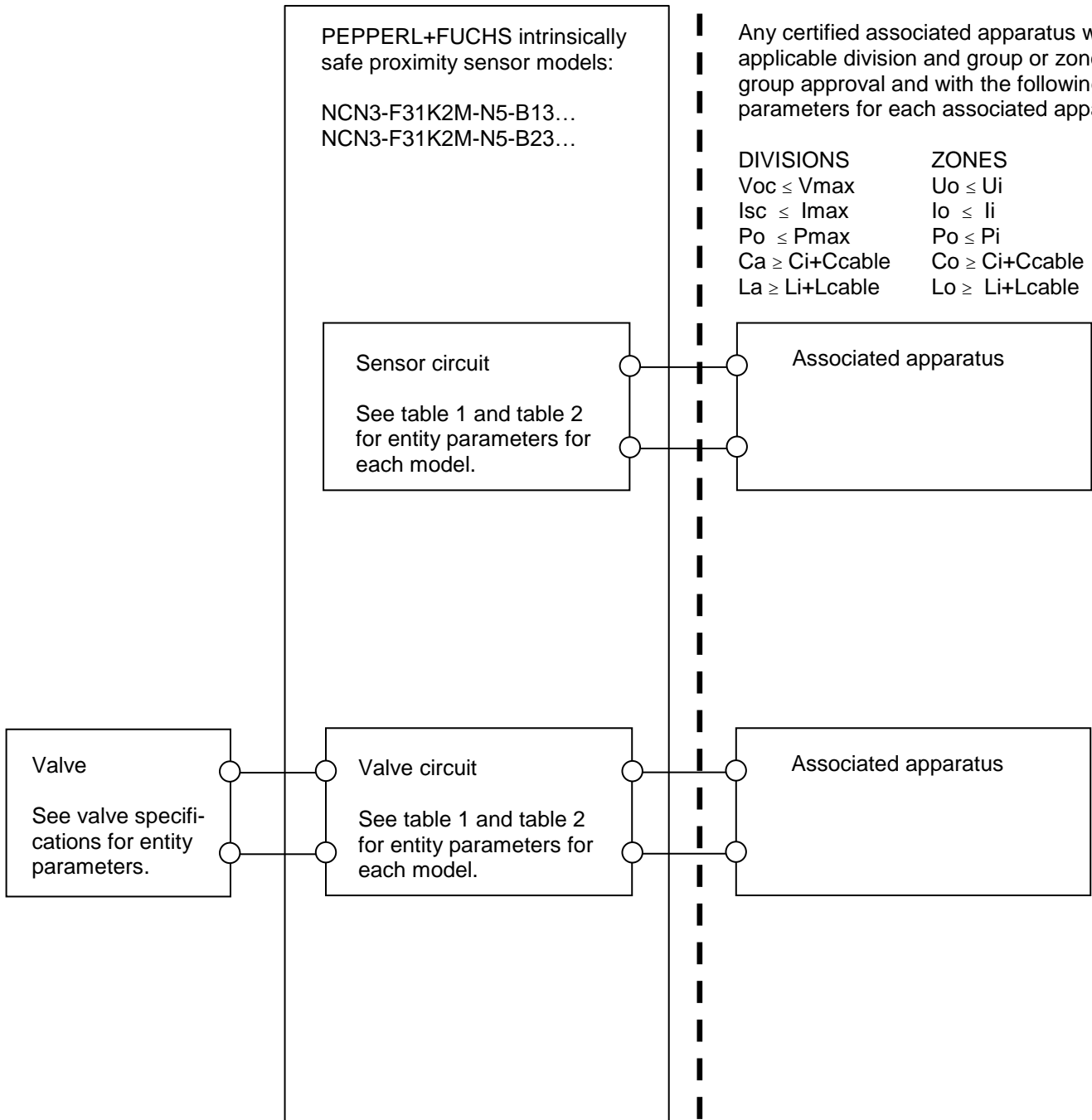
## NON-HAZARDOUS LOCATION


PEPPERL+FUCHS intrinsically safe proximity sensor models:

NCN3-F31K2M-N5-B13...  
 NCN3-F31K2M-N5-B23...

Any certified associated apparatus with applicable division and group or zone and group approval and with the following entity parameters for each associated apparatus:

DIVISIONS	ZONES
$V_{oc} \leq V_{max}$	$U_o \leq U_i$
$I_{sc} \leq I_{max}$	$I_o \leq I_i$
$P_o \leq P_{max}$	$P_o \leq P_i$
$C_a \geq C_i + C_{cable}$	$C_o \geq C_i + C_{cable}$
$L_a \geq L_i + L_{cable}$	$L_o \geq L_i + L_{cable}$



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## HAZARDOUS LOCATION

Class I, Division 1, Groups A, B, C, D

or  
Class I, Zone 0 IIC

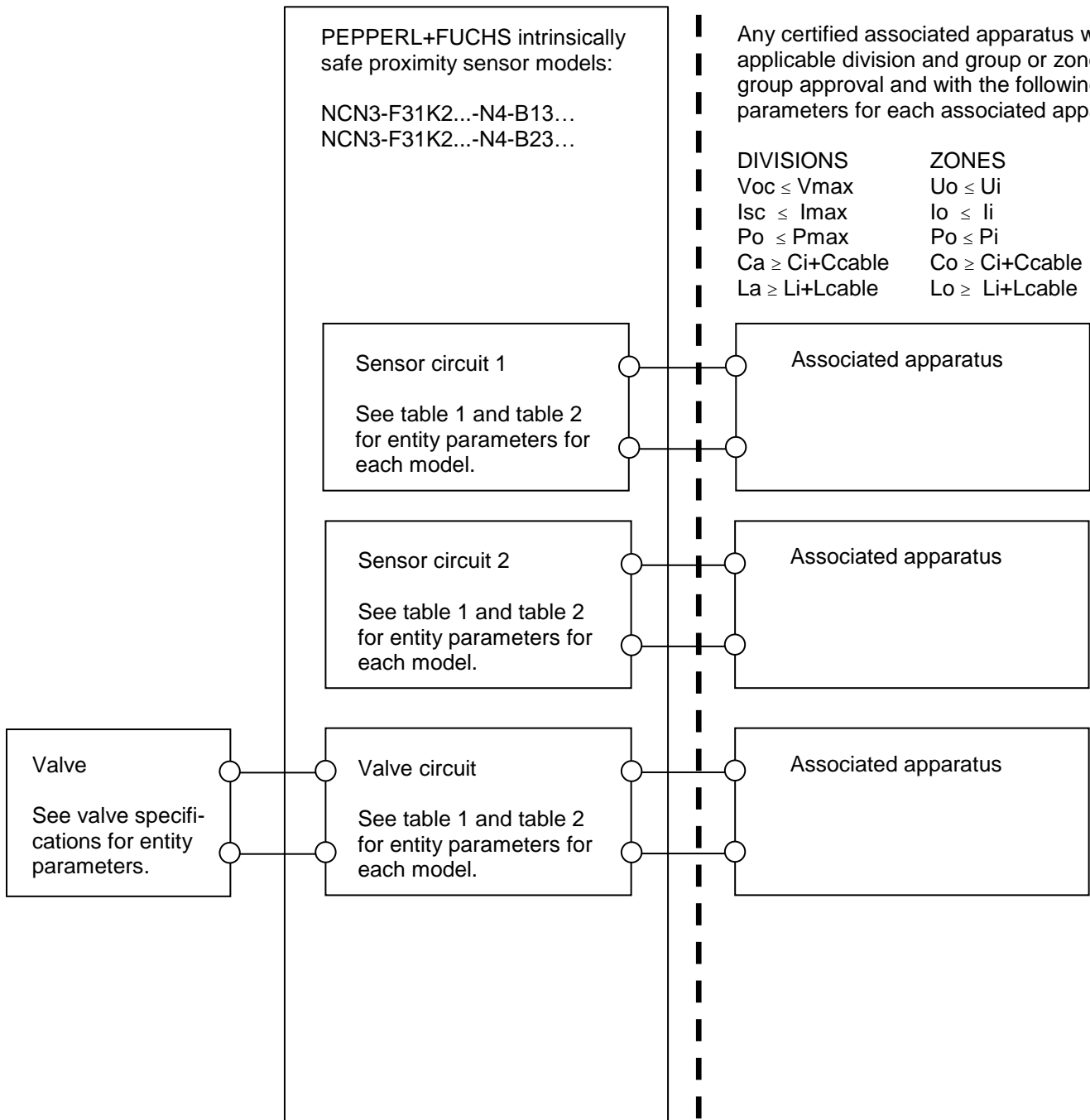
## NON-HAZARDOUS LOCATION

PEPPERL+FUCHS intrinsically safe proximity sensor models:

NCN3-F31K2...-N4-B13...  
NCN3-F31K2...-N4-B23...

Any certified associated apparatus with applicable division and group or zone and group approval and with the following entity parameters for each associated apparatus:

DIVISIONS	ZONES
$V_{oc} \leq V_{max}$	$U_o \leq U_i$
$I_{sc} \leq I_{max}$	$I_o \leq I_i$
$P_o \leq P_{max}$	$P_o \leq P_i$
$C_a \geq C_i + C_{cable}$	$C_o \geq C_i + C_{cable}$
$L_a \geq L_i + L_{cable}$	$L_o \geq L_i + L_{cable}$



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Control Drawing

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Valve position sensors NCN3-F31K2...-N...

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## HAZARDOUS LOCATION

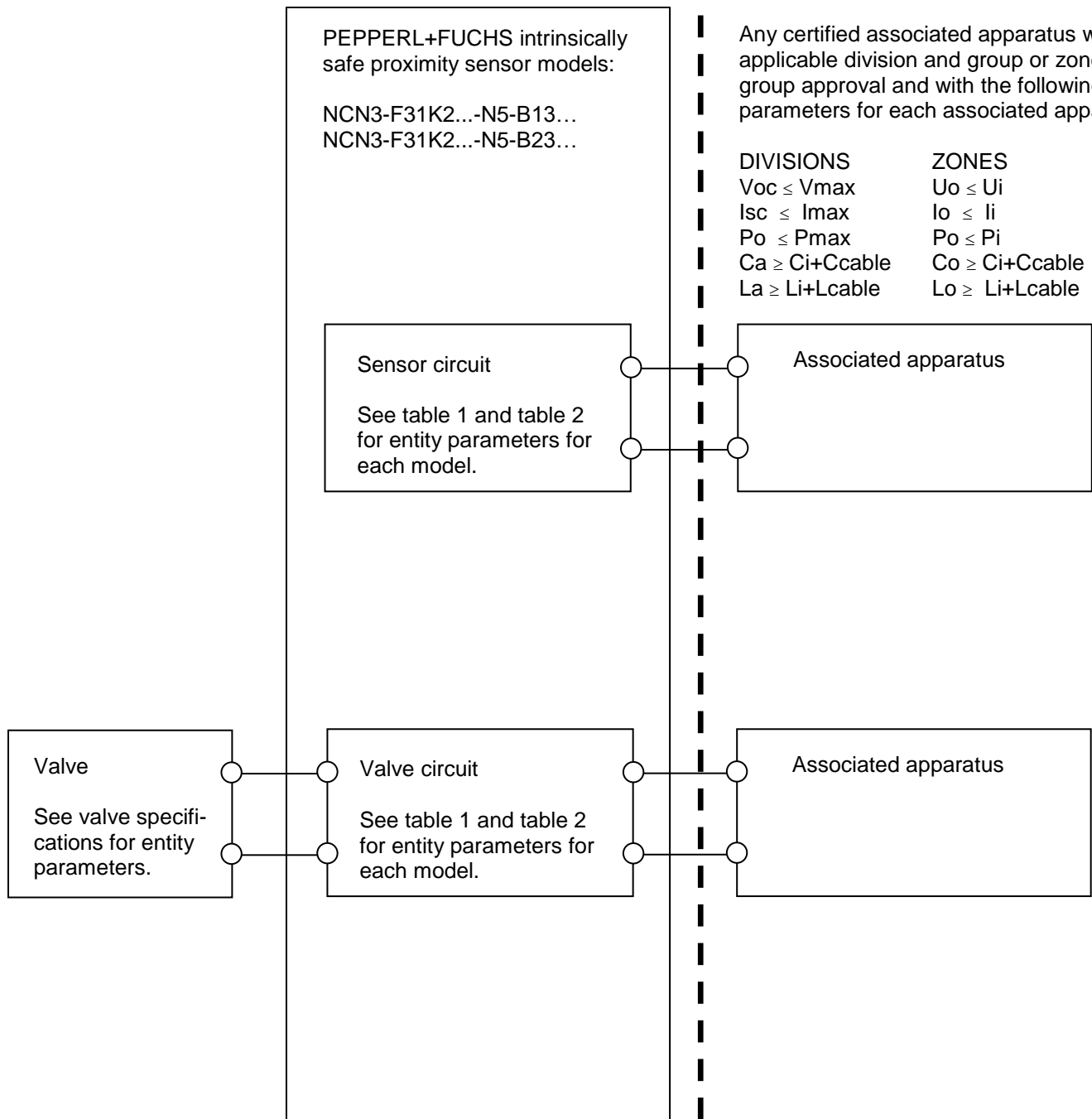
Class I, Division 1, Groups A, B, C, D

or  
Class I, Zone 0 IIC

## NON-HAZARDOUS LOCATION

Any certified associated apparatus with applicable division and group or zone and group approval and with the following entity parameters for each associated apparatus:

DIVISIONS	ZONES
$V_{oc} \leq V_{max}$	$U_o \leq U_i$
$I_{sc} \leq I_{max}$	$I_o \leq I_i$
$P_o \leq P_{max}$	$P_o \leq P_i$
$C_a \geq C_i + C_{cable}$	$C_o \geq C_i + C_{cable}$
$L_a \geq L_i + L_{cable}$	$L_o \geq L_i + L_{cable}$



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## HAZARDOUS LOCATION

Class I, Division 1, Groups A, B, C, D

or  
Class I, Zone 0 IIC

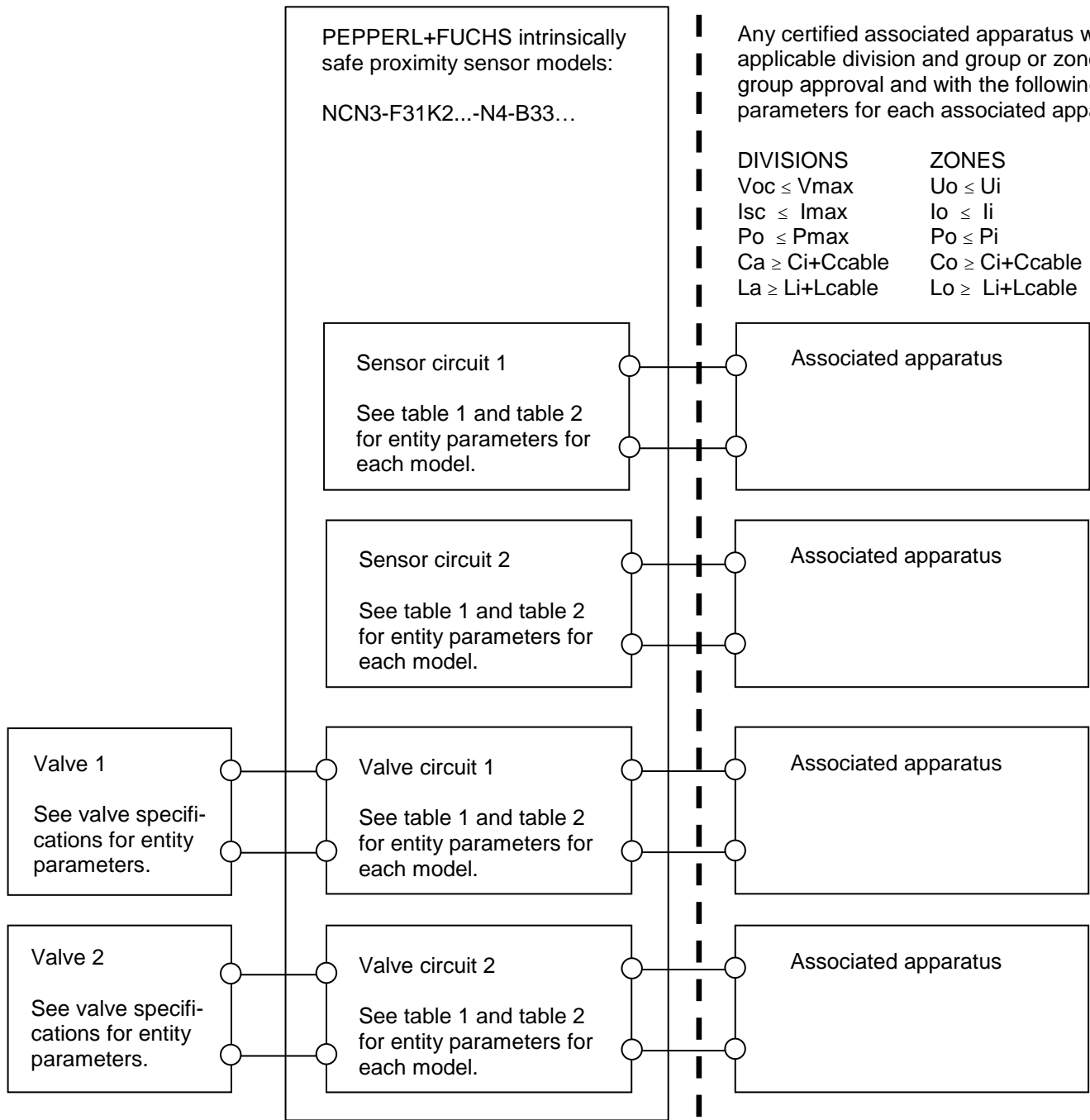
## NON-HAZARDOUS LOCATION

PEPPERL+FUCHS intrinsically safe proximity sensor models:

NCN3-F31K2...-N4-B33...

Any certified associated apparatus with applicable division and group or zone and group approval and with the following entity parameters for each associated apparatus:

DIVISIONS	ZONES
$V_{oc} \leq V_{max}$	$U_o \leq U_i$
$I_{sc} \leq I_{max}$	$I_o \leq I_i$
$P_o \leq P_{max}$	$P_o \leq P_i$
$C_a \geq C_i + C_{cable}$	$C_o \geq C_i + C_{cable}$
$L_a \geq L_i + L_{cable}$	$L_o \geq L_i + L_{cable}$



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Valve position sensors NCN3-F31K2...-N...

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## HAZARDOUS LOCATION

Class I, Division 1, Groups A, B, C, D

or  
Class I, Zone 0 IIC

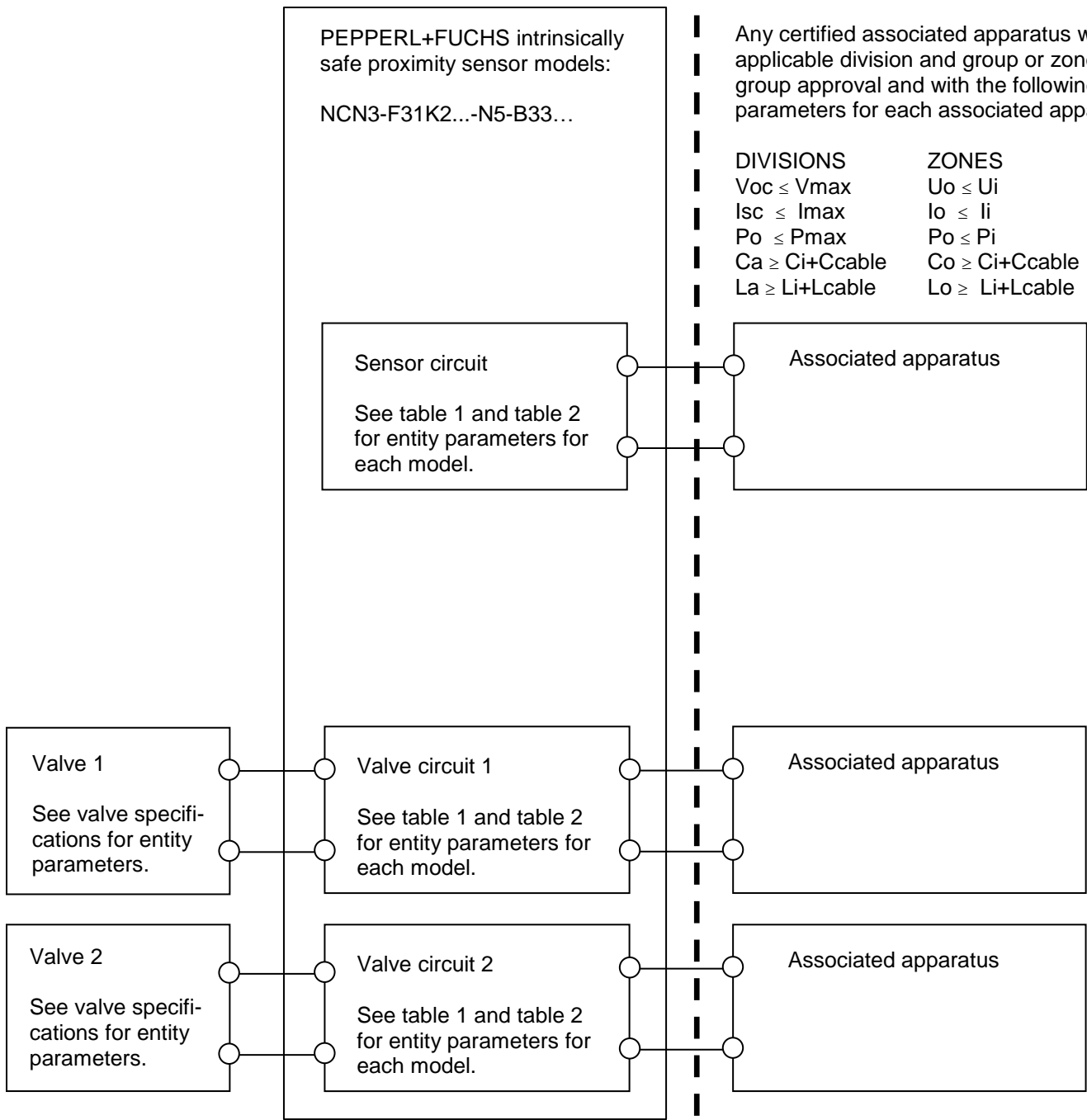
## NON-HAZARDOUS LOCATION

PEPPERL+FUCHS intrinsically safe proximity sensor models:

NCN3-F31K2...-N5-B33...

Any certified associated apparatus with applicable division and group or zone and group approval and with the following entity parameters for each associated apparatus:

DIVISIONS	ZONES
$V_{oc} \leq V_{max}$	$U_o \leq U_i$
$I_{sc} \leq I_{max}$	$I_o \leq I_i$
$P_o \leq P_{max}$	$P_o \leq P_i$
$C_a \geq C_i + C_{cable}$	$C_o \geq C_i + C_{cable}$
$L_a \geq L_i + L_{cable}$	$L_o \geq L_i + L_{cable}$



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Control Drawing

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Global


Valve position sensors NCN3-F31K2...-N...

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**Notes**

1. MARKING

- Listee's name or Trade Mark
- Model number or designation
- Class-Division marking resp. Class-Zone marking for models:  
 NCN3-F31K2...-N4-...  
 NCN3-F31K2...-N5-...
  - Class-Division marking:  
 Class I, Division 1, Group A, B, C, D, T6...T1  
 And/or
  - Class-Zone marking for USA:  
 Class I, Zone 0, AEx ia IIC T6...T1 Ga  
 And/Or
  - Class-Zone marking for Canada:  
 Ex ia IIC T6...T1 Ga X
- Class-Division marking resp. Class-Zone marking for models:  
 NCN3-F31K2M-N4-B13-...  
 NCN3-F31K2M-N4-B23...  
 NCN3-F31K2M-N5-B13-...  
 NCN3-F31K2M-N5-B23-...
  - Class-Division marking:  
 Class I, Division 1, Group A, B, C, D, T6...T1  
 And/Or  
 Class II, Division 1, Group E, F, G, T135 °C  
 And/Or  
 Class III, Division 1, T135 °C  
 And/or
  - Class-Zone marking for USA:  
 Class I, Zone 0, AEx ia IIC T6...T1 Ga  
 And/Or,  
 Zone 20, AEx ia IIIC T135 °C Da  
 And/Or
  - Class-Zone marking for Canada:  
 Ex ia IIC T6...T1 Ga X  
 And/Or,  
 Ex ia IIIC T135 °C Da X
- An indication that the apparatus is intrinsically safe
- A reference to the control drawing number
- A reference to ambient temperature range shown under suitable tables in the Control Drawing
- "WARNING – AVOID ELECTROSTATIC CHARGE – SEE INSTRUCTIONS" and/or "AVERTISSEMENT – DANGER POTENTIEL DE CHARGES ÉLECTROSTATIQUES – VOIR INSTRUCTIONS" for apparatus models according to suitable table in the Control Drawing.
- A serial number, date code or equivalent

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2. STANDARDS


Investigation acc. United States Standards: UL 913, UL 60079-0, UL 60079-11 and acc. Canadian National Standards CSA C22.2 NO. 60079-0, CSA C22.2 NO. 60079-11

3. The Entity Concept allows interconnection of an intrinsically safe apparatus with an associated apparatus not specifically examined in combination as a system when the approved values of  $V_{oc}$  (or  $U_o$ ),  $I_{sc}$  (or  $I_o$ ) and  $P_o$  for the associated apparatus are less than or equal to  $V_{max}$  (or  $U_i$ ),  $I_{max}$  (or  $I_i$ ) and  $P_{max}$  (or  $P_i$ ) for the intrinsically safe apparatus and the approved values of  $C_a$  (or  $C_o$ ) and  $L_a$  (or  $L_o$ ) for the associated apparatus are greater than  $C_i + C_{cable}$  and  $L_i + L_{cable}$ , respectively, for the intrinsically safe apparatus, where
  - $C_{cable} = 60 \text{ pF/ft}$  (197 pF/m) if unknown
  - $L_{cable} = 0.20 \text{ }\mu\text{H/ft}$  (0.66  $\mu\text{H/m}$ ) if unknown
4. The sum of all capacitances and inductances, including tolerances and a 10 m cable result to the given values for  $C_i$  and  $L_i$  for the respective sensor models, shown in Table 2.
5. Wiring methods must be in accordance with all applicable installation requirements of the country in use. For the U.S. see NFPA 70 (NEC) article 504. For Canada see CEC section 18. Segregation between separate intrinsically safe circuits must be observed.
6. For use in for use in Class II, Division 1, Class III, Division 1 or Zone 20: Mount the Proximity Sensor in a way that it is protected against mechanical hazard. Using the protective cover SH-F31K2-B13 and the activator with protective cover BT65-F31K2-RG-EN-01 or the protective cover of the activator SH-BT65-F31K2-01 an adequate protection of the device is guaranteed according to UL 60079-0 and CSA C22.2 NO. 60079-0.
7. WARNING: Substitution of components may impair intrinsic safety and suitability for hazardous (classified) locations.  
 AVERTISSEMENT - La substitution de composants peut compromettre la sécurité intrinsèque et l'adéquation à une utilisation en emplacements dangereux.
8. Correlations between the type of connected circuit and the maximum permissible ambient temperature are given in Table 1, Table 3 and Table 4 below.

When assigning the actual sensor to the respective table, use the type description, which describes the sensor best. Letters and digits describe the different types according to the type description key.

The dots in this type description represent free definable parameters. These free definable parameters can be omitted or replaced by letters or digits.

9. Appropriate measures need to be taken to protect the Proximity Sensors against mechanical damage due to impact if they are used within an ambient temperature range below  $-20 \text{ }^\circ\text{C}$ .  
 For for use in Class I, Division 1 or Class I, Zone 0: An ambient temperature below  $-60 \text{ }^\circ\text{C}$  is not permissible.  
 For use in for use in Class II, Division 1, Class III, Division 1 or Zone 20: An ambient temperature below  $-40 \text{ }^\circ\text{C}$  is not permissible.

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	Valve position sensors NCN3-F31K2...-N...	sheet 9 of 11

10. When the following types of proximity sensors are applied acc. to the following classification

- Class I, Division 1, Class II, Division 1 or Class III Division 1 or
- Class I, Zone 0 or Zone 20

as tabulated below, inadmissible electrostatic charge of the plastic housing has to be prevented.

Model	Division Classification			Zone Classification	
	Class I, Division 1	Class II, Division 1	Class III, Division 1	Class I, Zone 0	Zone 20
	for Groups A, B, C, D	for Groups Not permitted	for Class Not permitted	for Groups IIA / IIB / IIC	for Group Not permitted
NCN3-F31K2M-N...	A, B, C, D	E, F, G	III	IIA / IIB / IIC	III

WARNING – AVOID ELECTROSTATIC CHARGE – SEE INSTRUCTIONS  
 AVERTISSEMENT – DANGER POTENTIEL DE CHARGES ÉLECTROSTATIQUES – VOIR INSTRUCTIONS

Do not mount the supplied label in areas that can be electrostatically charged.

Information on electrostatic hazards can be found in the technical specification IEC/TS 60079-32-1.

11. Inadmissible electrostatic charge of parts of the metal housing has to be avoided for the following types of Proximity Sensors. Dangerous electrostatic charge of parts of the metal housing can be avoided by grounding these parts whereas very small parts of the metal housing (e.g. screws) do not need to be grounded:

NCN3-F31K2M-...

12. For use in Class I, Division 1 or Class I, Zone 0: The connection facilities of the Proximity Sensors shall be installed as such that a minimum degree of protection of IP20 according IEC 60529 is complied with.

For use in Class II, Division 1 or Class III, Division 1: The connection facilities of the Proximity Sensors shall be installed as such that a minimum degree of protection of IP6X according IEC 60529 is complied with.

For use in Zone 20: The connection facilities of the Proximity Sensors shall be installed as such that a minimum degree of protection of IP54 according IEC 60529 is complied with.

13. For use in Class I, Division 1 or Class I, Zone 0: Protection of cables and cable glands from tensile load and torsional stress is necessary, alternatively suitable certified cable glands have to be used.

For use in for use in Class II, Division 1, Class III, Division 1 or Zone 20: Suitable certified blind plugs and / or cable glands have to be used.

14. When the following types of proximity sensors are applied acc. to the following classification


- Class I, Division 1 or
- Class I, Zone 0

the maximum permissible mass fractions of metallic materials are exceeded for the following types of proximity sensors:

NCN3-F31K2M-N... (metallic base)

It shall be ensured by appropriate measures that an ignition hazard due to impact or friction effects cannot occur.

15. For Proximity sensors with valve circuits, the maximum values of each connected intrinsically safe valve have to be taken into account. It is not allowed to connect additional electrical sources to the intrinsically safe valve circuit on the valve side.

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Entity Parameters

Table 1, Proximity sensors, maximum values

Sensor circuits	<table border="1"> <tr> <th>Type 1</th> <th>Type 2</th> <th>Type 3</th> </tr> <tr> <td>Ui = 15 V li = 25 mA Pi = 34 mW</td> <td>Ui = 15 V li = 25 mA Pi = 64 mW</td> <td>Ui = 15 V li = 52 mA Pi = 169 mW</td> </tr> </table>	Type 1	Type 2	Type 3	Ui = 15 V li = 25 mA Pi = 34 mW	Ui = 15 V li = 25 mA Pi = 64 mW	Ui = 15 V li = 52 mA Pi = 169 mW
Type 1	Type 2	Type 3					
Ui = 15 V li = 25 mA Pi = 34 mW	Ui = 15 V li = 25 mA Pi = 64 mW	Ui = 15 V li = 52 mA Pi = 169 mW					
Valve circuit(s)	<table border="1"> <tr> <td>Ui = 32 V li = 240 mA</td> </tr> </table>	Ui = 32 V li = 240 mA					
Ui = 32 V li = 240 mA							

Table 2, Proximity sensors, effective internal inductance and capacitance

Model	Ci / nF	Li / µH
NCN3-F31K2...-N4-...	< 100	< 100
NCN3-F31K2...-N5-...	< 200	< 200

Valve circuit(s)	<table border="1"> <tr> <th>Ci / nF</th> <th>Li / µH</th> </tr> <tr> <td>&lt; 10</td> <td>&lt; 20</td> </tr> </table>	Ci / nF	Li / µH	< 10	< 20
Ci / nF	Li / µH				
< 10	< 20				

Table 3, Proximity sensors, maximum permissible ambient temperature for use in Class I, Division 1, Class I, Zone 0

	Type 1			Type 2			Type 3		
	maximum permissible ambient temperature in °C for application in temperature class								
Model	T6	T5	T4-T1	T6	T5	T4-T1	T6	T5	T4-T1
NCN3-F31K2...-N4-...	70	85	100	70	85	100	60	75	75
NCN3-F31K2...-N5-...	70	85	100	70	85	100	60	75	75

Table 4, Proximity sensors, maximum permissible ambient temperature for use in Class II, Division 1, Class III, Division 1 or Zone 20

	Type 1	Type 2	Type 3
Model	maximum permissible ambient temperature in °C		
NCN3-F31K2M-N4-B13-...	50	45	40
NCN3-F31K2M-N4-B23-...	50	45	40
NCN3-F31K2M-N5-B13-...	50	45	40
NCN3-F31K2M-N5-B23-...	50	45	40