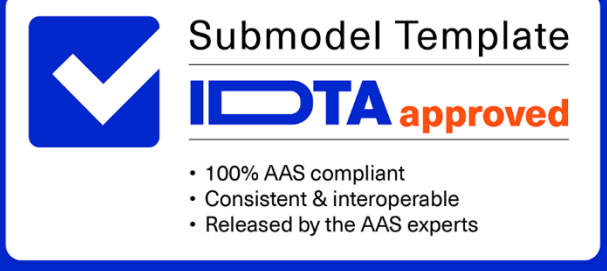
IDTA 02006-2-0 Digital Nameplate for Industrial Equipment

20. October 2022

SPECIFICATION

Submodel Template of the Asset Administration Shell



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Version history

Date	Version	Comment
2020-11-24	1.0	This version is the first version officially published by ZVEI and Plattform Industrie 4.0.
2022-10-20	2.0	Release of the official Submodel template published by IDTA. This version is based on V1.0.

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1 General

1.1 About this document

This document is a part of a specification series. Each part specifies the contents of a Submodel template for the Asset Administration Shell (AAS). The AAS is described in [1], [2], [3] and [6]. First exemplary Submodel contents were described in [4], while the actual format of this document was derived by the "Administration Shell in Practice" [5]. The format aims to be very concise, giving only minimal necessary information for applying a Submodel template, while leaving deeper descriptions and specification of concepts, structures and mapping to the respective documents [1] to [6].

The target group of the specification are developers and editors of technical documentation and manufacturer information, which are describing assets in smart manufacturing by means of the Asset Administration Shell (AAS) and therefore need to create a Submodel instance with a hierarchy of SubmodelElements. This document especially details on the question, which SubmodelElements with which semantic identification shall be used for this purpose.

1.2 Scope of the Submodel

This Submodel template aims to provide asset nameplate information to the respective Asset Administration Shells in an interoperable manner. Central element is the provision of properties [7], ideally interoperable by the means of dictionaries such as ECLASS and IEC CDD (Common Data Dictionary). While in the current version an IRI is provided for a small quantity of the specified properties as their semantic identifier, a complete harmonization of all properties is planned for the subsequent version 2.1. The purpose of this document is to make selected specifications of Submodels in such manner that information about assets and their nameplate can be exchanged in a meaningful way between partners in a value creation network. It targets equipment for process industry and factory automation by defining standardized meta data.

The intended use case is the provision of a standardized property structure within a digital nameplate, which enables the interoperability of digital nameplates from different manufacturers.

This concept can serve as a basis for standardizing the respective Submodel. The conception is based on existing norms, directives and standards so that a far-reaching acceptance can be achieved.

Beside standardized Submodel this template also introduces standardized SubmodelElementCollections (SMC) in order to improve the interoperability while modelling partial aspects within Submodels. The standardized SMCs include address and asset product marking.

1.3 Relevant standards for the Submodel template

The current version of the Submodel template is considered to meet the minimum requirement for nameplate information, hence it concentrates on the requirements specified by EU directives according to the Blue Guide published in the Official Journal of the EU-Commission. Furthermore, the current version provides a concept for modelling nameplate information required in the field of explosion protection according to the Directive 2014/34/EU.

The EU directive 2006/42/EC aims to standardize the market entry requirements for machines in the European economic area and further related countries. In regard to nameplate the EU directive establishes the minimum requirements on information a nameplate should provide which state as follows:

- the business name and full address of the manufacturer and, where applicable, his authorised representative,
- designation of the machinery,
- the CE Marking,
- designation of series or type,

- serial number, if any,
- the year of construction, that is the year in which the manufacturing process is completed.

With regard to explosion-protected equipment, various additional information is required for the respective device to be contained in the nameplate [8]. The additional information set also strongly depends on the country, e.g.

- Directive 2014/34/EU: specific mark of explosion protection, Equipment Group, Category, Gas or Dust areas etc.
- IEC Ex: Type of Protection, Equipment Protection Level, certificate number, etc.
- North America: Class, Division, Groups, Type of Protection, etc.

According to [3], interoperable properties might be defined by standards, consortium specifcations or manufacturer specifications. Useful standards providing sources of concepts are:

Table 1 List of examplary standards defining interoperable properties

IEC 62890:2020-07 — Industrial-process measurement, control and automation - Life-cycle-management for systems and components	Describes basic concepts of product types and instances and the concepts of a life-cycle mode
VDMA 24903 — Obsolescence management – Exchange of information regarding change and discontinuance of products and items	Describes important event in the life-cycle of a product type and identifies important information elements to be conveyed

So called property dictionaries are used identify information elements (see Terms and Definitions of [6]). Such property dictionaries include:

- ECLASS, see: https://www.eclasscontent.com/
- IEC CDD, see: https://cdd.iec.ch/cdd/iec61987/iec61987.nsf and https://cdd.iec.ch/cdd/iec62683/cdddev.nsf

In this document, properties are aimed to be described by ECLASS.

Further relevant basic requirements for nameplates are described in [8] and [9].

Requirements specified by further regulations and directives will be taken into account in subsequent versions.

1.4 Explanations on used UML diagrams

For clarity and an improved legibility readers suggested to go through this section at first before reading the following chapters.

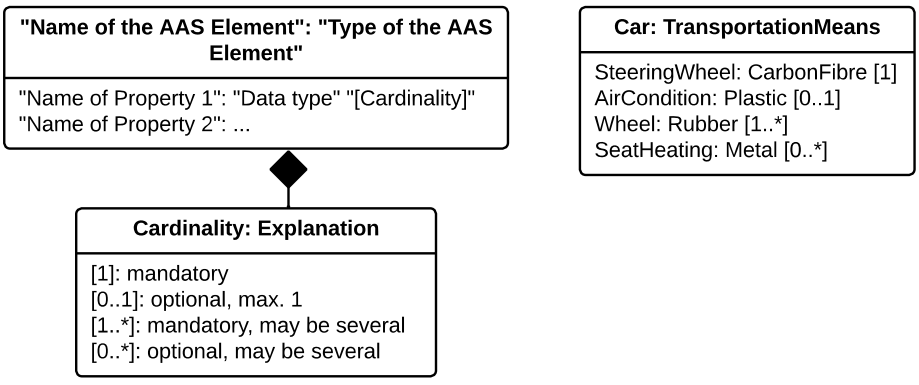


Figure 1: Reading aid and example: UML notation used in this document

Further details about UML diagrams please refer to [6] and [10].

Further details about used table formats please refer to Annex A.

2 Information set for Submodel “Nameplate”

The Submodel template was motivated by the prior ZVEI project “Digital Nameplate”. While defining Submodels the following three aspects must be considered as suggested in [5]:

Use and economic relevance

A nameplate contains identifying, descriptive and indicating information about an asset. Given the variety of requirements from national and global institutions, conventional nameplate have reached their limits of presenting mandatory content. Especially for industrial equipment in explosion hazardous areas the amount of information required on the markings has increased even more. The Submodel “Nameplate” helps to standardize the information structure for modelling a nameplate in compliance with EU Machine Directive 2006/42/EC. As a result, a breakthrough of restrictions due to limited labeling field can be achieved. At the same time the availability of asset information is widened from local to global level enabling further partners along the value chain to have access to nameplate information. The machine readability can be realized without ambiguity with the help of semantic information.

Possible functions and interactions

The Submodel “Nameplate” provides information from a nameplate. Customers or potential customers can use this Submodel to acquire identifying, classifying information about an asset, such as the manufacturer name, model type or serial number and the provided product markings. Customers can also use this Submodel to verify the asset with their order. Beside the customers public authorities and inter-trade organizations may also share interest in this Submodel in order to examine the information integrity stipulated for a nameplate. Manufacturers use this Submodel to fulfill the legal commitment on the one hand, on the other hand this Submodel helps them to identify the right asset in case maintenance services or spare parts are needed.

By using the SMC “Marking” and its child element SMC “ExplosionSafety” mandatory nameplate content related to explosion protection can be modelled sufficiently. The modelling method was concepted in such manner that a wide range of national and international regulations and standards regarding explosion protection were taken into account.

In order to take regulations for nameplate from further standards or directives into account additional properties can be modelled with SMC “AssetSpecificProperties” and its child element SMC “GuidelineSpecificProperties” while reference to the additional standard document should be stored in the property “GuidelineForConformityDeclaration”. A separate SMC “GuidelineSpecificProperties” needs to be created for each additional standard and all SMC “GuidelineSpecificProperties” should be placed under the parent node “AssetSpecificProperties”.

Property specification

See clause 3 “Submodel and collections“.

3 Submodel and collections

3.1 Properties of the Submodel “Nameplate”

Figure 2 shows the UML-diagram defining the relevant properties which need to be set. Table 2 describes the details of the Submodel structure combined with examples.

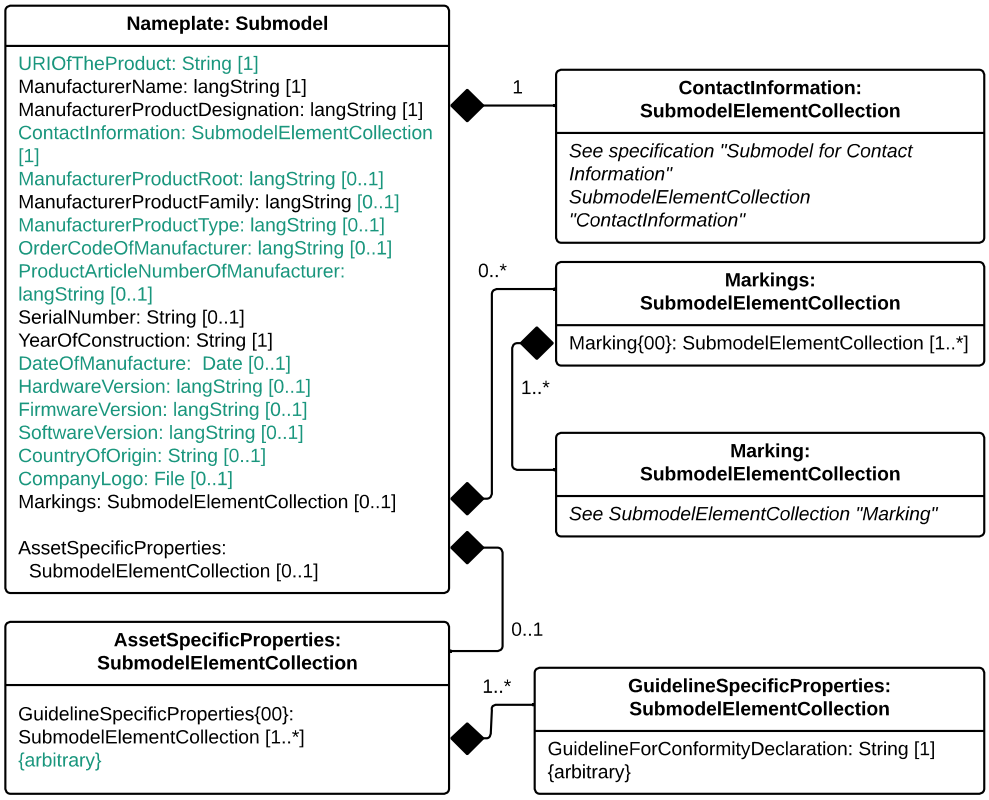


Figure 2: UML-Diagram for Submodel "Nameplate"

Table 2: Properties of Submodel "Nameplate"

idShort:	Nameplate Note: the above idShort shall always be as stated.		
Class:	Submodel		
semanticId:	[IRI] https://admin-shell.io/zvei/nameplate/2/0/Nameplate		
Explanation:	Contains the nameplate information attached to the product		
[SME type]	**semanticId = [idType]value**	**[valueType]**	**card.**
idShort	**Description@en**	**example**	
[Property] URIOfTheProduct	[IRDI] 0173-1#02-AAY811#001 unique global identification of the product using an universal resource identifier (URI) Note: see also [IRDI] 0112/2///61987#ABN590#001 URI of product instance	[String] https://www.domain-abc.com/Model-Nr-1234/Serial-Nr-5678	[1]

[MLP] ManufacturerName	[IRDI] 0173-1#02-AAO677#002 legally valid designation of the natural or judicial person which is directly responsible for the design, production, packaging and labeling of a product in respect to its being brought into circulation Note: see also [IRDI] 0112/2///61987#ABA565#007 manufacturer Note: mandatory property according to EU Machine Directive 2006/42/EC.	[langString] Muster AG @DE	[1]
[MLP] ManufacturerProductDesignation	[IRDI] 0173-1#02-AAW338#001 Short description of the product (short text) Note: see also [IRDI] 0112/2///61987#ABA567#007 name of product Note: Short designation of the product is meant. Note: mandatory property according to EU Machine Directive 2006/42/EC.	[langString] ABC-123 @EN Industrieroboter @DE	[1]
[SubmodelElementCollection] ContactInformation	[IRI] https://admin-shell.io/zvei/nameplate/1/0/ContactInformations/ContactInformation The SMC “ContactInformation” contains information on how to contact the manufacturer or an authorised service provider, e.g. when a maintenance service is required Note: physical address is a mandatory property according to EU Machine Directive 2006/42/EC. See separate clause	n/a	[1]
[MLP] ManufacturerProductRoot	[IRDI] 0173-1#02-AAU732#001 Top level of a 3 level manufacturer specific product hierarchy	[langString] flow meter@EN	[0..1]
[MLP] ManufacturerProductFamily	[IRDI] 0173-1#02-AAU731#001 2nd level of a 3 level manufacturer specific product hierarchy Note: conditionally mandatory property according to EU Machine Directive 2006/42/EC. One of the two properties must be provided: ManufacturerProductFamily (0173-1#02-AAU731#001) or ManufacturerProductType (0173-1#02-AAO057#002).	[langString] Type ABC@EN	[0..1]
[MLP] ManufacturerProductType	[IRDI] 0173-1#02-AAO057#002 Characteristic to differentiate between different products of a product family or special variants Note: see also [IRDI] 0112/2///61987#ABA300#006 code of product Note: conditionally mandatory property according to EU Machine Directive 2006/42/EC. One of the two properties must be provided: ManufacturerProductFamily (0173-1#02-AAU731#001) or ManufacturerProductType (0173-1#02-AAO057#002).	[langString] FM-ABC-1234@EN	[0..1]

[MLP][1] OrderCodeOfManufacturer	[IRDI] 0173-1#02-AAO227#002 By manufactures issued unique combination of numbers and letters used to identify the device for ordering Note: see also [IRDI] 0112/2///61987#ABA950#006 order code of product	[langString][1] FMABC1234@EN	[0..1]
[MLP] [1] ProductArticleNumberOfManufacturer	[IRDI] 0173-1#02-AAO676#003 unique product identifier of the manufacturer Note: see also [IRDI] 0112/2///61987#ABA581#006 article number	[langString] [1] FM11-ABC22-123456@EN	[0..1]
[Property] SerialNumber	[IRDI] 0173-1#02-AAM556#002 unique combination of numbers and letters used to identify the device once it has been manufactured Note: see also [IRDI] 0112/2///61987#ABA951#007 serial number	[String] 12345678	[0..1]
[Property] YearOfConstruction	[IRDI] 0173-1#02-AAP906#001 Year as completion date of object Note: mandatory property according to EU Machine Directive 2006/42/EC.	[String] 2020	[1]
[Property] DateOfManufacture	[IRDI] 0173-1#02-AAR972#002 Date from which the production and / or development process is completed or from which a service is provided completely Note: see also [IRDI] 0112/2///61987#ABB757#007 date of manufacture Note: format by lexical representation: CCYY-MM-DD	[Date] 2021-01-01	[0..1]
[MLP] [1] HardwareVersion	[IRDI] 0173-1#02-AAN270#002 Version of the hardware supplied with the device Note: see also [IRDI] 0112/2///61987#ABA926#006 hardware version	[langString] [1] 1.0.0@EN	[0..1]
[MLP] [1] FirmwareVersion	[IRDI] 0173-1#02-AAM985#002 Version of the firmware supplied with the device Note: see also [IRDI] 0112/2///61987#ABA302#004 firmware version	[langString] [1] 1.0@EN	[0..1]
[MLP] [1] SoftwareVersion	[IRDI] 0173-1#02-AAM737#002 Version of the software used by the device Note: see also [IRDI] 0112/2///61987#ABA601#006 software version	[langString] [1] 1.0.0@EN	[0..1]

[1] Recommendation: property declaration as MLP is required by its semantic definition. As the property value is language independent, users are recommended to provide maximal 1 string in any language of the user's choice.

[Property] CountryOfOrigin	[IRDI] 0173-1#02-AAO259#004 Country where the product was manufactured Note: see also [IRDI] 0112/2///61360_4#ADA034#001 country of origin Note: Country codes defined accord. to DIN EN ISO 3166-1 alpha-2 codes	[String] DE	[0..1]
[File] CompanyLogo	[IRI] https://admin-shell.io/zvei/nameplate/2/0/Nameplate/CompanyLogo A graphic mark used to represent a company, an organisation or a product	[File]	[0..1]
[SubmodelElementCollection] Markings	[IRDI] 0173-1#01-AGZ673#001 Collection of product markings Note: CE marking is declared as mandatory according to EU Machine Directive 2006/42/EC. See separate clause	n/a	[0..1]
[SubmodelElementCollection] AssetSpecificProperties	[IRDI] 0173-1#01-AGZ672#001 Group of properties that are listed on the asset's nameplate and are grouped based on guidelines Note: defined as “Asset specific nameplate information” per ECLASS See separate clause	n/a	[0..1]

3.2 Mandatory properties of the SMC “ContactInformation” for physical address

In order to provide information about a physical address, the SMC “ContactInformation” defined by [11] is to be re-used in the context of digital nameplate.

Due to the fact that the SMC “ContactInformation” has been concepted to provide interoperable contact information thus all properties within the SMC “ContactInformation” are defined as optional, this chapter defines properties that are mandatorily required to ensure the provision of physical address.

Figure 3 shows the UML-diagram defining the relevant properties which need to be set mandatory.

Table 3 describes the details of the SMC structure combined with examples.

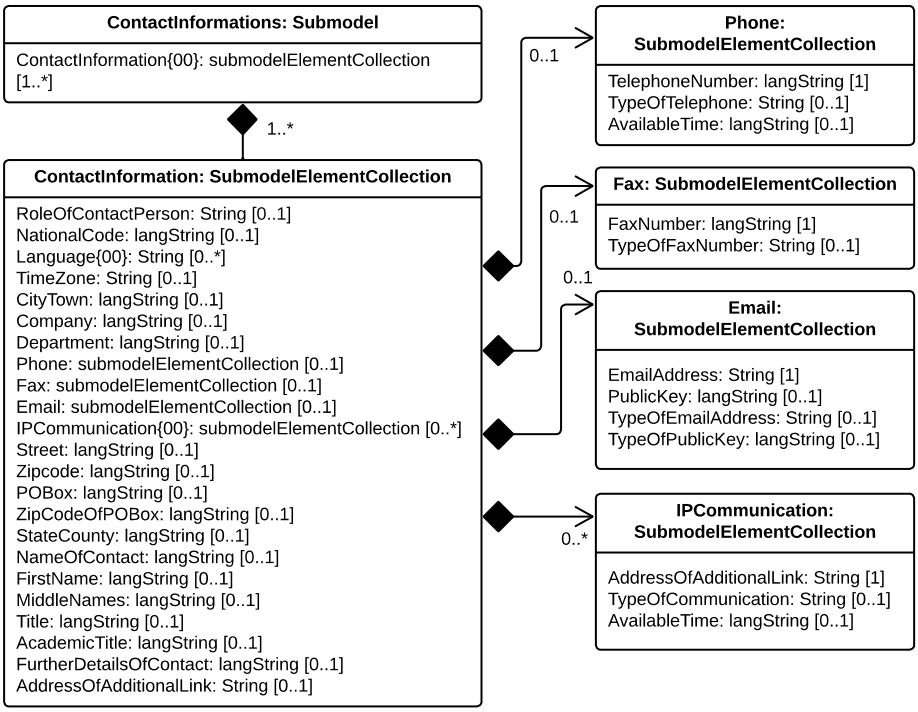


Figure 3: UML-Diagram for SMC "ContactInformation" defined in Submodel “ContactInformations” by [11][2]

[2] As SMC “ContactInformation” is designed for re-usage in other submodels, the displayed cardinalities of properties in the UML diagramm differ from requirements for this submodel template.

Table 3: Mandatory properties of SMC "ContactInformation"

idShort:	ContactInformation Note: the above idShort shall always be as stated.
Class:	SubmodelElementCollection
semanticId:	[IRI] https://admin-shell.io/zvei/nameplate/1/0/ContactInformations/ContactInformation
isCaseOf	[IRDI] 0173-1#02-AAQ837#005
AllowDuplicates	True
Parent:	Submodel “Nameplate”
Explanation:	The SMC “ContactInformation” contains information on how to contact the manufacturer or an authorised service provider, e.g. when a maintenance service is required

[SME type]	**semanticId = [idType]value**	**[valueType]**	**card.**
idShort	**Description@en**	**example**	
[MLP] Street	[IRDI] 0173-1#02-AAO128#002 street name and house number Note: see also [IRDI] 0112/2///61987#ABA286#001 street Note: mandatory property according to EU Machine Directive 2006/42/EC.	[langString] Musterstraße 1@DE	[1]
[MLP] [1] Zipcode	[IRDI] 0173-1#02-AAO129#002 ZIP code of address Note: see also [IRDI] 0112/2///61987#ABA281#001 ZIP/Postal code Note: mandatory property according to EU Machine Directive 2006/42/EC.	[langString] [1] 12345@DE	[1]
[MLP] CityTown	[IRDI] 0173-1#02-AAO132#002 town or city Note: see also [IRDI] 0112/2///61987#ABA129#001 city/town Note: mandatory property according to EU Machine Directive 2006/42/EC.	[langString] Musterstadt@DE	[1]
[MLP] [1] NationalCode	[IRDI] 0173-1#02-AAO134#002 code of a country Note: see also [IRDI] 0112/2///61360_4#ADA005#001 country code Note: Country codes defined accord. to DIN EN ISO 3166-1 alpha-2 codes Note: mandatory property according to EU Machine Directive 2006/42/EC.	[langString] [1] DE@DE	[1]

The following example in Figure 4 shows a possible modelling of SMC “Address” in Submodel “Nameplate”.

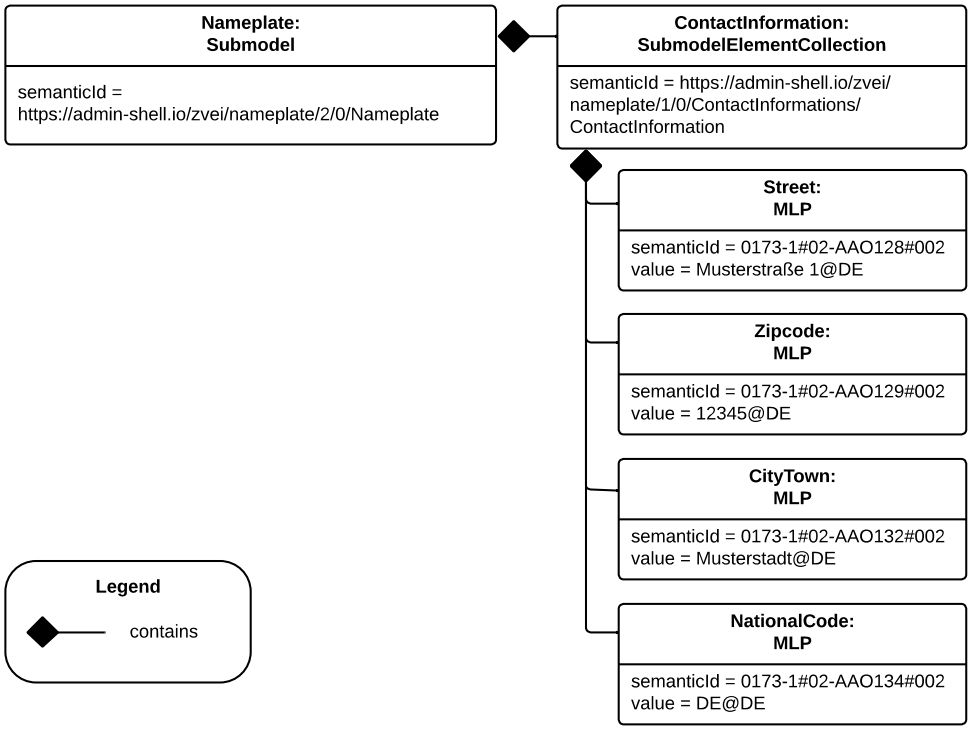


Figure 4: Example modelling of SMC "ContactInformation"

3.3 Properties of the SMC “Markings”

Figure 2 shows the UML-diagram defining the relevant properties which need to be set. Table 4 describes the details of the SMC structure.

Table 4: Properties of SMC "Markings"

idShort:	Markings		
Class:	SubmodelElementCollection		
semanticId:	[IRDI] 0173-1#01-AGZ673#001		
AllowDuplicates	True		
Parent:	Submodel “Nameplate”		
Explanation:	Collection of product markings Note: CE marking is declared as mandatory according to EU Machine Directive 2006/42/EC.		
[SME type]	**semanticId = [idType]value**	**[valueType]**	**card.**
idShort	**Description@en**	**example**	
[SubmodelElementCollection] Marking{00}	[IRDI] 0173-1#01-AHD206#001 contains information about the marking labelled on the device Note: see also [IRDI] 0112/2///61987#ABH515#003 Certificate or approval Note: CE marking is declared as mandatory according to the Blue Guide of the EU-Commission See separate clause.	n/a	[1..*]

3.4 Properties of the SMC “Marking” for product marking

Figure 5 shows the UML-diagram defining the relevant properties which need to be set. Table 5 describes the details of the SMC structure combined with examples.

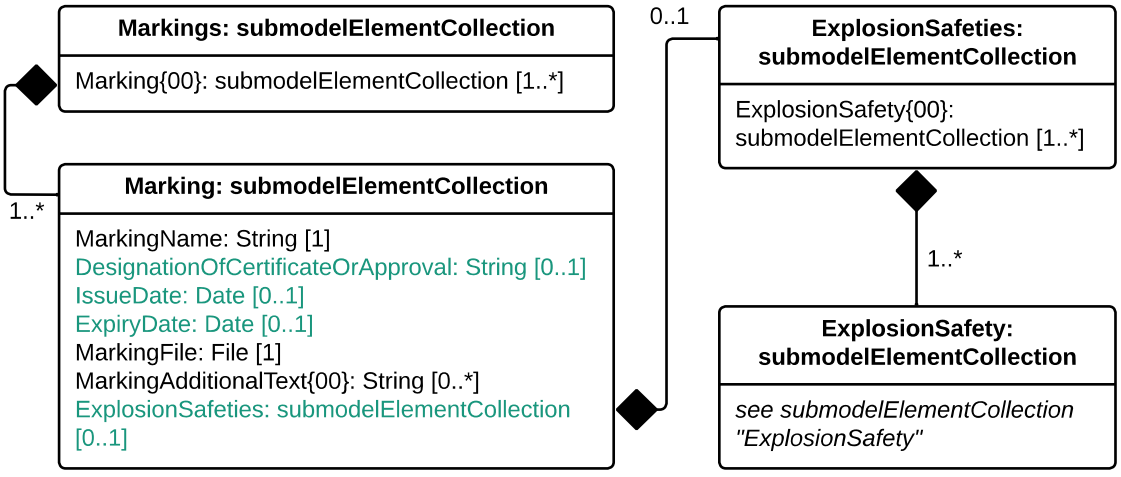


Figure 5: UML-Diagram for SMC "Marking"

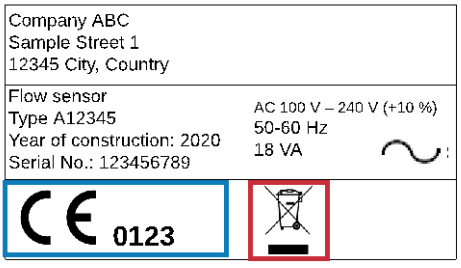
Table 5: Properties of SMC "Marking"

idShort:	Marking{00}		
Class:	SubmodelElementCollection		
semanticId:	[IRDI] 0173-1#01-AHD206#001		
AllowDuplicates	True		
Parent:	SubmodelElementCollection “Markings”		
Explanation:	contains information about the marking labelled on the device Note: see also [IRDI] 0112/2///61987#ABH515#003 Certificate or approval		
[SME type]	**semanticId = [idType]value**	**[valueType]**	**card.**
idShort	**Description@en**	**example**	
[Property] MarkingName	[IRI] https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/MarkingName common name of the marking Note: see also [IRDI] 0173-1#02-BAB392#015 certificate/approval Note: CE marking is declared as mandatory according to Blue Guide of the EU-Commission	[String] valueId with ECLASS enumeration IRDI is preferable, e.g. [IRDI] 0173-1#07-DAA603#004 for CE. If no IRDI available, string value can also be accepted. Samples for valueId from ECLASS are listed in Annex B	[1]
[Property] DesignationOfCertificateOrApproval	[IRDI] 0112/2///61987#ABH783#001 alphanumeric character sequence identifying a certificate or approval Note: Approval identifier, reference to the certificate number, to be entered without spaces	[String] KEMA99IECEX1105/128	[0..1]
[Property] IssueDate	[IRI] https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/IssueDate Date, at which the specified certificate is issued Note: format by lexical representation: CCYY-MM-DD Note: to be specified to the day	[Date] 2021-01-01	[0..1]
[Property] ExpiryDate	[IRI] https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExpiryDate Date, at which the specified certificate expires Note: see also [IRDI] 0173-1#02-AAO997#001 Validity date Note: format by lexical representation: CCYY-MM-DD Note: to be specified to the day	[Date] 2021-01-01	[0..1]

[File] MarkingFile	[IRI] https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/MarkingFile conformity symbol of the marking	[File] /aasx/Nameplate/marking_ce.png	[1]
[Property] MarkingAdditionalText{00}	[IRI] https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/MarkingAdditionalText where applicable, additional information on the marking in plain text, e.g. the ID-number of the notified body involved in the conformity process Note: see also [IRDI] 0173-1#02-AAM954#002 details of other certificate	[String] 0044	[0..*]
[SubmodelElementCollection] ExplosionSafeties	[IRI] https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties Collection of explosion safefy specifications See separate clause	n/a	[0..1]

Regarding the property “MarkingName” the preferable solution is to provide a valueId in IRDI originating from ECLASS enumeration value list, e.g. "CE” (IRDI: 0173-1#07-DAA603#004). In case none of the existing ECLASS enumeration values matches, filling plain string text into the “value” field of the property “MarkingName” can be accepted alternatively. It needs to be pointed out that ECLASS also provides marking definitions in terms of boolean property, e.g. “CE- qualification present” (IRDI: 0173-1#02-BAF053#008). In this case users should instead use a matching ECLASS enumeration value or, if not provided as enumeration, fill in plain string text.

The following example illustrates how to model product marking in an AAS. On the left side there is a sample nameplate which contains two markings to be modelled: the CE marking and the WEEE marking with a crossed-out wheeled bin. Next to the nameplate a table lists all properties and their attributes.



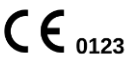
		CE	crossed-out wheeled bin (WEEE)
MarkingName	valueType	String	String
	value		WEEE
	valueId	[IRDI] 0173-1#07-DAA603#004	[URI] https://eur-lex.europa.eu/aas/2012-19-EU/crossed-out-wheeled-bin
MarkingFile	value	/aasx/Nameplate/marking_ce.png 	/aasx/Nameplate/WEEE.png 
	mimeType	image/png	image/png
MarkingAdditionalText	valueType	string	string
	value	0123	
	valueId		

Figure 6: Example modelling of SMC "Marking"

3.5 Properties of the SMC “ExplosionSafeties”

Figure 5 shows the UML-diagram defining the relevant properties which need to be set. describes the details of the SMC structure

Table 6 Properties of SMC “ExplosionSafeties"

idShort:	ExplosionSafeties		
Class:	SubmodelElementCollection		
semanticId:	[IRI] https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties		
AllowDuplicates	True		
Parent:	SubmodelElementCollection “Marking”		
Explanation:	Collection of explosion safefy specifications		
[SME type]	**semanticId = [idType]value**	**[valueType]**	**card.**
idShort	**Description@en**	**example**	
[SubmodelElementCollection] ExplosionSafety{00}	[IRI] https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety contains information related to explosion safety according to device nameplate See separate clause.	n/a	[1..*]

3.6 Properties of the SMC “ExplosionSafety”

Figure 7 shows the UML-diagram defining the relevant properties which need to be set.

Table 7 describes the details of the SMC structure.

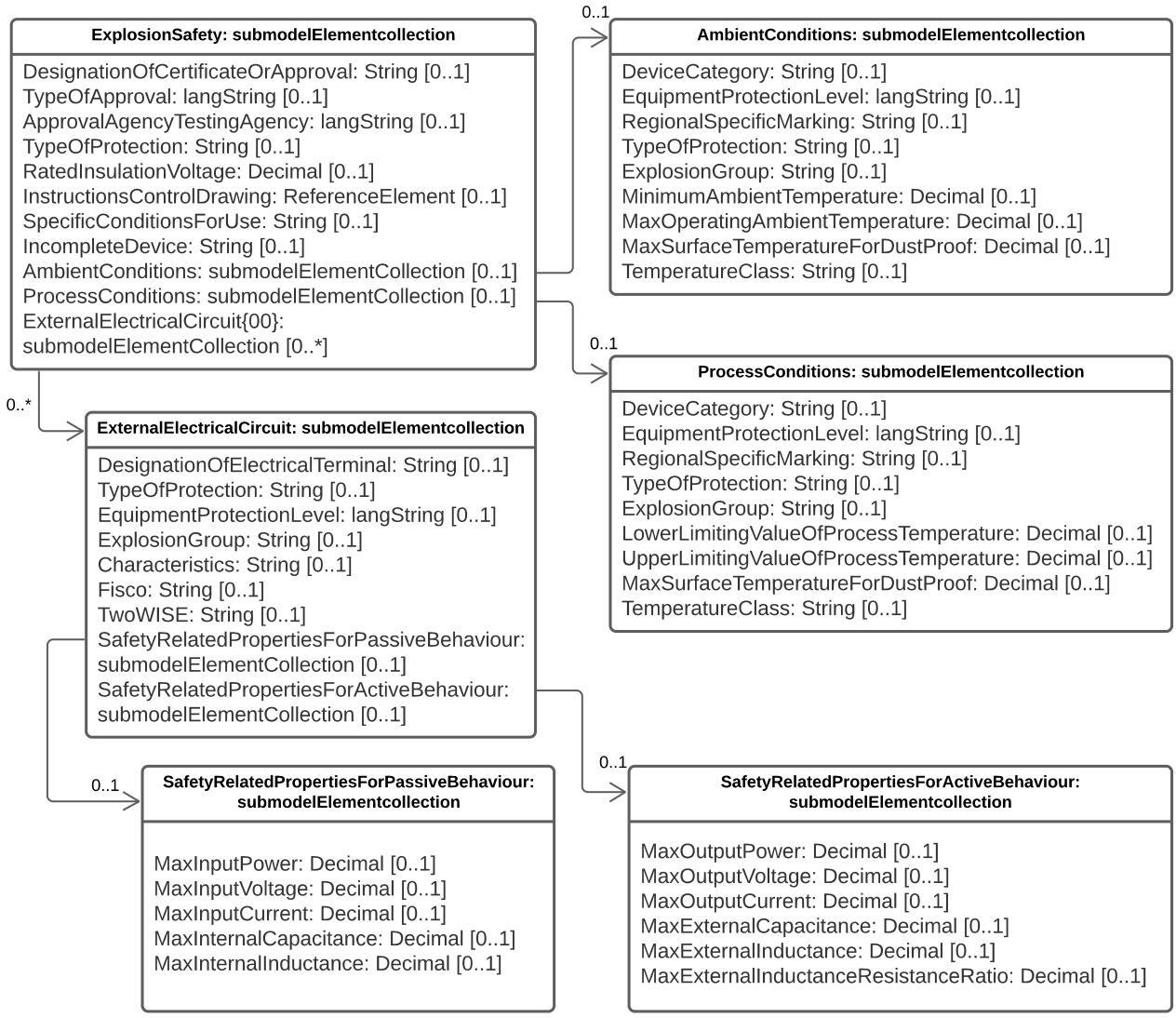


Figure 7: UML-Diagram of SMC "ExplosionSafety"

Table 7: Properties of SMC “ExplosionSafety”

idShort:	ExplosionSafety		
Class:	SubmodelElementCollection		
semanticId:	[IRI] https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety		
AllowDuplicates	True		
Parent:	SubmodelElementCollection “ExplosionSafeties”		
Explanation:	contains information related to explosion safety according to device nameplate		
[SME type]	**semanticId = [idType]value**	**[valueType]**	**card.**
idShort	**Description@en**	**example**	
[Property] DesignationOfCertificateOrApproval	[IRDI] 0112/2///61987#ABH783#001 alphanumeric character sequence identifying a certificate or approval Note: Approval identifier, reference to the certificate number, to be entered without spaces	[String] KEMA99IECEX1105/128	[0..1]
[MLP] [1] TypeOfApproval	[IRDI] 0173-1#02-AAM812#003 ([IRDI] 0112/2///61987#ABA231#008 type of hazardous area approval) classification according to the standard or directive to which the approval applies Note: name of the approval system, e.g. ATEX, IECEX, NEC, EAC, CCC, CEC Note: only values from the enumeration should be used as stated. For additional systems further values can be used.	[langString] [1] ATEX@DE	[0..1]
[MLP] [1] ApprovalAgencyTestingAgency	[IRDI] 0173-1#02-AAM632#001 ([IRDI] 0112/2///61987#ABA634#004 approval agency/testing agency) certificates and approvals pertaining to general usage and compliance with constructional standards and directives Note: name of the agency, which has issued the certificate, e.g. PTB, KEMA, CSA, SIRA Note: only values from the enumeration should be used as stated. For additional systems further values can be used.	[langString] [1] PTB@DE	[0..1]

[Property] TypeOfProtection	[IRDI] 0173-1#02-AAQ325#003 ([IRDI] 0112/2///61987#ABA589#002 type of protection (Ex)) classification of an explosion protection according to the specific measures applied to avoid ignition of a surrounding explosive atmosphere Note: • Type of protection for the device as listed in the certificate • Symbol(s) for the Type of protection. Several types of protection are separated by a semicolon ";" • If several TypeOfProtection are listed in the same certificate, for each TypeOfProtection a separate SMC "Explosion Safety" shall be provided	[String] db NI; NIFW Ex db eb ia Ex db; Ex eb	[0..1]
[Property] RatedInsulationVoltage	[IRDI] 0173-1#02-AAN532#003 from the manufacturer for the capital assets limited isolation with given(indicated) operating conditions Note: U_m(eff) Note: Insulation voltage, if specified in the certificate	[Decimal] 250 Unit: V	[0..1]
[ReferenceElement] InstructionsControlDrawing	[IRDI] 0112/2///61987#ABO102#001 file name of control/reference drawing designation used to uniquely identify a control/reference drawing stored in a file system Note: Reference to the instruction manual or control drawing	[Reference]	[0..1]
[Property] SpecificConditionsForUse	[IRI] https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety/SpecificConditionsForUse Note: X if any, otherwise no entry	[String] X	[0..1]
[Property] IncompleteDevice	[IRI] https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety/IncompleteDevice U if any, otherwise no entry	[String] U	[0..1]
[SubmodelElementCollection] AmbientConditions	[IRI] https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety/AmbientConditions Contains properties which are related to the ambient conditions of the device. Note: If the device is mounted in the process boundary, ambient and process conditions are provided separately. See separate clause	n/a	[0..1]

[SubmodelElementCollection] ProcessConditions	[IRI] https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety/ProcessConditions Contains properties which are related to the process conditions of the device. Note: If the device is mounted in the process boundary, ambient and process conditions are provided separately. See separate clause	n/a	[0..1]
[SubmodelElementCollection] ExternalElectricalCircuit{00}	[IRI] https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety/ExternalElectricalCircuit specifies the parameters of external electrical circuits. Note: If several external circuits can be connected to the device, this block shall provide a cardinality with the number of circuits Note: If for one external IS circuit several sets of safety parameters are provided (e.g. for several material groups), each set is specified in a separate block as a separate circuit. See separate clause	n/a	[0..*]

3.7 Properties of the SMC “AmbientConditions”

Figure 7 shows the UML-diagram defining the relevant properties which need to be set. Table 8 describes the details of the SMC structure.

Table 8: Properties of SMC "AmbientConditions "

idShort:	AmbientConditions		
Class:	SubmodelElementCollection		
semanticId:	[IRI] https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety/AmbientConditions		
Parent:	SubmodelElementCollection “ExplosionSafety”		
Explanation:	Contains properties which are related to the ambient conditions of the device. If the device is mounted in the process boundary, ambient and process conditions are provided separately		
[SME type]	**semanticId = [idType]value**	**[valueType]**	**card.**
idShort	**Description@en**	**example**	
[Property] DeviceCategory	[IRDI] 0173-1#02-AAK297#004 ([IRDI] 0112/2///61987#ABA467#002 equipment/device category) category of device in accordance with directive 94/9/EC Note: editorial definiton: Category of device in accordance with directive 2014/34/EU Note: Equipment category according to the ATEX system. According to the current nameplate, also the combination “GD” is permitted Note: The combination “GD” is no longer accepted and was changed in the standards. Currently the marking for “G” and “D” must be provided in a separate marking string. Older devices may still exist with the marking “GD”.	[String] 2G	[0..1]
[MLP] [1] EquipmentProtectionLevel	[IRDI] 0173-1#02-AAM668#001 ([IRDI] 0112/2///61987#ABA464#005 equipment protection level) part of a hazardous area classification system indicating the likelihood of the existence of a classified hazard Note: editorial definition: Level of protection assigned to equipment based on its likelihood of becoming a source of ignition Note: Equipment protection level according to the IEC standards. According to the current nameplate, also the combination “GD” is permitted Note: The combination “GD” is no longer accepted and was changed in the standards. Currently the marking for “G” and “D” must be provided in a separate marking string. Older devices may still exist with the marking “GD”.	[langString] [1] Gb@DE	[0..1]

[Property] RegionalSpecificMarking	[IRI] https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety/RegionalSpecificMarking Marking used only in specific regions, e.g. North America: class/divisions, EAC: “1” or NEC: “AIS”	[String] Class I, Division 2	[0..1]
[Property] TypeOfProtection	[IRDI] 0173-1#02-AAQ325#003 ([IRDI] 0112/2///61987#ABA589#002 type of protection (Ex)) classification of an explosion protection according to the specific measures applied to avoid ignition of a surrounding explosive atmosphere Note: Symbol(s) for the Type of protection. Several types of protection are separated by a semicolon “;”	[String] db NI; NIFW Ex db eb ia Ex db; Ex eb	[0..1]
[Property] ExplosionGroup	[IRDI] 0173-1#02-AAT372#001 ([IRDI] 0112/2///61987#ABA961#007 permitted gas group/explosion group) classification of dangerous gaseous substances based on their ability to cause an explosion Note: Equipment grouping according to IEC 60079-0 is meant by this property Note: Symbol(s) for the gas group (IIA…IIC) or dust group (IIIA…IIIC)	[String] IIC IIIB A,B,C,D	[0..1]
[Property] MinimumAmbientTemperature	[IRDI] 0173-1#02-AAZ952#001 ([IRDI] 0112/2///61987#ABA621#007 minimum ambient temperature) lower limit of the temperature range of the surrounding space in which the component, the pipework or the system can be operated Note: editorial defnition: lower limit of the temperature range of the environment in which the component, the pipework or the system can be operated Note: Rated minimum ambient temperature	[Decimal] -40[3] Unit: ºC	[0..1]
[Property] MaxAmbientTemperature	[IRDI] 0173-1#02-BAA039#010 ([IRDI] 0112/2///61987#ABA623#007 maximum ambient temperature) upper limit of the temperature range of the surrounding space in which the component, the pipework or the system can be operated Note: editorial definition: upper limit of the temperature range of the environment in which the component, the pipework or the system can be operated Note: Rated maximum ambient temperature	[Decimal] 120[3] Unit: ºC	[0..1]

[3] Positive temperatures are listed without “+” sign. If several temperatures ranges are marked, only the most general range shall be indicated in the template, which is consistent with the specified temperature class or maximum surface temperature. Other temperature ranges and temperature classes/maximum surface temperatures may be listed in the instructions.

[Property] MaxSurfaceTemperatureForDustProof	[IRDI] 0173-1#02-AAM666#005 ([IRDI] 0112/2///61987#ABB159#004 maximum surface temperature for dust-proof) maximum permissible surface temperature of a device used in an explosion hazardous area with combustible dust Note: Maximum surface temperature of the device (dust layer ≤ 5 mm) for specified maximum ambient and maximum process temperature, relevant for Group III only	[Decimal] 100^3 Unit: ºC	[0..1]
[Property] TemperatureClass	[IRDI] 0173-1#02-AAO371#004 ([IRDI] 0112/2///61987#ABA593#002 temperature class) classification system of electrical apparatus, based on its maximum surface temperature, related to the specific explosive atmosphere for which it is intended to be used. Note: editorial defnition: classification system of electrical apparatus, based on its maximum surface temperature, intended for use in an explosive atmosphere with flammable gas, vapour or mist. Note: Temperature class of the device for specified maximum ambient and maximum process temperature, relevant for Group II only (Further combinations may be provided in the instruction manual).	[String] T6 T5	[0..1]

3.8 Properties of the SMC “ProcessConditions”

Figure 7 shows the UML-diagram defining the relevant properties which need to be set. Table 9 describes the details of the SMC structure.

Table 9: Properties of SMC "ProcessConditions"

idShort:	ProcessConditions		
Class:	SubmodelElementCollection		
semanticId:	[IRI] https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety/ProcessConditions		
Parent:	SubmodelElementCollection “ExplosionSafety”		
Explanation:	Contains properties are related to the process conditions of the device. Note: If the device is mounted in the process boundary, ambient and process conditions are provided separately.		
[SME type]	**semanticId = [idType]value**	**[valueType]**	**card.**
idShort	**Description@en**	**example**	
[Property] DeviceCategory	[IRDI] 0173-1#02-AAK297#004 ([IRDI] 0112/2///61987#ABA467#002 equipment/device category) category of device in accordance with directive 94/9/EC Note: editorial defnition: Category of device in accordance with directive 2014/34/EU	[String] 1G	[0..1]

	Note: Equipment category according to the ATEX system.		
[MLP] [1] EquipmentProtectionLevel	[IRDI] 0173-1#02-AAM668#001 ([IRDI] 0112/2///61987#ABA464#005 equipment protection level) part of a hazardous area classification system indicating the likelihood of the existence of a classified hazard Note: editorial defnition: Level of protection assigned to equipment based on its likelihood of becoming a source of ignition Note: Equipment protection level according to the IEC or other standards, e.g. Ga (IEC), Class I/Division 1 (US), Zone (EAC)	[langString] [1] Ga@DE	[0..1]
[Property] RegionalSpecificMarking	[IRI] https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety/RegionalSpecificMarking Marking used only in specific regions, e.g. North America: class/divisions, EAC: “1” or NEC: “AIS”	[String] IS NI;AIS	[0..1]
[Property] TypeOfProtection	[IRDI] 0173-1#02-AAQ325#003 ([IRDI] 0112/2///61987#ABA589#002 type of protection (Ex)) classification of an explosion protection according to the specific measures applied to avoid ignition of a surrounding explosive atmosphere Note: Symbol(s) for the Type of protection. Several types of protection are separated by a semicolon “;”	[String] ia	[0..1]
[Property] ExplosionGroup	[IRDI] 0173-1#02-AAT372#001 ([IRDI] 0112/2///61987#ABA961#007 permitted gas group/explosion group) classification of dangerous gaseous substances based on their ability to cause an explosion Note: editorial definition: classification of dangerous gaseous substances based on their ability to be ignited Note: Equipment grouping according to IEC 60079-0 is meant by this property Note: Symbol(s) for the gas group (IIA…IIC) or dust group (IIIA…IIIC)	[String] IIC A,B,C,D	[0..1]
[Property] LowerLimitingValueOfProcessTemperature	[IRDI] 0173-1#02-AAN309#004 lowest temperature to which the wetted parts of the equipment can be subjected without permanent impairment of operating characteristics Note: Rated minimum process temperature	[Decimal] -40[3] Unit: ºC	[0..1]
[Property] UpperLimitingValueOfProcessTemperature	[IRDI] 0173-1#02-AAN307#004 highest temperature to which the wetted parts of the device may be subjected without permanent impairment of operating characteristics Note: Rated maximum process temperature	[Decimal] 120[3] Unit: ºC	[0..1]

[Property] MaxSurfaceTemperatureForDustProof	[IRDI] 0173-1#02-AAM666#005 ([IRDI] 0112/2///61987#ABB159#004 maximum surface temperature for dust-proof) maximum permissible surface temperature of a device used in an explosion hazardous area with combustible dust Note: Maximum surface temperature (dust layer ≤ 5 mm) for specified maximum ambient and maximum process temperature, relevant for Group III only	[Decimal] 85^3 Unit: ºC	[0..1]
[Property] TemperatureClass	[IRDI] 0173-1#02-AAO371#004 ([IRDI] 0112/2///61987#ABA593#002 temperature class) classification system of electrical apparatus, based on its maximum surface temperature, related to the specific explosive atmosphere for which it is intended to be used Note: editorial definition: classification system of electrical apparatus, based on its maximum surface temperature, intended for use in an explosive atmospheres with flammable gas, vapour or mist. Note: Temperature class for specified maximum ambient and maximum process temperature, relevant for Group II only (Further combinations may be provided in the instruction manual).	[String] T4	[0..1]

3.9 Properties of the SMC “ExternalElectricalCircuit”

Figure 7 shows the UML-diagram defining the relevant properties which need to be set. Table 10 describes the details of the SMC structure.

Table 10: Properties of SMC "ExternalElectricalCircuit"

idShort:	ExternalElectricalCircuit		
Class:	SubmodelElementCollection		
semanticId:	[IRI] https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety/ExternalElectricalCircuit		
Parent:	SubmodelElementCollection “ExplosionSafety”		
Explanation:	specifies the parameters of external electrical circuits. Note: If several external circuits can be connected to the device, this block shall provide a cardinality with the number of circuits Note: If for one external IS circuit several sets of safety parameters are provided (e.g. for several material groups), each set is specified in a separate block as a separate circuit.		
[SME type]	**semanticId = [idType]value**	**[valueType]**	**card.**
idShort	**Description@en**	**example**	
[Property] DesignationOfElectricalTerminal	[IRDI] 0112/2///61987#ABB147#004 alphanumeric character sequence identifying an electrical terminal Note: For each circuit the designation of the terminals shall be specified. If several circuits are provided with the same	[String] +/- 1/2 26(+)/27(-)	[0..1]

	parameters, their terminal pairs are listed and separated by a semicolon. If several circuits belong to one channel this shall be described in the instructions.		
[Property] TypeOfProtection	[IRDI] 0173-1#02-AAQ325#003 ([IRDI] 0112/2///61987#ABA589#002 type of protection (Ex)) classification of an explosion protection according to the specific measures applied to avoid ignition of a surrounding explosive atmosphere Note: • Type of protection for the device as listed in the certificate • Symbol(s) for the Type of protection. Several types of protection are separated by a semicolon ";" • If several TypeOfProtection are listed in the same certificate, for each TypeOfProtection a separate SMC "Explosion Safety" shall be provided	[String] db NI; NIFW Ex db eb ia Ex db; Ex eb	[0..1]
[MLP] [1] EquipmentProtectionLevel	[IRDI] 0173-1#02-AAM668#001 ([IRDI] 0112/2///61987#ABA464#005 equipment protection level) part of a hazardous area classification system indicating the likelihood of the existence of a classified hazard Note: editorial definition: Level of protection assigned to equipment based on its likelihood of becoming a source of ignition Note: EPL according to IEC standards Note: value should be chosen from an enumeration list with values "Ga, Gb, Gc, Da, Db, Dc, Ma, Mb"	[langString] [1] Ga@DE	[0..1]
[Property] ExplosionGroup	[IRDI] 0173-1#02-AAT372#001 ([IRDI] 0112/2///61987#ABA961#007 permitted gas group/explosion group) classification of dangerous gaseous substances based on their ability to cause an explosion Note: editorial definition: classification of dangerous gaseous substances based on their ability to be ignited Note: Equipment grouping according to IEC 60079-0 is meant by this property Note: Symbol(s) for the gas group (IIA…IIC) or dust group (IIIA…IIIC)	[String] IIC	[0..1]
[Property] Characteristics	[IRI] https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety/ExternalElectricalCircuit/Characteristics Characteristic of the intrinsically safe circuit Note: linear/ non-linear	[String] linear	[0..1]
[Property] Fisco	[IRI] https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/	[String]	[0..1]

	Marking/ExplosionSafeties/ExplosionSafety/ExternalElectricalCircuit/Fisco FISCO certified intrinsically safe fieldbus circuit (IEC 60079-11) Note: Enter “x” if relevant		
[Property] TwoWISE	[IRI] https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety/ExternalElectricalCircuit/TwoWISE 2-WISE certified intrinsically safe circuit (IEC 60079-47) Note: Enter “x” if relevant	[String]	[0..1]
[SubmodelElementCollection] SafetyRelatedPropertiesForPassiveBehaviour	[IRDI] 0173-1#02-AAQ380#006 ([IRDI] 0112/2///61987#ABC586#001 Safety related properties for passive behaviour) properties characterizing the safety related parameters of a loop-powered, intrinsically safe input or output circuit Note: IS-parameters for passive circuits, if relevant (e.g. 2 wire field devices, valves) See separate clause	n/a	[0..1]
[SubmodelElementCollection] SafetyRelatedPropertiesForActiveBehaviour	[IRDI] 0173-1#02-AAQ381#006 ([IRDI] 0112/2///61987#ABC585#001 Safety related properties for active behaviour) properties characterizing the safety related parameters of an intrinsically safe circuit Note: IS-parameters for active circuits, if relevant (e.g. power supply, IS-barriers) See separate clause	n/a	[0..1]

3.10 Properties of the SMC “SafetyRelatedPropertiesForPassiveBehaviour”

Figure 7 shows the UML-diagram defining the relevant properties which need to be set. Table 11 describes the details of the SMC structure.

Table 11: Properties of SMC "SafetyRelatedPropertiesForPassiveBehaviour"

idShort:	SafetyRelatedPropertiesForPassiveBehaviour		
Class:	SubmodelElementCollection		
semanticId:	[IRDI] 0173-1#02-AAQ380#006 ([IRDI] 0112/2///61987#ABC586#001 Safety related properties for passive behaviour)		
Parent:	SubmodelElementCollection “ExternalElectricalCircuit”		
Explanation:	properties characterizing the safety related parameters of a loop-powered, intrinsically safe input or output circuit Note: IS-parameters for passive circuits, if relevant (e.g. 2 wire field devices, valves)		
[SME type]	**semanticId = [idType]value**	**[valueType]**	**card.**
idShort	**Description@en**	**example**	
[Property] MaxInputPower	[IRDI] 0173-1#02-AAQ372#003 ([IRDI] 0112/2///61987#ABA981#001 maximum input power (Pi)) maximum power that can be applied to the connection facilities of the apparatus without invalidating the type of protection Note: Limit value for input power	[Decimal] 1250 Unit: mW	[0..1]
[Property] MaxInputVoltage	[IRDI] 0173-1#02-AAM638#003 ([IRDI] 0112/2///61987#ABA982#001 maximum input voltage (Ui)) maximum voltage (peak a.c. or d.c.) that can be applied to the connection facilities of the apparatus without invalidating the type of protection Note: Limit value for input voltage	[Decimal] 30 Unit: V	[0..1]
[Property] MaxInputCurrent	[IRDI] 0173-1#02-AAM642#004 ([IRDI] 0112/2///61987#ABA983#001 maximum input current (Ii)) maximum current (peak a.c. or d.c) that can be applied to the connection facilities of the apparatus without invalidating the type of protection Note: Limit value for input current	[Decimal] 100 Unit: mA	[0..1]

[Property] MaxInternalCapacitance	[IRDI] 0173-1#02-AAM640#004 ([IRDI] 0112/2///61987#ABA984#001 maximum internal capacitance (Ci)) maximum equivalent internal capacitance of the apparatus which is considered as appearing across the connection facilities Note: Maximum internal capacitance of the circuit	[Decimal] 0 Unit: µF	[0..1]
[Property] MaxInternalInductance	[IRDI] 0173-1#02-AAM639#003 ([IRDI] 0112/2///61987#ABA985#001 maximum internal inductance (Li)) maximum equivalent internal inductance of the apparatus which is considered as appearing across the connection facilities Note: Maximum internal inductance of the circuit	[Decimal] 0 Unit: mH	[0..1]

3.11 Properties of the SMC “SafetyRelatedPropertiesForActiveBehaviour”

Figure 7 shows the UML-diagram defining the relevant properties which need to be set. Table 12 describes the details of the SMC structure.

Table 12: Properties of SMC "SafetyRelatedPropertiesForActiveBehaviour"

idShort:	SafetyRelatedPropertiesForActiveBehaviour		
Class:	SubmodelElementCollection		
semanticId:	[IRDI] 0173-1#02-AAQ381#006 ([IRDI] 0112/2///61987#ABC585#001 Safety related properties for active behaviour)		
Parent:	SubmodelElementCollection “ExternalElectricalCircuit”		
Explanation:	properties characterizing the safety related parameters of an intrinsically safe circuit Note: IS-parameters for active circuits, if relevant (e.g. power supply, IS-barriers)		
[SME type]	**semanticId = [idType]value**	**[valueType]**	**card.**
idShort	**Description@en**	**example**	
[Property] MaxOutputPower	[IRDI] 0173-1#02-AAQ371#003 ([IRDI] 0112/2///61987#ABA987#001 maximum output power (Po)) maximum electrical power that can be taken from the apparatus Note: Limit value for output power	[Decimal] 960 Unit: mW	[0..1]
[Property] MaxOutputVoltage	[IRDI] 0173-1#02-AAM635#003 ([IRDI] 0112/2///61987#ABA989#001 maximum output voltage (Uo)) maximum voltage (peak a.c. or d.c.) that can occur at the connection facilities of the apparatus at any applied voltage up to the maximum voltage Note: Limit value for open circuits output voltage	[Decimal] 15.7 Unit: V	[0..1]
[Property] MaxOutputCurrent	[IRDI] 0173-1#02-AAM641#004 ([IRDI] 0112/2///61987#ABA988#001maximum output current (Io)) maximum current (peak a.c. or d.c.) in the apparatus that can be taken from the connection facilities of the apparatus Note: Limit value for closed circuit output current	[Decimal] 245 Unit: mA	[0..1]
[Property] MaxExternalCapacitance	[IRDI] 0173-1#02-AAM637#004 ([IRDI] 0112/2///61987#ABA990#001 maximum external capacitance (Co)) maximum capacitance that can be connected to the connection facilities of the apparatus without invalidating the type of protection Note: Maximum external capacitance to be connected to the circuit	[Decimal] 2878 Unit: µF	[0..1]

[Property] MaxExternalInductance	[IRDI] 0173-1#02-AAM636#003 ([IRDI] 0112/2///61987#ABA991#001 maximum external inductance (Lo)) maximum value of inductance that can be connected to the connection facilities of the apparatus without invalidating the type of protection Note: Maximum external inductance to be connected to the circuit	[Decimal] 2.9 Unit: mH	[0..1]
[Property] MaxExternalInductanceResistanceRatio	[IRDI] 0173-1#02-AAM634#003 ([IRDI] 0112/2///61987#ABB145#001 maximum external inductance/resistance ratio (Lo/Ro)) maximum value of ratio of inductance (Lo) to resistance (Ro) of any external circuit that can be connected to the connection facilities of the electrical apparatus without invalidating intrinsic safety Note: External Inductance to Resistance ratio	[Decimal] Unit: mH/Q	[0..1]

3.12 Properties of the SMC “AssetSpecificProperties”

Figure 2 shows the UML-diagram defining the relevant properties which need to be set. Table 13 describes the details of the SMC structure.

Table 13: Properties of SMC “AssetSpecificProperties”

idShort:	AssetSpecificProperties		
Class:	SubmodelElementCollection		
semanticId:	[IRDI] 0173-1#01-AGZ672#001		
Parent:	Submodel “Nameplate”		
Explanation:	Group of properties that are listed on the asset's nameplate and are grouped based on guidelines		
[SME type]	**semanticId = [idType]value**	**[valueType]**	**card.**
idShort	**Description@en**	**example**	
[SubmodelElementCollection] GuidelineSpecificProperties{00}	[IRDI] 0173-1#01-AHD205#001 Asset specific nameplate information required by guideline, stipulation or legislation. See separate clause	n/a	[1..*]
[Property] {arbitrary}	semanticId = {arbitrary, representing information required by further standards} Properties which are not required by any legislations but provided due to best practice.	n/a	[1..*]

3.13 Properties of the SMC “GuidelineSpecificProperties”

Figure 2 shows the UML-diagram defining the relevant properties which need to be set. Table 14 describes the details of the SMC structure combined with examples.

Table 14: Properties of SMC “GuidelineSpecificProperties”

idShort:	GuidelineSpecificProperties{00}		
Class:	SubmodelElementCollection		
semanticId:	[IRDI] 0173-1#01-AHD205#001		
Parent:	SMC “AssetSpecificProperties”		
Explanation:	Asset specific nameplate information required by guideline, stipulation or legislation.		
[SME type]	**semanticId = [idType]value**	**[valueType]**	**card.**
idShort	**Description@en**	**example**	
[Property] GuidelineForConformityDeclaration	[IRDI] 0173-1#02-AAO856#002 guideline, stipulation or legislation used for determining conformity	[String]	[1]
[Property] {arbitrary}	semanticId = {arbitrary, representing information required by further standards}	n/a	[1..*]

Beside the mentioned EU Machine Directive 2006/42/EC which this Submodel template is compliant with, there might be further information required by further stipulations and regulations depending on different asset. The SMC “AssetSpecificProperties” and its child SMC “GuidelineSpecificProperties” are therefore used to cover additional mandatory nameplate information while referencing the related stipulation or regulation.

In the following example a pressure equipment is addressed. Due to EU Directive 2014/68/EU the essential maximum/minimum allowable limits shall be provided for all pressure equipment. The example in Figure 8 shows a possible modelling of SMC “GuidelineSpecificProperties” in order to specify the minimum and maximum allowable pressure.

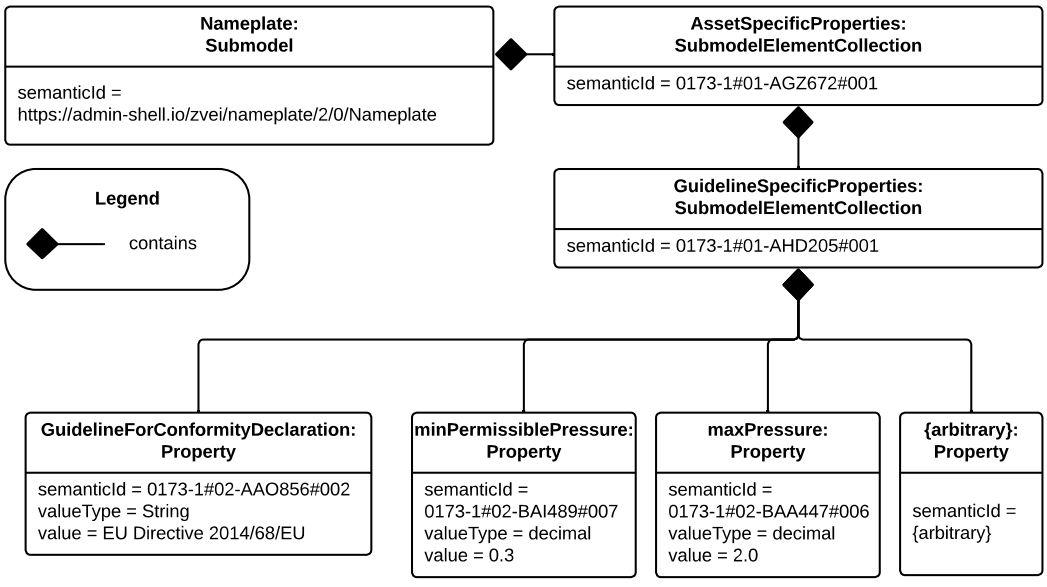


Figure 8: Example modelling of SMC “AssetSpecificProperties”

4 Examples for using SMC “ExplosionSafety”

Due to the complexity of SMC “ExplosionSafety” examples are offered in this section to show best practices based on real nameplates.

4.1 Remote I/O Module 9468 (AI/AO, 8 channels)

Figure 9 shows the nameplate of a Remote I/O module.

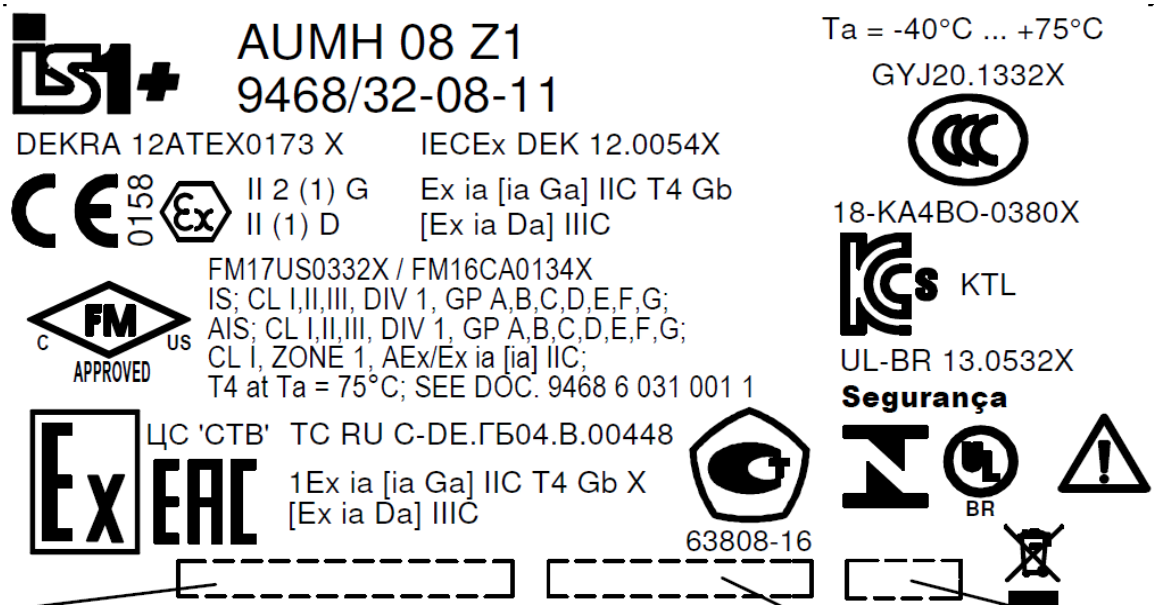


Figure 9: Sample nameplate of Remote I/O Module 9468

Figure 10 shows the UML diagram of all SMC “ExplosionSafety” of the respective nameplate.

Table 15 describes the details of the SMC structure.

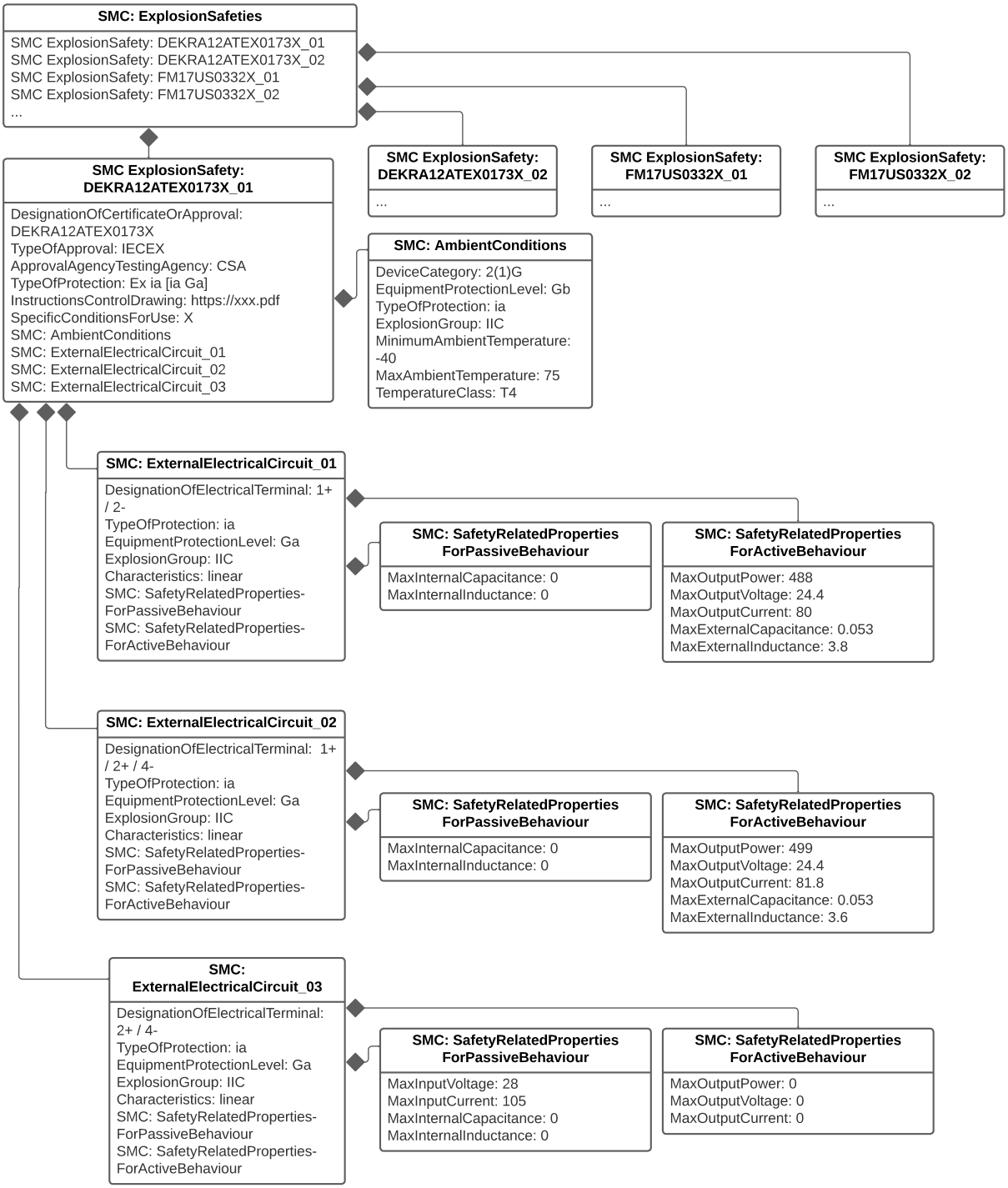


Figure 10: UML diagram of SMC "ExplosionSafety" for Remote I/O Module 9468

Table 15: List of elements in SMC “ExplosionSafety” of Remote I/O Module 9468

Parent element	semanticId	Element	Unit	SMC 01	SMC 02	SMC 03	SMC 04
Marking	https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties	SMC “ExplosionSafeties”					
SMC “ExplosionSafeties”	https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety	SMC “ExplosionSafety”		DEKRA12ATEX0173X_01	DEKRA12ATEX0173X_02	FM17US0332X_01	FM17US0332X_02
SMC “ExplosionSafety”	0112/2///61987#ABH783#001	DesignationOfCertificateOrApproval		DEKRA12ATEX0173X	DEKRA12ATEX0173X	FM17US0332X	FM17US0332X
SMC “ExplosionSafety”	0173-1#02-AAM812#003	TypeOfApproval		IECEX@EN	IECEX@EN	IECEX@EN	IECEX@EN
SMC “ExplosionSafety”	0173-1#02-AAM632#001	ApprovalAgencyTestingAgency		CSA@EN	CSA@EN	CSA@EN	CSA@EN
SMC “ExplosionSafety”	0173-1#02-AAQ325#003	TypeOfProtection		Ex ia [ia Ga]	[Ex ia Da]	IS; AIS	AEx ia [ia]
SMC “ExplosionSafety”	0112/2///61987#ABO102#001	InstructionsControlDrawing		https://xxx.pdf	https://xxx.pdf	https://xxx.pdf	https://xxx.pdf
SMC “ExplosionSafety”	https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety/SpecificConditionsForUse	SpecificConditionsForUse		X	X	X	X

Parent element	semanticId	Element	Unit	SMC 01	SMC 02	SMC 03	SMC 04
SMC "ExplosionSafety"	https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety/AmbientConditions	SMC "AmbientConditions"		*existing*	*existing*	*existing*	*existing*
SMC "AmbientConditions"	0173-1#02-AAK297#004	DeviceCategory		2(1)G	(1)D		
SMC "AmbientConditions"	0173-1#02-AAM668#001	EquipmentProtectionLevel		Gb			
SMC "AmbientConditions"	https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety/RegionalSpecificMarking	RegionalSpecificMarking				Class I, Division 1	Class I, Zone 1
SMC "AmbientConditions"	0173-1#02-AAQ325#003	TypeOfProtection		ia		IS	ia
SMC "AmbientConditions"	0173-1#02-AAT372#001	ExplosionGroup		IIC	IIIC	A,B,C,D	IIC
SMC "AmbientConditions"	0173-1#02-AAZ952#001	MinimumAmbientTemperature	°C	-40	-40	-40	-40
SMC "AmbientConditions"	0173-1#02-BAA039#010	MaxAmbientTemperature	°C	75	75	75	75
SMC "AmbientConditions"	0173-1#02-AAO371#004	TemperatureClass		T4		T4	T4

Parent element	semanticId	Element	Unit	SMC 01	SMC 02	SMC 03	SMC 04
SMC "ExplosionSafety"	https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety/ExternalElectricalCircuit	SMC "ExternalElectricalCircuit"		ExternalElectricalCircuit_01	ExternalElectricalCircuit_01	ExternalElectricalCircuit_01	ExternalElectricalCircuit_01
SMC "ExternalElectricalCircuit_01"	0112/2///61987#ABB147#004	DesignationOfElectricalTerminal		1+ / 2-	1+ / 2-	1+ / 2-	1+ / 2-
SMC "ExternalElectricalCircuit_01"	0173-1#02-AAQ325#003	TypeOfProtection		ia	ia	IS	ia
SMC "ExternalElectricalCircuit_01"	0173-1#02-AAM668#001	EquipmentProtectionLevel		Ga	Da	Class I, Division 1	Class I, Zone 1
SMC "ExternalElectricalCircuit_01"	0173-1#02-AAT372#001	ExplosionGroup		IIC	IIIC	A,B	IIC
SMC "ExternalElectricalCircuit_01"	https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety/ExternalElectricalCircuit/Characteristics	Characteristics		linear	linear	linear	linear
SMC "ExternalElectricalCircuit_01"	0173-1#02-AAQ380#006	SMC "SafetyRelatedPropertiesForPassiveBehaviour"		*existing*	*existing*	*non-existing*	*non-existing*

Parent element	semanticId	Element	Unit	SMC 01	SMC 02	SMC 03	SMC 04
SMC "SafetyRelated PropertiesForPassiveBehaviour"	0173-1#02-AAM640#004	MaxInternalCapacitance	µF	0	0		
SMC "SafetyRelated PropertiesForPassiveBehaviour"	0173-1#02-AAM639#003	MaxInternalInductance	mH	0	0		
SMC "ExternalElectricalCircuit_01"	0173-1#02-AAQ381#006	SMC "SafetyRelated PropertiesForActiveBehaviour"		*existing*	*existing*	*existing*	*existing*
SMC "SafetyRelated PropertiesForActiveBehaviour"	0173-1#02-AAQ371#003	MaxOutputPower	mW	488	488	488	488
SMC "SafetyRelated PropertiesForActiveBehaviour"	0173-1#02-AAM635#003	MaxOutputVoltage	V	24.4	24.4	24.4	24.4
SMC "SafetyRelated PropertiesForActiveBehaviour"	0173-1#02-AAM641#004	MaxOutputCurrent	mA	80	80	80	80
SMC "SafetyRelated PropertiesForActiveBehaviour"	0173-1#02-AAM637#004	MaxExternalCapacitance	µF	0.053	0.053	0.053	0.053
SMC "SafetyRelated PropertiesForActiveBehaviour"	0173-1#02-AAM636#003	MaxExternalInductance	mH	3.8	3.8	3.8	3.8

Parent element	semanticId	Element	Unit	SMC 01	SMC 02	SMC 03	SMC 04
SMC "ExplosionSafety"	https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety/ExternalElectricalCircuit	SMC "ExternalElectricalCircuit"		ExternalElectricalCircuit_02	ExternalElectricalCircuit_02	ExternalElectricalCircuit_02	ExternalElectricalCircuit_02
SMC "ExternalElectricalCircuit_02"	0112/2///61987#ABB147#004	DesignationOfElectricalTerminal		1+ / 2+ / 4-	1+ / 2+ / 4-	1+ / 2+ / 4-	1+ / 2+ / 4-
SMC "ExternalElectricalCircuit_02"	0173-1#02-AAQ325#003	TypeOfProtection		ia	ia	IS	ia
SMC "ExternalElectricalCircuit_02"	0173-1#02-AAM668#001	EquipmentProtectionLevel		Ga	Da	Class I, Division 1	Class I, Zone 1
SMC "ExternalElectricalCircuit_02"	0173-1#02-AAT372#001	ExplosionGroup		IIC	IIIC	A,B	IIC
SMC "ExternalElectricalCircuit_02"	https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety/ExternalElectricalCircuit/Characteristics	Characteristics		linear	linear	linear	linear
SMC "ExternalElectricalCircuit_02"	0173-1#02-AAQ380#006	SMC "SafetyRelatedPropertiesForPassiveBehaviour"		*existing*	*existing*	*existing*	*existing*

Parent element	semanticId	Element	Unit	SMC 01	SMC 02	SMC 03	SMC 04
SMC "SafetyRelated PropertiesForPassiveBehaviour"	0173-1#02-AAM640#004	MaxInternalCapacitance	µF	0	0	0	0
SMC "SafetyRelated PropertiesForPassiveBehaviour"	0173-1#02-AAM639#003	MaxInternalInductance	mH	0	0	0	0
SMC "ExternalElectricalCircuit_02"	0173-1#02-AAQ381#006	SMC "SafetyRelated PropertiesForActiveBehaviour"		*existing*	*existing*	*existing*	*existing*
SMC "SafetyRelated PropertiesForActiveBehaviour"	0173-1#02-AAQ371#003	MaxOutputPower	mW	499	499	499	499
SMC "SafetyRelated PropertiesForActiveBehaviour"	0173-1#02-AAM635#003	MaxOutputVoltage	V	24.4	24.4	24.4	24.4
SMC "SafetyRelated PropertiesForActiveBehaviour"	0173-1#02-AAM641#004	MaxOutputCurrent	mA	81.8	81.8	81.8	81.8
SMC "SafetyRelated PropertiesForActiveBehaviour"	0173-1#02-AAM637#004	MaxExternalCapacitance	µF	0.053	0.053	0.053	0.053
SMC "SafetyRelated PropertiesForActiveBehaviour"	0173-1#02-AAM636#003	MaxExternalInductance	mH	3.6	3.6	3.6	3.6

Parent element	semanticId	Element	Unit	SMC 01	SMC 02	SMC 03	SMC 04
SMC "ExplosionSafety"	https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety/ExternalElectricalCircuit	SMC "ExternalElectricalCircuit"		ExternalElectricalCircuit_03	ExternalElectricalCircuit_03	ExternalElectricalCircuit_03	ExternalElectricalCircuit_03
SMC "ExternalElectricalCircuit_03"	0112/2///61987#ABB147#004	DesignationOfElectricalTerminal		2+ / 4-	2+ / 4-	2+ / 4-	2+ / 4-
SMC "ExternalElectricalCircuit_03"	0173-1#02-AAQ325#003	TypeOfProtection		ia	ia	IS	ia
SMC "ExternalElectricalCircuit_03"	0173-1#02-AAM668#001	EquipmentProtectionLevel		Ga	Da	Class I, Division 1	Class I, Zone 1
SMC "ExternalElectricalCircuit_03"	0173-1#02-AAT372#001	ExplosionGroup		IIC	IIIC	A,B	IIC
SMC "ExternalElectricalCircuit_03"	https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety/ExternalElectricalCircuit/Characteristics	Characteristics		linear	linear	linear	linear
SMC "ExternalElectricalCircuit_03"	0173-1#02-AAQ380#006	SMC "SafetyRelatedPropertiesForPassiveBehaviour"		*existing*	*existing*	*existing*	*existing*

Parent element	semanticId	Element	Unit	SMC 01	SMC 02	SMC 03	SMC 04
SMC "SafetyRelated PropertiesForPassiveBehaviour"	0173-1#02-AAM638#003	MaxInputVoltage	V	28	28	28	28
SMC "SafetyRelated PropertiesForPassiveBehaviour"	0173-1#02-AAM642#004	MaxInputCurrent	mA	105	105	105	105
SMC "SafetyRelated PropertiesForPassiveBehaviour"	0173-1#02-AAM640#004	MaxInternalCapacitance	µF	0	0	0	0
SMC "SafetyRelated PropertiesForPassiveBehaviour"	0173-1#02-AAM639#003	MaxInternalInductance	mH	0	0	0	0
SMC "ExternalElectricalCircuit_03"	0173-1#02-AAQ381#006	SMC "SafetyRelated PropertiesForActiveBehaviour"		*existing*	*existing*	*existing*	*existing*
SMC "SafetyRelated PropertiesForActiveBehaviour"	0173-1#02-AAQ371#003	MaxOutputPower	mW	0	0	0	0
SMC "SafetyRelated PropertiesForActiveBehaviour"	0173-1#02-AAM635#003	MaxOutputVoltage	V	0	0	0	0
SMC "SafetyRelated PropertiesForActiveBehaviour"	0173-1#02-AAM641#004	MaxOutputCurrent	mA	0	0	0	0

4.2 Load disconnect switch

Figure 11 shows the nameplate of a load disconnect switch.

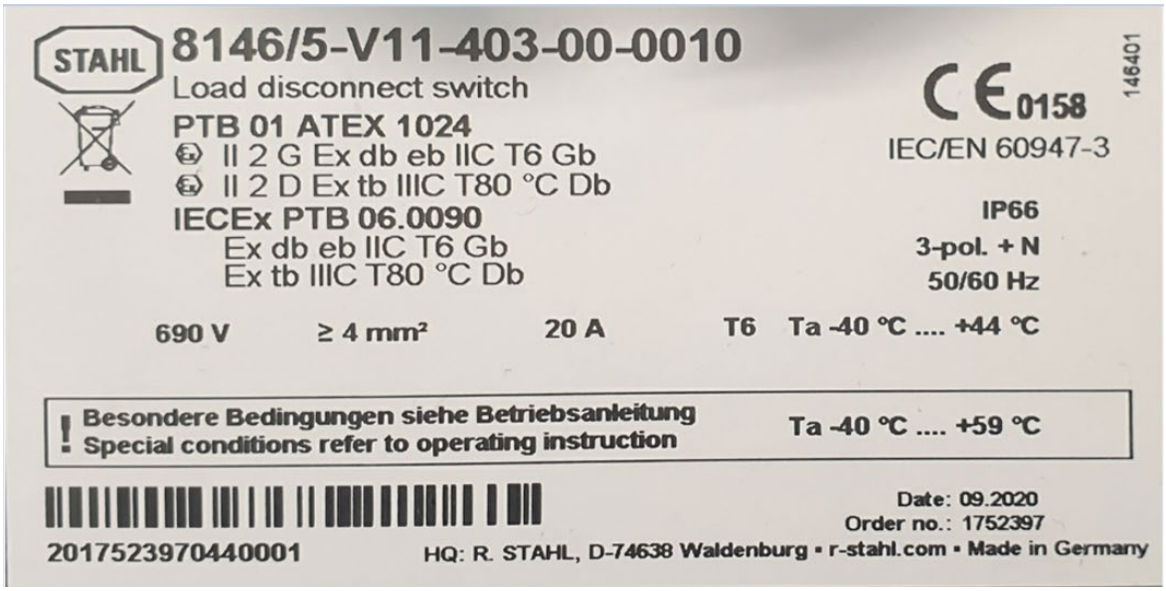


Figure 11: Sample nameplate of a load disconnect switch

Figure 12 shows the UML diagram of all SMC “ExplosionSafety” of the respective nameplate.

Table 16 describes the details of the SMC structure.

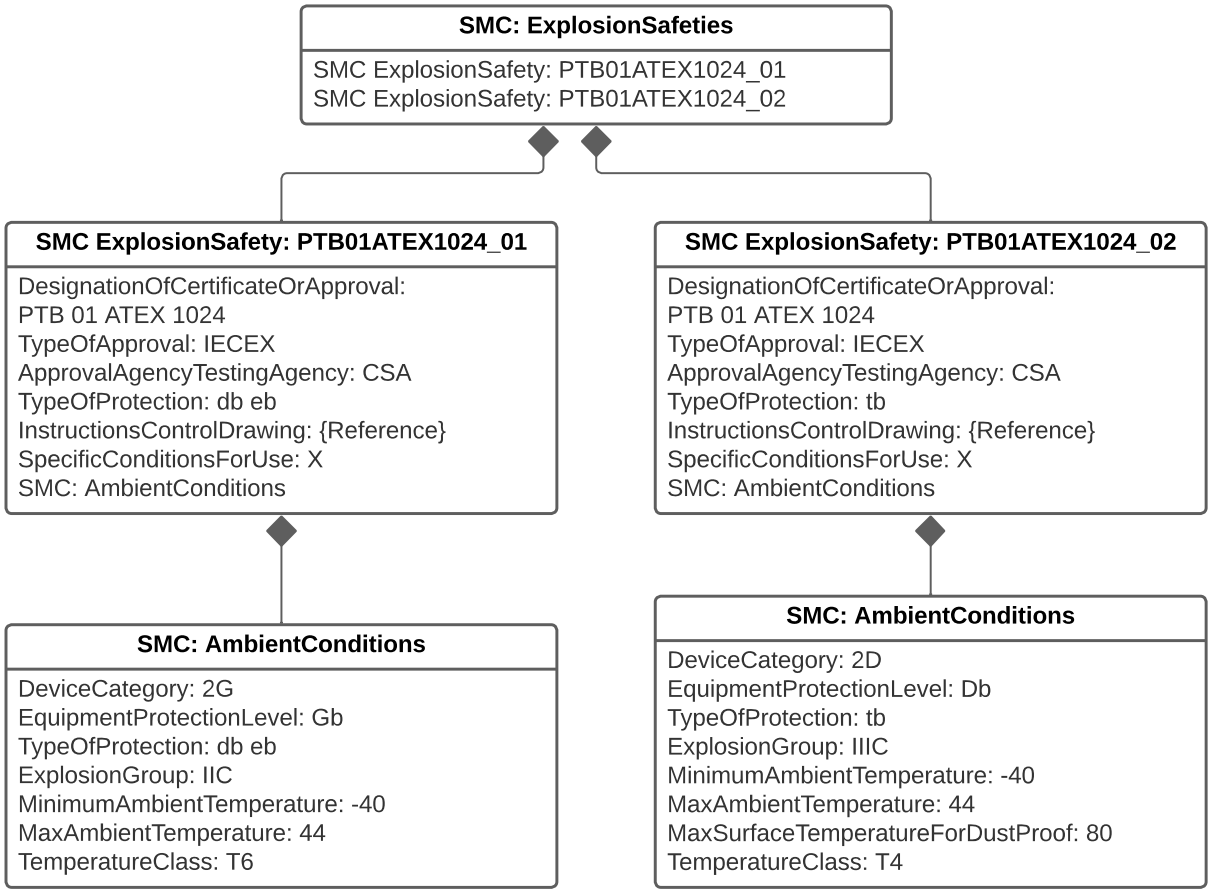


Figure 12: UML diagram of SMC “ExplosionSafety” for load disconnect switch

Table 16: List of elements in SMC “ExplosionSafety” of the load disconnect switch

Parent element	semanticId	Element	Unit	SMC 01	SMC 02
Marking	https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties	SMC “ExplosionSafeties”			
SMC “ExplosionSafeties”	https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety	SMC “ExplosionSafety”		PTB01ATEX1024_01	PTB01ATEX1024_02
SMC “ExplosionSafety”	0112/2///61987#ABH783#001	DesignationOfCertificateOrApproval		PTB 01 ATEX 1024	PTB 01 ATEX 1024
SMC “ExplosionSafety”	0173-1#02-AAM812#003	TypeOfApproval		IECEX@EN	IECEX@EN
SMC “ExplosionSafety”	0173-1#02-AAM632#001	ApprovalAgencyTestingAgency		CSA@EN	CSA@EN
SMC “ExplosionSafety”	0173-1#02-AAQ325#003	TypeOfProtection		db eb	tb
SMC “ExplosionSafety”	0112/2///61987#ABO102#001	InstructionsControlDrawing		{Reference}	{Reference}
SMC “ExplosionSafety”	https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety/SpecificConditionsForUse	SpecificConditionsForUse		X	X
SMC “ExplosionSafety”	https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety/AmbientConditions	SMC “AmbientConditions”		*existing*	*existing*
SMC “AmbientConditions”	0173-1#02-AAK297#004	DeviceCategory		2G	2D
SMC “AmbientConditions”	0173-1#02-AAM668#001	EquipmentProtectionLevel		Gb	Db

Parent element	semanticId	Element	Unit	SMC 01	SMC 02
SMC "AmbientConditions"	0173-1#02-AAQ325#003	TypeOfProtection		db eb	tb
SMC "AmbientConditions"	0173-1#02-AAT372#001	ExplosionGroup		IIC	IIIC
SMC "AmbientConditions"	0173-1#02-AAZ952#001	MinimumAmbientTemperature	°C	-40	-40
SMC "AmbientConditions"	0173-1#02-BAA039#010	MaxAmbientTemperature	°C	44	44
SMC "AmbientConditions"	0173-1#02-AAM666#005	MaxSurfaceTemperatureForDustProof	°C		80
SMC "AmbientConditions"	0173-1#02-AAO371#004	TemperatureClass		T6	

4.3 FISCO Power supply

Figure 13 shows the nameplate of a FISCO power supply.

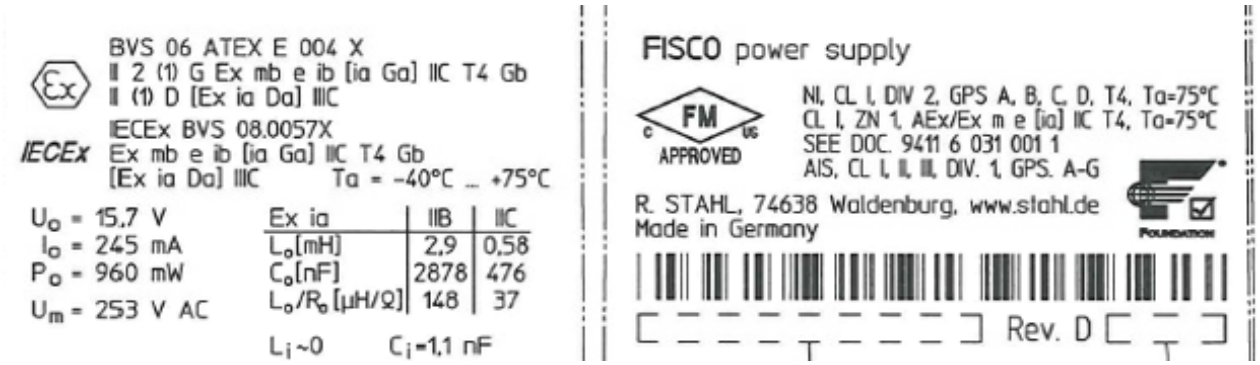


Figure 13: Sample nameplate of FISCO power supply

Figure 14 shows the UML diagram of all SMC "ExplosionSafety" of the respective nameplate.

Table 17 describes the details of the SMC structure.

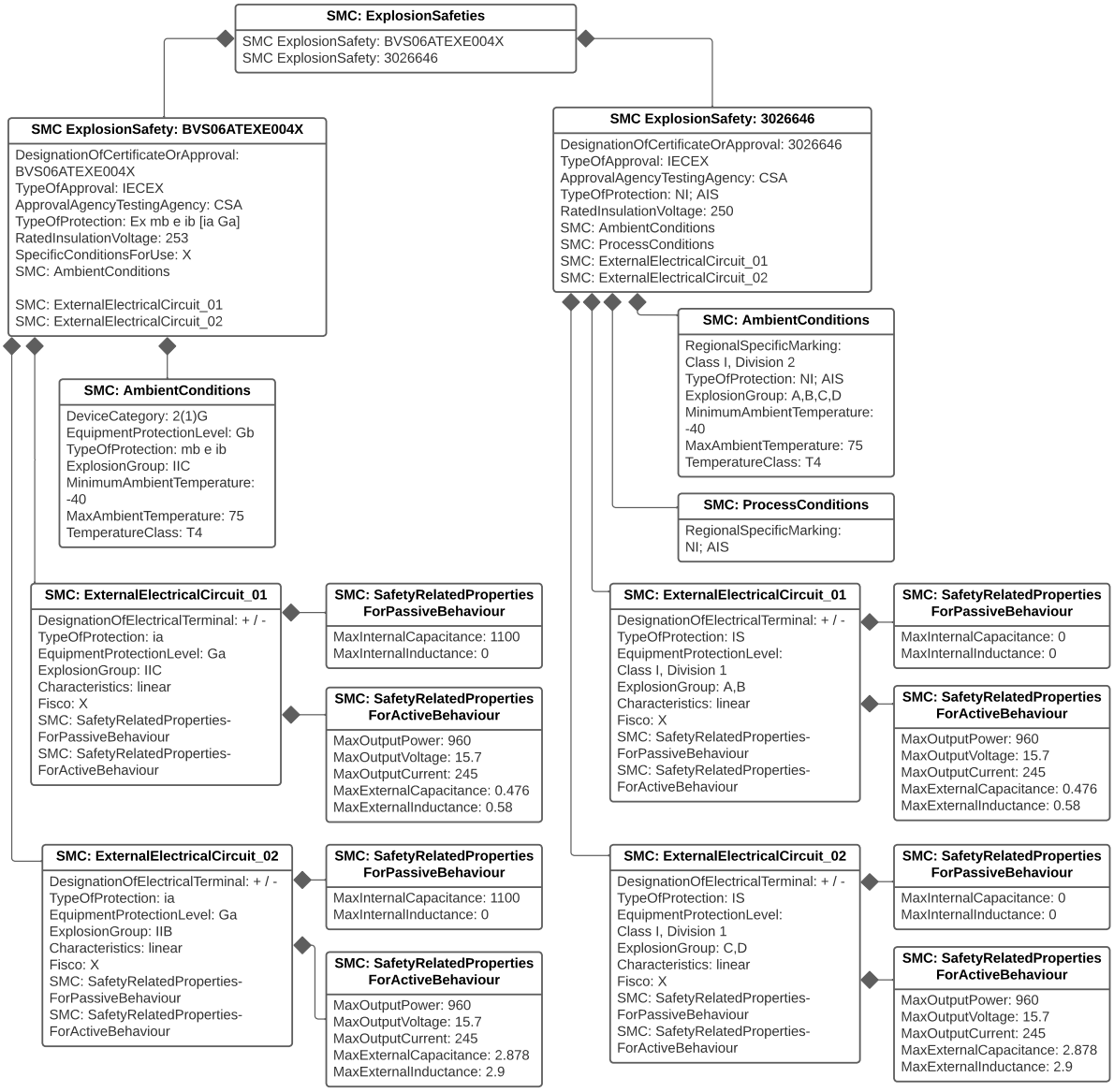


Figure 14: UML diagram of SMC "ExplosionSafety" for FISCO power supply

Table 17: List of elements in SMC "ExplosionSafety" of FISCO power supply

Parent element	semanticId	Element	Unit	SMC 01	SMC 02
Marking	https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties	SMC "ExplosionSafeties"			
SMC "ExplosionSafeties"	https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety	SMC "ExplosionSafety"		BVS06ATEXE004X	3026646
SMC "ExplosionSafety"	0112/2///61987#ABH783#001	DesignationOfCertificateOrApproval		BVS06ATEXE004X	3026646

Parent element	semanticId	Element	Unit	SMC 01	SMC 02
SMC "ExplosionSafety"	0173-1#02-AAM812#003	TypeOfApproval		IECEX@EN	IECEX@EN
SMC "ExplosionSafety"	0173-1#02-AAM632#001	ApprovalAgencyTestingAgency		CSA@EN	CSA@EN
SMC "ExplosionSafety"	0173-1#02-AAQ325#003	TypeOfProtection		Ex mb e ib [ia Ga]	NI; AIS
SMC "ExplosionSafety"	0173-1#02-AAN532#003	RatedInsulationVoltage	V	253	250
SMC "ExplosionSafety"	https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety/SpecificConditionsForUse	SpecificConditionsForUse		X	
SMC "ExplosionSafety"	https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety/AmbientConditions	SMC "AmbientConditions"		*existing*	*existing*
SMC "AmbientConditions"	0173-1#02-AAK297#004	DeviceCategory		2(1)G	
SMC "AmbientConditions"	0173-1#02-AAM668#001	EquipmentProtectionLevel		Gb	
SMC "AmbientConditions"	https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety/RegionalSpecificMarking	RegionalSpecificMarking			Class I, Division 2
SMC "AmbientConditions"	0173-1#02-AAQ325#003	TypeOfProtection		mb e ib	NI; AIS
SMC "AmbientConditions"	0173-1#02-AAT372#001	ExplosionGroup		IIC	A,B,C,D
SMC "AmbientConditions"	0173-1#02-AAZ952#001	MinimumAmbientTemperature	°C	-40	-40
SMC "AmbientConditions"	0173-1#02-BAA039#010	MaxAmbientTemperature	°C	75	75

Parent element	semanticId	Element	Unit	SMC 01	SMC 02
SMC "AmbientConditions"	0173-1#02-AAO371#004	TemperatureClass		T4	T4
SMC "ExplosionSafety"	https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety/ProcessConditions	SMC "ProcessConditions"			*existing*
SMC "ProcessConditions"	https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety/RegionalSpecificMarking	RegionalSpecificMarking			NI; AIS
SMC "ExplosionSafety"	https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety/ExternalElectricalCircuit	SMC "ExternalElectricalCircuit"		ExternalElectricalCircuit_01	ExternalElectricalCircuit_01
SMC "ExternalElectricalCircuit_01"	0112/2///61987#ABB147#004	DesignationOfElectricalTerminal		+ / -	+ / -
SMC "ExternalElectricalCircuit_01"	0173-1#02-AAQ325#003	TypeOfProtection		ia	IS
SMC "ExternalElectricalCircuit_01"	0173-1#02-AAM668#001	EquipmentProtectionLevel		Ga	Class I, Division 1
SMC "ExternalElectricalCircuit_01"	0173-1#02-AAT372#001	ExplosionGroup		IIC	A,B
SMC "ExternalElectricalCircuit_01"	https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety/ExternalElectricalCircuit/Characteristics	Characteristics		linear	linear
SMC "ExternalElectricalCircuit_01"	https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety/ExternalElectricalCircuit/Fisco	Fisco		X	X
SMC "ExternalElectricalCircuit_01"	0173-1#02-AAQ380#006	SMC "SafetyRelatedPropertiesForPassiveBehaviour"		*existing*	*existing*

Parent element	semanticId	Element	Unit	SMC 01	SMC 02
SMC "SafetyRelated PropertiesFor PassiveBehaviour"	0173-1#02-AAM640#004	MaxInternalCapacitance	µF	1.1	0
SMC "SafetyRelated PropertiesFor PassiveBehaviour"	0173-1#02-AAM639#003	MaxInternalInductance	mH	0	0
SMC "ExternalElectricalCircuit_01"	0173-1#02-AAQ381#006	SMC "SafetyRelated PropertiesFor ActiveBehaviour"		*existing*	*existing*
SMC "SafetyRelated PropertiesFor ActiveBehaviour"	0173-1#02-AAQ371#003	MaxOutputPower	mW	960	960
SMC "SafetyRelated PropertiesFor ActiveBehaviour"	0173-1#02-AAM635#003	MaxOutputVoltage	V	15.7	15.7
SMC "SafetyRelated PropertiesFor ActiveBehaviour"	0173-1#02-AAM641#004	MaxOutputCurrent	mA	245	245
SMC "SafetyRelated PropertiesFor ActiveBehaviour"	0173-1#02-AAM637#004	MaxExternalCapacitance	µF	0.476	0.476
SMC "SafetyRelated PropertiesFor ActiveBehaviour"	0173-1#02-AAM636#003	MaxExternalInductance	mH	0.58	0.58
SMC "ExplosionSafety"	https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety/ExternalElectricalCircuit	SMC "ExternalElectricalCircuit"		ExternalElectricalCircuit_02	ExternalElectricalCircuit_02
SMC "ExternalElectricalCircuit_02"	0112/2///61987#ABB147#004	DesignationOfElectricalTerminal		+ / -	+ / -
SMC "ExternalElectricalCircuit_02"	0173-1#02-AAQ325#003	TypeOfProtection		ia	IS

Parent element	semanticId	Element	Unit	SMC 01	SMC 02
SMC "ExternalElectricalCircuit_02"	0173-1#02-AAM668#001	EquipmentProtectionLevel		Ga	Class I, Division 1
SMC "ExternalElectricalCircuit_02"	0173-1#02-AAT372#001	ExplosionGroup		IIB	C,D
SMC "ExternalElectricalCircuit_02"	https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety/ExternalElectricalCircuit/Characteristics	Characteristics		linear	linear
SMC "ExternalElectricalCircuit_02"	https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety/ExternalElectricalCircuit/Fisco	Fisco		X	X
SMC "ExternalElectricalCircuit_02"	0173-1#02-AAQ380#006	SMC "SafetyRelatedPropertiesForPassiveBehaviour"		*existing*	*existing*
SMC "SafetyRelatedPropertiesForPassiveBehaviour"	0173-1#02-AAM640#004	MaxInternalCapacitance	µF	1100	0
SMC "SafetyRelatedPropertiesForPassiveBehaviour"	0173-1#02-AAM639#003	MaxInternalInductance	mH	0	0
SMC "ExternalElectricalCircuit_02"	0173-1#02-AAQ381#006	SMC "SafetyRelatedPropertiesForActiveBehaviour"		*existing*	*existing*
SMC "SafetyRelatedPropertiesForActiveBehaviour"	0173-1#02-AAQ371#003	MaxOutputPower	mW	960	960
SMC "SafetyRelatedPropertiesForActiveBehaviour"	0173-1#02-AAM635#003	MaxOutputVoltage	V	15.7	15.7
SMC "SafetyRelatedPropertiesForActiveBehaviour"	0173-1#02-AAM641#004	MaxOutputCurrent	mA	245	245

Parent element	semanticId	Element	Unit	SMC 01	SMC 02
SMC “SafetyRelated PropertiesFor ActiveBehaviour”	0173-1#02-AAM637#004	MaxExternalCapacitance	µF	2.878	2.878
SMC “SafetyRelated PropertiesFor ActiveBehaviour”	0173-1#02-AAM636#003	MaxExternalInductance	mH	2.9	2.9

4.4 Flow meter Promag 300

Figure 15 shows the nameplate of a flow meter Promag 300.

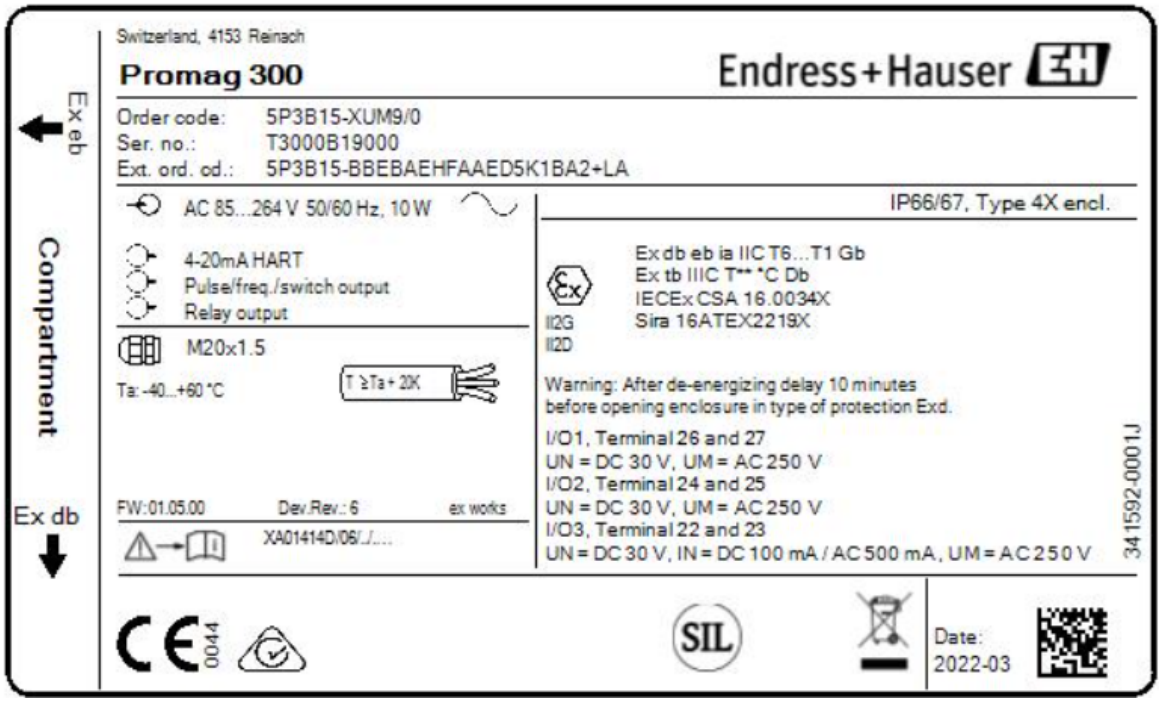


Figure 15: Sample nameplate of flow meter Promag 300

Figure 16 shows the UML diagram of all SMC “ExplosionSafety” of the respective nameplate.

Table 18 describes the details of the SMC structure.

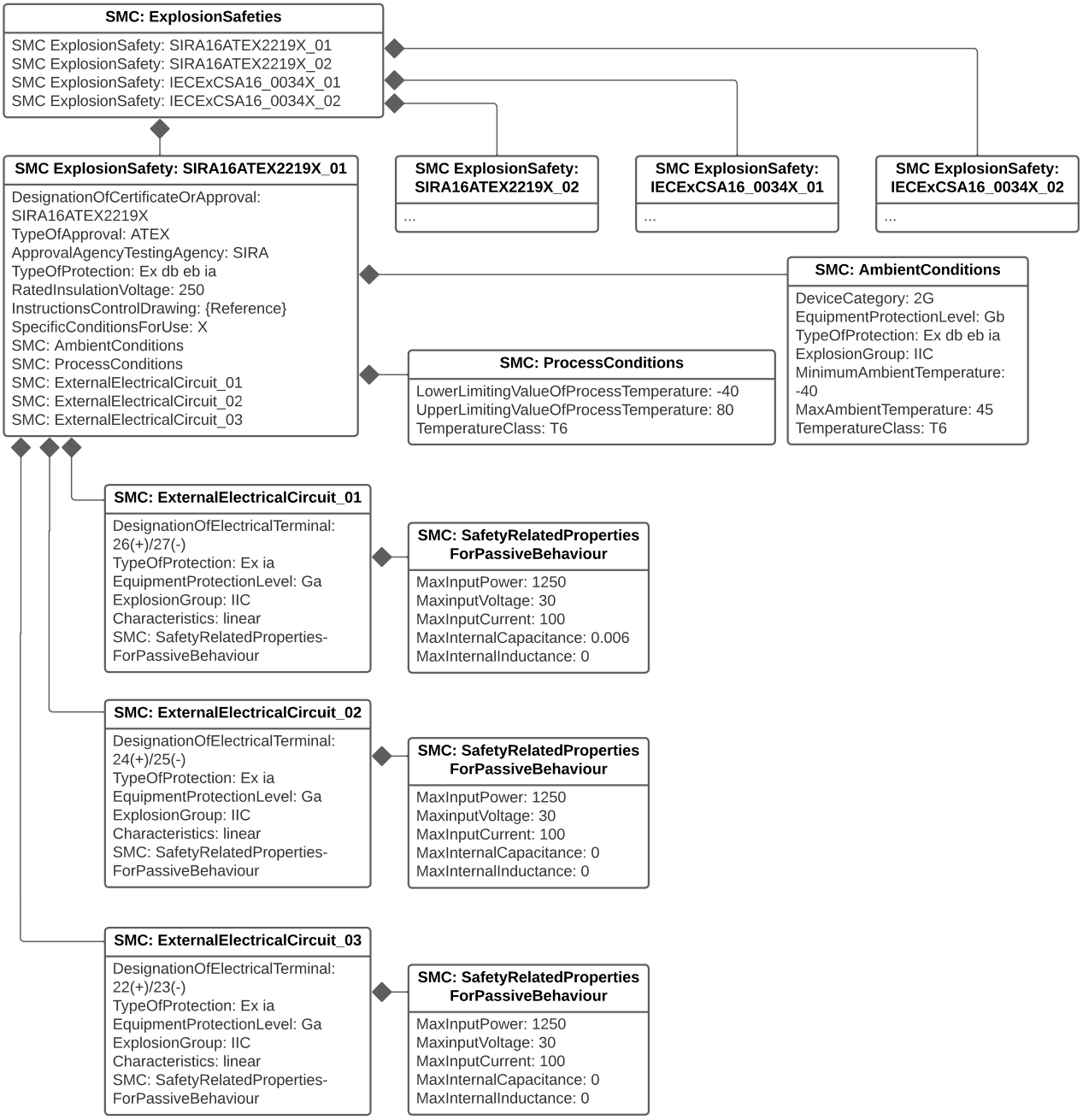


Figure 16: UML diagram of SMC "ExplosionSafety" for flow meter Promag 300

Table 18: List of elements in SMC "ExplosionSafety" of flow meter Promag 300

Parent element	semanticId	Element	Unit	SMC 01	SMC 02	SMC 03	SMC 04
Marking	https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties	SMC "ExplosionSafeties"					

Parent element	semanticId	Element	Unit	SMC 01	SMC 02	SMC 03	SMC 04
SMC "ExplosionSafeties"	https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety	SMC "ExplosionSafety"		SIRA16ATEX2219X_01	SIRA16ATEX2219X_02	IECExCSA16_0034X_01	IECExCSA16_0034X_02
SMC "ExplosionSafety"	0112/2///61987#ABH783#001	DesignationOfCertificateOrApproval		SIRA16ATEX2219X	SIRA16ATEX2219X	IECExCSA16.0034X	IECExCSA16.0034X
SMC "ExplosionSafety"	0173-1#02-AAM812#003	TypeOfApproval		ATEX@EN	ATEX@EN	IECEX@EN	IECEX@EN
SMC "ExplosionSafety"	0173-1#02-AAM632#001	ApprovalAgencyTestingAgency		SIRA@EN	SIRA@EN	CSA@EN	CSA@EN
SMC "ExplosionSafety"	0173-1#02-AAQ325#003	TypeOfProtection		Ex db eb ia	Ex tb	Ex db eb ia	Ex tb IIIC T** °C Db
SMC "ExplosionSafety"	0173-1#02-AAN532#003	RatedInsulationVoltage	V	250	250	250	250
SMC "ExplosionSafety"	0112/2///61987#ABO102#001	InstructionsControlDrawing		{Reference}	{Reference}	{Reference}	{Reference}
SMC "ExplosionSafety"	https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety/SpecificConditionsForUse	SpecificConditionsForUse		X	X	X	X

Parent element	semanticId	Element	Unit	SMC 01	SMC 02	SMC 03	SMC 04
SMC "ExplosionSafety"	https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety/AmbientConditions	SMC "AmbientConditions"		*existing*	*existing*	*existing*	*existing*
SMC "AmbientConditions"	0173-1#02-AAK297#004	DeviceCategory		2G	2D	2G	2D
SMC "AmbientConditions"	0173-1#02-AAM668#001	EquipmentProtectionLevel		Gb	Db	Gb	Db
SMC "AmbientConditions"	0173-1#02-AAQ325#003	TypeOfProtection		Ex db eb ia	Ex tb	Ex db eb ia	Ex tb
SMC "AmbientConditions"	0173-1#02-AAT372#001	ExplosionGroup		IIC	IIIC	IIC	IIIC
SMC "AmbientConditions"	0173-1#02-AAZ952#001	MinimumAmbientTemperature	°C	-40	-40	-40	-40
SMC "AmbientConditions"	0173-1#02-BAA039#010	MaxAmbientTemperature	°C	45	45	45	45
SMC "AmbientConditions"	0173-1#02-AAM666#005	MaxSurfaceTemperatureForDustProof	°C		85		85
SMC "AmbientConditions"	0173-1#02-AAO371#004	TemperatureClass		T6		T6	
SMC "ExplosionSafety"	https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety/ProcessConditions	SMC "ProcessConditions"		*existing*	*existing*	*existing*	*existing*

Parent element	semanticId	Element	Unit	SMC 01	SMC 02	SMC 03	SMC 04
SMC "ProcessConditions"	0173-1#02-AAN309#004	LowerLimitingValueOfProcessTemperature	°C	-40	-40	-40	-40
SMC "ProcessConditions"	0173-1#02-AAN307#004	UpperLimitingValueOfProcessTemperature	°C	80	80	80	80
SMC "ProcessConditions"	0173-1#02-AAM666#005	MaxSurfaceTemperatureForDustProof	°C		85		85
SMC "ProcessConditions"	0173-1#02-AAO371#004	TemperatureClass		T6		T6	
SMC "ExplosionSafety"	https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety/ExternalElectricalCircuit	SMC "ExternalElectricalCircuit"		ExternalElectricalCircuit_01	ExternalElectricalCircuit_01	ExternalElectricalCircuit_01	ExternalElectricalCircuit_01
SMC "ExternalElectricalCircuit_01"	0112/2///61987#ABB147#004	DesignationOfElectricalTerminal		26(+)/27(-)	26(+)/27(-)	26(+)/27(-)	26(+)/27(-)
SMC "ExternalElectricalCircuit_01"	0173-1#02-AAQ325#003	TypeOfProtection		Ex ia	Ex ia	Ex ia	Ex ia
SMC "ExternalElectricalCircuit_01"	0173-1#02-AAM668#001	EquipmentProtectionLevel		Ga	Da	Ga	Da
SMC "ExternalElectricalCircuit_01"	0173-1#02-AAT372#001	ExplosionGroup		IIC	IIIC	IIC	IIIC

Parent element	semanticId	Element	Unit	SMC 01	SMC 02	SMC 03	SMC 04
SMC "ExternalElectricalCircuit_01"	https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety/ExternalElectricalCircuit/Characteristics	Characteristics		linear	linear	linear	linear
SMC "ExternalElectricalCircuit_01"	0173-1#02-AAQ380#006	SMC "SafetyRelated PropertiesFor PassiveBehaviour"		*existing*	*existing*	*non-existing*	*non-existing*
SMC "SafetyRelated PropertiesFor PassiveBehaviour"	0173-1#02-AAQ372#003	MaxInputPower	mW	1250	1250	1250	1250
SMC "SafetyRelated PropertiesFor PassiveBehaviour"	0173-1#02-AAM638#003	MaxInputVoltage	V	30	30	30	30
SMC "SafetyRelated PropertiesFor PassiveBehaviour"	0173-1#02-AAM642#004	MaxInputCurrent	mA	100	100	100	100
SMC "SafetyRelated PropertiesFor PassiveBehaviour"	0173-1#02-AAM640#004	MaxInternalCapacitance	µF	0.006	0.006	0.006	0.006
SMC "SafetyRelated PropertiesFor PassiveBehaviour"	0173-1#02-AAM639#003	MaxInternalInductance	mH	0	0	0	0

Parent element	semanticId	Element	Unit	SMC 01	SMC 02	SMC 03	SMC 04
SMC "ExplosionSafety"	https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety/ExternalElectricalCircuit	SMC "ExternalElectricalCircuit"		ExternalElectricalCircuit_02	ExternalElectricalCircuit_02	ExternalElectricalCircuit_02	ExternalElectricalCircuit_02
SMC "ExternalElectricalCircuit_02"	0112/2///61987#ABB147#004	DesignationOfElectricalTerminal		24(+)/25(-)	24(+)/25(-)	24(+)/25(-)	24(+)/25(-)
SMC "ExternalElectricalCircuit_02"	0173-1#02-AAQ325#003	TypeOfProtection		Ex ia	Ex ia	Ex ia	Ex ia
SMC "ExternalElectricalCircuit_02"	0173-1#02-AAM668#001	EquipmentProtectionLevel		Ga	Da	Ga	Da
SMC "ExternalElectricalCircuit_02"	0173-1#02-AAT372#001	ExplosionGroup		IIC	IIIC	IIC	IIIC
SMC "ExternalElectricalCircuit_02"	https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety/ExternalElectricalCircuit/Characteristics	Characteristics		linear	linear	linear	linear
SMC "ExternalElectricalCircuit_02"	0173-1#02-AAQ380#006	SMC "SafetyRelatedPropertiesForPassiveBehaviour"		*existing*	*existing*	*existing*	*existing*

Parent element	semanticId	Element	Unit	SMC 01	SMC 02	SMC 03	SMC 04
SMC "SafetyRelated PropertiesFor PassiveBehaviour"	0173-1#02-AAQ372#003	MaxInputPower	mW	1250	1250	1250	1250
SMC "SafetyRelated PropertiesFor PassiveBehaviour"	0173-1#02-AAM638#003	MaxInputVoltage	V	30	30	30	30
SMC "SafetyRelated PropertiesFor PassiveBehaviour"	0173-1#02-AAM642#004	MaxInputCurrent	mA	100	100	100	100
SMC "SafetyRelated PropertiesFor PassiveBehaviour"	0173-1#02-AAM640#004	MaxInternalCapacitance	µF	0	0	0	0
SMC "SafetyRelated PropertiesFor PassiveBehaviour"	0173-1#02-AAM639#003	MaxInternalInductance	mH	0	0	0	0
SMC "ExplosionSafety"	https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety/ExternalElectricalCircuit	SMC "ExternalElectricalCircuit"		ExternalElectricalCircuit_03	ExternalElectricalCircuit_03	ExternalElectricalCircuit_03	ExternalElectricalCircuit_03
SMC "ExternalElectricalCircuit_03"	0112/2///61987#ABB147#004	DesignationOfElectricalTerminal		22(+)/23(-)	22(+)/23(-)	22(+)/23(-)	22(+)/23(-)

Parent element	semanticId	Element	Unit	SMC 01	SMC 02	SMC 03	SMC 04
SMC "ExternalElectricalCircuit_03"	0173-1#02-AAQ325#003	TypeOfProtection		Ex ia	Ex ia	Ex ia	Ex ia
SMC "ExternalElectricalCircuit_03"	0173-1#02-AAM668#001	EquipmentProtectionLevel		Ga	Da	Ga	Da
SMC "ExternalElectricalCircuit_03"	0173-1#02-AAT372#001	ExplosionGroup		IIC	IIIC	IIC	IIIC
SMC "ExternalElectricalCircuit_03"	https://admin-shell.io/zvei/nameplate/2/0/Nameplate/Markings/Marking/ExplosionSafeties/ExplosionSafety/ExternalElectricalCircuit/Characteristics	Characteristics		linear	linear	linear	linear
SMC "ExternalElectricalCircuit_03"	0173-1#02-AAQ380#006	SMC "SafetyRelated PropertiesFor PassiveBehaviour"		*existing*	*existing*	*existing*	*existing*
SMC "SafetyRelated PropertiesFor PassiveBehaviour"	0173-1#02-AAQ372#003	MaxInputPower	mW	1250	1250	1250	1250
SMC "SafetyRelated PropertiesFor PassiveBehaviour"	0173-1#02-AAM638#003	MaxInputVoltage	V	30	30	30	30
SMC "SafetyRelated PropertiesFor PassiveBehaviour"	0173-1#02-AAM642#004	MaxInputCurrent	mA	100	100	100	100

Parent element	semanticId	Element	Unit	SMC 01	SMC 02	SMC 03	SMC 04
SMC "SafetyRelated PropertiesFor PassiveBehaviour"	0173-1#02-AAM640#004	MaxInternalCapacitance	µF	0	0	0	0
SMC "SafetyRelated PropertiesFor PassiveBehaviour"	0173-1#02-AAM639#003	MaxInternalInductance	mH	0	0	0	0

Annex A. Explanations on used table formats

1. General

The used tables in this document try to outline information as concise as possible. They do not convey all information on Submodels and SubmodelElements. For this purpose, the definitive definitions are given by a separate file in form of an AASX file of the Submodel template and its elements.

2. Tables on Submodels and SubmodelElements

For clarity and brevity, a set of rules is used for the tables for describing Submodels and SubmodelElements.

- The tables follow in principle the same conventions as in [5].
- The table heads abbreviate 'cardinality' with 'card'.
- The tables often place two informations in different rows of the same table cell. In this case, the first information is marked out by sharp brackets [] form the second information. A special case are the semanticIds, which are marked out by the format: (type)(local)[idType]value.
- The types of SubmodelElements are abbreviated:

SME type	SubmodelElement type
Property	Property
MLP	MultiLanguageProperty
Range	Range
File	File
Blob	Blob
Ref	ReferenceElement
Rel	RelationshipElement
SMC	SubmodelElementCollection

- If an idShort ends with '{00}', this indicates a suffix of the respective length (here: 2) of decimal digits, in order to make the idShort unique. A different idShort might be choosen, as long as it is unique in the parent's context.
- The Keys of semanticId in the main section feature only idType and value, such as: [IRI]https://admin-shell.io/vdi/2770/1/0/DocumentId/Id. The attributes "type" and "local" (typically "ConceptDescription" and "(local)" or "GlobalReference" and (no-local)") need to be set accordingly; see [6].
- If a table does not contain a column with "parent" heading, all represented attributes share the same parent. This parent is denoted in the head of the table.
- Multi-language strings are represented by the text value, followed by '@'-character and the ISO 639 language code: example@EN.
- The [valueType] is only given for Properties.

Annex B. Sample ECLASS definitions for product marking

The following table provides sample ECLASS definitions for modelling product marking in SMC “Marking”. Further values will be provided by ECLASS or other repositories.

Table 19: Sample ECLASS definitions for product marking

Item	IRDI	preferredName@en
1	0173-1#07-AAB047#003	CCC
2	0173-1#07-DAA603#004	CE
3	0173-1#07-AAA555#001	CECC mark of conformity
4	0173-1#07-AAU119#001	DGRL
5	0173-1#07-ABC243#001	EAC
6	0173-1#07-WAA099#003	EEx ia
7	0173-1#07-WAA102#003	EExedIIC
8	0173-1#07-WAA101#003	EExmII
9	0173-1#07-WAA094#003	Explosion-proof
10	0173-1#07-AAA374#003	GS mark of conformity
11	0173-1#07-AAA375#001	TÜV sign
12	0173-1#07-AAA554#001	VDE mark of conformity

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