

**EUROMAP 84.12**

**OPC UA interfaces for plastics and rubber  
machinery – Extrusion – Part 12: Calender**

**Release 2.00, 2022-06-08**

**EUROMAP 84.12 (Release 2.00) is identical with  
OPC 40084-12 (Release 2.00) and VDMA 40084-12:2022-08**

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## Foreword

This specification was created by a joint working group of the OPC Foundation and EUROMAP. It is adopted identically as VDMA Specification.

Compared with the previous version, the following changes have been made:

| Version   | Changes   |
|---|---|
| OPC 40084-12, version 2.00<br>(identical with VDMA 40084-12:2022-07<br>and EUROMAP 84.12, version 2.00) | Use of OPC UA for machinery / version 2.00 of OPC 40084-1 : <ul style="list-style-type: none"><li>– Changed entry point from <i>DeviceSet</i> to <i>Machines Object</i></li><li>– Use of updated <i>ExtrusionDeviceType</i> (see OPC 40084-1) with:<ul style="list-style-type: none"><li>– replaced <i>MachineInformation</i> (<i>MachineInformationType</i> from OPC 40083) with <i>Identification</i> (<i>MachineIdentificationType</i> from OPC 40001-1),</li><li>– replaced <i>LineStatus</i> by <i>MachineryItemState</i> and <i>MachineryOperationMode</i></li></ul></li></ul> <p>Security Policy deleted because included in part 1</p> <p>Conformance units and profiles adjusted</p> |

## EUROMAP

EUROMAP is the European umbrella association of the plastics and rubber machinery industry which accounts for annual sales of around 13.5 billion euro and a 40 per cent share of worldwide production. Almost 75 per cent of its European output is shipped to worldwide destinations. With global exports of 10.0 billion euro, EUROMAP's around 1,000 machinery manufacturers are market leaders with nearly half of all machines sold being supplied by EUROMAP members.

EUROMAP provides technical recommendations for plastics and rubber machines. In addition to standards for machine descriptions, dimensions and energy measurement, interfaces between machines feature prominently. The provision of manufacturer independent interfaces ensures high levels of machine compatibility.

## OPC Foundation

OPC is the interoperability standard for the secure and reliable exchange of data and information in the industrial automation space and in other industries. It is platform independent and ensures the seamless flow of information among devices from multiple vendors. The OPC Foundation is responsible for the development and maintenance of this standard.

OPC UA is a platform independent service-oriented architecture that integrates all the functionality of the individual OPC Classic specifications into one extensible framework. This multi-layered approach accomplishes the original design specification goals of:

- Platform independence: from an embedded microcontroller to cloud-based infrastructure
- Secure: encryption, authentication, authorization and auditing
- Extensible: ability to add new features including transports without affecting existing applications
- Comprehensive information modelling capabilities: for defining any model from simple to complex

## 1 Scope

OPC 40084-12 describes the data exchange interface for calenders as part of an extrusion line. The interface is used by

- MES (Manufacturing Execution System) for collecting the information generated by extrusion lines at a central point for easier quality assurance and job and dataset management.
- Line controllers to monitor and set process parameters.

Safety related signals like emergency stop are not included.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies

OPC 10000-1, *OPC Unified Architecture - Part 1: Overview and Concepts*

<http://www.opcfoundation.org/UA/Part1/>

OPC 10000-3, *OPC Unified Architecture - Part 3: Address Space Model*

<http://www.opcfoundation.org/UA/Part3/>

OPC 10000-4, *OPC Unified Architecture - Part 4: Services*

<http://www.opcfoundation.org/UA/Part4/>

OPC 10000-5, *OPC Unified Architecture - Part 5: Information Model*

<http://www.opcfoundation.org/UA/Part5/>

OPC 10000-6, *OPC Unified Architecture - Part 6: Mappings*

<http://www.opcfoundation.org/UA/Part6/>

OPC 10000-7, *OPC Unified Architecture - Part 7: Profiles*

<http://www.opcfoundation.org/UA/Part7/>

OPC 10000-8, *OPC Unified Architecture - Part 8: Data Access*

<http://www.opcfoundation.org/UA/Part8/>

OPC 10000-100, *OPC Unified Architecture - Part 100: Devices*

<http://www.opcfoundation.org/UA/Part100/>

OPC 40001-1, *OPC UA for Machinery - Part 1: Basic Building Blocks*

<http://www.opcfoundation.org/UA/Machinery/>

OPC 40083: *OPC UA interfaces for plastics and rubber machinery – General Type definitions*

<http://www.opcfoundation.org/UA/PlasticsRubber/GeneralTypes>

OPC 40084-1: *OPC UA interfaces for plastics and rubber machinery – Extrusion – Part 1: General Type Definitions*

[http://www.opcfoundation.org/UA/PlasticsRubber/Extrusion\\_v2/GeneralTypes/](http://www.opcfoundation.org/UA/PlasticsRubber/Extrusion_v2/GeneralTypes/)

### 3 Terms, definitions and conventions

#### 4 Overview

It is assumed that basic concepts of OPC UA information modelling are understood in this specification. This specification will use these concepts to describe the OPC 40084-5 Information Model. For the purposes of this document, the terms and definitions given in the documents referenced in Clause 2 apply.

Note that OPC UA terms and terms defined in this specification are *italicized* in the specification.

#### 5 Conventions used in this document

The conventions described in OPC 40083 apply.

#### 6 Abbreviations

MES    Manufacturing Execution System

### 7 General information to OPC UA interfaces for plastics and rubber machinery and OPC UA

For general information on OPC UA interfaces for plastics and rubber machinery and OPC UA see OPC 40083.

#### 8 Use cases

OPC 40084-12 describes the data exchange interface for calenders as part of an extrusion line. The interface is used by

- MES (Manufacturing Execution System) for collecting the information generated by extrusion lines at a central point for easier quality assurance and job and dataset management.
- Line controllers to monitor and set process parameters.

### 9 Calender\_InterfaceType

#### 10 Calender\_InterfaceType Definition

The *Calender\_InterfaceType* is used for the root Object representing a calender as part of an extrusion line. It is based on the *ExtrusionDeviceType* (defined in OPC 40084-1) and formally defined in Table 1.

The instance(s) of *Calender\_InterfaceType* shall be located under the *Machines* Object of the Server (see OPC UA for Machinery).

NOTE: If the OPC UA server is implemented directly in the control of a calender then only one instance of *Calender\_InterfaceType* will be created. But it is also possible that one OPC UA server is connected to several machine controls as one interface to the MES. In this case several instances of *Calender\_InterfaceType* will be created.



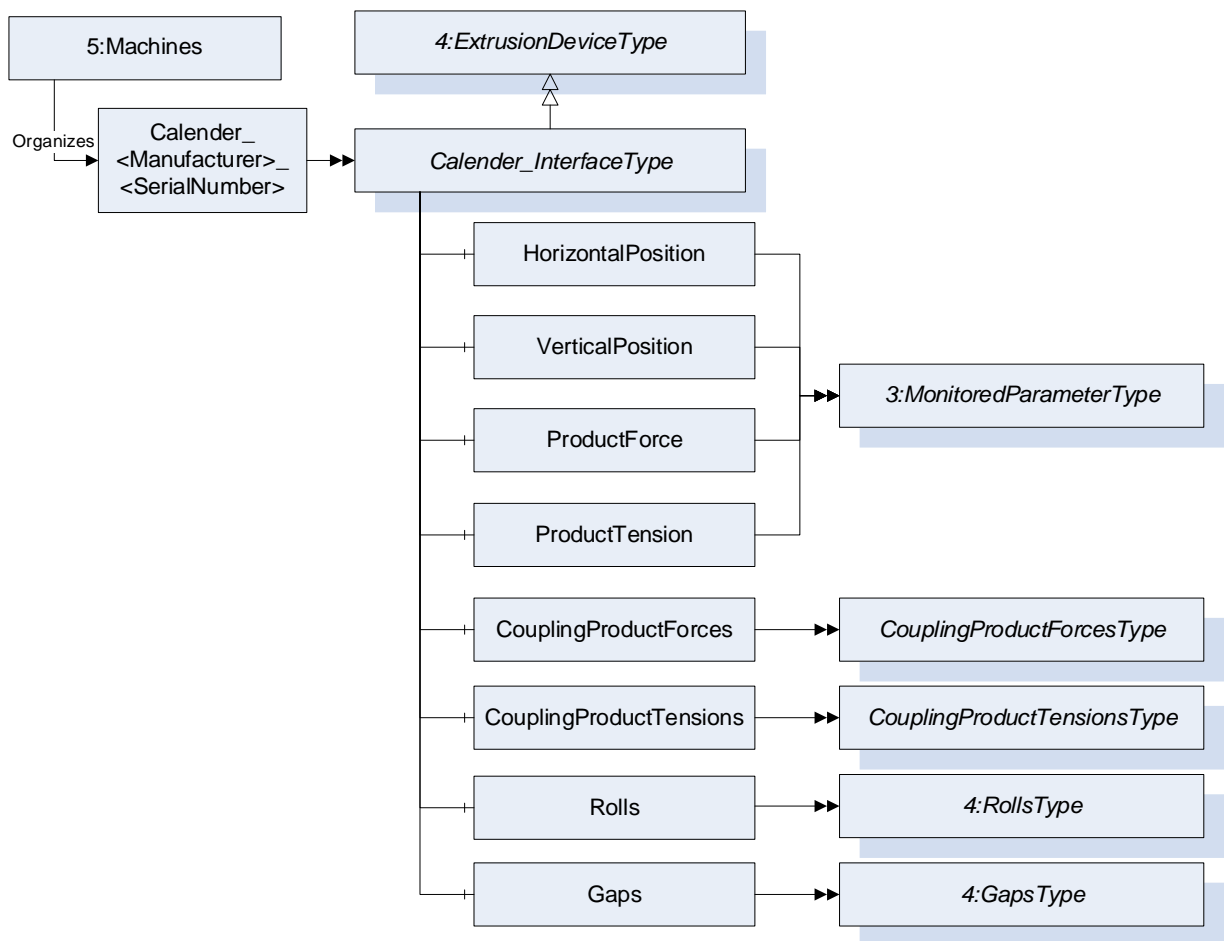


Figure 1 – Calender\_InterfaceType Overview

Table 1 – Calender\_InterfaceType Definition

| Attribute   | Value                  |                         |           |                             |       |
|---|------------------------|-------------------------|-----------|-----------------------------|-------|
| BrowseName  | Calender_InterfaceType |                         |           |                             |       |
| IsAbstract  | False                  |                         |           |                             |       |
| References  | Node Class             | BrowseName              | Data Type | Type Definition             | Other |
| Subtype of the 4:ExtrusionDeviceType defined in OPC 40084-1 |                        |                         |           |                             |       |
| 0:HasComponent  | Object                 | HorizontalPosition      |           | 3:MonitoredParameterType    | O     |
| 0:HasComponent  | Object                 | VerticalPosition        |           | 3:MonitoredParameterType    | O     |
| 0:HasComponent  | Object                 | ProductForce            |           | 3:MonitoredParameterType    | O     |
| 0:HasComponent  | Object                 | ProductTension          |           | 3:MonitoredParameterType    | O     |
| 0:HasComponent  | Object                 | CouplingProductForces   |           | CouplingProductForcesType   | O     |
| 0:HasComponent  | Object                 | CouplingProductTensions |           | CouplingProductTensionsType | O     |
| 0:HasComponent  | Object                 | Rolls                   |           | 4:RollsType                 | M     |
| 0:HasComponent  | Object                 | Gaps                    |           | 4:GapsType                  | M     |
| <b>Conformance Units</b>                                    |                        |                         |           |                             |       |
| OPC 40084-12 Basic  |                        |                         |           |                             |       |

The BrowseName of the object instance shall start with “Calender”. It may be extended with additional information, e.g. a number (“Calender\_1”) or manufacturer/serial number (“Calender\_Bandera\_0123456”).

NOTE: Clients will browse the root node by type and not by BrowseName.

## 11 DeviceClass

The *DeviceClass Property* in the *Identification Object* inside the *ExtrusionDeviceType* shall have the value "Calender".

## 12 HorizontalPosition, VerticalPosition

Position of the calender from a reference point (e.g. floor for vertical position, centre of exit of feeding device (e.g. flat die) for horizontal position).

Unit: mm or inch

## 13 ProductForce

Force of outgoing product.

Unit: N or lbf

## 14 ProductTension

Tension of outgoing product.

Unit: N/mm<sup>2</sup> or lbf/in<sup>2</sup>

## 15 CouplingProductForces

Force of ingoing "sub product"

Unit: N or lbf

**Table 2 – CouplingProductForcesType Definiton**

| Attribute  | Value                     |                           |          |                          |       |
|--|---------------------------|---------------------------|----------|--------------------------|-------|
| BrowseName   | CouplingProductForcesType |                           |          |                          |       |
| IsAbstract   | False                     |                           |          |                          |       |
| References   | Node Class                | BrowseName                | DataType | TypeDefinition           | Other |
| Subtype of the 0:BaseObjectType defined in OPC 10000-5 |                           |                           |          |                          |       |
| 0:HasProperty  | Variable                  | 0:NodeVersion             | 0:String | 0:PropertyType           | M, RO |
| 0:HasComponent   | Object                    | CouplingProductForce_<Nr> |          | 3:MonitoredParameterType | OP    |
| 0:GeneratesEvent                                       | ObjectType                | 0:GeneralModelChangeEvent |          |                          |       |

## 16 CouplingProductTensions

Tension of ingoing "sub product"

Unit: N/mm<sup>2</sup> or lbf/in<sup>2</sup>

**Table 3 – CouplingProductTensionsType Definiton**

| Attribute  | Value                       |                             |          |                          |       |
|--|-----------------------------|-----------------------------|----------|--------------------------|-------|
| BrowseName   | CouplingProductTensionsType |                             |          |                          |       |
| IsAbstract   | False                       |                             |          |                          |       |
| References   | Node Class                  | BrowseName                  | DataType | TypeDefinition           | Other |
| Subtype of the 0:BaseObjectType defined in OPC 10000-5 |                             |                             |          |                          |       |
| 0:HasProperty  | Variable                    | 0:NodeVersion               | 0:String | 0:PropertyType           | M, RO |
| 0:HasComponent   | Object                      | CouplingProductTension_<Nr> |          | 3:MonitoredParameterType | OP    |
| 0:GeneratesEvent                                       | ObjectType                  | 0:GeneralModelChangeEvent   |          |                          |       |

## 17 Rolls and Gaps

These containers represent the calender rolls and the gaps between them. The *RollsType* and *GapsType* are defined in OPC 40084-1.

## 18 Profiles and Conformance Units

### 18.1 Conformance Units

This chapter defines the corresponding *Conformance Unit* for OPC 40084-12.

**Table 4 – Conformance Units for OPC 40084-12**

| Category | Title              | Description   |
|----------|--------------------|---|
| Server   | OPC 40084-12 Basic | Support of <i>Calender_InterfaceType</i> and all mandatory child elements giving information on the melt pump and its status. There is at least one instance of the <i>Calender_InterfaceType</i> in the <i>Machines Object</i> . |

### 18.2 Profiles

#### 18.2.1 Profile list

Table 5 lists all Profiles defined in this document and defines their URIs.

**Table 5 – Profile URIs for OPC 40084-4**

| Profile                              | URI   |
|--------------------------------------|---|
| OPC 40084-12 v2 Basic Server Profile | <a href="http://opcfoundation.org/UA-Profile/PlasticsRubber/Extrusion_v2/Calender/Server/Basic">http://opcfoundation.org/UA-Profile/PlasticsRubber/Extrusion_v2/Calender/Server/Basic</a> |

#### 18.2.2 Server Facets

This version of OPC 40084-12 defined only one *Profile*.

**Table 6 – OPC 40084-12 v2 Basic Server Profile**

| Group     | Conformance Unit / Profile Title        | Mandatory / Optional |
|-----------|---|----------------------|
| Extrusion | 4:Extrusion Device Basic Server Profile | M                    |
| Extrusion | OPC 40084-12 Basic                      | M                    |

NOTE: OPC 40084-1 includes the Facet “Extrusion v2 Production Dataset Management Server Facet” which indicates that the server supports the *3:ProductionDatasetManagementType* (defined in OPC 40083) with all its mandatory *InstanceDeclarations* and that there is the component *ProductionDatasetManagement* available in the instance of the *Calender\_InterfaceType*.

NOTE: The names of the supported profiles are available in the *Server Object* under *ServerCapabilities.ServerProfileArray*

## 19 Namespaces

### 20 Namespace Metadata

Table 7 defines the namespace metadata for this document. The *Object* is used to provide version information for the namespace and an indication about static *Nodes*. Static *Nodes* are identical for all *Attributes* in all *Servers*, including the *Value Attribute*. See OPC 10000-5 for more details.

The information is provided as *Object* of type *NamespaceMetadataType*. This *Object* is a component of the *Namespaces Object* that is part of the *Server Object*. The *NamespaceMetadataType ObjectType* and its *Properties* are defined in OPC 10000-5.

The version information is also provided as part of the *ModelTableEntry* in the *UANodeSet XML* file. The *UANodeSet XML* schema is defined in OPC 10000-6.

**Table 7 – NamespaceMetadata Object for this Document**

| Attribute                 | Value   |   |
|---------------------------|---|---|
| BrowseName                | http://opcfoundation.org/UA/PlasticsRubber/Extrusion_v2/Calender/ |   |
| Property                  | DataType  | Value   |
| NamespaceUri              | String  | http://opcfoundation.org/UA/PlasticsRubber/Extrusion_v2/Calender/ |
| NamespaceVersion          | String  | 2.00  |
| NamespacePublicationDate  | DateTime  | 2022-05-01  |
| IsNamespaceSubset         | Boolean   | False   |
| StaticNodeIdTypes         | IdType []   | 0   |
| StaticNumericNodeIdRange  | NumericRange []   |   |
| StaticStringNodeIdPattern | String  |   |

## 21 Handling of OPC UA Namespaces

Namespaces are used by OPC UA to create unique identifiers across different naming authorities. The *Attributes* *NodeId* and *BrowseName* are identifiers. A *Node* in the UA *AddressSpace* is unambiguously identified using a *NodeId*. Unlike *NodeIds*, the *BrowseName* cannot be used to unambiguously identify a *Node*. Different *Nodes* may have the same *BrowseName*. They are used to build a browse path between two *Nodes* or to define a standard *Property*.

*Servers* may often choose to use the same namespace for the *NodeId* and the *BrowseName*. However, if they want to provide a standard *Property*, its *BrowseName* shall have the namespace of the standards body although the namespace of the *NodeId* reflects something else, for example the *EngineeringUnits Property*. All *NodeIds* of *Nodes* not defined in this document shall not use the standard namespaces.

Table 8 provides a list of mandatory and optional namespaces used in an OPC 40084-12 OPC UA Server.

**Table 8 – Namespaces used in an OPC 40084-12 Server**

| NamespaceURI  | Description   | Use       |
|---|---|-----------|
| http://opcfoundation.org/UA/  | Namespace for <i>NodeIds</i> and <i>BrowseNames</i> defined in the OPC UA specification. This namespace shall have namespace index 0.   | Mandatory |
| Local Server URI  | Namespace for nodes defined in the local server. This may include types and instances used in a device represented by the server. This namespace shall have namespace index 1.            | Mandatory |
| http://opcfoundation.org/UA/DI/                                       | Namespace for <i>NodeIds</i> and <i>BrowseNames</i> defined in OPC 10000-100. The namespace index is server specific.   | Mandatory |
| http://opcfoundation.org/UA/PlasticsRubber/GeneralTypes/              | Namespace for <i>NodeIds</i> and <i>BrowseNames</i> defined in OPC 40083. The namespace index is server specific.   | Mandatory |
| http://opcfoundation.org/UA/PlasticsRubber/Extrusion_v2/GeneralTypes/ | Namespace for <i>NodeIds</i> and <i>BrowseNames</i> defined in OPC 40084-1. The namespace index is server specific.   | Mandatory |
| http://opcfoundation.org/UA/Machinery/                                | Namespace for <i>NodeIds</i> and <i>BrowseNames</i> defined in OPC 40001-1. The namespace index is server specific.   | Mandatory |
| http://opcfoundation.org/UA/PlasticsRubber/Extrusion_v2/Calender/     | Namespace for <i>NodeIds</i> and <i>BrowseNames</i> defined in this specification. The namespace index is server specific.  | Mandatory |
| Vendor specific types and instances                                   | A server may provide vendor specific types like types derived from <i>MachineType</i> or <i>MachineStatusType</i> or vendor specific instances of devices in a vendor specific namespace. | Optional  |

Table 9 provides a list of namespaces and their index used for *BrowseNames* in this document. The default namespace of this document is not listed since all *BrowseNames* without prefix use this default namespace.

**Table 9 – Namespaces used in this document**

| NamespaceURI  | Namespace Index | Example                  |
|---|-----------------|--------------------------|
| http://opcfoundation.org/UA/  | 0               | 0:NodeVersion            |
| http://opcfoundation.org/UA/DI/                                       | 2               | 2:DeviceClass            |
| http://opcfoundation.org/UA/PlasticsRubber/GeneralTypes/              | 3               | 3:MachineInformationType |
| http://opcfoundation.org/UA/PlasticsRubber/Extrusion_v2/GeneralTypes/ | 4               | 4:ExtrusionDeviceType    |
| http://opcfoundation.org/UA/Machinery/                                | 5               | 5:Machines               |

## Annex A (normative)

### OPC 40084-12 Namespace and mappings

#### A.1 Namespace and identifiers for OPC 40084-12 Information Model

This appendix defines the numeric identifiers for all of the numeric *NodeIds* defined in this specification. The identifiers are specified in a CSV file with the following syntax:

<SymbolName>, <Identifier>, <NodeClass>

Where the *SymbolName* is either the *BrowseName* of a *Type Node* or the *BrowsePath* for an *Instance Node* that appears in the specification and the *Identifier* is the numeric value for the *NodeId*.

The *BrowsePath* for an *Instance Node* is constructed by appending the *BrowseName* of the instance *Node* to the *BrowseName* for the containing instance or type. An underscore character is used to separate each *BrowseName* in the path. Let's take for example, the *MachineInformationType ObjectType Node* which has the *ControllerName Property*. The **Name** for the *ControllerName InstanceDeclaration* within the *MachineInformationType* declaration is: *MachineInformationType\_ControllerName*.

The *NamespaceUri* for all *NodeIds* defined here is  
[http://opcfoundation.org/UA/PlasticsRubber/Extrusion\\_v2/Calender/](http://opcfoundation.org/UA/PlasticsRubber/Extrusion_v2/Calender/)

The CSV released with this version of the specification can be found here:

- [http://www.opcfoundation.org/UA/schemas/PlasticsRubber/Extrusion\\_v2/calender/2.00/NodeIds.csv](http://www.opcfoundation.org/UA/schemas/PlasticsRubber/Extrusion_v2/calender/2.00/NodeIds.csv)

NOTE: The latest CSV that is compatible with this version of the specification can be found here:

- [http://www.opcfoundation.org/UA/schemas/PlasticsRubber/Extrusion\\_v2/Calender/NodeIds.csv](http://www.opcfoundation.org/UA/schemas/PlasticsRubber/Extrusion_v2/Calender/NodeIds.csv)

A computer processible version of the complete Information Model defined in this specification is also provided. It follows the XML Information Model schema syntax defined in OPC 10000-6.

The Information Model Schema released with this version of the specification can be found here:

- [http://www.opcfoundation.org/UA/schemas/PlasticsRubber/Extrusion\\_v2/Calender/2.00/Opc.Ua.PlasticsRubber.Extrusion\\_v2.Calender.NodeSet2.xml](http://www.opcfoundation.org/UA/schemas/PlasticsRubber/Extrusion_v2/Calender/2.00/Opc.Ua.PlasticsRubber.Extrusion_v2.Calender.NodeSet2.xml)

NOTE: The latest Information Model schema that is compatible with this version of the specification can be found here:

- [http://www.opcfoundation.org/UA/schemas/PlasticsRubber/Extrusion\\_v2/Calender/Opc.Ua.PlasticsRubber.Extrusion\\_v2.Calender.NodeSet2.xml](http://www.opcfoundation.org/UA/schemas/PlasticsRubber/Extrusion_v2/Calender/Opc.Ua.PlasticsRubber.Extrusion_v2.Calender.NodeSet2.xml)
-