QuantityWare

QAPI Developer Guide

QuantityCloud Phase 1

Version History

Version	Date	Description
00	2025-04-11	Initial Version
01	2025-05-07	Modified QAPI_CALC_CONTEXT_GET input XML structure.
02	2025-05-19	Fixed typo in QAPI_CALC_CONTEXT_GET XML example.
03	2025-07-09	Added *XML Structure – XSD* sections containing XSD contents to: • QAPI_CALC_CONTEXT_GET request (4.2.3) • QAPI_CALC_CONTEXT_GET response (4.3.3) • QAPI_CALCULATE request (5.2.3) • QAPI_CALCULATE response (5.3.3)
04	2025-08-21	Edited for Knowledge Base

Contents

1. Introduction

QAPI provides access to the QuantityWare BCS quantity conversion functionality to systems external to SAP, via an SAP BTP API.

It is the first phase of the wider QuantityCloud project, and more information can be found at https://www.quantityware.com/faqs/qapi.

This document describes the interaction with the QAPI functions, detailing the data that should be sent, how it should be sent, and how to process returned data.

1.1. QAPI Terminology

- UoM = An SAP Unit of Measure, for example M15 (which represents: m^3 at 15 °C)
- BCS = Bulk Calculations Solution, by QuantityWare
- BCP = Bulk Calculations – Petroleum, by QuantityWare
- BCG = Bulk Calculations – Gas, by QuantityWare
- RFC = Remote Function Call
- BTP = SAP Business Technology Platform
- SAP Client = The client which QAPI is connected to, containing the BCS configuration

1.2. Prerequisites

1.2.1. Test Scenarios Created

Before using QAPI with an SAP system, the organization **must** have created test scenarios in the BCS Petroleum or Gas Measurement Cockpit within the SAP client.

This ensures that the BCS installation in the SAP client is configured correctly and is ready for QAPI calculations.

It is required that the organization creates at least five successful test scenarios for each of the conversion groups to be used in calculations with QAPI_CALCULATE.

Using the internal “Explain by Scenario” program, included with BCS as the ABAP program “/QTWY/QAPI_EXPLAIN_BY_SCENARIO”, someone with access to the SAP system/client can generate XML to test each of the five test scenarios for a conversion group.

This ensures that the accurate results are returned by QAPI_CALCULATE for each scenario (for more details see "Explain by Scenario" Program).

1.2.2. BCP/BCG Expert(s) Available

You **must** have people within the organization with expertise in configuring BCS (ideally a QuantityWare BCP/BCG certified consultant).

Their BCS expertise will be important for assisting with any calculation issues and questions pertaining to specific conversion groups, as they can perform comparative calculations using BCS on the SAP client and provide details of configuration details such as ranges.

In addition, they will be able to use the "Explain by Scenario" program to generate XML for you to test.

1.2.3. Conversion Group Known

QAPI requires a conversion group be provided for all calculations.

Providing a material and its associated plant is **not** supported, as these entities can be affected by additional business processes – QAPI is designed as a "low level", direct calculation tool that is separate from any of these processes.

Therefore, the customer-facing system must perform any material/plant-to-conversion group translations prior to performing a calculation with QAPI.

1.2.4. Units of Measure Defined

You must have defined the mapping of all required units of measure in your external system to the corresponding SAP units of measure, as follows:

- Your internal unit of measure name
- Description
- Displayed unit
- Dimension
- Decimal places to displaying values
- Any temperature and/or pressure related settings

This information is **not** provided by QAPI, with the exception of the units available for input/result parameters, where the description, displayed unit, and decimal places are returned.

NOTE: UoM groups are **not** supported. Individual UoMs must be specified for the target quantities.

1.2.5. Access to QAPI Functions Established

You must have configured your BTP environment to connect to the QAPI_CALC_CONTEXT_GET and QAPI_CALCULATE functions on the required SAP client and expose these functions via a web URL.

It is assumed you have this connection established in order to send any of the XML requests described in this document.

Configuration of your BTP environment is out of scope of this document and is provided in a separate document: *QAPI – Connection Guide* (view in the Knowledge Base).

1.3. Data

1.3.1. Content Format

Initially, XML is used for both sending and receiving data, because we use the RFC protocol to access the QAPI functions, and RFC uses XML as its data communication format.

For maximum efficiency, and to allow BCS to perform all data-based validation checks without requiring additional middleware, no data manipulation is performed in the BTP layer (e.g., conversion to JSON, renaming or consolidation of fields, etc).

The RFC protocol enables access to QAPI from programs within the SAP environment, not just via BTP.

1.3.2. Field Names

Field names match those in the SAP back-end system, which will aid debugging and comparison with the "Explain by Scenario" program, available on the SAP system and described later in this document.

1.3.3. Number Format

Floating point numbers, when sent, must use a period "." as a decimal point, and must not include thousand separators. Valid examples include "10000.00" and "10000000.0000".

2. Functionality Overview

Two functions are provided by the API:

- **/QTYW/QAPI_CALC_CONTEXT_GET** - This function allows you to obtain the details required to perform a calculation using QAPI_CALCULATE for a specified conversion group – only used during the initial configuration
- **/QTYW/QAPI_CALCULATE** - This function allows you to perform a quantity conversion calculation for a conversion group

In addition, a transformation program is provided within the SAP system:

- **/QTYW/QAPI_EXPLAIN_BY_SCENARIO** – The "Explain by Scenario" program generates example calculation request XML based on one or more "test scenarios" configured in BCS on the target SAP client

Further details are provided later in the document.

3. Parameters

3.1. Input Parameters

When performing a quantity conversion calculation, the amount and UoM to convert **from** along with the UoM(s) to convert **to** are required.

However, this is not sufficient information to perform an accurate quantity conversion: environmental readings to help accurately convert quantities are also required.

Factors such as the temperature and pressure of the liquid or gas at the time of measurement can have a significant impact when converting to other UoM.

For example: you measure 10,000 litres of liquid crude. Converting it to "litres at 15 °C" will yield different results depending on the observed temperature of the measured liquid crude:

Observed Temperature °C	Measured Quantity L	Converted Quantity L @ 15 °C
10	10000	10042.5
15	10000	10000.0
20	10000	9957.4

(Table is for illustrative purposes only)

Input parameters allow you to provide such values. These can vary by conversion group (product).

3.1.1. Input Parameter Information

QAPI_CALC_CONTEXT_GET returns the following information for each input parameter:

- BCS field name
- Type
- Default value, UoM and/or selected status (depending on parameter type)
- Allowed UoM
- Field description (for display)
- Recommended display order

When performing a quantity conversion calculation with QAPI_CALCULATE, the following information **must** be provided for each input parameter:

- BCS field name
- Specified Value, UoM and/or selected status (depending on parameter type)
- Flag for checkbox / UoM-only parameter types

3.1.2. Input Parameter Types

There are four input parameter types, described below:

- **Value + UoM** – requires both a value and a UoM to be provided when calculating
- **Value Only** – requires only a value to be provided when calculating
- **UoM Only** – requires only a UoM to be provided when calculating
- **Checkbox** – requires an indicator of whether the parameter is selected or not.

More details on how the parameters are displayed, along with the fields returned are described in QAPI_CALC_CONTEXT_GET -> Response Details.

3.1.3. Hydrometer Correction Indicator Note

Input parameter "HYDROCORR" (Hydrometer correction indicator), has a quirk wherein its logic is reversed (this is due to a design by API/ASTM in 1980).

Specifically, if the hydrometer indicator is SET, the hydrometer correction is turned OFF.

QuantityWare has provided a method to reverse this behaviour – please read Note 000026 below for details:

https://www.quantityware.com/?s=hydrometer+correction+logic

3.2. Result Parameters

When performing a quantity conversion calculation, the converted UoM values are returned, along with additional environmental values.

These environmental values are calculated during the calculation process and are returned in result parameter fields. These can vary by conversion group (product).

3.2.1. Result Parameters are Optional

Unlike input parameters, result parameters are optional.

However, on attempting to specify an unallowed UoM with a result parameter or specifying a result parameter that is not supported for a conversion group, the conversion will fail.

3.2.2. Result Parameter Information

QAPI_CALC_CONTEXT_GET returns the following information for each result parameter:

- BCS field name
- Type
- Default UoM (where applicable, depending on parameter type)
- Allowed UoM
- Field description (for display)
- Recommended display order

When performing a quantity conversion with QAPI_CALCULATE, the following information must be provided for each result parameter:

- BCS field name
- Specified UoM (where applicable, depending on parameter type)

3.2.3. Result Parameter Types

There are four result parameter types, as described below:

- **Value + UoM** – returns both a value and a UoM from the calculation
- **Value Only** – returns only value from the calculation
- **UoM Only** – returns only a UoM from the calculation
- **Checkbox** – returns an indicator of whether the parameter is selected or not.

As the values of each result parameter are calculated during the calculation, less information is required to be sent than for input parameters:

- **Value + UoM** – requires only a UoM to be provided when calculating
- **Value Only** – requires no data to be provided* when calculating
- **UoM Only** – requires only a UoM to be provided when calculating
- **Checkbox** – requires no data to be provided* when calculating

* Other than the result parameter name.

More details on how the parameters are displayed, along with the fields returned are described in QAPI_CALC_CONTEXT_GET -> Response Details.

4. Function: /QTYW/QAPI_CALC_CONTEXT_GET

4.1. Overview

QAPI_CALC_CONTEXT_GET allows you to obtain the details for the input / result parameters required to perform a calculation (using QAPI_CALCULATE) for a specified conversion group, during the initial configuration of your quantity calculation calls or after any change in a quantity calculation.

It is called by passing the name of the conversion group.

For each parameter returned, details are provided for the parameter type, default value/UoM (if applicable), and a list of valid UoM for the parameter (if applicable).

It is **strongly** recommended to call this function for each conversion group you wish to perform conversions for, as:

- Input and result parameters required can vary between conversion groups (products). If a required parameter is missing, a calculation will fail.
- Only the UoM permitted for a specific input or result parameter can be used. If an unsupported UoM is provided for a parameter, a calculation to fail.

Information regarding how to display each parameter is also returned, which is important for constructing a user interface for interaction with QAPI.

Generating Example XML

QAPI_CALC_CONTEXT_GET provides the data required to both perform a calculation **and** display a user interface for a calculation. How this works, along with the functionality of Function: /QTYW/QAPI_CALCULATE, must be understood to interact with QAPI.

To ensure confidence with your QAPI implementation, the "Explain by Scenario" program can be used to generate example calculation request XML for each conversion group the organization wishes to use with QAPI. See "Explain by Scenario" Program for more details.

4.2. Request Details

4.2.1. Structure

The structure to use is as follows:

Count	Item	Description
1 ... 1	**ns0:_-QTYW_-QAPI_CALC_CONTEXT_GET** xmlns:ns0="urn:sap-com:document:sap:rfc:functions"	**Wrapper defining function**
1 ... 1	**IS_CONTEXT_PARAMETERS**	**Container**
1 ... 1	CONVERSION_GROUP	Conversion group name

4.2.2. Per-field Details

Field
ns0:_-QTYW_-QAPI_CALC_CONTEXT_GET xmlns:ns0="urn:sap-com:document:sap:rfc:functions" Data type: Container Occurrence: 1 ... 1 Use: Defines the function to call (QTYW/QAPI_CALC_CONTEXT_GET) and contains all parameters. The "xmlns" property must be provided exactly as described for QAPI.
IS_CONTEXT_PARAMETERS Data type: Container Occurrence: 1 ... 1 Use: Contains the context parameter items.
CONVERSION_GROUP Data type: String Occurrence: 1 ... 1 Use: The conversion group name

4.2.3. XML Structure - XSD

Validating Using This XSD

Our QAPI_CALC_CONTEXT_GET request XML structure begins with a namespace of **ns0**, is not included in the XSD below.

If you wish to validate the XML request with the XSD below, please change the following in the XML from:

```
<ns0:-QTYW_-QAPI_CALC_CONTEXT_GET xmlns:ns0="urn:sap-
com:document:sap:rfc:functions">
...
</ns0:_z-QTYW_-QAPI_CALC_CONTEXT_GET>
```

To:

```
<_-QTYW_-QAPI_CALC_CONTEXT_GET xmlns="urn:sap-com:document:sap:rfc:functions">
...
</_-QTYW_-QAPI_CALC_CONTEXT_GET>
```

On review we have discovered that the ns0: prefix is not required in the QAPI_CALC_CONTEXT_GET request XML, so this can be omitted if required. This may be removed from a future version of this document.

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema attributeFormDefault="unqualified" elementFormDefault="qualified"
targetNamespace="urn:sap-com:document:sap:rfc:functions" xmlns:xs="http://www.w3.org/2001/XMLSchema">
  <xs:element name="_-QTYW_-QAPI_CALC_CONTEXT_GET">
    <xs:complexType>
      <xs:sequence>
        <xs:element name="IS_CONTEXT_PARAMETERS">
          <xs:complexType>
            <xs:sequence>
              <xs:element name="CONVERSION_GROUP" type="xs:string" />
            </xs:sequence>
          </xs:complexType>
        </xs:element>
      </xs:sequence>
    </xs:complexType>
  </xs:element>
</xs:schema>
```

4.2.4. XML Structure - Annotated

```
<?xml version="1.0" encoding="UTF-8"?>
<ns0:_-QTYW_-QAPI_CALC_CONTEXT_GET xmlns:ns0="urn:sap-com:document:sap:rfc:functions">
    <IS_CONTEXT_PARAMETERS>
        <IF_CONVERSION_GROUP>[Conversion Group Name]</IF_CONVERSION_GROUP>
    </IS_CONTEXT_PARAMETERS>
</ns0:_-QTYW_-QAPI_CALC_CONTEXT_GET>
```

4.3. Response Details

4.3.1. Structure

The structure received is as follows:

Count	Field	Description
1 ... 1	**rfc:_-QTYW_-QAPI_CALC_CONTEXT_GET** xmlns:rfc="urn:sap-com:document:sap:rfc:functions"	**Wrapper defining function**
1 ... 1	**ET_INPUT_PARAMETERS**	**Input parameter definitions**
0 ... Unbounded	**item**	
1 ... 1	MANDT	*Not relevant: ignore*
1 ... 1	RDGGRP	*Not relevant: ignore*
1 ... 1	PAR_NAME	BCS parameter name
1 ... 1	PAR_FLTP	Default floating point value
1 ... 1	PAR_CHAR	Varies
1 ... 1	UNIT_CHAR	Default SAP UoM name
1 ... 1	CHAR_FLAG	Parameter type determinator 1
1 ... 1	PAR_LENGTH	*Not relevant: ignore*
1 ... 1	ITEM	Parameter display order
1 ... 1	CONSTANT_COPY	*Not relevant: ignore*
1 ... 1	SCREEN_FLAG_DEF	*Not relevant: ignore*
1 ... 1	SCREEN_FLAG	Parameter type determinator 2
1 ... 1	FLOAT_CHAR	*Not relevant: ignore*
1 ... 1	SCREENGROUP	*Not relevant: ignore*
1 ... 1	DESC	Parameter on-screen description
1 ... 1	**ET_INP_PARAM_ALLOWED_UOM**	**Input param allowed UoMs list**
0 ... Unbounded	**item**	
1 ... 1	MANDT	*Not relevant: ignore*
1 ... 1	UMRSL	*Not relevant: ignore*
1 ... 1	PAR_NAME	BCS parameter name
1 ... 1	MSEHI	SAP UoM name
1 ... 1	MSEHT	SI unit
1 ... 1	MSEHL	Description
1 ... 1	DECAN	Decimal places for display
1 ... 1	**ET_RESULT_PARAMETERS**	**Result parameter definitions**
	[Same format as ET_INPUT_PARAMETERS]	
1 ... 1	**ET_RES_PARAM_ALLOWED_UOM**	**Result param allowed UoMs list**

	[Same format as ET_INP_PARAM_ALLOWED_UOM]	
1 ... 1	**ET_RETURN**	**Returned messages / errors**
0 ... Unbounded	**item**	
1 ... 1	TYPE	Message type (I, W, E, D)
1 ... 1	ID	*Not relevant: ignore*
1 ... 1	NUMBER	Message type number
1 ... 1	MESSAGE	Message
1 ... 1	LOG_NO	*Not relevant: ignore*
1 ... 1	LOG_MSG_NO	*Not relevant: ignore*
1 ... 1	MESSAGE_V1	First variable in MESSAGE
1 ... 1	MESSAGE_V2	Second variable in MESSAGE
1 ... 1	MESSAGE_V3	Third variable in MESSAGE
1 ... 1	MESSAGE_V4	Fourth variable in MESSAGE
1 ... 1	PARAMETER	*Not relevant: ignore*
1 ... 1	ROW	*Not relevant: ignore*
1 ... 1	FIELD	*Not relevant: ignore*
1 ... 1	SYSTEM	*Not relevant: ignore*

4.3.2. Per-field Details

Field
rfc:_-QTYW_-QAPI_CALC_CONTEXT_GET.Response xmlns:rfc="urn:sap-com:document:sap:rfc:functions" Data type: Container Occurrence: 1 ... 1 Use: Defines the function responding (QTYW/QAPI_CALC_CONTEXT_GET), and contains all parameters.
ET_INPUT_PARAMETERS Data type: Container Occurrence: 1 ... 1 Use: Contains a group of input parameter defintion items
Item Data type: Container Occurrence: 0 ... Unbounded Use: Contains a group of fields describing a single input parameter
MANDT Data type: String Occurrence: 1 ... 1 Use: Not relevant. Ignore.
RDGGRP

Data type:	String
Occurrence:	1 … 1
Use:	Not relevant. Ignore.

PAR_NAME

Data type:	String
Occurrence:	1 … 1
Use:	The BCS name for the parameter.

PAR_FLTP

Data type:	Float
Occurrence:	1 … 1
Use:	The floating point representation of the default value for this input parameter. NOTE: for parameters of type “UoM only” and “Checkbox”, this is 0.0.

PAR_CHAR

Data type:	String
Occurrence:	1 … 1
Use:	Content depends on the input parameter type (see Value, UoM, and “Selected” Fields)

Type	Field Contents
Value + UoM	A string representation of the default value in PAR_FLTP
UoM only	The default SAP UoM name
Value only	A string representation of the default value in PAR_FLTP
Checkbox	An indicator of whether the field should be selected by default: - X = selected - *Blank* = unselected

UNIT_CHAR

Data type:	String
Occurrence:	1 … 1
Use:	The default SAP UoM name. NOTE: for parameters of type “UoM only”, “Value only” and “Checkbox”, this is left blank. “UoM only” parameters store the SAP UoM name in the PAR_CHAR field (see Value, UoM, and “Selected” Fields)

CHAR_FLAG

Data type:	String
Occurrence:	1 … 1
Use:	A flag to indicate whether this is a “character only” field. Used in combination with SCREEN_FLAG to determine the parameter type, (see *Determining Parameter Configuration*).

PAR_LENGTH

Data type:	String
Occurrence:	1 ... 1
Use:	Not relevant. Ignore.

ITEM

Data type:	Integer
Occurrence:	1 ... 1
Use:	An integer suggesting the order in which this parameter should be displayed on a user interface.

CONSTANT_COPY

Data type:	String
Occurrence:	1 ... 1
Use:	Not relevant. Ignore.

SCREEN_FLAG_DEF

Data type:	String
Occurrence:	1 ... 1
Use:	A duplicate of the value in SCREEN_FLAG. Ignore.

SCREEN_FLAG

Data type:	Integer
Occurrence:	1 ... 1
Use:	An integer that is used in combination with CHAR_FLAG to determine the parameter type, (see *Determining Parameter Configuration*).

FLOAT_CHAR

Data type:	String
Occurrence:	1 ... 1
Use:	Not relevant. Ignore.

SCREENGROUP

Data type:	String
Occurrence:	1 ... 1
Use:	Not relevant. Ignore.

DESC

Data type:	String
Occurrence:	1 ... 1
Use:	The display name for the parameter, when shown on a user interface.

ET_INP_PARAM_ALLOWED_UOM

Data type:	Container
Occurrence:	1 ... 1
Use:	Contains a group of input parameter allowed UoM items.

Item

Data type:	Container

Occurrence:	0 ... Unbounded
Use:	Contains a group of fields describing an allowed UoM for an input parameter
MANDT	
Data type:	String
Occurrence:	1 ... 1
Use:	Not relevant. Ignore.
UMRSL	
Data type:	String
Occurrence:	1 ... 1
Use:	Not relevant. Ignore.
PAR_NAME	
Data type:	String
Occurrence:	1 ... 1
Use:	The BCS name for the parameter this UoM is for
MSEHI	
Data type:	String
Occurrence:	1 ... 1
Use:	The SAP UoM name of the UoM allowed for the parameter
MSEHT	
Data type:	String
Occurrence:	1 ... 1
Use:	The SI unit for the UoM allowed for the parameter
MSEHL	
Data type:	String
Occurrence:	1 ... 1
Use:	The description for the UoM allowed for the parameter
DECAN	
Data type:	String
Occurrence:	1 ... 1
Use:	The recommended decimal places to use for the UoM when displayed in the user interface
ET_RESULT_PARAMETERS	
Data type:	Container
Occurrence:	1 ...
Use:	Contains a group of result parameter definition items
Item	
Data type:	Container
Occurrence:	0 ... Unbounded
Use:	Contains a group of fields describing a single result parameter

Same field defintions as for ET_INPUT_PARAMETERS→item

NOTE: The PAR_FLTP field can be ignored for result parameters, as the value of a result parameter is calculated during a conversion and returned – it is not **provided** to the QAPI_CALCULATE.

ET_RES_PARAM_ALLOWED_UOM

Data type: Container
Occurrence: 1 ... 1
Use: Contains a group of result parameter allowed UoM items

Item

Data type: Container
Occurrence: 0 ... Unbounded
Use: Contains a group of fields describing an allowed UoM for a result parameter

Same field definitions as for ET_INP_PARAM_ALLOWED_UOM->item

ET_RETURN

Data type: Container
Occurrence: 1 ... 1
Use: Contains a group of message items.

Item

Data type: Container
Occurrence: 0 ... Unbounded
Use: Contains a group of fields describing a returned message from QAPI

TYPE

Data type: String
Occurrence: 1 ... 1
Use: The type of message:

Value	Message Type	Conversion Failed?
I	Information only	No
W	A warning	No
E	An error occurred	YES

ID

Data type: String
Occurrence: 1 ... 1
Use: Not relevant. Ignore.

NUMBER

Data type: String

Occurrence:	1 ... 1
Use:	The internal BCS number for the message.
MESSAGE	
Data type:	String
Occurrence:	1 ... 1
Use:	The message returned from BCS.
LOG_NO	
Data type:	String
Occurrence:	1 ... 1
Use:	Not relevant. Ignore.
LOG_MSG_NO	
Data type:	String
Occurrence:	1 ... 1
Use:	Not relevant. Ignore.
MESSAGE_V1	
Data type:	String
Occurrence:	1 ... 1
Use:	The first variable used in MESSAGE, if applicable. This could be the conversion group name if a conversion group isn't found, a unit name for quantity out-of-range errors on manually entered converted values, or a parameter name for parameter-based issues. Examples of messages are listed in
MESSAGE_V2	
Data type:	String
Occurrence:	1 ... 1
Use:	The second variable used in MESSAGE (similar to MESSAGE_V1), if applicable.
MESSAGE_V3	
Data type:	String
Occurrence:	1 ... 1
Use:	The third variable used in MESSAGE (similar to MESSAGE_V1), if applicable.
MESSAGE_V4	
Data type:	String
Occurrence:	1 ... 1
Use:	The fourth variable used in MESSAGE (similar to MESSAGE_V1), if applicable.
PARAMETER	
Data type:	String
Occurrence:	1 ... 1
Use:	Not relevant. Ignore.
ROW	
Data type:	String

Occurrence:	1 ... 1
Use:	Not relevant. Ignore.
FIELD	
Data type:	String
Occurrence:	1 ... 1
Use:	Not relevant. Ignore.
SYSTEM	
Data type:	String
Occurrence:	1 ... 1
Use:	Not relevant. Ignore.

4.3.3. XML Structure - XSD

Validating Using This XSD

Our QAPI_CALC_CONTEXT_GET response XML structure begins with a namespace of **rfc**, is not included in the XSD below.

If you wish to validate the XML response with the XSD below, please change the following in the XML from:

```
<rfc:_-QTYW_-QAPI_CALC_CONTEXT_GET.Response xmlns:rfc="urn:sap-
com:document:sap:rfc:functions">
...
</rfc:_-QTYW_-QAPI_CALC_CONTEXT_GET.Response>
```

To:

```
<_-QTYW_-QAPI_CALC_CONTEXT_GET.Response xmlns ="urn:sap-
com:document:sap:rfc:functions">
...
</_-QTYW_-QAPI_CALC_CONTEXT_GET.Response>
```

```
<?xml version="1.0" encoding="utf-8"?>
<xs:schema attributeFormDefault="unqualified" elementFormDefault="qualified"
targetNamespace="urn:sap-com:document:sap:rfc:functions" xmlns:xs="http://www.w3.org/2001/XMLSchema">
  <xs:element name="_-QTYW_-QAPI_CALC_CONTEXT_GET.Response">
    <xs:complexType>
      <xs:sequence>
        <xs:element name="ET_INPUT_PARAMETERS">
          <xs:complexType>
            <xs:sequence>
              <xs:element minOccurs="0" maxOccurs="unbounded" name="item">
```

```
            <xs:complexType>
              <xs:sequence>
                <xs:element name="MANDT" type="xs:string" />
                <xs:element name="RDGGRP" type="xs:string" />
                <xs:element name="PAR_NAME" type="xs:string" />
                <xs:element name="PAR_FLTP" type="xs:float" />
                <xs:element name="PAR_CHAR" type="xs:string" />
                <xs:element name="UNIT_CHAR" type="xs:string" />
                <xs:element name="CHAR_FLAG" type="xs:string" />
                <xs:element name="PAR_LENGTH" type="xs:string" />
                <xs:element name="ITEM" type="xs:string" />
                <xs:element name="CONSTANT_COPY" type="xs:string" />
                <xs:element name="SCREEN_FLAG_DEF" type="xs:string" />
                <xs:element name="SCREEN_FLAG" type="xs:decimal" />
                <xs:element name="FLOAT_CHAR" type="xs:string" />
                <xs:element name="SCREENGROUP" type="xs:string" />
                <xs:element name="DESCR" type="xs:string" />
              </xs:sequence>
            </xs:complexType>
          </xs:element>
        </xs:sequence>
      </xs:complexType>
    </xs:element>
    <xs:element name="ET_INP_PARAM_ALLOWED_UOM">
      <xs:complexType>
        <xs:sequence>
          <xs:element minOccurs="0" maxOccurs="unbounded" name="item">
            <xs:complexType>
              <xs:sequence>
                <xs:element name="MANDT" type="xs:string" />
                <xs:element name="UMRSL" type="xs:string" />
                <xs:element name="PAR_NAME" type="xs:string" />
                <xs:element name="MSEHI" type="xs:string" />
                <xs:element name="MSEHT" type="xs:string" />
                <xs:element name="MSEHL" type="xs:string" />
                <xs:element name="DECAN" type="xs:string" />
              </xs:sequence>
            </xs:complexType>
          </xs:element>
        </xs:sequence>
      </xs:complexType>
    </xs:element>
    <xs:element name="ET_RESULT_PARAMETERS">
      <xs:complexType>
        <xs:sequence>
          <xs:element minOccurs="0" maxOccurs="unbounded" name="item">
            <xs:complexType>
              <xs:sequence>
                <xs:element name="MANDT" type="xs:string" />
                <xs:element name="RDGGRP" type="xs:string" />
                <xs:element name="PAR_NAME" type="xs:string" />
                <xs:element name="PAR_FLTP" type="xs:float" />
                <xs:element name="PAR_CHAR" type="xs:string" />
                <xs:element name="UNIT_CHAR" type="xs:string" />
```

```
                <xs:element name="CHAR_FLAG" type="xs:string" />
                <xs:element name="PAR_LENGTH" type="xs:string" />
                <xs:element name="ITEM" type="xs:string" />
                <xs:element name="CONSTANT_COPY" type="xs:string" />
                <xs:element name="SCREEN_FLAG_DEF" type="xs:string" />
                <xs:element name="SCREEN_FLAG" type="xs:decimal" />
                <xs:element name="FLOAT_CHAR" type="xs:string" />
                <xs:element name="SCREENGROUP" type="xs:string" />
                <xs:element name="DESCR" type="xs:string" />
              </xs:sequence>
            </xs:complexType>
          </xs:element>
        </xs:sequence>
      </xs:complexType>
    </xs:element>
    <xs:element name="ET_RES_PARAM_ALLOWED_UOM">
      <xs:complexType>
        <xs:sequence>
          <xs:element minOccurs="0" maxOccurs="unbounded" name="item">
            <xs:complexType>
              <xs:sequence>
                <xs:element name="MANDT" />
                <xs:element name="UMRSL" type="xs:string" />
                <xs:element name="PAR_NAME" type="xs:string" />
                <xs:element name="MSEHI" type="xs:string" />
                <xs:element name="MSEHT" type="xs:string" />
                <xs:element name="MSEHL" type="xs:string" />
                <xs:element name="DECAN" type="xs:string" />
              </xs:sequence>
            </xs:complexType>
          </xs:element>
        </xs:sequence>
      </xs:complexType>
    </xs:element>
    <xs:element name="ET_RETURN">
      <xs:complexType>
        <xs:sequence>
          <xs:element minOccurs="0" maxOccurs="unbounded" name="item">
            <xs:complexType>
              <xs:sequence>
                <xs:element name="TYPE" type="xs:string" />
                <xs:element name="ID" type="xs:string" />
                <xs:element name="NUMBER" type="xs:string" />
                <xs:element name="MESSAGE" type="xs:string" />
                <xs:element name="LOG_NO" type="xs:string" />
                <xs:element name="LOG_MSG_NO" type="xs:string" />
                <xs:element name="MESSAGE_V1" type="xs:string" />
                <xs:element name="MESSAGE_V2" type="xs:string" />
                <xs:element name="MESSAGE_V3" type="xs:string" />
                <xs:element name="MESSAGE_V4" type="xs:string" />
                <xs:element name="PARAMETER" type="xs:string" />
                <xs:element name="ROW" type="xs:decimal" />
                <xs:element name="FIELD" type="xs:string" />
                <xs:element name="SYSTEM" type="xs:string" />
```

```
                </xs:sequence>
              </xs:complexType>
            </xs:element>
          </xs:sequence>
        </xs:complexType>
      </xs:element>
    </xs:sequence>
  </xs:complexType>
 </xs:element>
</xs:schema>
```

4.3.4. XML Structure - Annotated

```
<?xml version="1.0" encoding="UTF-8" standalone="no"?>
<rfc:_-QTYW_-QAPI_CALC_CONTEXT_GET.Response xmlns:rfc="urn:sap-com:document:sap:rfc:functions">
    <ET_INPUT_PARAMETERS>
        <item> <!-- One for each input parameter -->
            <MANDT>[Ignore]</MANDT>
            <RDGGRP>[Ignore]</RDGGRP>
            <PAR_NAME>[BCS Param Name]</PAR_NAME>
            <PAR_FLTP>[Value]</PAR_FLTP>
            <PAR_CHAR>[Value/UoM/Selected Indicator]</PAR_CHAR>
            <UNIT_CHAR>[UoM]</UNIT_CHAR>
            <CHAR_FLAG>[Field Type Indicator 1]</CHAR_FLAG>
            <PAR_LENGTH>[Ignore]</PAR_LENGTH>
            <ITEM>[Display Order]</ITEM>
            <CONSTANT_COPY>[Ignore]</CONSTANT_COPY>
            <SCREEN_FLAG_DEF>[Ignore]</SCREEN_FLAG_DEF>
            <SCREEN_FLAG>[Field Type Indicator 2]</SCREEN_FLAG>
            <FLOAT_CHAR>1</FLOAT_CHAR>
            <SCREENGROUP>[Ignore]</SCREENGROUP>
            <DESCR>[Description]</DESCR>
        </item>
    </ET_INPUT_PARAMETERS>
    <ET_INP_PARAM_ALLOWED_UOM>
        <item> <!-- One for each input parameter allowed UoM -->
            <MANDT/>
            <UMRSL>[Ignore]</UMRSL>
            <PAR_NAME>[BCS Param Name]</PAR_NAME>
            <MSEHI>[UoM]</MSEHI>
            <MSEHT>[SI unit]</MSEHT>
            <MSEHL>[Description]</MSEHL>
            <DECAN>[Decimal places]</DECAN>
        </item>
    </ET_INP_PARAM_ALLOWED_UOM>
    <ET_RESULT_PARAMETERS>
        <item> <!-- One for each result parameter -->
            <MANDT>[Ignore]</MANDT>
            <RDGGRP>[Ignore]</RDGGRP>
            <PAR_NAME>[BCS Param Name]</PAR_NAME>
            <PAR_FLTP>[Ignore]</PAR_FLTP>
            <PAR_CHAR>[Value/UoM/Selected Indicator]</PAR_CHAR>
```

```
            <UNIT_CHAR>[UoM]</UNIT_CHAR>
            <CHAR_FLAG>[Field Type Indicator 1]</CHAR_FLAG>
            <PAR_LENGTH>[Ignore]</PAR_LENGTH>
            <ITEM>[Display Order]</ITEM>
            <CONSTANT_COPY>[Ignore]</CONSTANT_COPY>
            <SCREEN_FLAG_DEF>[Ignore]</SCREEN_FLAG_DEF>
            <SCREEN_FLAG>[Field Type Indicator 2]</SCREEN_FLAG>
            <FLOAT_CHAR>1</FLOAT_CHAR>
            <SCREENGROUP>[Ignore]</SCREENGROUP>
            <DESCR>[Description]</DESCR>
        </item>
    </ET_RESULT_PARAMETERS>
    <ET_RES_PARAM_ALLOWED_UOM>
        <item> <!-- One for each result parameter allowed UoM -->
            <MANDT/>
            <UMRSL>[Ignore]</UMRSL>
            <PAR_NAME>[BCS Param Name]</PAR_NAME>
            <MSEHI>[UoM]</MSEHI>
            <MSEHT>[SI unit]</MSEHT>
            <MSEHL>[Description]</MSEHL>
            <DECAN>[Decimal places]</DECAN>
        </item>
    </ET_RES_PARAM_ALLOWED_UOM>
    <ET_RETURN>
        <item> <!-- One for each returned message -->
            <TYPE>I</TYPE>
            <ID>[Ignore]</ID>
            <NUMBER>[BCS internal message number]</NUMBER>
            <MESSAGE>[Message] </MESSAGE>
            <LOG_NO>[Ignore]</LOG_NO>
            <LOG_MSG_NO>[Ignore]</LOG_MSG_NO>
            <MESSAGE_V1>[Message variable 1]</MESSAGE_V1>
            <MESSAGE_V2>[Message variable 2]</MESSAGE_V2>
            <MESSAGE_V3>[Message variable 3]</MESSAGE_V3>
            <MESSAGE_V4>[Message variable 4]</MESSAGE_V4>
            <PARAMETER>[Ignore]</PARAMETER>
            <ROW>[Ignore]</ROW>
            <FIELD>[Ignore]</FIELD>
            <SYSTEM>[Ignore]</SYSTEM>
        </item>
    </ET_RETURN>
</rfc:_-QTYW_-QAPI_CALC_CONTEXT_GET.Response>
```

4.4. Parameter Configuration

Each parameter's configuration is defined in the data received from QAPI_CALC_CONTEXT_GET.

Described below is how the configuration data is parsed to determine parameter type, which fields to use for display and calculation, and which UoMs are permitted.

4.4.1. Parameter Type

Parameter type is defined using the SCREEN_FLAG and CHAR_FLAG fields.

Determining parameter type differs slightly between input and result parameters, namely as the value of SCREEN_FLAG is either 1 or 3 for input, 2 or 4 for result.

Input parameters (in ET_INPUT_PARAMETERS):

SCREEN_FLAG	CHAR_FLAG	Type
1		Value + UoM
1	**X**	UoM only
3		Value only
3	**X**	Checkbox

Result parameters (in ET_RESULT_PARAMETERS):

SCREEN_FLAG	CHAR_FLAG	Type
2		Value + UoM
2	**X**	UoM only
4		Value only
4	**X**	Checkbox

4.4.2. Value, UoM, and "Selected" Fields

The fields used for the default parameter value, default SAP UoM and/or parameter selected status vary based on parameter type.

The table below describes which field contains the appropriate value:

Type	UoM field	Value Field	Selected Field	Notes

Value + UoM	UNIT_CHAR	PAR_FLTP	--	--
UoM only	PAR_CHAR		--	--
Value only	--	PAR_FLTP	--	--
Checkbox	--		PAR_CHAR	If PAR_CHAR contains "X", the checkbox is selected. If blank, it is not selected.

Be careful with the UoM Field!

As described above, the SAP UoM name **is not always returned in the UNIT_CHAR field**. For UoM only fields, it's returned in PAR_CHAR.

This is for technical design reasons within BCS.

4.4.3. Allowed UoM

For Value+UoM and UoM Only parameters, a set of allowed UoM is defined in the ET_INP_PARAM_ALLOWED_UOM and ET_RES_PARAM_ALLOWED_UOM containers.

Each of these containers contains a full list of allowed UoMs across all relevant input / result parameters.

You need to match each allowed UoM to a parameter using the PAR_NAME field of the allowed UoM and the PAR_NAME field of the parameter.

The allowed UoM list provides two functions:

- To provide the entire list of UoMs permitted for the parameter
- To provide display details of each of the UoM – specifically the SI unit and unit description

For the latter, this information is provided to aid with displaying the UoM on any on-screen form input fields, and when displaying the input/result parameters returned from a conversion.

4.4.4. Parameter Examples

4.4.4.1. Value + UoM Parameter

ET_INPUT_PARAMETERS item:

```
        <item>
            <MANDT>030</MANDT>
            <RDGGRP>Q130</RDGGRP>
            <PAR_NAME>BSWCN</PAR_NAME>              <!-- BCS parameter name -->
            <PAR_FLTP>1.0</PAR_FLTP>                <!-- Default floating point val -->
            <PAR_CHAR>1,00000000</PAR_CHAR>
            <UNIT_CHAR>V%</UNIT_CHAR>               <!-- Default SAP UoM -->
            <CHAR_FLAG/>                            <!-- Field type indicator 1 -->
            <PAR_LENGTH>00</PAR_LENGTH>
            <ITEM>006</ITEM>                        <!-- Display order -->
            <CONSTANT_COPY/>
            <SCREEN_FLAG_DEF>1</SCREEN_FLAG_DEF>
            <SCREEN_FLAG>1</SCREEN_FLAG>            <!-- Field type indicator 2 -->
            <FLOAT_CHAR>1</FLOAT_CHAR>
            <SCREENGROUP/>
            <DESCR>Sediment &amp;amp; water %</DESCR>   <!-- Description -->
        </item>
```

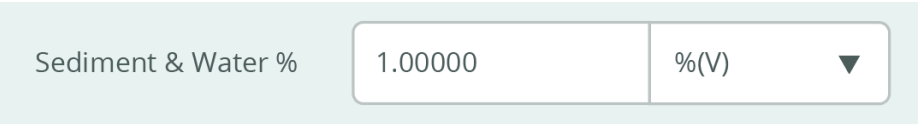
ET_INP_PARAM_ALLOWED_UOM item:

```
        <item>
            <MANDT/>
            <UMRSL>Q154</UMRSL>
            <PAR_NAME>BSWCN</PAR_NAME>              <!-- Parameter name -->
            <MSEHI>V%</MSEHI>                       <!-- SAP UoM -->
            <MSEHT>%(V)</MSEHT>                     <!-- SI unit -->
            <MSEHL>percent (volume)</MSEHL>         <!-- Description -->
            <DECAN>5</DECAN>                        <!-- Decimal places -->
        </item>
```

Extracted key data:

Field	Data	Notes
BCS Parameter Name	**BSWCN**	
Description (for display)	**Sediment & water %**	
Field Type	**Value + UoM**	SCREEN_FLAG = 1, CHAR_FLAG = [blank]
Default value	**1.0**	
Default UoM	**V%**	
Default UoM SI Unit	**%(V)**	From ET_INPUT_PARAM_ALLOWED_UOM
Default UoM decimal places	**5**	From ET_INPUT_PARAM_ALLOWED_UOM

Display example:



4.4.4.2. UoM Only Parameter

ET_INPUT_PARAMETERS XML:

```
<item>
    <MANDT>030</MANDT>
    <RDGGRP>Q130</RDGGRP>
    <PAR_NAME>/QTYW/DCFT</PAR_NAME>          <!-- BCS parameter name -->
    <PAR_FLTP>0.0</PAR_FLTP>
    <PAR_CHAR>CEL</PAR_CHAR>                 <!-- Default SAP UoM -->
    <UNIT_CHAR/>
    <CHAR_FLAG>X</CHAR_FLAG>                 <!-- Field type indicator 1 -->
    <PAR_LENGTH>00</PAR_LENGTH>
    <ITEM>005</ITEM>                         <!-- Display order -->
    <CONSTANT_COPY/>
    <SCREEN_FLAG_DEF>1</SCREEN_FLAG_DEF>
    <SCREEN_FLAG>1</SCREEN_FLAG>             <!-- Field type indicator 2 -->
    <FLOAT_CHAR>2</FLOAT_CHAR>
    <SCREENGROUP/>
    <DESCR>DCF temperature unit</DESCR>      <!-- Description -->
</item>
```

ET_INP_PARAM_ALLOWED_UOM item:

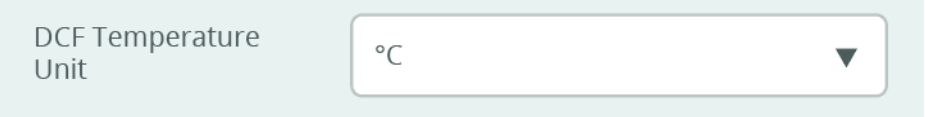
```
<item>
    <MANDT/>
    <UMRSL>Q154</UMRSL>
    <PAR_NAME>/QTYW/DCFT</PAR_NAME>          <!-- Parameter name -->
    <MSEHI>CEL</MSEHI>                       <!-- SAP UoM -->
    <MSEHT>°C</MSEHT>                        <!-- SI unit -->
    <MSEHL>degree Celcius</MSEHL>            <!-- Description -->
    <DECAN>2</DECAN>
</item>
```

Extracted key data:

Field	Data	Notes
BCS Parameter Name	**/QTYW/DCFT**	
Description (for display)	**DCF temperature unit**	
Field Type	**UoM only**	SCREEN_FLAG = 1, CHAR_FLAG = X
Default UoM	**CEL**	

Default UoM SI Unit	**°C**	From ET_INPUT_PARAM_ALLOWED_UOM

Display example:



4.4.4.3. Value Only Parameter

ET_INPUT_PARAMETERS item:

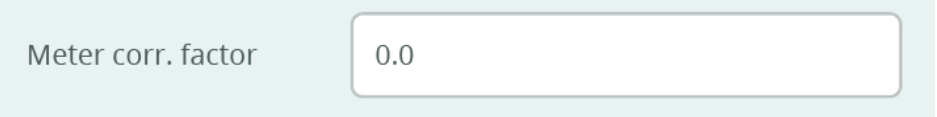
```
<item>
    <MANDT>030</MANDT>
    <RDGGRP>Q130</RDGGRP>
    <PAR_NAME>METCORFAC</PAR_NAME>          <!-- BCS parameter name -->
    <PAR_FLTP>0.0</PAR_FLTP>                <!-- Default floating point val -->
    <PAR_CHAR>0,00000000</PAR_CHAR>
    <UNIT_CHAR/>
    <CHAR_FLAG/>                            <!-- Field type indicator 1 -->
    <PAR_LENGTH>00</PAR_LENGTH>
    <ITEM>007</ITEM>                        <!-- Display order -->
    <CONSTANT_COPY/>
    <SCREEN_FLAG_DEF>3</SCREEN_FLAG_DEF>
    <SCREEN_FLAG>3</SCREEN_FLAG>            <!-- Field type indicator 2 -->
    <FLOAT_CHAR>1</FLOAT_CHAR>
    <SCREENGROUP/>
    <DESCR>Meter corr. factor</DESCR>       <!-- Description -->
</item>
```

ET_INP_PARAM_ALLOWED_UOM item: Not applicable – the parameter has no unit.

Extracted key data:

Field	Data	Notes
BCS Parameter Name	**METCORFAC**	
Description (for display)	**Meter corr. factor**	
Field Type	**Value only**	SCREEN_FLAG = 3, CHAR_FLAG = [blank]
Default value	**0.0**	

Display example:



4.4.4.4. Checkbox Parameter

ET_INPUT_PARAMETERS item:

```
<item>
    <MANDT>030</MANDT>
    <RDGGRP>Q130</RDGGRP>
    <PAR_NAME>HYDROCORR</PAR_NAME>          <!-- BCS parameter name -->
    <PAR_FLTP>0.0</PAR_FLTP>
    <PAR_CHAR>X</PAR_CHAR>                  <!-- "Selected" indicator -->
    <UNIT_CHAR/>
    <CHAR_FLAG>X</CHAR_FLAG>                <!-- Field type indicator 1 -->
    <PAR_LENGTH>00</PAR_LENGTH>
    <ITEM>004</ITEM>                        <!-- Display order -->
    <CONSTANT_COPY/>
    <SCREEN_FLAG_DEF>3</SCREEN_FLAG_DEF>
    <SCREEN_FLAG>3</SCREEN_FLAG>            <!-- Field type indicator 2 -->
    <FLOAT_CHAR>2</FLOAT_CHAR>
    <SCREENGROUP/>
    <DESCR>Hydrometer corr. indicator</DESCR>       <!-- Description -->
</item>
```

ET_INP_PARAM_ALLOWED_UOM item: Not applicable – the parameter has no unit.

Extracted key data:

Field	Data	Notes
BCS Parameter Name	**HYDROCORR**	
Description (for display)	**Hyrometer corr. indicator**	
Field Type	**Checkbox**	SCREEN_FLAG = 3, CHAR_FLAG = X
Selected	**Yes**	PAR_CHAR = X

Display example:

Hydrometer correction indicator ☑ Selected

4.4.5. Sending to QAPI_CALCULATE

Only a subset of parameter fields provided by QAPI_CALC_CONTEXT_GET are required to be sent to QAPI_CALCULATE. Fields describing non-relevant information are not required, for example on-screen display or available UoM for selection.

The parameter fields required are described in the *QAPI_CALCULATE* section of this document.

4.5. Error Handling

Should any errors occur in obtaining the calculation context within BCS, details of the errors are returned within the ET_RETURN container as messages with a type of “E” or “W”.

If any message with a type of “E” or “W” has been returned, the request to obtain conversion group context has failed.

BTP Errors

Errors can occur prior to connecting to the QAPI / BCS backend but are out of the scope of this document.

4.5.1. XML Example

An example error message returned from QAPI in the ET_RETURN container is shown below:

```
<item>
    <TYPE>E</TYPE>
    <ID>/QTYW/QCI</ID>
    <NUMBER>024</NUMBER>
    <MESSAGE>Conversion group PAT is not defined in customizing</MESSAGE>
    <LOG_NO/>
    <LOG_MSG_NO>000000</LOG_MSG_NO>
    <MESSAGE_V1>PAT</MESSAGE_V1>
    <MESSAGE_V2/>
    <MESSAGE_V3/>
    <MESSAGE_V4/>
    <PARAMETER/>
    <ROW>0</ROW>
    <FIELD/>
    <SYSTEM>SOICLNT030</SYSTEM>
</item>
```

4.5.2. Error List

The errors that can occur for QAPI_CALC_CONTEXT_GET are described below:

TYPE	NUMBER	MESSAGE
E	024	Conversion group [CONV_GROUP] is not defined in customizing
W	261	Enter conversion group and language

4.5.3. Error Details

NOTE: Only the relevant returned fields are listed in each returned error below.

4.5.3.1. E024 - Conversion Group Not Found

Returned when: the specified conversion group doesn't exist within the client on the QAPI SAP system.

Field	Content
TYPE	**E**
NUMBER	**024**
MESSAGE	**Conversion group [CONV_GROUP] is not defined in customizing**
MESSAGE_V1	**[CONV_GROUP]**

4.5.3.2. W261 - Conversion Group Not Specified in Request

Returned when: no conversion group is specified.

Field	Content
TYPE	**W**
NUMBER	**261**
MESSAGE	**Enter conversion group and language**

5. Function: /QTYW/QAPI_CALCULATE

5.1. Overview

This function allows you to perform a quantity conversion calculation for a conversion group.

Using this function requires the following information:

- Conversion group name
- Input quantity amount + UoM
- Quantity UoMs to convert to
- Configured input and result parameters

Batch calculations are supported, where multiple calculations can be provided via a single request.

The input and result parameters provided must match those returned by the QAPI_CALC_CONTEXT_GET function, as these can vary between conversion groups (products).

Generating Example XML

This section of the document describes the XML required to be sent to QAPI_CALCULATE, with supporting information on batch processing, returned data, error handling etc. This must be understood in order to interact with QAPI.

To ensure confidence with your QAPI implementation, the "Explain by Scenario" program can be used to generate example calculation request XML for each conversion group the organization wishes to use with QAPI. See "Explain by Scenario" Program for more details.

5.2. Request Details

5.2.1. Structure

The structure to send is as follows:

Count	Field	Description
1 ... 1	**ns0:_-QTYW_-QAPI_CALCULATE** xmlns:ns0="urn:sap-com:document:sap:rfc:functions"	**Wrapper defining function**
1 ... 1	**IT_CALC_PARAMETERS**	**Calculation parameters**
1 ... Unbounded	**item**	
0 ... 1	HANDLE	Batch handle (optional)
1 ... 1	CONVERSION_GROUP	Conversion group name
1 ... 1	TRANSACTION_QTY	Floating point quantity amount
1 ... 1	TRANSACTION_QTY_UOM	Quantity SAP UoM name
1 ... 1	**CT_QUANTITY_VALUES**	**Quantities to convert**
1 ... Unbounded	**item**	
0 ... 1	HANDLE	Batch handle (optional)
1 ... 1	MSEHI	SAP UoM to convert to
0 ... 1	ADQNT	Converted quantity override (optional)
1 ... 1	**IT_INPUT_PARAMETERS**	**Input parameters**
0 ... Unbounded	**item**	
0 ... 1	HANDLE	Batch handle (optional)
1 ... 1	PAR_NAME	BCS parameter name
0 ... 1	PAR_FLTP	Floating point value
0 ... 1	PAR_CHAR	Checkbox indicator / SAP UoM name
0 ... 1	UNIT_CHAR	SAP UoM name
0 ... 1	CHAR_FLAG	Checkbox / UoM-only flag
1 ... 1	**CT_RESULT_PARAMETERS**	**Result parameters**
0 ... Unbounded	**item**	
0 ... 1	HANDLE	Batch handle (optional)
1 ... 1	PAR_NAME	BCS parameter name
0 ... 1	PAR_CHAR	SAP UoM name
0 ... 1	UNIT_CHAR	SAP UoM name

5.2.2. Per-field Details

Field
ns0:_-QTYW_-QAPI_CALCULATE xmlns:ns0="urn:sap-com:document:sap:rfc:functions" Data type: Container Occurrence: 1 … 1 Use: Defines the function to run (QTYW/QAPI_CALCULATE), and contains all parameters. The "xmlns" property must be provided exactly as described for QAPI.
IT_CALC_PARAMETERS Data type: Container Occurrence: 1 … 1 Use: Contains a group of calculation parameter items.
item Data type: Container Occurrence: 1 … Unbounded (1 … 1 per calculation) Use: Contains a group of fields describing the parameters for a calculation.
HANDLE Data type: String Length: 1 – 32 characters Occurrence: 0 … 1 Use: When performing calculations in bulk, enter a "handle" for the specific calculation this field set relates to. This could be a simple incrementing index (e.g. 001), or could refer to a business document title (e.g. UPSTREAM-DOC-00200001), as required by your business processes. For more details see Batch Processing. When performing a single calculation only, this field can be left blank.
CONVERSION_GROUP Data type: String Occurrence: 1 … 1 Use: The name of the conversion group to perform the calculation against.
TRANSACTION_QTY Data type: Float Occurrence: 1 … 1 Use: The quantity amount to convert from, as a floating point value.
TRANSACTION_QTY_UOM Data type: String Occurrence: 1 … 1 Use: The quantity UoM to convert from, as a SAP UoM name.
CT__QUANTITY_VALUES

Data type:	Container
Occurrence:	1 … 1
Use:	Contains a group of quantity value items for a calculation.
item	
Data type:	Container
Occurrence:	1 … Unbounded (1 … 1 per calculation)
Use:	Contains a group of fields describing UoM to convert to for a calculation.
HANDLE	
Data type:	String
Length:	1 – 32 characters
Occurrence:	0 … 1
Use:	As per IT_CALC_PARAMETERS→item→HANDLE.
MSEHI	
Data type:	String
Occurrence:	1 … 1
Use:	The UoM to convert to, as a SAP UoM name.
ADQNT	
Data type:	Float
Occurrence:	0 … 1
Use:	A pre-converted quantity value, which will override any conversion QAPI would perform for this quantity. The pre-converted value must be within a tolerated range of the value converted by QAPI – if not, an error message will be returned and the calculation will fail.
IT_INPUT_PARAMETERS	
Data type:	Container
Occurrence:	1 … 1
Use:	Contains a group of input parameter items for a calculation.
Item	
Data type:	Container
Occurrence:	0 … Unbounded
Use:	Contains a group of fields describing a single input parameter for a calculation.
HANDLE	
Data type:	String
Length:	1 – 32 characters
Occurrence:	0 … 1
Use:	As per IT_CALC_PARAMETERS→item→HANDLE.
PAR_NAME	
Data type:	String

Occurrence: 1 ... 1

Use: The BCS name for the parameter.

PAR_FLTP

Data type: Float

Occurrence: 1 ... 1 – Value+UoM parameter + Value Only parameter

0 ... 0 – UoM Only parameter + Checkbox parameter

Use: The floating point representation of the value for this input parameter.

PAR_CHAR

Data type: String

Occurrence: 1 ... 1 – UoM Only parameter + Checkbox parameter

0 ... 0 – Value+UoM parameter + Value Only parameter

Use: Content depends on the input parameter type (see Value, UoM, and "Selected" Fields):

Type	Field Contents
UoM only	The selected SAP UoM name for the input parameter
Checkbox	An indicator of whether the field is selected: - X = selected - *Blank* = unselected

UNIT_CHAR

Data type: String

Occurrence: 1 ... 1 – Value+UoM parameter + UoM Only parameter

0 ... 0 – Value Only parameter + Checkbox parameter

Use: The selected SAP UoM name for the input parameter (see Value, UoM, and "Selected" Fields)

CT_RESULT_PARAMETERS

Data type: Container

Occurrence: 1 ... 1

Use: Contains a group of result parameter items for a calculation.

Item

Data type: Container

Occurrence: 0 ... Unbounded

Use: Contains a group of fields describing a single result parameter for a calculation. Result parameters, when **sent** for conversion, don't support sending a value, so PAR_FLTP is not sent.

HANDLE

Data type: String

Length: 1 – 32 characters

Occurrence: 0 ... 1

	Use:	As per IT_CALC_PARAMETERS→item→HANDLE.
	PAR_NAME	
	Data type:	String
	Occurrence:	1 ... 1
	Use:	The BCS name for the parameter.
	PAR_CHAR	
	Data type:	String
	Occurrence:	1 ... 1 – UoM Only parameter
		0 ... 0 – Value+UoM parameter + UoM Only parameter + Checkbox parameter
	Use:	The selected SAP UoM name for the input parameter.
	UNIT_CHAR	
	Data type:	String
	Occurrence:	1 ... 1 – Value+UoM parameter + UoM Only parameter
		0 ... 0 – UoM Only parameter + Checkbox parameter
	Use:	The selected SAP UoM name for the input parameter.

5.2.3. XML Structure - XSD

Validating Using This XSD

Our QAPI_CALCULATE request XML structure begins with a namespace of **ns0**, is not included in the XSD below.

```
<ns0:_-QTYW_-QAPI_CALCULATE xmlns:ns0="urn:sap-com:document:sap:rfc:functions">
...
</ns0:_-QTYW_-QAPI_CALCULATE>
```

To:

```
<_-QTYW_-QAPI_CALCULATE xmlns="urn:sap-com:document:sap:rfc:functions">
...
</_-QTYW_-QAPI_CALCULATE>
```

On review we have discovered that the ns0: prefix is not required in the QAPI_CALCULATE request XML, so this can be omitted if required. This may be removed from a future version of this document, and the *Explain By Scenario* program updated to remove ns0: from its generated XML.

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema attributeFormDefault="unqualified" elementFormDefault="qualified"
targetNamespace="urn:sap-com:document:sap:rfc:functions" xmlns:xs="http://www.w3.org/2001/XMLSchema">
```

```
<xs:element name="_-QTYW_-QAPI_CALCULATE">
  <xs:complexType>
    <xs:sequence>
      <xs:element name="IT_CALC_PARAMETERS">
        <xs:complexType>
          <xs:sequence>
            <xs:element maxOccurs="unbounded" name="item">
              <xs:complexType>
                <xs:sequence>
                  <xs:element minOccurs="0" name="HANDLE" type="xs:string" />
                  <xs:element name="CONVERSION_GROUP" type="xs:string" />
                  <xs:element name="TRANSACTION_QTY" type="xs:float" />
                  <xs:element name="TRANSACTION_QTY_UOM" type="xs:string" />
                </xs:sequence>
              </xs:complexType>
            </xs:element>
          </xs:sequence>
        </xs:complexType>
      </xs:element>
      <xs:element name="CT_QUANTITY_VALUES">
        <xs:complexType>
          <xs:sequence>
            <xs:element maxOccurs="unbounded" name="item">
              <xs:complexType>
                <xs:sequence>
                  <xs:element minOccurs="0" name="HANDLE" type="xs:string" />
                  <xs:element name="MSEHI" type="xs:string" />
                  <xs:element minOccurs="0" name="ADQNT" type="xs:string" />
                </xs:sequence>
              </xs:complexType>
            </xs:element>
          </xs:sequence>
        </xs:complexType>
      </xs:element>
      <xs:element name="IT_INPUT_PARAMETERS">
        <xs:complexType>
          <xs:sequence>
            <xs:element minOccurs="0" maxOccurs="unbounded" name="item">
              <xs:complexType>
                <xs:sequence>
                  <xs:element minOccurs="0" name="HANDLE" type="xs:string" />
                  <xs:element name="PAR_NAME" type="xs:string" />
                  <xs:element minOccurs="0" name="PAR_FLTP" type="xs:float" />
                  <xs:element minOccurs="0" name="PAR_CHAR" type="xs:string" />
                  <xs:element minOccurs="0" name="UNIT_CHAR" type="xs:string" />
                  <xs:element minOccurs="0" name="CHAR_FLAG" type="xs:string" />
                </xs:sequence>
              </xs:complexType>
            </xs:element>
          </xs:sequence>
        </xs:complexType>
      </xs:element>
      <xs:element name="CT_RESULT_PARAMETERS">
        <xs:complexType>
```

```
            <xs:sequence>
              <xs:element minOccurs="0" maxOccurs="unbounded" name="item">
                <xs:complexType>
                  <xs:sequence>
                    <xs:element minOccurs="0" name="HANDLE" type="xs:string" />
                    <xs:element name="PAR_NAME" type="xs:string" />
                    <xs:element minOccurs="0" name="PAR_CHAR" type="xs:string" />
                    <xs:element minOccurs="0" name="UNIT_CHAR" type="xs:string" />
                  </xs:sequence>
                </xs:complexType>
              </xs:element>
            </xs:sequence>
          </xs:complexType>
        </xs:element>
      </xs:sequence>
    </xs:complexType>
  </xs:element>
</xs:schema>
```

5.2.4. XML Structure - Annotated

```
<?xml version="1.0" encoding="UTF-8"?>
<ns0:_-QTYW_-QAPI_CALCULATE xmlns:ns0="urn:sap-com:document:sap:rfc:functions">
    <IT_CALC_PARAMETERS>
        <item> <!-- One for each calculation -->
            <HANDLE>[Calculation Handle]</HANDLE>
            <CONVERSION_GROUP>[Conversion Group Name]</CONVERSION_GROUP>
            <TRANSACTION_QTY>[Transaction Quantity Amount]</TRANSACTION_QTY>
            <TRANSACTION_QTY_UOM>[Transaction Quantity UoM]</TRANSACTION_QTY_UOM>
        </item>
    </IT_CALC_PARAMETERS>
    <CT_QUANTITY_VALUES>
        <item> <!-- One for each UoM to convert to, for each calculation -->
            <HANDLE>[Calculation Handle]</HANDLE>
            <MSEHI>[UoM]</MSEHI>
        </item>
    </CT_QUANTITY_VALUES>
    <IT_INPUT_PARAMETERS>
        <item> <!-- One for each Value+UoM input parameter, for each calculation -->
            <HANDLE>[Calculation Handle]</HANDLE>
            <PAR_NAME>[BCS Parameter Name]</PAR_NAME>
            <PAR_FLTP>[Value]</PAR_FLTP>
            <UNIT_CHAR>[UoM]</UNIT_CHAR>
        </item>
        <item> <!-- One for each Unit-Only input parameter, for each calculation -->
            <HANDLE>[Calculation Handle]</HANDLE>
            <PAR_NAME>[BCS Parameter Name]</PAR_NAME>
            <PAR_CHAR>[UoM]</PAR_CHAR>
            <CHAR_FLAG>X</CHAR_FLAG>
        </item>
        <item> <!-- One for each Value-Only input parameter, for each calculation -->
            <HANDLE>[Calculation Handle]</HANDLE>
            <PAR_NAME>[BCS Parameter Name]</PAR_NAME>
```

```
            <PAR_FLTP>[Value]</PAR_FLTP>
        </item>
        <item> <!-- One for each Checkbox input parameter, for each calculation -->
            <HANDLE>[Calculation Handle]</HANDLE>
            <PAR_NAME>[BCS Parameter Name]</PAR_NAME>
            <PAR_CHAR>[Selected indicator (X = Selected, blank = Not selected)]</PAR_CHAR>
            <CHAR_FLAG>X</CHAR_FLAG>
        </item>
    </IT_INPUT_PARAMETERS>
    <CT_RESULT_PARAMETERS>
        <item> <!-- One for each Value+UoM result parameter, for each calculation -->
            <HANDLE>[Calculation Handle]</HANDLE>
            <PAR_NAME>[BCS Parameter Name]</PAR_NAME>
            <UNIT_CHAR>[UoM]</UNIT_CHAR>
        </item>
        <item> <!-- One for each Unit-Only result parameter, for each calculation -->
            <HANDLE>[Calculation Handle]</HANDLE>
            <PAR_NAME>[BCS Parameter Name]</PAR_NAME>
            <PAR_CHAR>[UoM]</PAR_CHAR>
            <CHAR_FLAG>X</CHAR_FLAG>
        </item>
        <item> <!-- One for each Value-Only result parameter, for each calculation -->
            <HANDLE>[Calculation Handle]</HANDLE>
            <PAR_NAME>[BCS Parameter Name]</PAR_NAME>
        </item>
        <item> <!-- One for each Checkbox result parameter, for each calculation -->
            <HANDLE>[Calculation Handle]</HANDLE>
            <PAR_NAME>[BCS Parameter Name]</PAR_NAME>
            <CHAR_FLAG>X</CHAR_FLAG>
        </item>
    </CT_RESULT_PARAMETERS>
</ns0:_-QTYW_-QAPI_CALCULATE>
```

5.3. Response Technical Details

5.3.1. Structure

The structure received is as follows:

Count	Field	Description
1 ... 1	**rfc:_-QTYW_-QAPI_CALCULATE.Response** xmlns:rfc="urn:sap-com:document:sap:rfc:functions"	**Wrapper defining function**
1 ... 1	**CT_QUANTITY_VALUES**	**Converted quantity values**
1 ... Unbounded	**item**	
1 ... 1	HANDLE	Batch handle
1 ... 1	MSEHI	SAP UoM to convert to
1 ... 1	ADQNT	Floating point converted quantity amount
1 ... 1	ADQNTP	String representation of converted quantity amount
1 ... 1	MANEN	"Manual override" flag
1 ... 1	**CT_RESULT_PARAMETERS**	**Result parameters (with values)**
0 ... Unbounded	**item**	
1 ... 1	HANDLE	Batch handle
1 ... 1	PAR_NAME	BCS parameter name
1 ... 1	PAR_FLTP	Floating point value
1 ... 1	PAR_CHAR	Checkbox indicator / SAP UoM name
1 ... 1	UNIT_CHAR	SAP UoM name
1 ... 1	CHAR_FLAG	*Not relevant: ignore*
1 ... 1	**ET_RETURN**	**Messages / Errors**
0 ... Unbounded	**item**	
1 ... 1	HANDLE	Batch handle
1 ... 1	TYPE	Message type (I, W, E, D)
1 ... 1	ID	*Not relevant: ignore*
1 ... 1	NUMBER	Message type number
1 ... 1	MESSAGE	Message
1 ... 1	LOG_NO	*Not relevant: ignore*
1 ... 1	LOG_MSG_NO	*Not relevant: ignore*
1 ... 1	MESSAGE_V1	First variable in MESSAGE
1 ... 1	MESSAGE_V2	Second variable in MESSAGE

1 ... 1	MESSAGE_V3	Third variable in MESSAGE
1 ... 1	MESSAGE_V4	Fourth variable in MESSAGE
1 ... 1	PARAMETER	*Not relevant: ignore*
1 ... 1	ROW	*Not relevant: ignore*
1 ... 1	FIELD	*Not relevant: ignore*
1 ... 1	SYSTEM	*Not relevant: ignore*
1 ... 1	**IT_CALC_PARAMETERS**	**Calculation parameters (as sent)**
1 ... Unbounded	**item**	
1 ... 1	HANDLE	Batch handle
1 ... 1	CONVERSION_GROUP	Conversion group name
1 ... 1	TRANSACTION_QTY	Floating point quantity amount
1 ... 1	TRANSACTION_QTY_UOM	Quantity SAP UoM name
1 ... 1	**IT_INPUT_PARAMETERS**	**Input parameters (as sent)**
0 ... Unbounded	**item**	
1 ... 1	HANDLE	Batch handle
1 ... 1	PAR_NAME	BCS parameter name
1 ... 1	PAR_FLTP	Floating point value
1 ... 1	PAR_CHAR	Checkbox indicator / SAP UoM name
1 ... 1	UNIT_CHAR	SAP UoM name
1 ... 1	CHAR_FLAG	*Not relevant: ignore*

5.3.2. Per-field details

Field
rfc:_-QTYW_-QAPI_CALCULATE.Response xmlns:rfc="urn:sap-com:document:sap:rfc:functions" Data type: Container Occurrence: 1 ... 1 Use: Defines the function responding (QTYW/QAPI_CALCULATE), and contains all parameters
CT__QUANTITY_VALUES Data type: Container Occurrence: 1 ... 1 Use: Contains a group of quantity value items for a calculation.
item Data type: Container Occurrence: 1 ... Unbounded (1 ... 1 per calculation) Use: Contains a group of fields with converted UoM quantities from the calculation.
HANDLE

Data type:	String
Length:	1 – 32 characters
Occurrence:	0 ... 1
Use:	The "handle" entered for the specific calculation this field set relates to. If no handle was specified – i.e. only a single calculation was performed – this is blank. For more details see Batch Processing.

MSEHI

Data type:	String
Occurrence:	1 ... 1
Use:	The UoM converted to, as a SAP UoM name.

ADQNT

Data type:	Float
Occurrence:	1 ... 1
Use:	The converted quantity value, as a floating point number. If a pre-converted quantity value had been submitted in the request, this value will be returned here.

ADQNTP

Data type:	String
Occurrence:	1 ... 1
Use:	A string representation of the value in ADQNT.

MANEN

Data type:	String
Occurrence:	1 ... 1
Use:	A flag to state that a pre-converted value had been submitted and is shown in ADQNT. Set to X if a pre-converted value was submitted, blank if not.

CT_RESULT_PARAMETERS

Data type:	Container
Occurrence:	1 ... 1
Use:	Contains a group of result parameter items for a calculation.

Item

Data type:	Container
Occurrence:	0 ... Unbounded
Use:	Contains a group of fields describing a single result parameter for a calculation, with the calculated value included.

HANDLE

Data type:	String
Length:	1 – 32 characters
Occurrence:	0 ... 1
Use:	As per CT_QUANTITY_VALUES→item→HANDLE.

PAR_NAME

Data type: String

Occurrence: 1 ... 1

Use: The BCS name for the parameter.

PAR_FLTP

Data type: Float

Occurrence: 1 ... 1 – Value+UoM parameter + Value Only parameter

0 ... 0 – UoM Only parameter + Checkbox parameter

Use: The floating point representation of the value for this input parameter.

PAR_CHAR

Data type: String

Occurrence: 1 ... 1 – UoM Only parameter + Checkbox parameter

0 ... 0 – Value+UoM parameter + Value Only parameter

Use: Content depends on the input parameter type:

Type	Field Contents
UoM only	The selected SAP UoM name for the input parameter
Checkbox	An indicator of whether the field is selected: - X = selected - *Blank* = unselected

UNIT_CHAR

Data type: String

Occurrence: 1 ... 1 – Value+UoM parameter + UoM Only parameter

0 ... 0 – Value Only parameter + Checkbox parameter

Use: The selected SAP UoM name for the input parameter.

CHAR_FLAG

Data type: String

Occurrence: 1 ... 1

Use: Not relevant. Ignore.

ET_RETURN

Data type: Container

Occurrence: 1 ... 1

Use: Contains a group of message items.

Item

Data type: Container

Occurrence: 0 ... Unbounded

Use: Contains a group of fields describing a returned message from QAPI

HANDLE

Data type: String
Length: 1 – 32 characters
Occurrence: 0 ... 1
Use: As per CT_QUANTITY_VALUES→item→HANDLE.

TYPE
Data type: String
Occurrence: 1 ... 1
Use: The type of message:

Value	Message Type	Conversion Failed?
I	Information only	No
W	A warning	No
E	An error occurred	YES

ID
Data type: String
Occurrence: 1 ... 1
Use: Not relevant. Ignore.

NUMBER
Data type: String
Occurrence: 1 ... 1
Use: The internal BCS number for the message.

MESSAGE
Data type: String
Occurrence: 1 ... 1
Use: The message returned from BCS.

LOG_NO
Data type: String
Occurrence: 1 ... 1
Use: Not relevant. Ignore.

LOG_MSG_NO
Data type: String
Occurrence: 1 ... 1
Use: Not relevant. Ignore.

MESSAGE_V1
Data type: String
Occurrence: 1 ... 1

Use:	The first variable used in MESSAGE, if applicable. This could be the conversion group name if a conversion group isn't found, a unit name for quantity out-of-range errors on manually entered converted values, or a parameter name for parameter-based issues. Examples of messages are listed in
MESSAGE_V2	
Data type:	String
Occurrence:	1 ... 1
Use:	The second variable used in MESSAGE (similar to MESSAGE_V1), if applicable.
MESSAGE_V3	
Data type:	String
Occurrence:	1 ... 1
Use:	The third variable used in MESSAGE (similar to MESSAGE_V1), if applicable.
MESSAGE_V4	
Data type:	String
Occurrence:	1 ... 1
Use:	The fourth variable used in MESSAGE (similar to MESSAGE_V1), if applicable.
PARAMETER	
Data type:	String
Occurrence:	1 ... 1
Use:	Not relevant. Ignore.
ROW	
Data type:	String
Occurrence:	1 ... 1
Use:	Not relevant. Ignore.
FIELD	
Data type:	String
Occurrence:	1 ... 1
Use:	Not relevant. Ignore.
SYSTEM	
Data type:	String
Occurrence:	1 ... 1
Use:	Not relevant. Ignore.
CT_CALC_PARAMETERS	
Data type:	Container
Occurrence:	1 ... 1
Use:	Contains a group of calculation parameter items sent for a calculation.
item	
Data type:	Container

Occurrence:	1 … Unbounded
	(1 … 1 per calculation)
Use:	Contains a group of fields describing the parameters for a calculation.
HANDLE	
Data type:	String
Length:	1 – 32 characters
Occurrence:	1 … 1
Use:	As per CT_QUANTITY_VALUES→item→HANDLE.
CONVERSION_GROUP	
Data type:	String
Occurrence:	1 … 1
Use:	The name of the conversion group the calculation was performed against.
TRANSACTION_QTY	
Data type:	Float
Occurrence:	1 … 1
Use:	The quantity amount converted from, as a floating point value.
HANDLE	
Data type:	String
Occurrence:	1 … 1
Use:	The quantity UoM converted from, as a SAP UoM name.
IT_INPUT_PARAMETERS	
Data type:	Container
Occurrence:	1 … 1
Use:	Contains a group of the input parameter items sent for a calculation.
Item	
Data type:	Container
Occurrence:	0 … Unbounded
Use:	Contains a group of fields describing the single input parameter sent for a calculation.
HANDLE	
Data type:	String
Length:	1 – 32 characters
Occurrence:	0 … 1
Use:	As per CT_QUANTITY_VALUES→item→HANDLE.
PAR_NAME	
Data type:	String
Occurrence:	1 … 1
Use:	The BCS name for the parameter.
PAR_FLTP	
Data type:	Float

Occurrence:	1 ... 1 – Value+UoM parameter + Value Only parameter 0 ... 0 – UoM Only parameter + Checkbox parameter
Use:	The floating point representation of the value for this input parameter.
PAR_CHAR	
Data type:	String
Occurrence:	1 ... 1 – UoM Only parameter + Checkbox parameter 0 ... 0 – Value+UoM parameter + Value Only parameter
Use:	Content depends on the input parameter type:

Type	Field Contents
UoM only	The selected SAP UoM name for the input parameter
Checkbox	An indicator of whether the field is selected: - X = selected - *Blank* = unselected

UNIT_CHAR	
Data type:	String
Occurrence:	1 ... 1 – Value+UoM parameter + UoM Only parameter 0 ... 0 – Value Only parameter + Checkbox parameter
Use:	The selected SAP UoM name for the input parameter.
CHAR_FLAG	
Data type:	String
Occurrence:	1 ... 1
Use:	Not relevant. Ignore.

5.3.3. XML Structure - XSD

Validating Using This XSD

Our QAPI_CALCULATE response XML structure begins with a namespace of **rfc**, is not included in the XSD below.

```
<rfc:_-QTYW_-QAPI_CALCULATE.Response xmlns:rfc="urn:sap-
com:document:sap:rfc:functions">
...
</rfc:_-QTYW_-QAPI_CALCULATE.Response>
```

To:

```
<_-QTYW_-QAPI_CALCULATE.Response xmlns="urn:sap-com:document:sap:rfc:functions">
...
```

```
</_-QTYW_-QAPI_CALCULATE.Response>
```

```
<?xml version="1.0" encoding="UTF-8"?>
<xs:schema attributeFormDefault="unqualified" elementFormDefault="qualified"
targetNamespace="urn:sap-com:document:sap:rfc:functions" xmlns:xs="http://www.w3.org/2001/XMLSchema">
  <xs:element name="_-QTYW_-QAPI_CALCULATE.Response">
    <xs:complexType>
      <xs:sequence>
        <xs:element name="CT_QUANTITY_VALUES">
          <xs:complexType>
            <xs:sequence>
              <xs:element maxOccurs="unbounded" name="item">
                <xs:complexType>
                  <xs:sequence>
                    <xs:element name="HANDLE" type="xs:string" />
                    <xs:element name="MSEHI" type="xs:string" />
                    <xs:element name="ADQNT" type="xs:float" />
                    <xs:element name="ADQNTP" type="xs:string" />
                    <xs:element name="MANEN" type="xs:string"/>
                  </xs:sequence>
                </xs:complexType>
              </xs:element>
            </xs:sequence>
          </xs:complexType>
        </xs:element>
        <xs:element name="CT_RESULT_PARAMETERS">
          <xs:complexType>
            <xs:sequence>
              <xs:element minOccurs="0" maxOccurs="unbounded" name="item">
                <xs:complexType>
                  <xs:sequence>
                    <xs:element name="HANDLE" type="xs:string" />
                    <xs:element name="PAR_NAME" type="xs:string" />
                    <xs:element name="PAR_FLTP" type="xs:float" />
                    <xs:element name="PAR_CHAR" type="xs:string"/>
                    <xs:element name="UNIT_CHAR" type="xs:string" />
                    <xs:element name="CHAR_FLAG" type="xs:string"/>
                  </xs:sequence>
                </xs:complexType>
              </xs:element>
            </xs:sequence>
          </xs:complexType>
        </xs:element>
        <xs:element name="ET_RETURN">
          <xs:complexType>
            <xs:sequence>
              <xs:element minOccurs="0" maxOccurs="unbounded" name="item">
                <xs:complexType>
                  <xs:sequence>
                    <xs:element name="HANDLE" />
                    <xs:element name="TYPE" type="xs:string" />
```

```
                <xs:element name="ID" type="xs:string" />
                <xs:element name="NUMBER" type="xs:string" />
                <xs:element name="MESSAGE" type="xs:string" />
                <xs:element name="LOG_NO" type="xs:string" />
                <xs:element name="LOG_MSG_NO" type="xs:string" />
                <xs:element name="MESSAGE_V1" type="xs:string" />
                <xs:element name="MESSAGE_V2" type="xs:string" />
                <xs:element name="MESSAGE_V3" type="xs:string" />
                <xs:element name="MESSAGE_V4" type="xs:string" />
                <xs:element name="PARAMETER" type="xs:string" />
                <xs:element name="ROW" type="xs:decimal" />
                <xs:element name="FIELD" type="xs:string" />
                <xs:element name="SYSTEM" type="xs:string" />
              </xs:sequence>
            </xs:complexType>
          </xs:element>
        </xs:sequence>
      </xs:complexType>
    </xs:element>
    <xs:element name="IT_CALC_PARAMETERS">
      <xs:complexType>
        <xs:sequence>
          <xs:element maxOccurs="unbounded" name="item">
            <xs:complexType>
              <xs:sequence>
                <xs:element name="HANDLE" type="xs:string" />
                <xs:element name="CONVERSION_GROUP" type="xs:string" />
                <xs:element name="TRANSACTION_QTY" type="xs:float" />
                <xs:element name="TRANSACTION_QTY_UOM" type="xs:string" />
              </xs:sequence>
            </xs:complexType>
          </xs:element>
        </xs:sequence>
      </xs:complexType>
    </xs:element>
    <xs:element name="IT_INPUT_PARAMETERS">
      <xs:complexType>
        <xs:sequence>
          <xs:element minOccurs="0" maxOccurs="unbounded" name="item">
            <xs:complexType>
              <xs:sequence>
                <xs:element name="HANDLE" type="xs:string" />
                <xs:element name="PAR_NAME" type="xs:string" />
                <xs:element name="PAR_FLTP" type="xs:float" />
                <xs:element name="PAR_CHAR" type="xs:string" />
                <xs:element name="UNIT_CHAR" type="xs:string" />
                <xs:element name="CHAR_FLAG" type="xs:string" />
              </xs:sequence>
            </xs:complexType>
          </xs:element>
        </xs:sequence>
      </xs:complexType>
    </xs:element>
  </xs:sequence>
```

```
    </xs:complexType>
  </xs:element>
</xs:schema>
```

5.3.4. XML Structure - Annotated

```
<?xml version="1.0" encoding="UTF-8" standalone="no"?>
<rfc:_-QTYW_-QAPI_CALCULATE.Response xmlns:rfc="urn:sap-com:document:sap:rfc:functions">
    <CT_QUANTITY_VALUES>
        <item> <!-- One for each UoM to convert to, for each calculation -->
            <HANDLE>[Calculation Handle]</HANDLE>
            <MSEHI>[UoM]</MSEHI>
            <ADQNT>[Value]</ADQNT>
            <ADQNTP>[Value as a formatted string]</ADQNTP>
            <MANEN>[Manual entry indicator[</MANEN>
        </item>
    </CT_QUANTITY_VALUES>
    <CT_RESULT_PARAMETERS>
        <item> <!-- One for each result parameter, for each calculation -->
            <HANDLE>[Calculation Handle]</HANDLE>
            <PAR_NAME>[BCS Parameter Name]</PAR_NAME>
            <PAR_FLTP>[Value (Value+UoM/Value params)]</PAR_FLTP>
            <PAR_CHAR>[UoM (UoM-only params)/Selected Indicator (Checkbox params)]</PAR_CHAR>
            <UNIT_CHAR>[UoM (Value+UoM params)]</UNIT_CHAR>
            <CHAR_FLAG>[Ignore]</CHAR_FLAG>
        </item>
    </CT_RESULT_PARAMETERS>
    <ET_RETURN>
        <item> <!-- One for each returned message, for each calculation -->
            <HANDLE>[Calculation Handle]</HANDLE>
            <TYPE>I</TYPE>
            <ID>[Ignore]</ID>
            <NUMBER>[BCS internal message number]</NUMBER>
            <MESSAGE>[Message] </MESSAGE>
            <LOG_NO>[Ignore]</LOG_NO>
            <LOG_MSG_NO>[Ignore]</LOG_MSG_NO>
            <MESSAGE_V1>[Message variable 1]</MESSAGE_V1>
            <MESSAGE_V2>[Message variable 2]</MESSAGE_V2>
            <MESSAGE_V3>[Message variable 3]</MESSAGE_V3>
            <MESSAGE_V4>[Message variable 4]</MESSAGE_V4>
            <PARAMETER>[Ignore]</PARAMETER>
            <ROW>[Ignore]</ROW>
            <FIELD>[Ignore]</FIELD>
            <SYSTEM>[Ignore]</SYSTEM>
        </item>
    </ET_RETURN>
    <IT_CALC_PARAMETERS>
        <item> <!-- One for each calculation -->
            <HANDLE>[Calculation Handle]</HANDLE>
            <CONVERSION_GROUP>[Conversion Group Name]</CONVERSION_GROUP>
            <TRANSACTION_QTY>[Transaction Quantity Amount]</TRANSACTION_QTY>
            <TRANSACTION_QTY_UOM>[Transaction Quantity UoM]</TRANSACTION_QTY_UOM>
        </item>
    </IT_CALC_PARAMETERS>
    <IT_INPUT_PARAMETERS>
        <item> <!-- One for each input parameter, for each calculation -->
            <HANDLE>[Calculation Handle]</HANDLE>
```

```
            <PAR_NAME>[BCS Parameter Name]</PAR_NAME>
            <PAR_FLTP>[Value (Value+UoM/Value params)]</PAR_FLTP>
            <PAR_CHAR>[UoM (UoM-only params)/Selected Indicator (Checkbox params)]</PAR_CHAR>
            <UNIT_CHAR>[UoM (Value+UoMparams)]</UNIT_CHAR>
            <CHAR_FLAG>[Ignore]</CHAR_FLAG>
        </item>
    </IT_INPUT_PARAMETERS>
</rfc:_-QTYW_-QAPI_CALCULATE.Response>
```

5.4. Batch Processing

QAPI supports performing multiple calculations within a single “batch” request.

The maximum number of calculations currently supported in a batch request are xxx (to be confirmed following further tests). A higher number of calculations within a single batch request may negatively impact performance.

5.4.1. Batch Requests

When performing calculations in bulk, you provide the data for every calculation together in a single request and differentiate each item of data fields with a “handle” that uniquely identifies a calculation.

This means that each of the **data containers** will contain the items for every calculation provided - only one of each data containers is provided (i.e. we do not provide a hierarchical data format).

For example, if two calculations with handles of UPSTREAM-DOC-00200001 and UPSTREAM-DOC-00200002 are performed, the following data structure will be sent:

```
<CT_CALC_PARAMETERS>
    <item>
        <HANDLE>UPSTREAM-DOC-00200001</HANDLE>
        <CONVERSION_GROUP>Q154</CONVERSION_GROUP>
        <TRANSACTION_QTY>100000</TRANSACTION_QTY>
        <TRANSACTION_QTY_UOM>L</TRANSACTION_QTY_UOM>
    </item>
    <item>
        <HANDLE>UPSTREAM-DOC-00200002</HANDLE>
        <CONVERSION_GROUP>Q0A0</CONVERSION_GROUP>
        <TRANSACTION_QTY>23000</TRANSACTION_QTY>
        <TRANSACTION_QTY_UOM>BBL</TRANSACTION_QTY_UOM>
    </item>
</CT_CALC_PARAMETERS>
<CT_QUANTITY_VALUES>
    <item>
        <HANDLE>UPSTREAM-DOC-00200001</HANDLE>
        <MSEHI>M15</MSEHI>
    </item>
    <item>
        <HANDLE>UPSTREAM-DOC-00200001</HANDLE>
        <MSEHI>L15</MSEHI>
    </item>
    <item>
        <HANDLE>UPSTREAM-DOC-00200002</HANDLE>
        <MSEHI>STO</MSEHI>
    </item>
<CT_QUANTITY_VALUES>
```

. . .

5.4.2. Batch Responses

Batch responses mirror the format used for batch requests.

This includes each of the ET_RETURN messages.

NOTE: If a single calculation is being performed, and no HANDLE was provided, an empty HANDLE field will be returned in each of the item fields.

5.4.3. Calculation Handle

A handle is a GUID in “CHAR” format and can be up to 32 characters long.

You could use a simple incrementing index (e.g. 001, 002, 003 etc) or it could refer a specific document number and/or cost centre number (e.g UPSTREAM-DOC-00200001).

NOTE: If you’re only performing a single calculation, you don’t need to provide a handle.

5.5. Manual Quantity Entries

It is possible to provide a “manual” entry for a converted quantity when calling QAPI_CALCULATE.

This can be useful if a separate system has performed a conversion on a quantity prior to sending the request for further conversions to QAPI_CALCULATE, and you wish to have that value included with the other data returned by QAPI_CALCULATE.

To do this, for a particular quantity value, you enter the value as a floating-point value in the PAR_FLTP field, for example:

```
<item>
  <HANDLE>UPSTREAM-DOC-00200001</HANDLE>
  <MSEHI>BBL</MSEHI>
  <ADQNT>62.8</ADQNT>
</item>
```

The manually provided value will be returned with the response, along with a flag to state that the value has been manually entered, in the MANEN field:

```
<item>
    <HANDLE>UPSTREAM-DOC-00200001</HANDLE>
    <MSEHI>BBL</MSEHI>
    <ADQNT>62.8</ADQNT>
    <ADQNTP>62.800</ADQNTP>
    <MANEN>X</MANEN>
</item>
```

NOTE: QAPI still performs the conversion internally, and if the manually entered value falls outside of the permitted error range the calculation will fail, and an error message will be returned.

5.6. Error Handling

Should any errors occur during a calculation within BCS, details of the errors are returned within the ET_RETURN container as messages with a type of “E” or “W”.

If any message with a type of “E” or “W” has been returned, the calculation request has failed.

BTP Errors

Errors can occur prior to connecting to the QAPI / BCS backend but are out of the scope of this document.

5.6.1. XML Example

An example message returned from QAPI in the ET_RETURN container is shown below:

```
<item>
    <HANDLE>UPSTREAM-DOC-00200001</HANDLE>
    <TYPE>I</TYPE>
    <ID>/QTYW/BCC</ID>
    <NUMBER>997</NUMBER>
    <MESSAGE> Density value, temp./press. value or thermal exp. factor out of range</MESSAGE>
    <LOG_NO/>
    <LOG_MSG_NO>000000</LOG_MSG_NO>
    <MESSAGE_V1>Records send:</MESSAGE_V1>
    <MESSAGE_V2>16</MESSAGE_V2>
    <MESSAGE_V3/>
    <MESSAGE_V4/>
    <PARAMETER/>
    <ROW>0</ROW>
    <FIELD/>
    <SYSTEM>SOICLNT030</SYSTEM>
</item>
```

5.6.2. Error Behaviour

If an error (message type “E”) is encountered during a calculation, that calculation is generally ceased immediately.

This means that, often, only one error will be returned per calculation.

This can “mask” other errors that are not yet encountered, as the calculation process halts on the first error. The order of errors received is not fixed.

5.6.3. Errors During Batch Processing

If an error occurs for a calculation during batch processing, this will **not** stop the processing of the other calculations; the calculation with the error will stop, and the batch process will move onto the next calculation.

Any calculation with an error will be returned with the error messages stored in ET_RETURN, with the matching batch handle stored in the message’s HANDLE field.

5.6.4. Error List

Common errors that can occur for QAPI_CALCULATE are described below:

TYPE	NUMBER	Category	MESSAGE
E	003	Out of range	Target quantity value in [UoM] is larger than 9,999,999,999.999
E	004	Out of range	External quantity in [UoM] is outside the error range (low)
E	005	Out of range	External quantity in [UoM] is outside the error range (high)
E	057	Out of range	Sediment and water fraction is negative – enter 0 or a positive value
E	061	Out of range	Sediment and water fraction is greater than or equal 100% - correct entry
E	095	Out of range	Density value, temp./press. value or thermal exp. factor out of range
E	019	Invalid param UoM	Units [Provided UoM] and [Default UoM] cannot be converted - dimensions are different
E	045	Invalid param UoM	Dimension of UoM [UoM] is incorrect; select a UoM with dimension 'DENSITY'
E	064	Invalid param UoM	Sediment and water UoM [Uom] is not a volume proportion UoM - correct UoM
E	072	Undefined data	Conversion group [CONV_GROUP] is not defined in customizing
E	312	Undefined data	(Internal) unit [UoM] not defined in the unit table

NOTE: This is not a complete list of errors but are the most likely errors to encounter. Errors regarding incorrect data structure are not included as it is assumed this will be correct in productive use.

5.6.5. Out of Range Errors

These errors can be encountered in a productive environment, as they are trigged by user input / provided readings.

NOTE: Only the relevant returned fields are listed in each example below.

5.6.5.1. E003 – Input Quantity Value Out of Range

Returned when: the entered input quantity is greater than 9,999,999,999.999 (or less than -9,999,999,999.999).

Field	Content
TYPE	**E**
NUMBER	**003**
MESSAGE	**Target quantity value in [UoM] is larger than 9,999,999,999.999**
MESSAGE_V1	**[UoM]**

5.6.5.2. E004/005 – Converted Manual Entry Value Too Low/High

Returned when: a manually-entered override value for a converted quantity is too low (004) or high (005).

Background

When a manually-entered override value is provided for a converted quantity, this will generally be returned in place of a QAPI-converted value. However, QAPI still performs the conversion internally, and checks that the manually entered value is within the permitted error range the calculation.

Too Low:

Field	Content
TYPE	**E**
NUMBER	**004**
MESSAGE	**External quantity in [UoM] is outside the error range (low)**
MESSAGE_V1	**[UoM]**

Too High:

Field	Content
TYPE	**E**
NUMBER	**005**
MESSAGE	**External quantity in [UoM] is outside the error range (high)**
MESSAGE_V1	**[UoM]**

5.6.5.3. E057/061 – Sediment and Water % Input Parameter – Out of Range

Returned when: the provided value for the Sediment and Water % input parameter "BSWCN" is less than 0 or greater than 100%.

Less than 0:

Field	Content
TYPE	**E**
NUMBER	**057**
MESSAGE	**Sediment and water fraction is negative – enter 0 or a positive value**

Greater than 100%:

Field	Content
TYPE	**E**
NUMBER	**061**
MESSAGE	**Sediment and water fraction is greater than or equal 100% - correct entry**

5.6.5.4. E095 – Temperature / Pressure Input Parameter – Out of Range

Returned when: the provided value for a temperature or pressure input parameter is out of range.

Usage Note

This error message does **not** specify the source input parameter causing the issue. If more than one input parameter triggers the error, the error message will only be returned once.

Specific ranges can be defined per parameter within BCS by a BCP/BCG certified consultant, along with the error message to show. If this has been implemented the defined error message will be shown. Depending on how it has been written, the error message may describe the exact value causing the issue.

Field	Content
TYPE	**E**
NUMBER	**095**
MESSAGE	**Density value, temp./press. value or thermal exp. factor out of range**

5.6.6. Parameter Invalid UoM Errors

These errors will only be encountered if UoM outside those included in the "allowed UoM" data from QAPI_CALC_CONTEXT_GET are used, so should not be encountered.

NOTE: Only the relevant returned fields are listed in each example below.

5.6.6.1. E019 – Temperature / Pressure Input Parameter – Invalid UoM

Returned when: the UoM provided for an input parameter is not valid - specifically, when the UoM provided is using a different *dimension* (e.g. mass instead of temperature) to the default UoM of the input parameter.

Usage Note
This will not be encountered if the UoM provided is in the list of allowed UoM for the parameter, as provided by QAPI_CALC_CONTEXT_GET.
This error message does **not** specify the source input parameter causing the issue but does provide the provided UoM at fault.

Field	Content
TYPE	**E**
NUMBER	**019**
MESSAGE	**Units [Provided UoM] and [Default UoM] cannot be converted - dimensions are different**
MESSAGE_V1	**[Provided UoM]**
MESSAGE_V2	**[Default UoM]**

5.6.6.2. E045 – Density Input Parameters – Invalid UoM

Returned when: the UoM provided for a density input parameter is not valid – specifically, when the UoM provided is using a different *dimension* to the default UoM of the input parameter.

Field	Content
TYPE	**E**
NUMBER	**064**
MESSAGE	**Dimension of UoM [UoM] is incorrect; select a UoM with dimension 'DENSITY'**
MESSAGE_V1	**[UoM]**

Usage Note
This will not be encountered if the UoM provided is in the list of allowed UoM for the parameter, as provided by QAPI_CALC_CONTEXT_GET.
This error message does **not** specify the source input parameter causing the issue, but does provide the provided UoM at fault.

5.6.6.3.E064 – Sediment and Water % Input Parameter – Invalid UoM

Returned when: the UoM provided for the Sediment and Water % input parameter "BSWCN" is not valid – specifically, when the UoM provided is using a different *dimension* to the default UoM of the input parameter.

Field	Content
TYPE	**E**
NUMBER	**064**
MESSAGE	**Sediment and water UoM [Uom] is not a volume proportion UoM - correct UoM**
MESSAGE_V1	**[Provided UoM]**

Usage Note
This will not be encountered if the UoM provided is in the list of allowed UoM for the parameter, as provided by QAPI_CALC_CONTEXT_GET.

5.6.7. Undefined Data Errors

These errors will be encountered if a specified conversion group or UoM to convert from/to do not exist in the SAP system client performing the calculations.

NOTE: Only the relevant returned fields are listed in each example below.

5.6.7.1. E072 – Conversion Group Not Found

Returned when: the specified conversion group doesn't exist within the client on the QAPI SAP system.

Field	Content
TYPE	**E**
NUMBER	**072**
MESSAGE	**Conversion group [CONV_GROUP] is not defined in customizing**
MESSAGE_V1	**[CONV_GROUP]**

Usage Note

This error returns a different number (072) to that returned for the same error in QAPI_CALC_CONTEXT_GET (024).

5.6.7.2. E312 – Quantity / Converted UoM Not Found

Returned when: the specified quantity UoM or UoM to convert to does not exist within the client on the QAPI SAP system.

Field	Content
TYPE	**E**
NUMBER	**312**
MESSAGE	**Internal) unit [UoM] not defined in the unit table**
MESSAGE_V1	**[UoM]**

Usage Note

This error returns a different number (072) to that returned for the same error in QAPI_CALC_CONTEXT_GET (024).

5.7. Confirming Accuracy

To confirm the accuracy of the converted results, liaise with the BCS expert at the organization to cross check your results with those returned using the Oil and Gas Test Calculator in the BCS Petroleum / Gas Measurement Cockpit on the SAP client.

The use of the “Explain by Scenario” program is recommended to generate example XML for every conversion group the organization wishes to use with QAPI. This will give you the confidence in your QAPI implementation and allows you to compare expected values with the values returned by QAPI_CALCULATE. For more details see “Explain by Scenario” Program.

6. "Explain By Scenario" Program

The "Explain by Scenario" program generates example XML calculation requests, which can be copied and used to send to QAPI_CALCULATE for testing (e.g. via Postman).

Each XML calculation request includes, as XML comments, the expected values of each converted quantity and each result parameter.

This can help speed up development and debugging and is designed to provide confidence in your QAPI implementation, by confirming that conversions can be successful for conversion group, and to confirm the accuracy of the results received.

It should be used in tandem with the information in this document.

6.1. XML Request Definition

The XML calculation requests are generated with the data from one or more "test scenarios". Test scenarios are created in BCS on an SAP client to ensure BCS has been configured by the organization correctly.

Each test scenario is for a specific conversion group, with a set of preconfigured settings for input and result parameters, with expected results included.

Previously, each test scenario will have been run by a BCS expert at the organization and confirmed as accurate.

Thus, the XML generated with the "Explain by Scenario" program using a test scenario for a conversion group is both an example of valid XML to send for that conversion group but also can be used to prove the calculations are being performed as expected through QAPI.

NOTE: Batch calculations are supported in the generated XML, so if the program is directed to generate XML for multiple test scenarios, it will generate a single XML calculation request containing each of the test scenarios' calculation requests. This can speed up testing as one single XML calculation request can be used to check against **all** test scenarios configured in BCS.

6.2. Program Location + Access

The program, located on the SAP system in /QTWY/QAPI_EXPLAIN_BY_SCENARIO, is only accessible within the SAP system itself and so requires someone with access to the system / client to use it.

This **must** be someone with expertise in QuantityWare BCP and/or BCG configuration (ideally a QuantityWare certified consultant), as the program requires understanding of BCP / BCG test scenarios.

6.3. What to Ask For

To be confident that your QAPI implementation has been configured correctly, it is recommended to request XML for at least one test scenario for each conversion group the organization wishes to use with QAPI.

6.4. Confirming Accuracy

You should confirm that the generated XML sent to QAPI_CALCULATE, receives a successful response without errors.

To check that the converted values are accurate and match a calculation request within BCS itself, you can compare the results with the “expected results”, contained within the generated request XML as comments.

If there are any inconsistencies, you can liaise with the BCP / BCG consultant who can cross-check against the relevant test scenario on the BCS Petroleum / Gas Measurement Cockpit.

NOTE: Due to floating point rounding within the SAP system, the returned results may differ from the expected result at the 17th decimal place, for example:

XML Calculation Request: <!-- Expected value: **0.998950** -->

Returned result in PAR_FLTP: **0.998950**0000000001

To account for these potential differences, the returned result should be rounded to the 15th decimal place.

6.5. Example Generated XML

This is some example XML (truncated) for a test scenario Q154 for conversion group Q154:

```
<?xml version="1.0" encoding="UTF-8"?>
<ns0:_-QTYW_-QAPI_CALCULATE xmlns:ns0="urn:sap-com:document:sap:rfc:functions">
<IT_CALC_PARAMETERS>
<!-- Scenario Q154 BCP 000C290F008A1FD085BF379DD57725DE -->
  <item>
    <HANDLE>000C290F008A1FD085BF379DD57725DE</HANDLE>
    <CONVERSION_GROUP>Q154</CONVERSION_GROUP>
    <TRANSACTION_QTY>99000.000</TRANSACTION_QTY>
    <TRANSACTION_QTY_UOM>TO</TRANSACTION_QTY_UOM>
  </item>
</IT_CALC_PARAMETERS>
<IT_INPUT_PARAMETERS>
  <item>
    <HANDLE>000C290F008A1FD085BF379DD57725DE</HANDLE>
    <PAR_NAME>OBSMTMETTP</PAR_NAME>
    <PAR_FLTP>15.000000</PAR_FLTP>
    <UNIT_CHAR>CEL</UNIT_CHAR>
  </item>
  ...
  <item>
    <HANDLE>000C290F008A1FD085BF379DD57725DE</HANDLE>
    <PAR_NAME>METCORFAC</PAR_NAME>
    <PAR_FLTP>0.000000</PAR_FLTP>
  </item>
</IT_INPUT_PARAMETERS>
<CT_RESULT_PARAMETERS>
  <item>
    <HANDLE>000C290F008A1FD085BF379DD57725DE</HANDLE>
    <PAR_NAME>CTPL_O_B</PAR_NAME>
    <!-- Expected value: 1.000000 -->
    <UNIT_CHAR>VCF</UNIT_CHAR>
  </item>
  ...
  <item>
    <HANDLE>000C290F008A1FD085BF379DD57725DE</HANDLE>
    <PAR_NAME>BDICH_AIR</PAR_NAME>
    <!-- Expected value: 0.998950 -->
    <UNIT_CHAR>KGL</UNIT_CHAR>
  </item>
</CT_RESULT_PARAMETERS>
<CT_QUANTITY_VALUES>
  <item>
    <HANDLE>000C290F008A1FD085BF379DD57725DE</HANDLE>
    <!-- Expected value: 100000.000 -->
    <MSEHI>GT</MSEHI>
  </item>
  ...
  <item>
```

```
    <HANDLE>000C290F008A1FD085BF379DD57725DE</HANDLE>
    <!-- Expected value: 98896.050 -->
    <MSEHI>TOA</MSEHI>
  </item>
</CT_QUANTITY_VALUES>
</ns0:_-QTYW_-QAPI_CALCULATE>
```

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