

Profile Error: This profile contains 3 errors (search for 'Error:')



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Example Sensors Profile

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Foreword

This document was prepared by the DMTF Physical Platform Profiles Working Group and Server Management Working Group

DMTF is a not-for-profit association of industry members dedicated to promoting enterprise and systems management and interoperability. For information about the DMTF, see <http://www.dmtf.org>.

Design Note: This document contains design notes (like this one), that provide information about the way the document is written, or to demonstrate certain things. Such design notes would not appear in a released version of this document.

Design Note: This MRP document represents DSP1009 1.0.2 as a machine readable profile. Since machine readable profiles need to be compliant to DSP1001 1.1, this document utilizes the newly introduced concepts, such as adaptations, features and collaboration diagrams. Its HTML version generated by the DSP8029 XSL stylesheet uses the new condensed format defined in DSP1001 1.1.

Design Note: This profile demonstrates how boilerplate text can be replaced with references to messages defined in an MRP Organization Message Registry. The copyright text demonstrates how to specify dynamic values within the message, for the copyright years.

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Introduction

This document defines the usage of CIM classes used to represent and manage sensors in a managed environment. The document also defines the usage of CIM association classes that describe the relationship of the sensors with the sensed elements they measure and with DMTF profile implementation information. The information in this document is intended to be sufficient for a provider or consumer of this data to identify unambiguously the classes, properties, methods, and values that need to be instantiated and manipulated.

The target audience for this specification is implementers who are writing CIM-based providers or consumers of management interfaces that represent the components described in this document.

Document conventions

Typographical conventions

The following typographical conventions are used in this document:

- Document titles are marked in *italics*.
- Important terms that are used for the first time are marked in *italics*.
- Terms include a link to the term definition in the "Terms and definitions" clause, enabling easy navigation to the term definition.

OCL usage conventions

Constraints in this document are specified using OCL (see [OCL 2.0](#)).

OCL statements are in `monospaced font`.

1 Scope

The Sensors profile extends the management capabilities of referencing profiles by adding the capability to represent sensors, their relationship with the sensed elements they measure, and the implementation of this profile.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated or versioned references, only the edition cited (including any corrigenda or DMTF update versions) applies. For references without a date or version, the latest published edition of the referenced document (including any corrigenda or DMTF update versions) applies.

DMTF DSP0004, *CIM Infrastructure Specification 2.5*,
http://www.dmtf.org/standards/published_documents/DSP0004_2.5.pdf

DMTF DSP0223, *Generic Operations 1.0*,
http://www.dmtf.org/standards/published_documents/DSP0223_1.0.pdf

DMTF DSP1001, *Management Profile Specification Usage Guide 1.1*,
http://www.dmtf.org/standards/published_documents/DSP1001_1.1.pdf

DMTF XMP1033, *Example Profile Registration Profile (sample profile in DSP2023) 1.0*,
http://www.dmtf.org/standards/published_documents/DSP2023_1.0.zip

OMG formal/06-05-01, *Object Constraint Language 2.0*,
<http://www.omg.org/spec/OCL/2.0/>

ISO/IEC Directives, Part 2, *Rules for the structure and drafting of International Standards*,
<http://isotc.iso.org/livelink/livelink?func=ll&objId=4230456&objAction=browse&sort=subtype>

3 Terms and definitions

In this document, some terms have a specific meaning beyond the normal English meaning. Those terms are defined in this clause.

3.1 General

The terms "shall" ("required"), "shall not", "should" ("recommended"), "should not" ("not recommended"), "may", "need not" ("not required"), "can" and "cannot" in this document are to be interpreted as described in [ISO/IEC Directives, Part2](#), Annex H. The terms in parenthesis are alternatives for the preceding term, for use in exceptional cases when the preceding term cannot be used for linguistic reasons. Note that [ISO/IEC Directives, Part2](#), Annex H specifies additional alternatives. Occurrences of such additional alternatives shall be interpreted in their normal English meaning in this document.

The terms "clause", "subclause", "paragraph", "annex" in this document are to be interpreted as described in [ISO/IEC Directives, Part2](#), Clause 5.

The terms "normative" and "informative" in this document are to be interpreted as described in [ISO/IEC Directives, Part2](#), Clause 3. In this document, clauses, subclauses or annexes indicated with "(informative)" as well as notes and examples do not contain normative content.

The terms defined in [DSP0004](#), [DSP0223](#), and [DSP1001](#) apply to this document.

The following additional terms are defined in this document.

3.2**analog sensor**

sensor that measures an analog quantity (e.g. voltage) and provides a numeric value for the quantity. Also called a numeric sensor.

3.3**discrete sensor**

sensor that provides discrete values for the quantity it measures (e.g. a lock is closed or open).

3.4**sensor**

device that measures a physical quantity and makes a value for the quantity accessible to a programmatic observer.

3.5**sensored element**

element in the managed environment that is measured by a sensor.

4 Symbols and abbreviated terms

The abbreviations defined in [DSP0004](#), [DSP0223](#), and [DSP1001](#) apply to this document.

This document does not define any additional abbreviations.

5 Synopsis

Profile name: Example Sensors

Version: 1.0.3

Organization: DMTF

Abstract indicator: False

Profile type: Component

Schema: DMTF CIM 2.22 (experimental)

Central class adaptation: AbstractSensor

Scoping class adaptation: ComputerSystem

Scoping path: SystemDevice

The Sensors profile extends the management capabilities of referencing profiles by adding the capability to represent, monitor and control sensors, and to represent their relationship with sensed elements.

The following table identifies the profile references defined in this profile.

Table 1 – Profile references

Profile reference name	Profile name	Organization	Version	Relationship	Description
PRP	Profile Registration	DMTF	1.0	Mandatory	Used to represent the implementation of this profile.

The following table identifies the features defined in this profile.

Table 2 – Features

Feature	Requirement	Description
SensorElementNameModification	Optional	See subclause "Feature: SensorElementNameModification".
SensorStateManagement	Optional	See subclause "Feature: SensorStateManagement".
LowerThresholdNonCriticalSupported	Optional	See subclause "Feature: LowerThresholdNonCriticalSupported".
UpperThresholdNonCriticalSupported	Optional	See subclause "Feature: UpperThresholdNonCriticalSupported".
LowerThresholdCriticalSupported	Optional	See subclause "Feature: LowerThresholdCriticalSupported".
UpperThresholdCriticalSupported	Optional	See subclause "Feature: UpperThresholdCriticalSupported".
LowerThresholdFatalSupported	Optional	See subclause "Feature: LowerThresholdFatalSupported".
UpperThresholdFatalSupported	Optional	See subclause "Feature: UpperThresholdFatalSupported".
LowerThresholdNonCriticalSettable	Optional	See subclause "Feature: LowerThresholdNonCriticalSettable".
UpperThresholdNonCriticalSettable	Optional	See subclause "Feature: UpperThresholdNonCriticalSettable".
LowerThresholdCriticalSettable	Optional	See subclause "Feature: LowerThresholdCriticalSettable".
UpperThresholdCriticalSettable	Optional	See subclause "Feature: UpperThresholdCriticalSettable".
LowerThresholdFatalSettable	Optional	See subclause "Feature: LowerThresholdFatalSettable".
UpperThresholdFatalSettable	Optional	See subclause "Feature: UpperThresholdFatalSettable".

The following table identifies the class adaptations defined in this profile.

Table 3 – Adaptations

Adaptation	Elements	Requirement	Description
Instantiated, embedded and abstract adaptations			
ComputerSystem	CIM_ComputerSystem	Mandatory	See subclause "Adaptation: ComputerSystem".
SystemDevice	CIM_SystemDevice	Mandatory	See subclause "Adaptation: SystemDevice".
AbstractSensor	CIM_Sensor	See derived adaptations	See subclause "Adaptation: AbstractSensor".
DiscreteSensor	CIM_Sensor	Mandatory	See subclause "Adaptation: DiscreteSensor".
NumericSensor	CIM_NumericSensor	Mandatory	See subclause "Adaptation: NumericSensor".
SensorCapabilities	CIM_EnabledLogicalElementCapabilities	Conditional	See subclause "Adaptation: SensorCapabilities".
ElementCapabilities	CIM_ElementCapabilities	Conditional	See subclause "Adaptation: ElementCapabilities".
SensoredElement	CIM_ManagedSystemElement	See derived adaptations	See subclause "Adaptation: SensoredElement".
AssociatedSensor	CIM_AssociatedSensor	Mandatory	See subclause "Adaptation: AssociatedSensor".
Indications and exceptions			
This profile does not define any such adaptations.			

The following table identifies the use cases and state descriptions defined in this profile.

Table 4 – Use cases and state descriptions

Name	Description
State description SimpleObjectDiagram	See subclause "State description: SimpleObjectDiagram".
Use case ShowAllSensorStates	See subclause "Use case: ShowAllSensorStates".
Use case FindSensorsOfSystemElement	See subclause "Use case: FindSensorsOfSystemElement".
Use case ChangeThreshold	See subclause "Use case: ChangeThreshold".
Use case ResetThresholds	See subclause "Use case: ResetThresholds".
Use case DetermineElementNameModifiability	See subclause "Use case: DetermineElementNameModifiability".
Use case DetermineStateManagementSupport	See subclause "Use case: DetermineStateManagementSupport".

6 Description

The following two DMTF collaboration structure diagrams show all class adaptations defined in this profile, and all profiles referenced by this profile.

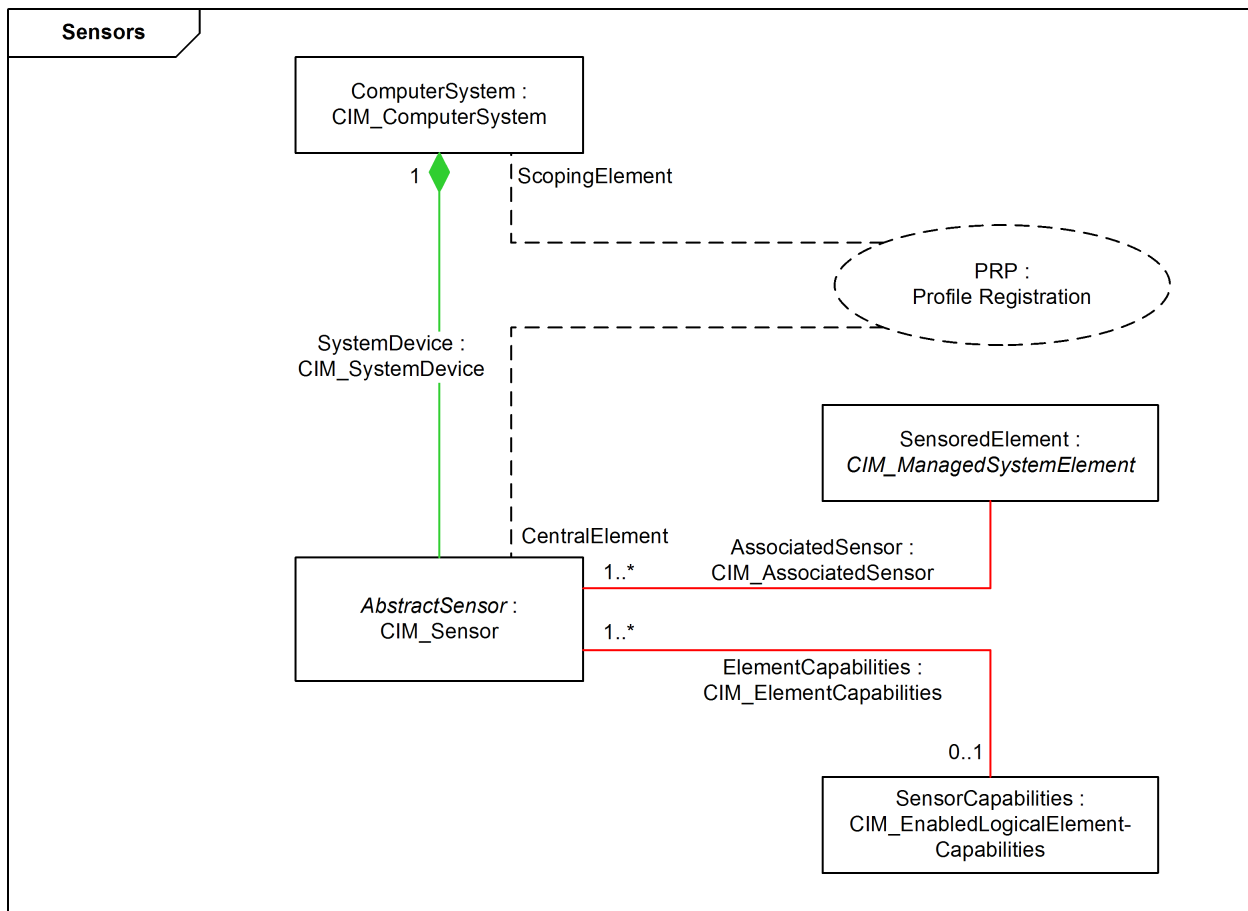


Figure 1 – DMTF collaboration structure diagram for the Sensors profile

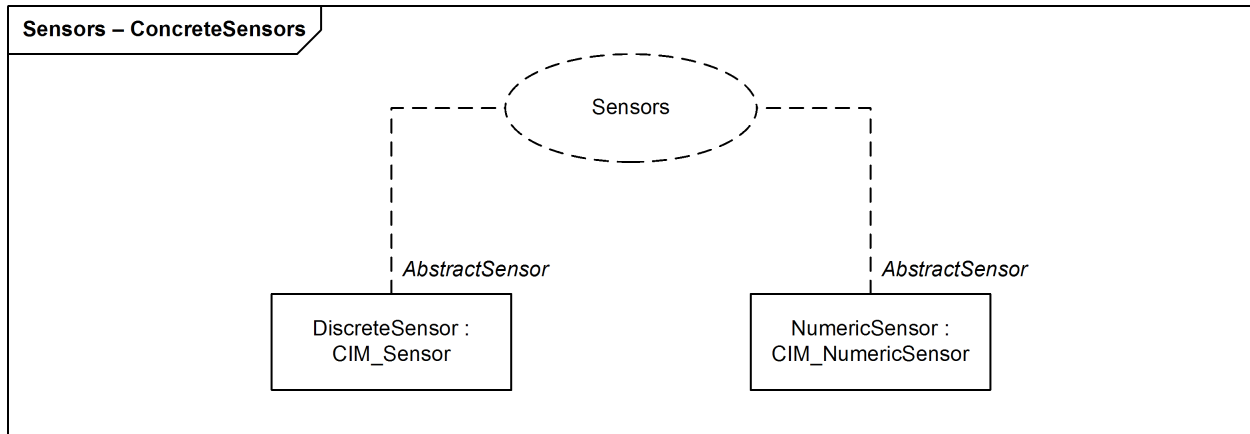


Figure 2 – DMTF collaboration structure diagram for the ConcreteSensors component of the Sensors profile

The logical aspect of sensors in the managed environment is represented by instances of the following adaptations that are based on the abstract base adaptation AbstractSensor:

- The DiscreteSensor adaptation, representing discrete sensors.
- The NumericSensor adaptation, representing analog sensors.

The system hosting a sensor is represented by a ComputerSystem instance associated via SystemDevice to the AbstractSensor instance representing the sensor.

The sensed elements of a sensor are represented by SensoredElement instances associated via AssociatedSensor to the AbstractSensor instance representing the sensor. If no such instance is associated to a AbstractSensor instance, the corresponding sensor's scope is the entire system that hosts the sensor.

The capabilities of a sensor and of the implementation of its AbstractSensor adaptation are represented by a SensorCapabilities instance associated via ElementCapabilities to the AbstractSensor instance representing the sensor. SensorCapabilities instances can be shared between multiple AbstractSensor instances.

Conformance of an implementation to this profile is represented through the PRP profile.

7 Implementation

7.1 Features

7.1.1 Feature: SensorElementNameModification

Implementing this feature provides support for client modification of the ElementName property of a AbstractSensor instance.

The requirement level for this feature is optional.

This feature can be made available to clients at the granularity of AbstractSensor instances.

It can be concluded that the feature is available for a AbstractSensor instance if:

- The following OCL derivation constraint evaluates to a Boolean value of True.

OCL context: A AbstractSensor instance.

```
derive: self.ElementCapabilities::Capabilities.ElementNameEditSupported
```

Otherwise, it can be concluded that the feature is not available.

The following profile elements are conditional or conditional exclusive on the implementation of this feature:

- SensorCapabilities adaptation.
- ElementCapabilities adaptation.
- MaxElementNameLen property in SensorCapabilities adaptation.
- ModifyInstance() operation in AbstractSensor adaptation.

7.1.2 Feature: SensorStateManagement

Implementing this feature provides support for client management of the state of a sensor by means of the RequestStateChange() method.

The requirement level for this feature is optional.

This feature can be made available to clients at the granularity of AbstractSensor instances.

It can be concluded that the feature is available for a AbstractSensor instance if:

- The following OCL derivation constraint evaluates to a Boolean value of True.

OCL context: A AbstractSensor instance.

```
derive: self.ElementCapabilities::Capabilities.  
  RequestedStatesSupported->notEmpty()
```

Otherwise, it can be concluded that the feature is not available.

The following profile elements are conditional or conditional exclusive on the implementation of this feature:

- SensorCapabilities adaptation.
- ElementCapabilities adaptation.
- RequestStateChange() method in AbstractSensor adaptation.

7.1.3 Feature: LowerThresholdNonCriticalSupported

Implementing this feature provides support for the LowerThresholdNonCritical threshold of an analog sensor.

The requirement level for this feature is optional.

This feature can be made available to clients at the granularity of NumericSensor instances.

It can be concluded that the feature is available for a NumericSensor instance if:

- The following OCL derivation constraint evaluates to a Boolean value of True.

OCL context: A NumericSensor instance.

```
derive: self.SupportedThresholds->  
  select( entry | entry = 0 /* LowerThresholdNonCritical */ )->size() = 1
```

Otherwise, it can be concluded that the feature is not available.

The following profile elements are conditional or conditional exclusive on the implementation of this feature:

- LowerThresholdNonCritical property in NumericSensor adaptation.

7.1.4 Feature: UpperThresholdNonCriticalSupported

Implementing this feature provides support for the UpperThresholdNonCritical threshold of an analog sensor.

The requirement level for this feature is optional.

This feature can be made available to clients at the granularity of NumericSensor instances.

It can be concluded that the feature is available for a NumericSensor instance if:

- The following OCL derivation constraint evaluates to a Boolean value of True.

OCL context: A NumericSensor instance.

```
derive: self.SupportedThresholds->
  select( entry | entry = 1 /* UpperThresholdNonCritical */ )->size() = 1
```

Otherwise, it can be concluded that the feature is not available.

The following profile elements are conditional or conditional exclusive on the implementation of this feature:

- UpperThresholdNonCritical property in NumericSensor adaptation.

7.1.5 Feature: LowerThresholdCriticalSupported

Implementing this feature provides support for the LowerThresholdCritical threshold of an analog sensor.

The requirement level for this feature is optional.

This feature can be made available to clients at the granularity of NumericSensor instances.

It can be concluded that the feature is available for a NumericSensor instance if:

- The following OCL derivation constraint evaluates to a Boolean value of True.

OCL context: A NumericSensor instance.

```
derive: self.SupportedThresholds->
  select( entry | entry = 2 /* LowerThresholdCritical */ )->size() = 1
```

Otherwise, it can be concluded that the feature is not available.

The following profile elements are conditional or conditional exclusive on the implementation of this feature:

- LowerThresholdCritical property in NumericSensor adaptation.

7.1.6 Feature: UpperThresholdCriticalSupported

Implementing this feature provides support for the UpperThresholdCritical threshold of an analog sensor.

The requirement level for this feature is optional.

This feature can be made available to clients at the granularity of NumericSensor instances.

It can be concluded that the feature is available for a NumericSensor instance if:

- The following OCL derivation constraint evaluates to a Boolean value of True.

OCL context: A NumericSensor instance.

```
derive: self.SupportedThresholds->
  select( entry | entry = 3 /* UpperThresholdCritical */ )->size() = 1
```

Otherwise, it can be concluded that the feature is not available.

The following profile elements are conditional or conditional exclusive on the implementation of this feature:

- UpperThresholdCritical property in NumericSensor adaptation.

7.1.7 Feature: LowerThresholdFatalSupported

Implementing this feature provides support for the LowerThresholdFatal threshold of an analog sensor.

The requirement level for this feature is optional.

This feature can be made available to clients at the granularity of NumericSensor instances.

It can be concluded that the feature is available for a NumericSensor instance if:

- The following OCL derivation constraint evaluates to a Boolean value of True.

OCL context: A NumericSensor instance.

```
derive: self.SupportedThresholds->
  select( entry | entry = 4 /* LowerThresholdFatal */ )->size() = 1
```

Otherwise, it can be concluded that the feature is not available.

The following profile elements are conditional or conditional exclusive on the implementation of this feature:

- LowerThresholdFatal property in NumericSensor adaptation.

7.1.8 Feature: UpperThresholdFatalSupported

Implementing this feature provides support for the UpperThresholdFatal threshold of an analog sensor.

The requirement level for this feature is optional.

This feature can be made available to clients at the granularity of NumericSensor instances.

It can be concluded that the feature is available for a NumericSensor instance if:

- The following OCL derivation constraint evaluates to a Boolean value of True.

OCL context: A NumericSensor instance.

```
derive: self.SupportedThresholds->
  select( entry | entry = 5 /* UpperThresholdFatal */ )->size() = 1
```

Otherwise, it can be concluded that the feature is not available.

The following profile elements are conditional or conditional exclusive on the implementation of this feature:

- UpperThresholdFatal property in NumericSensor adaptation.

7.1.9 Feature: LowerThresholdNonCriticalSettable

Implementing this feature provides support for setting the LowerThresholdNonCritical threshold of an analog sensor.

The requirement level for this feature is optional.

This feature can be made available to clients at the granularity of NumericSensor instances.

It can be concluded that the feature is available for a NumericSensor instance if:

- The following OCL derivation constraint evaluates to a Boolean value of True.

OCL context: A NumericSensor instance.

```
derive: self.SettableThresholds->
  select( entry | entry = 0 /* LowerThresholdNonCritical */ )->size() = 1
```

Otherwise, it can be concluded that the feature is not available.

The following profile elements are conditional or conditional exclusive on the implementation of this feature:

- RestoreDefaultThresholds() method in NumericSensor adaptation.
- ModifyInstance() operation in NumericSensor adaptation.

7.1.10 Feature: UpperThresholdNonCriticalSettable

Implementing this feature provides support for setting the UpperThresholdNonCritical threshold of an analog sensor.

The requirement level for this feature is optional.

This feature can be made available to clients at the granularity of NumericSensor instances.

It can be concluded that the feature is available for a NumericSensor instance if:

- The following OCL derivation constraint evaluates to a Boolean value of True.

OCL context: A NumericSensor instance.

```
derive: self.SettableThresholds->
  select( entry | entry = 1 /* UpperThresholdNonCritical */ )->size() = 1
```

Otherwise, it can be concluded that the feature is not available.

The following profile elements are conditional or conditional exclusive on the implementation of this feature:

- RestoreDefaultThresholds() method in NumericSensor adaptation.
- ModifyInstance() operation in NumericSensor adaptation.

7.1.11 Feature: LowerThresholdCriticalSettable

Implementing this feature provides support for setting the LowerThresholdCritical threshold of an analog sensor.

The requirement level for this feature is optional.

This feature can be made available to clients at the granularity of NumericSensor instances.

It can be concluded that the feature is available for a NumericSensor instance if:

- The following OCL derivation constraint evaluates to a Boolean value of True.

OCL context: A NumericSensor instance.

```
derive: self.SettableThresholds->
  select( entry | entry = 2 /* LowerThresholdCritical */ )->size() = 1
```

Otherwise, it can be concluded that the feature is not available.

The following profile elements are conditional or conditional exclusive on the implementation of this feature:

- RestoreDefaultThresholds() method in NumericSensor adaptation.
- ModifyInstance() operation in NumericSensor adaptation.

7.1.12 Feature: UpperThresholdCriticalSettable

Implementing this feature provides support for setting the UpperThresholdCritical threshold of an analog sensor.

The requirement level for this feature is optional.

This feature can be made available to clients at the granularity of NumericSensor instances.

It can be concluded that the feature is available for a NumericSensor instance if:

- The following OCL derivation constraint evaluates to a Boolean value of True.

OCL context: A NumericSensor instance.

```
derive: self.SettableThresholds->
  select( entry | entry = 3 /* UpperThresholdCritical */ )->size() = 1
```

Otherwise, it can be concluded that the feature is not available.

The following profile elements are conditional or conditional exclusive on the implementation of this feature:

- RestoreDefaultThresholds() method in NumericSensor adaptation.
- ModifyInstance() operation in NumericSensor adaptation.

7.1.13 Feature: LowerThresholdFatalSettable

Implementing this feature provides support for setting the LowerThresholdFatal threshold of an analog sensor.

The requirement level for this feature is optional.

This feature can be made available to clients at the granularity of NumericSensor instances.

It can be concluded that the feature is available for a NumericSensor instance if:

- The following OCL derivation constraint evaluates to a Boolean value of True.

OCL context: A NumericSensor instance.

```
derive: self.SettableThresholds->
  select( entry | entry = 4 /* LowerThresholdFatal */ )->size() = 1
```

Otherwise, it can be concluded that the feature is not available.

The following profile elements are conditional or conditional exclusive on the implementation of this feature:

- RestoreDefaultThresholds() method in NumericSensor adaptation.
- ModifyInstance() operation in NumericSensor adaptation.

7.1.14 Feature: UpperThresholdFatalSettable

Implementing this feature provides support for setting the UpperThresholdFatal threshold of an analog sensor.

The requirement level for this feature is optional.

This feature can be made available to clients at the granularity of NumericSensor instances.

It can be concluded that the feature is available for a NumericSensor instance if:

- The following OCL derivation constraint evaluates to a Boolean value of True.

OCL context: A NumericSensor instance.

```
derive: self.SettableThresholds->
  select( entry | entry = 5 /* UpperThresholdFatal */ )->size() = 1
```

Otherwise, it can be concluded that the feature is not available.

The following profile elements are conditional or conditional exclusive on the implementation of this feature:

- RestoreDefaultThresholds() method in NumericSensor adaptation.
- ModifyInstance() operation in NumericSensor adaptation.

7.2 Adaptations

7.2.1 Conventions

This profile defines operation requirements based on [DSP0223](#).

For adaptations of ordinary classes and of associations the requirements for operations are defined in adaptation-specific subclauses of the "Adaptations" clause.

For association traversal operation requirements that are specified only in the elements table of an adaptation (i.e. without operation-specific subclauses), the names of the association adaptations to be traversed are listed in the elements table.

The default initialization requirement level for property requirements is optional.

The default modification requirement level for property requirements is optional.

This profile repeats the effective values of certain Boolean qualifiers as part of property, method parameter, or method return value requirements. The following convention is established: If the name of a qualifier is listed, its effective value is True; if the qualifier name is not listed, its effective value is False. The convention is applied in the following cases:

- In: indicates that the parameter is an input parameter
- Out: indicates that the parameter is an output parameter
- Key: indicates that the property is a key (that is, its value is part of the instance path)
- Required: indicates that the element value shall be non-Null
- Null OK: indicates explicitly that the element value may be Null for mandatory, conditional or conditional exclusive properties. This information is not specified as a qualifier in the schema but as an indicator in the profile

7.2.2 Adaptation: ComputerSystem: CIM_ComputerSystem

This adaptation models systems hosting sensors.

The implementation type of this adaptation is instantiated ordinary adaptation.

The requirement level for this adaptation is mandatory.

The following table identifies the element requirements for this adaptation.

Table 5 – ComputerSystem: Element requirements

Element	Requirement	Description
Operations		
GetAssociatedInstancesWithPath() for SystemDevice	Mandatory	See DSP0223 .
GetAssociatedInstancePaths() for SystemDevice	Mandatory	See DSP0223 .
GetReferencingInstancesWithPath() for SystemDevice	Mandatory	See DSP0223 .
GetReferencingInstancePaths() for SystemDevice	Mandatory	See DSP0223 .

7.2.3 Adaptation: SystemDevice: CIM_SystemDevice

7.2.3.1 General

This adaptation models the relationship between sensors that are represented by AbstractSensor instances and the systems hosting these sensors that are represented by ComputerSystem instances.

The implementation type of this adaptation is instantiated association adaptation.

The requirement level for this adaptation is mandatory.

The following table identifies the element requirements for this adaptation.

Table 6 – SystemDevice: Element requirements

Element	Requirement	Description
Properties		
GroupComponent	Mandatory	Key, see subclause "Property: GroupComponent".
PartComponent	Mandatory	Key, see subclause "Property: PartComponent".
Operations		
GetInstance()	Mandatory	See DSP0223 .

7.2.3.2 Property: GroupComponent

The presentation requirement level for this property is mandatory.

The implementation shall satisfy the following constraints for this reference property:

- Referenced instances shall be of class adaptation ComputerSystem.
- The multiplicity of [1 .. 1] defined in the schema is not further constrained.

7.2.3.3 Property: PartComponent

The presentation requirement level for this property is mandatory.

The implementation shall satisfy the following constraints for this reference property:

- Referenced instances shall be of class adaptation AbstractSensor.
- The multiplicity of [0 .. *] defined in the schema is not further constrained.

7.2.4 Adaptation: AbstractSensor: CIM_Sensor

7.2.4.1 General

This abstract adaptation provides a basis for derived adaptations in this or other profiles, that model specific types of sensors.

This profile defines the DiscreteSensor and NumericSensor adaptations to be based on this adaptation.

Design Note: This adaptation demonstrates several ways to define the associations traversed by association traversal operations. Note the different ways mrp:Association child elements are specified vs. defaulted. Note that if no associations are specified in the MRP profile, they are defaulted and appear explicitly in the HTML output. Note that a certain number of traversed associations triggers the generation of subclauses for the operations.

The implementation type of this adaptation is abstract ordinary adaptation.

The requirement level for this abstract adaptation is left to be defined in its derived adaptations.

The implementation shall satisfy the following constraint for this adaptation:

OCIL constraint with context of a AbstractSensor instance:

```
inv: ( self.mrpIsFeatureAvailable('SensorElementNameModification') or
      self.mrpIsFeatureAvailable('SensorStateManagement') )
implies
  self.ElementCapabilities::Capabilities->size() = 1
```

The following table identifies the element requirements for this adaptation.

Table 7 – AbstractSensor: Element requirements

Element	Requirement	Description
Properties		
SystemCreationClassName	Mandatory	Key, see schema definition.
SystemName	Mandatory	Key, see schema definition.
CreationClassName	Mandatory	Key, see schema definition.

Element	Requirement	Description
DeviceID	Mandatory	Key, see schema definition.
ElementName	Mandatory	See subclause "Property: ElementName".
SensorType	Mandatory	See schema definition.
OtherSensorTypeDescription	Mandatory	Null OK, see subclause "Property: OtherSensorTypeDescription".
EnabledState	Mandatory	See subclause "Property: EnabledState".
RequestedState	Mandatory	See subclause "Property: RequestedState".
OperationalStatus	Mandatory	See schema definition.
HealthState	Mandatory	See schema definition.
Methods		
RequestStateChange()	Conditional	See subclause "Method: RequestStateChange()".
Operations		
GetInstance()	Mandatory	See DSP0223 .
GetClassInstancesWithPath()	Mandatory	See DSP0223 .
GetClassInstancePaths()	Mandatory	See DSP0223 .
ModifyInstance()	Conditional	See subclause "Operation: ModifyInstance()".
GetAssociatedInstancesWithPath() for AssociatedSensor and others	Mandatory	See subclause "Operation: GetAssociatedInstancesWithPath() for AssociatedSensor".
GetAssociatedInstancePaths() for AssociatedSensor and others	Mandatory	See subclause "Operation: GetAssociatedInstancePaths() for AssociatedSensor".
GetReferencingInstancesWithPath() for AssociatedSensor and SystemDevice	Mandatory	See DSP0223 .
GetReferencingInstancesWithPath() for ElementCapabilities	Optional	See DSP0223 .
GetReferencingInstancePaths() for AssociatedSensor and SystemDevice	Mandatory	See DSP0223 .
GetReferencingInstancePaths() for ElementCapabilities	Optional	See DSP0223 .

7.2.4.2 Property: ElementName

The presentation requirement level for this property is mandatory.

The implementation shall satisfy the following constraint for this property:

OCIL constraint with context of a AbstractSensor instance:

```
inv: self.ElementName.size() <=
self.ElementCapabilities::Capabilities.MaxElementNameLen
```

The modification requirement level for this property is conditional exclusive, with the following condition:

The SensorElementNameModification feature is implemented.

In order to enforce the length restriction specified in the `MaxElementNameLen` property of the associated `SensorCapabilities` instance, the implementation may reject or truncate property values that exceed that length.

7.2.4.3 Property: `OtherSensorTypeDescription`

The presentation requirement level for this property is mandatory.

The implementation shall satisfy the following constraint for this property:

OCIL constraint with context of a `AbstractSensor` instance:

```
inv: if self.SensorType = 1 /* Other */
then (
    self.OtherSensorTypeDescription.isNotNull()
) else (
    self.OtherSensorTypeDescription.isNull()
)
```

7.2.4.4 Property: `EnabledState`

The presentation requirement level for this property is mandatory.

The following table describes the mapping between values of this property and the corresponding sensor states.

Table 8 – Mapping between `EnabledState` values and sensor states

Value	Value description	Sensor state
2	Enabled	The sensor shall be operational.
3	Disabled	The sensor shall be disabled.
5	Not Applicable	The sensor's state is indeterminate, or sensor state management is not supported.

The value of this property may change as a result of the execution of the `RequestStateChange()` method or a change to the sensor's state by a non-CIM implementation.

7.2.4.5 Property: `RequestedState`

The presentation requirement level for this property is mandatory.

The implementation shall satisfy the following constraints for this property:

- OCIL constraint with context of a `AbstractSensor` instance:

```
inv: if self.mrpIsFeatureAvailable('SensorStateManagement')
then (
    self.RequestedState = 5 /* No Change */ or
    self.RequestedState = 12 /* Not Applicable */ or
    self.ElementCapabilities::Capabilities.
        RequestedStatesSupported->contains(self.RequestedState)
) else (
    self.RequestedState = 12 /* Not Applicable */
)
```

- OCIL constraint with context of a `AbstractSensor` instance:

```

init: if self.mrpIsFeatureAvailable('SensorStateManagement')
then (
    self.RequestedState = 5 /* No Change */
)

```

7.2.4.6 Method: RequestStateChange()

The requirement level for this method is conditional, with the following condition:

The SensorStateManagement feature is implemented.

Successful execution of this method on an instance of this adaptation shall change the instance's state to the value specified in the RequestedState parameter.

Invoking this method multiple times may result in earlier requests being overwritten or lost.

The implementation shall satisfy the following constraints for this method:

- OCL constraint with context of a AbstractSensor instance:

```

pre: self.ElementCapabilities::Capabilities.
    RequestedStatesSupported->contains(RequestedState)

```

- OCL constraint with context of a AbstractSensor instance:

```

post: self.RequestedState = RequestedState

```

The following table identifies the parameter and return value requirements of the method.

Table 9 – RequestStateChange(): Parameter requirements

Parameter	Description
RequestedState	In, see subclause "Parameter: RequestedState".
Job	Out, see subclause "Parameter: Job".
TimeoutPeriod	In, see subclause "Parameter: TimeoutPeriod".
ReturnValue	See subclause "Return value".

7.2.4.6.1 Parameter: RequestedState

The following table identifies input value requirements for this parameter:

Table 10 – RequestedState: Input value requirements

Input value	Requirement	Description
2	Mandatory	2 = Enabled; the sensor shall become operational.
3	Mandatory	3 = Disabled; the sensor shall become disabled.

7.2.4.6.2 Parameter: Job

If the request is being executed asynchronously, the value of this parameter shall reference a ConcreteJob **Profile Error: A class adaptation "ConcreteJob" is referenced in a class adaptation link but is not defined or is defined more than once in this profile.** instance representing the asynchronously executing request. Otherwise, the value of this parameter shall be NULL.

The implementation shall satisfy the following constraint for this reference parameter:

Referenced instances shall be of class adaptation ConcreteJob **Profile Error: A class adaptation "ConcreteJob" is referenced in a class adaptation link but is not defined or is defined more than once in this profile..**

7.2.4.6.3 Parameter: TimeoutPeriod

Client-specified maximum amount of time the transition to a new state is supposed to take:

- 0 or Null – No maximum time is specified
- Non-Null – The value specifies the maximum time allowed

If the maximum time expires, the method implementation may abort the execution. If it aborts, it shall return 2 (Error).

7.2.4.6.4 Return value

This method shall return one of the following return values:

Table 11 – RequestStateChange: Return values

Value	Description
0	The state change was successfully performed.
1	The method is not implemented.
2	An error has occurred.
4096	The request to change the state is being executed asynchronously, and the Job parameter references a ConcreteJob Profile Error: A class adaptation "ConcreteJob" is referenced in a class adaptation link but is not defined or is defined more than once in this profile. instance representing the request.

7.2.4.7 Operation: ModifyInstance()

For general requirements on the implementation of this operation, see [DSP0223](#).

The requirement level for this operation is conditional, with the following condition:

The SensorElementNameModification feature is implemented.

7.2.4.8 Operation: GetAssociatedInstancesWithPath() for AssociatedSensor and others

For general requirements on the implementation of this operation, see [DSP0223](#).

The requirement level for this operation is mandatory.

This operation requirement applies when traversing the following association adaptations:

- AssociatedSensor
- ElementCapabilities
- SystemDevice

7.2.4.9 Operation: GetAssociatedInstancePaths() for AssociatedSensor and others

For general requirements on the implementation of this operation, see [DSP0223](#).

The requirement level for this operation is mandatory.

This operation requirement applies when traversing the following association adaptations:

- AssociatedSensor
- ElementCapabilities
- SystemDevice

7.2.5 Adaptation: DiscreteSensor: CIM_Sensor

7.2.5.1 General

This adaptation models discrete sensors.

The implementation type of this adaptation is instantiated ordinary adaptation.

The requirement level for this adaptation is mandatory.

The following table identifies the element requirements for this adaptation.

Table 12 – DiscreteSensor: Element requirements

Element	Requirement	Description
Base adaptations		
AbstractSensor	Optional	See AbstractSensor.
Properties		
CurrentState	Mandatory	See subclause "Property: CurrentState".
PossibleStates	Mandatory	See subclause "Property: PossibleStates".

7.2.5.2 Property: CurrentState

The presentation requirement level for this property is mandatory.

The implementation shall satisfy the following constraint for this property:

OCIL constraint with context of a DiscreteSensor instance:

```
inv: self.PossibleStates->contains(self.CurrentState)
```

7.2.5.3 Property: PossibleStates

The presentation requirement level for this property is mandatory.

The set of array entry values of this array property shall represent the set of allowable values for the CurrentState property. The mapping between these values and the actual condition of the discrete sensor is implementation specific.

The implementation shall satisfy the following constraint for this property:

OCIL constraint with context of a DiscreteSensor instance:

```
inv:
self.SensorType = 2 /* Temperature */ implies
    self.PossibleStates->forall( s |
        Set { "Bad", "Good", "Unknown" }->contains(s)) and
self.SensorType = 3 /* Voltage */ implies
    self.PossibleStates->forall( s |
        Set { "Bad", "Good", "Unknown" }->contains(s)) and
```



```

self.SensorType = 4 /* Current */ implies
  self.PossibleStates->forAll( s |
    Set {"Bad", "Good", "Unknown" }->contains(s)) and
self.SensorType = 5 /* Tachometer */ implies
  self.PossibleStates->forAll( s |
    Set {"Bad", "Good", "Unknown" }->contains(s)) and
self.SensorType = 7 /* Switch */ implies
  self.PossibleStates->forAll( s |
    Set {"Closed", "Open", "Unknown" }->contains(s)) and
self.SensorType = 8 /* Lock */ implies
  self.PossibleStates->forAll( s |
    Set {"Locked", "Unlocked", "Unknown" }->contains(s)) and
self.SensorType = 9 /* Humidity */ implies
  self.PossibleStates->forAll( s |
    Set {"Humid", "Normal", "Unknown" }->contains(s)) and
self.SensorType = 10 /* Smoke Detection */ implies
  self.PossibleStates->forAll( s |
    Set {"Smokey", "Normal", "Unknown" }->contains(s)) and
self.SensorType = 11 /* Presence */ implies
  self.PossibleStates->forAll( s |
    Set {"Not Present", "Present", "Unknown" }->contains(s)) and
self.SensorType = 12 /* Air Flow */ implies
  self.PossibleStates->forAll( s |
    Set {"Bad", "Good", "Unknown" }->contains(s)) and
self.SensorType = 13 /* Power Consumption */ implies
  self.PossibleStates->forAll( s |
    Set {"Bad", "Good", "Unknown" }->contains(s)) and
self.SensorType = 14 /* Power Production */ implies
  self.PossibleStates->forAll( s |
    Set {"Bad", "Good", "Unknown" }->contains(s)) and
self.SensorType = 15 /* Pressure */ implies
  self.PossibleStates->forAll( s |
    Set {"Bad", "Good", "Unknown" }->contains(s))

```

7.2.6 Adaptation: NumericSensor: CIM_NumericSensor

7.2.6.1 General

This adaptation models analog sensors.

The implementation type of this adaptation is instantiated ordinary adaptation.

The requirement level for this adaptation is mandatory.

The following table identifies the element requirements for this adaptation.

Table 13 – NumericSensor: Element requirements

Element	Requirement	Description
Base adaptations		
AbstractSensor	Optional	See AbstractSensor.
Properties		
BaseUnits	Mandatory	See schema definition.
UnitModifier	Mandatory	See schema definition.
RateUnits	Mandatory	See schema definition.

Element	Requirement	Description
CurrentReading	Mandatory	See schema definition.
LowerThresholdNonCritical	Conditional	See subclause "Property: LowerThresholdNonCritical".
UpperThresholdNonCritical	Conditional	See subclause "Property: UpperThresholdNonCritical".
LowerThresholdCritical	Conditional	See subclause "Property: LowerThresholdCritical".
UpperThresholdCritical	Conditional	See subclause "Property: UpperThresholdCritical".
LowerThresholdFatal	Conditional	See subclause "Property: LowerThresholdFatal".
UpperThresholdFatal	Conditional	See subclause "Property: UpperThresholdFatal".
SupportedThresholds	Mandatory	See subclause "Property: SupportedThresholds".
SettableThresholds	Mandatory	See subclause "Property: SettableThresholds".
CurrentState	Mandatory	See subclause "Property: CurrentState".
PossibleStates	Mandatory	See subclause "Property: PossibleStates".
Methods		
RestoreDefaultThresholds()	Conditional	See subclause "Method: RestoreDefaultThresholds()".
Operations		
ModifyInstance()	Conditional	See subclause "Operation: ModifyInstance()".

7.2.6.2 Property: LowerThresholdNonCritical

The presentation requirement level for this property is conditional, with the following condition:

The LowerThresholdNonCriticalSupported feature is implemented.

The modification requirement level for this property is conditional, with the following condition:

The LowerThresholdNonCriticalSettable feature is implemented.

7.2.6.3 Property: UpperThresholdNonCritical

The presentation requirement level for this property is conditional, with the following condition:

The UpperThresholdNonCriticalSupported feature is implemented.

The modification requirement level for this property is conditional, with the following condition:

The UpperThresholdNonCriticalSettable feature is implemented.

7.2.6.4 Property: LowerThresholdCritical

The presentation requirement level for this property is conditional, with the following condition:

The LowerThresholdCriticalSupported feature is implemented.

The modification requirement level for this property is conditional, with the following condition:

The LowerThresholdCriticalSettable feature is implemented.

7.2.6.5 Property: UpperThresholdCritical

The presentation requirement level for this property is conditional, with the following condition:

The UpperThresholdCriticalSupported feature is implemented.

The modification requirement level for this property is conditional, with the following condition:

The UpperThresholdCriticalSettable feature is implemented.

7.2.6.6 Property: LowerThresholdFatal

The presentation requirement level for this property is conditional, with the following condition:

The LowerThresholdFatalSupported feature is implemented.

The modification requirement level for this property is conditional, with the following condition:

The LowerThresholdFatalSettable feature is implemented.

7.2.6.7 Property: UpperThresholdFatal

The presentation requirement level for this property is conditional, with the following condition:

The UpperThresholdFatalSupported feature is implemented.

The modification requirement level for this property is conditional, with the following condition:

The UpperThresholdFatalSettable feature is implemented.

7.2.6.8 Property: SupportedThresholds

The presentation requirement level for this property is mandatory.

The set of array entry values shall represent the set of thresholds that are implemented. If no thresholds are implemented, the array shall be empty.

7.2.6.9 Property: SettableThresholds

The presentation requirement level for this property is mandatory.

The set of array entry values shall represent the set of implemented thresholds that are modifiable.

If no thresholds are modifiable, the array shall be empty. The set of array entry values shall be a subset of the set of array entry values in the SupportedThresholds property.

7.2.6.10 Property: CurrentState

The presentation requirement level for this property is mandatory.

The implementation shall satisfy the following constraint for this property:

OCL constraint with context of a NumericSensor instance:

```
inv: self.PossibleStates->contains(self.CurrentState)
```

7.2.6.11 Property: PossibleStates

The presentation requirement level for this property is mandatory.

The set of array entry values of this array property shall represent the set of allowable values for the CurrentState property. The mapping between these values and the actual condition of the analog sensor is implementation specific.

The implementation shall satisfy the following constraint for this property:

OCL constraint with context of a NumericSensor instance:

```

define commonSet : Set =
    Set { "Non-Critical", "Lower Non-Critical", "Upper Non-Critical",
        "Critical",
        "Lower Critical", "Upper Critical", "Fatal", "Lower Fatal", "Upper
        Fatal",
        "Normal", "Unknown" }
inv:
self.SensorType = 3 /* Voltage */ implies
    self.PossibleStates->forall( s | commonSet->contains(s)) and
self.SensorType = 4 /* Current */ implies
    self.PossibleStates->forall( s | commonSet->contains(s)) and
self.SensorType = 5 /* Tachometer */ implies
    self.PossibleStates->forall( s | commonSet->contains(s)) and
self.SensorType = 9 /* Humidity */ implies
    self.PossibleStates->forall( s | commonSet->contains(s)) and
self.SensorType = 10 /* Smoke Detection */ implies
    self.PossibleStates->forall( s | commonSet->contains(s)) and
self.SensorType = 11 /* Presence */ implies
    self.PossibleStates->forall( s | commonSet->contains(s)) and
self.SensorType = 12 /* Air Flow */ implies
    self.PossibleStates->forall( s | commonSet->contains(s)) and
self.SensorType = 13 /* Power Consumption */ implies
    self.PossibleStates->forall( s | commonSet->contains(s)) and
self.SensorType = 14 /* Power Production */ implies
    self.PossibleStates->forall( s | commonSet->contains(s)) and
self.SensorType = 15 /* Pressure */ implies
    self.PossibleStates->forall( s | commonSet->contains(s))

```

7.2.6.12 Method: RestoreDefaultThresholds()

The requirement level for this method is conditional, with the following condition:

At least one of the following is true:

- The LowerThresholdNonCriticalSettable feature is implemented.
- The UpperThresholdNonCriticalSettable feature is implemented.
- The LowerThresholdCriticalSettable feature is implemented.
- The UpperThresholdCriticalSettable feature is implemented.
- The LowerThresholdFatalSettable feature is implemented.
- The UpperThresholdFatalSettable feature is implemented.

Successful execution of this method shall reset the values of the thresholds of the sensor represented by an instance of this adaptation to its default values.

The following table identifies the parameter and return value requirements of the method.

Table 14 – RestoreDefaultThresholds(): Parameter requirements

Parameter	Description
ReturnValue	See subclause "Return value".

7.2.6.12.1 Return value

This method shall return one of the following return values:

Table 15 – RestoreDefaultThresholds: Return values

Value	Description
0	The method has executed successfully.
1	The method is not implemented.
2	An error has occurred.

7.2.6.13 Operation: ModifyInstance()

For general requirements on the implementation of this operation, see [DSP0223](#).

The requirement level for this operation is conditional, with the following condition:

At least one of the following is true:

- The LowerThresholdNonCriticalSettable feature is implemented.
- The UpperThresholdNonCriticalSettable feature is implemented.
- The LowerThresholdCriticalSettable feature is implemented.
- The UpperThresholdCriticalSettable feature is implemented.
- The LowerThresholdFatalSettable feature is implemented.
- The UpperThresholdFatalSettable feature is implemented.

7.2.7 Adaptation: SensorCapabilities: CIM_EnabledLogicalElementCapabilities

7.2.7.1 General

This adaptation models the capabilities of a sensor represented by the associated AbstractSensor instance, and of the implementation of that adaptation.

The implementation type of this adaptation is instantiated ordinary adaptation.

The requirement level for this adaptation is conditional, with the following condition:

At least one of the following is true:

- The SensorElementNameModification feature is implemented.
- The SensorStateManagement feature is implemented.

The following table identifies the element requirements for this adaptation.

Table 16 – SensorCapabilities: Element requirements

Element	Requirement	Description
Properties		
InstanceID	Mandatory	Key, see schema definition.
RequestedStatesSupported	Mandatory	See subclause "Property: RequestedStatesSupported".
ElementNameEditSupported	Mandatory	See subclause "Property: ElementNameEditSupported".
MaxElementNameLen	Conditional	See subclause "Property: MaxElementNameLen".

Element	Requirement	Description
Operations		
GetInstance()	Mandatory	See DSP0223 .
GetClassInstancesWithPath()	Mandatory	See DSP0223 .
GetClassInstancePaths()	Mandatory	See DSP0223 .
GetAssociatedInstancesWithPath() for ElementCapabilities	Mandatory	See DSP0223 .
GetAssociatedInstancePaths() for ElementCapabilities	Mandatory	See DSP0223 .
GetReferencingInstancesWithPath() for ElementCapabilities	Optional	See DSP0223 .
GetReferencingInstancePaths() for ElementCapabilities	Optional	See DSP0223 .

7.2.7.2 Property: RequestedStatesSupported

The presentation requirement level for this property is mandatory.

The set of array entry values of this property shall represent the set of supported requested states for the associated AbstractSensor instance.

The implementation shall satisfy the following constraint for this property:

OCIL constraint with context of a SensorCapabilities instance:

```

inv: if self.ElementCapabilities::ManagedElement.
    mrpIsFeatureAvailable('SensorStateManagement')
then (
    self.RequestedStatesSupported->forall( entry |
        Set { 2 /* Enabled */, 3 /* Disabled */, 11 /* Reset */ }->
        contains(entry))
) else (
    self.RequestedStatesSupported->size() = 0
)

```

7.2.7.3 Property: ElementNameEditSupported

The presentation requirement level for this property is mandatory.

The implementation shall satisfy the following constraint for this property:

OCIL constraint with context of a SensorCapabilities instance:

```

inv: self.ElementCapabilities::ManagedElement.
    mrpIsFeatureAvailable('SensorElementNameModification') =
    self.ElementNameEditSupported

```

7.2.7.4 Property: MaxElementNameLen

The presentation requirement level for this property is conditional, with the following condition:

The SensorElementNameModification feature is implemented.

7.2.8 Adaptation: ElementCapabilities: CIM_ElementCapabilities

7.2.8.1 General

This adaptation models the relationship between sensors that are represented by AbstractSensor instances and the capabilities of these sensors or their adaptation implementation that are represented by SensorCapabilities instances.

The implementation type of this adaptation is instantiated association adaptation.

The requirement level for this adaptation is conditional, with the following condition:

At least one of the following is true:

- The SensorElementNameModification feature is implemented.
- The SensorStateManagement feature is implemented.

The following table identifies the element requirements for this adaptation.

Table 17 – ElementCapabilities: Element requirements

Element	Requirement	Description
Properties		
ManagedElement	Mandatory	Key, see subclause "Property: ManagedElement".
Capabilities	Mandatory	Key, see subclause "Property: Capabilities".
Operations		
GetInstance()	Mandatory	See DSP0223 .

7.2.8.2 Property: ManagedElement

The presentation requirement level for this property is mandatory.

The implementation shall satisfy the following constraints for this reference property:

- Referenced instances shall be of class adaptation AbstractSensor.
- The multiplicity of [1 .. *] defined in the schema is not further constrained.

7.2.8.3 Property: Capabilities

The presentation requirement level for this property is mandatory.

The implementation shall satisfy the following constraints for this reference property:

- Referenced instances shall be of class adaptation SensorCapabilities.
- The multiplicity of [0 .. *] defined in the schema is constrained to [0 .. 1].

7.2.9 Adaptation: SensoredElement: CIM_ManagedSystemElement

This adaptation models sensed elements that are measured by sensors represented by associated AbstractSensor instances. AbstractSensor instances representing sensors that sensor the entire computer system hosting them (rather than elements within that computer system) shall not be associated that way.

The implementation type of this adaptation is abstract ordinary adaptation.

The requirement level for this abstract adaptation is left to be defined in its derived adaptations.

The following table identifies the element requirements for this adaptation.

Table 18 – SensoredElement: Element requirements

Element	Requirement	Description
Operations		
GetAssociatedInstancesWithPath() for AssociatedSensor	Mandatory	See DSP0223 .
GetAssociatedInstancePaths() for AssociatedSensor	Mandatory	See DSP0223 .
GetReferencingInstancesWithPath() for AssociatedSensor	Mandatory	See DSP0223 .
GetReferencingInstancePaths() for AssociatedSensor	Mandatory	See DSP0223 .

7.2.10 Adaptation: AssociatedSensor: CIM_AssociatedSensor

7.2.10.1 General

This adaptation models the relationship between sensors that are represented by AbstractSensor instances and the sensed elements measured by these sensors that are represented by SensoredElement instances.

The implementation type of this adaptation is instantiated association adaptation.

The requirement level for this adaptation is mandatory.

The following table identifies the element requirements for this adaptation.

Table 19 – AssociatedSensor: Element requirements

Element	Requirement	Description
Properties		
Antecedent	Mandatory	Key, see subclause "Property: Antecedent".
Dependent	Mandatory	Key, see subclause "Property: Dependent".
Operations		
GetInstance()	Mandatory	See DSP0223 .

7.2.10.2 Property: Antecedent

The presentation requirement level for this property is mandatory.

The implementation shall satisfy the following constraints for this reference property:

- Referenced instances shall be of class adaptation AbstractSensor.
- The multiplicity of [0 .. *] defined in the schema is constrained to [1 .. *].

7.2.10.3 Property: Dependent

The presentation requirement level for this property is mandatory.

The implementation shall satisfy the following constraints for this reference property:

- Referenced instances shall be of class adaptation SensoredElement.
- The multiplicity of [0 .. *] defined in the schema is not further constrained.

8 Use cases and state descriptions

8.1 State description: SimpleObjectDiagram

The following figure shows a simple object diagram that represents a scenario that conforms to the requirements of this profile. In that scenario, there is one sensed element that is a fan, represented by an instance of CIM_Fan in the role of the SensoredElement adaptation. That fan has two sensors, a discrete sensor represented by the DiscreteSensor instance presencesensor1, and an analog sensor represented by the NumericSensor instance ntachsensor1. Both instances are associated with the SensoredElement instance through AssociatedSensor instances.

Based on the value 11 (Presence) of the SensorType property of the DiscreteSensor instance presencesensor1, the sensor represented by that instance is a presence sensor for the fan. In this implementation, only the values "Present" and "Not Present" are supported for the PossibleStates property.

Based on the value 5 (Tachometer) of the SensorType property of the NumericSensor instance ntachsensor1, the sensor represented by that instance is a speed sensor for the fan that provides numeric reading of the fan speed. Based on the value of the BaseUnits property (value 19 = RPM), and the RateUnits property showing no additional units, the fan speed is represented in RPM units. The CurrentReading property in this scenario has a value of 35, which is multiplied by the unit modifier represented by the UnitModifier property (value 2, so the actual multiplier is 10^2), to calculate the fan speed of 3500 RPM.

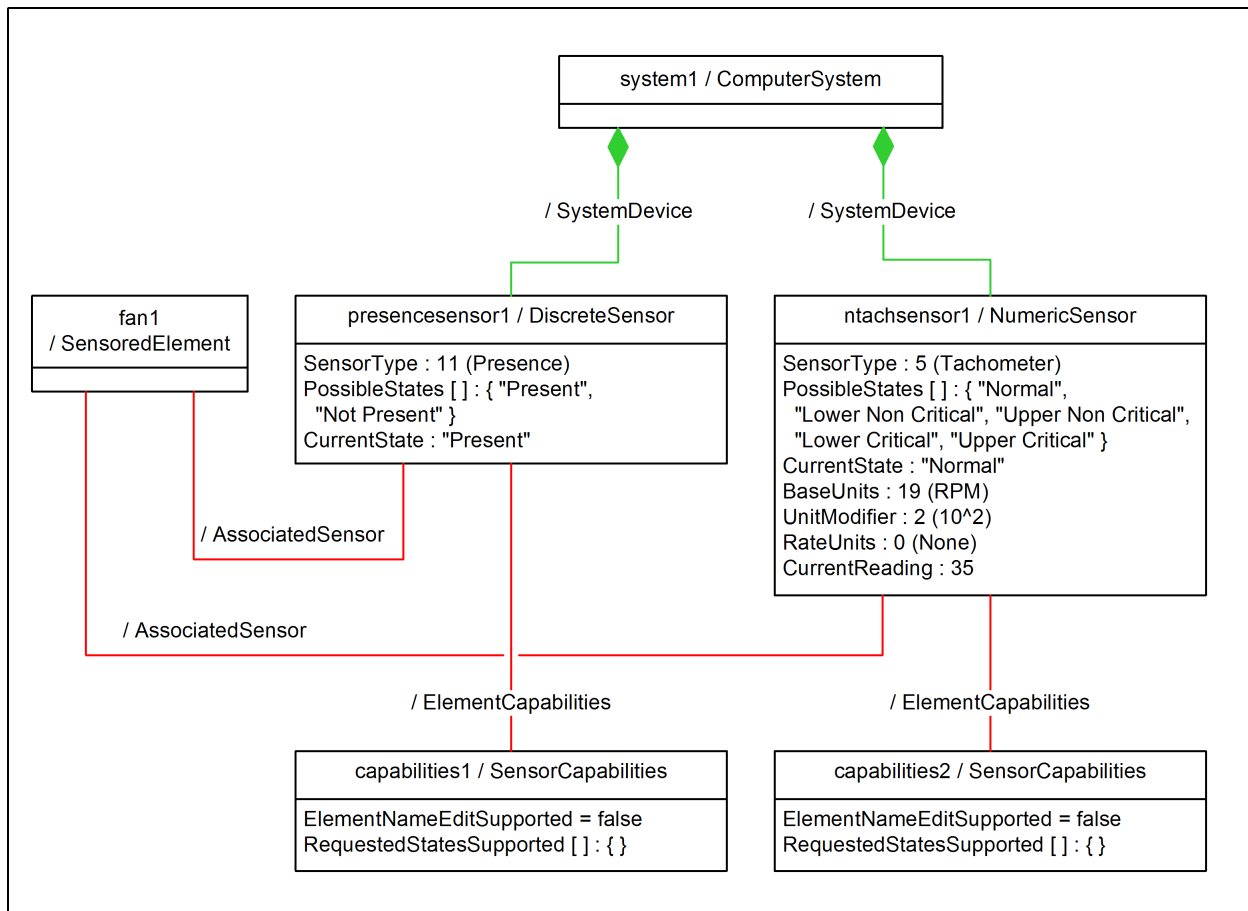


Figure 3 – Simple object diagram

8.2 Use case: ShowAllSensorStates

This use case describes the flow to obtain the current state of all sensed elements in a computer system, possibly including the computer system itself.

This use case has the following preconditions:

- A ComputerSystem instance is known.

The main flow for this use case consists of the following sequence of steps:

1. Invoke the GetAssociatedInstancesWithPath() for SystemDevice operation on that ComputerSystem instance. This will retrieve all DiscreteSensor and NumericSensor instances representing sensors that are hosted by the computer system represented by that ComputerSystem instance.
2. Iterate through these retrieved instances and inspect their DiscreteSensor. CurrentState and NumericSensor. CurrentState property values, which will represent the states of their sensed elements.

8.3 Use case: FindSensorsOfSystemElement

This use case describes the flow to find the sensors for a given sensed element in a computer system.

This use case has the following preconditions:

- A SensedElement instance is known.

The main flow for this use case consists of the following single step:

1. Invoke the GetAssociatedInstancesWithPath() for AssociatedSensor operation on that SensedElement instance. This will retrieve all DiscreteSensor and NumericSensor instances representing sensors that measure the sensed element represented by that SensedElement instance.

8.4 Use case: ChangeThreshold

This use case describes the flow to change the upper non-critical threshold of a given analog sensor.

This use case has the following preconditions:

- A NumericSensor instance is known.

The main flow for this use case consists of the following sequence of steps:

1. Invoke the GetInstance() operation on that NumericSensor instance. This step may be skipped if the instance has been retrieved by other means already.
2. Determine whether the SettableThresholds property in that instance contains an array entry value of 1 (UpperThresholdNonCritical).
3. If so, the threshold may be changed. Change the threshold by invoking the ModifyInstance() operation on that NumericSensor instance, including the new value for the UpperThresholdNonCritical property in the modified instance.

Otherwise, the threshold cannot be changed.

8.5 Use case: ResetThresholds

This use case describes the flow to reset the thresholds of a given analog sensor.

This use case has the following preconditions:

- A NumericSensor instance is known.

The main flow for this use case consists of the following single step:

1. Invoke the RestoreDefaultThresholds() method on that NumericSensor instance.

8.6 Use case: DetermineElementNameModifiability

This use case describes the flow to determine whether the ElementName property of a given sensor can be modified.

This use case has the following preconditions:

- A DiscreteSensor or NumericSensor instance is known.

The main flow for this use case consists of the following sequence of steps:

1. Retrieve the associated SensorCapabilities instance as follows:
 - Invoke the GetAssociatedInstancesWithPath() for ElementCapabilities operation on that DiscreteSensor or NumericSensor instance.
2. Inspect the value of the ElementNameEditSupported property of that SensorCapabilities instance.

If that value is TRUE, the client can modify the ElementName property of the given DiscreteSensor or NumericSensor instance.

8.7 Use case: DetermineStateManagementSupport

This use case describes the flow to determine whether state management (i.e. the SensorStateManagement feature) is supported for a given sensor.

This use case has the following preconditions:

- A DiscreteSensor or NumericSensor instance is known.

The main flow for this use case consists of the following sequence of steps:

1. Retrieve the associated SensorCapabilities instance as follows:
 - Invoke the GetAssociatedInstancesWithPath() for ElementCapabilities operation on that DiscreteSensor or NumericSensor instance.
2. Inspect the value of the RequestedStatesSupported array property of that SensorCapabilities instance.

If the array property contains at least one array entry, state management is supported for the sensor represented by the given DiscreteSensor or NumericSensor instance.

ANNEX A

(informative)

Change log

Table 20 – Change log

Version	Date	Description
1.0.0c	2006-05-16	DSP1009: Released as Preliminary Standard
1.0.0	2007-11-06	DSP1009: Released as Final Standard
1.0.1	2008-09-25	DSP1009: Released as DMTF Standard
1.0.2	2009-10-28	DSP1009: Released as DMTF Standard, with the following changes: <ul style="list-style-type: none">• Changed the values for the EnabledState property
1.0.3m	2011-08-31	XMP1009: Included as a sample profile into DSP2023

Bibliography

The following documents may provide additional background.

DMTF DSP1000, *Management Profile Specification Template 1.1*,
http://www.dmtf.org/standards/published_documents/DSP1000_1.1.pdf