Honeywell | CIU 888

Protocol Manual - OPC UA Host Guide

Release R210

PREFACE

General

ENTIS tank inventory system uses OPC UA TCP protocol to communicate with the CIU 888.

Ethernet based hosts systems can connect to CIU 888 using OPC UA TCP protocol. In this setup, CIU 888 acts as OPC UA server to the OPC UA host systems. OPC UA communication between the CIU 888 and the host systems is established through FTEA, FTEB and Office LAN ports. CIU 888 exposes the data based on Information model built with PA-DIM companion specification as basis.

Purpose of this manual

The purpose of this manual is to provide information about the OPC UA protocol and the implementation of the OPC UA protocol in the CIU 888.

Target audience of this manual

This manual is primarily intended for service technicians who are responsible for:

- Setting up (commissioning) and configuring the CIU 888
- Troubleshooting issues using the diagnostic features of the CIU 888
- Servicing and maintaining the CIU 888
- Configuring gauges via the CIU 888 using service tools such as Engauge

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CHAPTER 1 INTRODUCTION TO THE OPC UA PROTOCOL

1.1 What is OPC?

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

The OPC standard is a series of specifications developed by industry vendors, end-users and software developers. These specifications define the interface between Clients and Servers, as well as Servers and Servers, including access to real-time data, monitoring of alarms and events, access to historical data and other applications.

When the standard was first released in 1996, its purpose was to abstract PLC specific protocols (such as Modbus, Profibus, etc.) into a standardized interface allowing HMI/SCADA systems to interface with a “middle-man” who would convert generic-OPC read/write requests into device-specific requests and vice-versa. As a result, an entire cottage industry of products emerged allowing end-users to implement systems using best-of-breed products all seamlessly interacting via OPC.

Initially, the OPC standard was restricted to the Windows operating system. As such, the acronym OPC was borne from OLE (object linking and embedding) for Process Control. These specifications, which are now known as OPC Classic, have enjoyed widespread adoption across Protocol Manual - OPC UA Hostmultiple industries, including manufacturing, building automation, oil and gas, renewable energy and utilities, among others.

With the introduction of service-oriented architectures in manufacturing systems came new challenges in security and data modeling. The OPC Foundation developed the OPC UA specifications to address these needs and at the same time provided a feature-rich technology open-platform architecture that was future-proof, scalable and extensible.

1.2 General

The OPC Unified Architecture (UA), released in 2008, is a platform independent service-oriented architecture that integrates all the functionality of the individual OPC Classic specifications into one extensible framework. This multi-layered approach accomplishes the design specification goals of:

1.2.1 Security

One of the most important considerations in choosing a technology is security. OPC UA is firewall-friendly while addressing security concerns by providing a suite of controls:

- Transport: numerous protocols are defined providing options such as the ultra-fast OPC-binary transport or the more universally compatible JSON over Websockets, for example
- Session Encryption: messages are transmitted securely at various encryption levels
- Message Signing: with message signing the recipient can verify the origin and integrity of received messages
- Sequenced Packets: exposure to message replay attacks is eliminated with sequencing
- Authentication: each UA client and server is identified through X509 certificates providing control over which applications and systems are permitted to connect with each other
- User Control: applications can require users to authenticate (login credentials, certificate, web token etc.) and can further restrict and enhance their capabilities with access rights and address-space “views
- Auditing: activities by user and/or system are logged providing an access audit trail

1.2.2 Comprehensive information modeling

The OPC UA information modeling framework turns data into information. With complete object-oriented capabilities, even the most complex multi-level structures can be modeled and extended. This framework is THE fundamental element of OPC Unified Architecture. It defines the rules and base building blocks necessary to expose an information model with OPC UA. While OPC UA already defines several core models that can be applied in many industries, other organizations build their models upon them, exposing their more specific information with OPC UA.

OPC UA also defines the necessary access mechanisms to information models.

- Look-up mechanism (browsing) to locate instances and their semantic
- Read and write operations for current data and historical data
- Method execution
- Notification for data and events

For Client-Server communication the full range of information model access is available via services and in doing so follows the design paradigm of service-oriented architecture (SOA), with which a service

provider receives requests, processes them and sends the results back with the response.

1.2.3 Extensible

The multi-layered architecture of OPC UA provides a “future proof” framework. Innovative technologies and methodologies such as new transport protocols, security algorithms, encoding standards, or application-services can be incorporated into OPC UA while maintaining backwards compatibility for existing products. UA products built today will work with the products of tomorrow.

OPC UA also defines the necessary access mechanisms to information models.

- Look-up mechanism (browsing) to locate instances and their semantic
- Read and write operations for current data and historical data
- Method execution
- Notification for data and events

For Client-Server communication the full range of information model access is available via services and in doing so follows the design paradigm of service-oriented architecture (SOA), with which a service provider receives requests, processes them and sends the results back with the response.

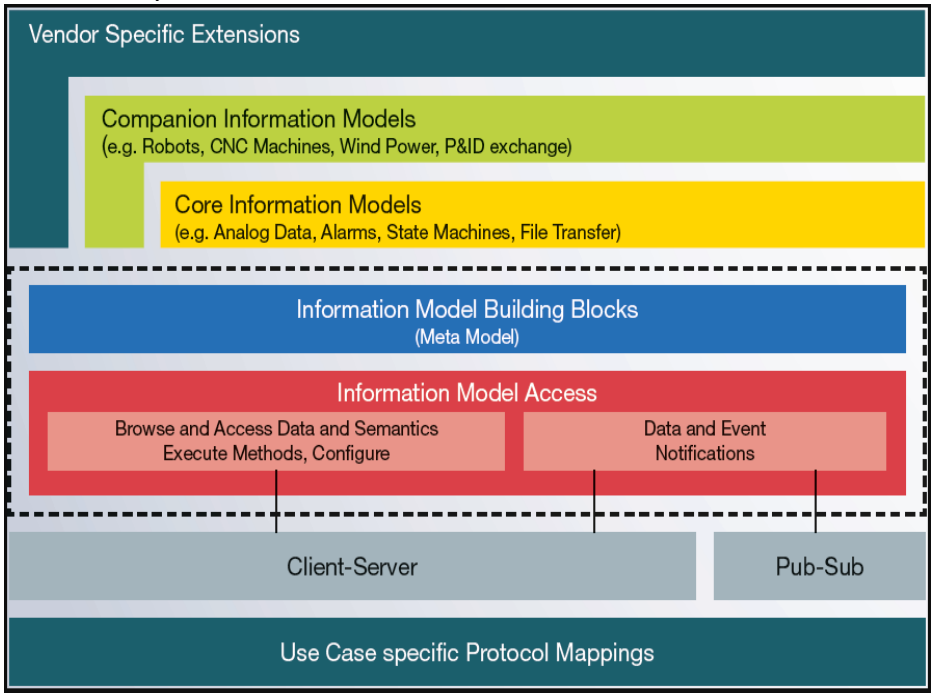


FIGURE 1-1 Information Model

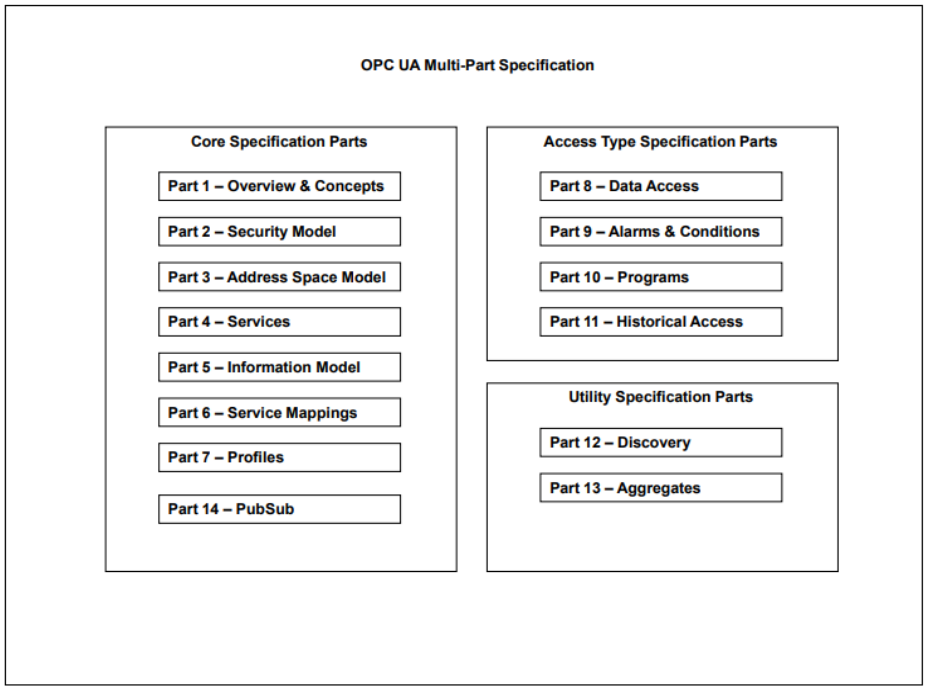


FIGURE 1-2 OPC UA Specification Organization

The OPC UA specification is organized as a multi-part specification Parts 1 through 7 and Part 14 specify the core capabilities of OPC UA. These core capabilities define the structure of the OPC Address Space and the Services that operate on it. Part 14 defines an OPC UA publish subscribe pattern in addition to the Client Server pattern defined by the Services in Part 4. Parts 8 through 11 apply these core capabilities to specific types of access previously addressed by separate OPC COM specifications, such as Data Access (DA), Alarms and Events (A&E) and Historical Data Access (HDA). Part 12 describes Discovery mechanisms for OPC UA and Part 13 describes ways of aggregating data.

1.3 System concepts

1.3.1 Client Server Overview

The OPC UA systems architecture models Clients and Servers as interacting partners. Each system may contain multiple Clients and Servers. Each Client may interact concurrently with one or more Servers, and each Server may interact concurrently with one or more Clients. An application may combine Server and Client components to allow interaction with other Servers and Clients.

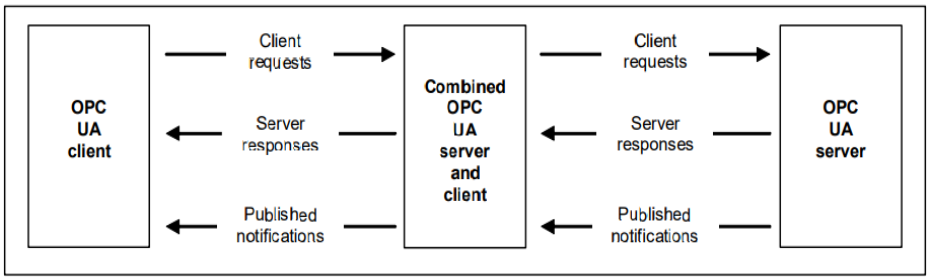


FIGURE 1-3 OPC UA System architecture

1.3.2 OPC UA Clients

The OPC UA Client architecture models the Client endpoint of client/server interactions.

The Client Application is the code that implements the function of the Client. It uses the Client API to send and receive OPC UA Service requests and responses to the Server. The Services defined for OPC UA are described in Clause 6.4, and specified in OPC 10000-4. Note that the “Client API” is an internal interface that isolates the Client application code from an OPC UA Communication Stack. The OPC UA Communication Stack converts Client API calls into Messages and sends them through the underlying communications entity to the Server at the request of the Client application. The OPC UA Communication Stack also receives response and Notification Messages from the underlying communications entity and delivers them to the Client application through the Client API.

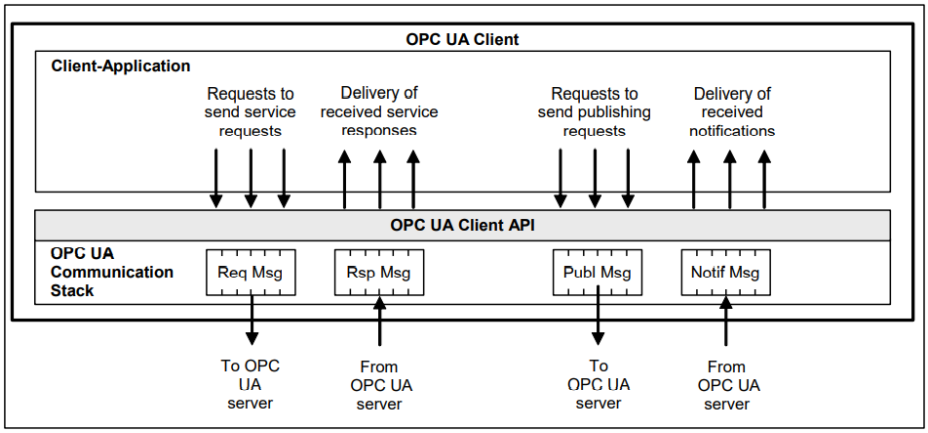


FIGURE 1-4 OPC UA Client Architecture

1.3.3 OPC UA Server

The OPC UA Server architecture models the Server endpoint of client/server interactions.

Real objects are physical or software objects that are accessible by the Server application or that it maintains internally. Examples include physical devices and diagnostics counters.

The Server application is the code that implements the function of the Server. It uses the Server API to send and receive OPC UA Messages from Clients. Note that the “Server API” is an internal interface that isolates the Server application code from an OPC UA Communication Stack.

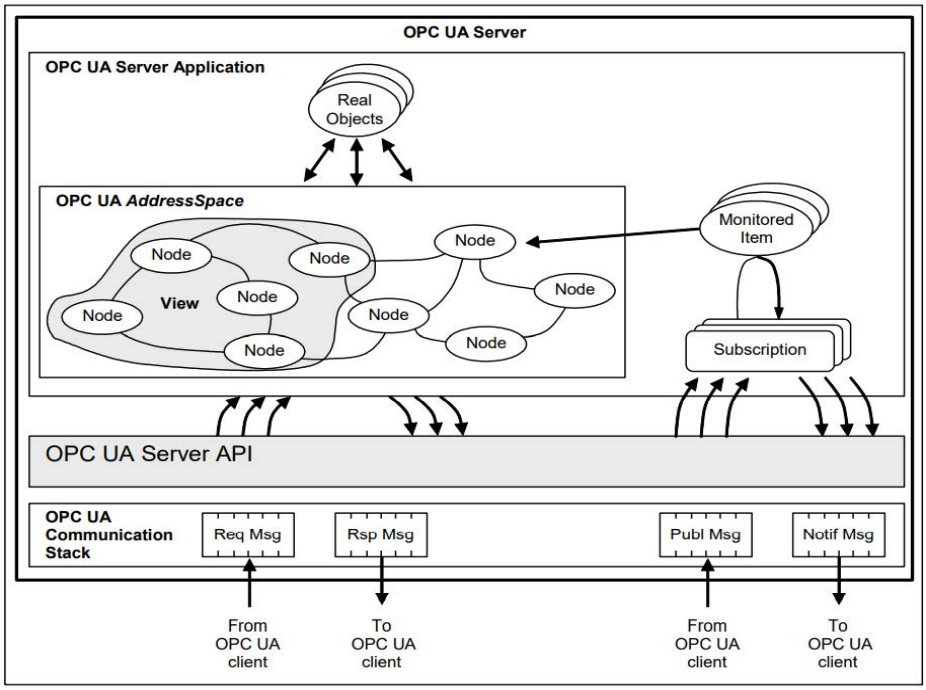


FIGURE 1-5 OPC UA Server Architecture

1.4 OPC UA security architecture

1.4.1 Overview

The OPC UA security architecture is a generic solution that allows implementation of the required security features at various places in the OPC UA Application architecture. Depending on the different mappings described in OPC 10000-6, the security objectives are addressed at different levels. The OPC UA security architecture, for Client / Server communication is structured in an Application Layer and a Communication Layer atop the Transport Layer as shown in FIGURE 1-6.

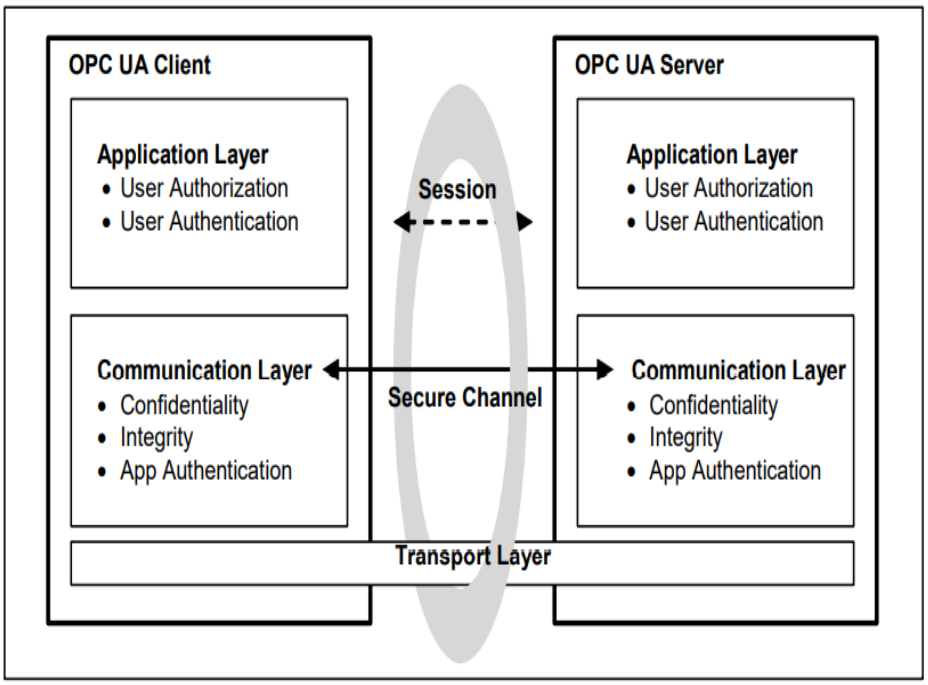


FIGURE 1-6 OPC UA security architecture – Client / Server

1.4.2 Client / Server

Client / Server communication can include both Session and session-less communication. The routine work of a client application and a Server application to transmit information, settings, and commands is done in a Session in the Application Layer. The Application Layer also manages the security objectives user Authentication and user Authorization. The security objectives that are managed by the Application Layer are addressed by the Session Services. A Session in the Application Layer communicates over a Secure Channel that is created in the Communication Layer and relies upon it for secure communication. All of the Session data is passed to the Communication Layer for further processing. Although a Session communicates over a Secure Channel and has to be activated before it can be used, the binding of users, Sessions, and Secure Channels is flexible.

If a Secure Channel breaks, the Session will remain valid for a period of time allowing the Client to reestablish the connection to the Session via a new Secure Channel. Otherwise, the Session closes after its lifetime expires. The Communication Layer provides security mechanisms to meet Confidentiality, Integrity and application Authentication as security objectives. One essential mechanism to meet these security objectives is to establish a Secure Channel that is used to secure the communication between a Client and a Server. The Secure Channel provides encryption to maintain Confidentiality, Message Signatures to

maintain Integrity and Certificates to provide application Authentication. The data that comes from the Application Layer is secured and passes the “secured” data to the Transport Layer. The security mechanisms that are managed by the Communication Layer are provided by the Secure Channel Services.

The security mechanisms provided by the Secure Channel services are implemented by a protocol stack that is chosen for the implementation. Mappings of the services to some of the protocol stack options are specified in OPC 10000-6 which define how functions in the protocol stack are used to meet the OPC UA security objectives. The Communication Layer can represent an OPC UA connection protocol stack. OPC UA specifies alternative stack mappings that can be used as the Communication Layer.

If the OPC UA Connection Protocol (UACP) is used, then functionality for Confidentiality, Integrity, application Authentication, and the Secure Channel are similar to the SSL/TLS specifications. The Transport Layer handles the transmission, reception, and the transport of data that is provided by the Communication Layer. To survive the loss of the Transport Layer connections (e.g., TCP connections) and resume with a new connection, the Communication Layer is responsible for re-establishing the Transport Layer connection without interrupting the logical Secure Channel.

1.4.3 Security Policies

A Security Policy specifies which security mechanisms are to be used and are derived from a Security Profile (see 4.7 for details). Security policies are used by the Server to announce which mechanisms it supports and by the Client to select one to use with the Secure Channel it wishes to open or for the session-less connection it wishes to make. Security Policies are also used with PubSub communication. Security Policies include the following information:

- algorithms for signing and encryption
- algorithm for key derivation

The choice of allowed Security Policies is normally made by the administrator typically when the OPC UA Applications are installed. The available security policies are specified in OPC 10000-7. The Administrator can at a later time also change or modify the selection of allowed Security Policies as circumstances dictate.

The announcement of security policies is handled by special discovery services specified in OPC 10000-4. More details about the discovery mechanisms and policy announcement strategies can be found in OPC 10000-12.

In the Client Server communications pattern, each Client can select a policy independent of the policy selected by other Clients.

For the Publish Subscribe communications pattern, the Security Policy is associated with a published DataSet and all Subscribers must utilize the same Security Policy.

Since computing power increases every year, specific algorithms that are considered as secure today can become insecure in the future, therefore, it makes sense to support different security policies in an OPC UA Application and to be able to adopt more as they become available. NIST or other agencies even make predictions about the expected lifetime of algorithms (see NIST 800-57). The list of supported security policies will be updated based on recommendation such as those published by NIST. From a deployment point of view it is important that the periodic site-review checks that the currently selected list of security profiles still fulfill the required security objectives and if they do not, then a newer selection of Security Profiles is selected

There is also the case that new security policies are composed to support new algorithms that improve the level of security of OPC UA products. The application architecture of OPC UA Application should be designed in a way that it is possible to update or add additional cryptographic algorithms to the application with little or no coding changes.

1.4.4 Security Profiles

OPC UA Client and Server products are certified against Profiles. Some of the Profiles specify security functions and others specify other functionality that is not related to security. The Profiles impose requirements on the certified products, but they do not impose requirements on how the products are used. A consistent minimum level of security is required by the various Profiles. However, different Profiles specify different details such as which encryption algorithms are required for which OPC UA functions. If a problem is found in one encryption algorithm, then the OPC Foundation can define a new Profile that is similar, but that specifies a different encryption algorithm that does not have a known problem.

Policies refer to many of the same security choices as Profiles; however, the policy specifies which of those choices to use in the Session. The policy does not specify the range of choices that the product offers, they are described in the Profiles that it supports.

These policies are included in Certification Testing associated with OPC UA Applications. The Certification Testing ensures that the standard is followed and that the appropriate security algorithms are supported.

Each security mechanism in OPC UA is provided in OPC UA Applications in accordance with the Profiles with which the OPC UA Application complies. At the site, however, the security mechanisms may be deployed optionally. In this way each individual site has all the OPC UA security functions available and can choose which of them to use to meet its security objectives.

Security Profiles describe a Profile “None” that is used for testing, but if any other more secure Profiles are available this Profile is disabled by default. Profile “None” provides no security.

CHAPTER 2 CIU 888 OPC UA SERVER SPECIFICATIONS

CIU 888 supports OPC UA server compliant to the specifications defined by the OPC foundation.

2.1 FUNCTIONAL SPECIFICATIONS

CIU's OPC UA Server offers the following functionalities:

- Supports OPC UA TCP protocol
- Supports OPC UA Server on FTEA, FTEB and Office LAN ports
- Supports security features through self-signed certificates and CA-signed certificates
- Provides the OPC UA client, the (unique) names of the selectable entities
- Provides data to the OPC clients using the defined system dimensions (unit of measure).
- Supports subscription of one or more data items.
- Provides the following data for to ENTIS and third-party systems
  - Tank inventory data (measurement, configuration, and calculated values)
  - Tank temperature profiles data
  - CIU operational and diagnostics data
- Supports manual overwrite of data from ENTIS and third-party systems
- Supports gauge command execution (like water dip, density dip etc.,) from ENTIS and third-party systems
- Supports tank command execution (like kill, resurrect etc.,) from ENTIS
- Supports density profile and interface profile command execution from ENTIS and third-party systems

2.2 CAPACITY SPECIFICATIONS

- Supports up to 10 OPC UA client connections
- Supports up to 30000 subscription items

NOTE: OPC UA server functionality is a licensed option in CIU's SW MSG.

NOTE: For ENTIS integration, OPC UA server functionality needs to be selected in CIU's SW MSG.

CHAPTER 3 CIU 888 OPC UA INFORMATION MODEL

CIU888 information model defines the data structure in which data is exposed by the OPC UA server. The OPC UA server provides the OPC UA client data in a hierarchical way; e.g. like ‘explorer’ does with directories and files. Entries on the same hierarchy level appear in the order defined in the CIU.

CIU Information model is built using the PA-DIM companion specification as the basis.

CIU information model is built around 3 main types

- CIU888 Type
- Tank Type
- Gauge Type

All entities have been categorized as groups and created as objects under each of the type. All tanks connected to CIU888 are represented as a node of tank type in the server address space and similarly all gauges connected to respective tanks are created as gauges type nodes under corresponding tanks in the address space.

3.1 CIU888 Type

The root node of the OPC UA server is named as CIU888 and is of the CIU888 Type. The following data w.r.t CIU site element are modeled in this type:

- Operational data
- Diagnostics data
- Configuration data
- Operational commands
- Collection of Tanks

3.1.1 Data structure

This section provides a high-level overview of the data structure of the CIU 888 node as exposed in OPC UA server. For detailed information on data and command integration, refer to section 3.5 and section 3.6.

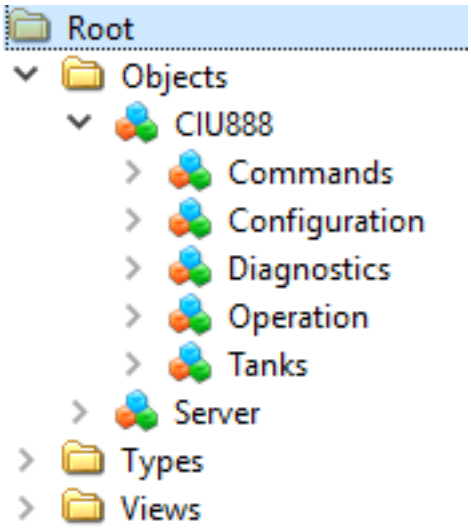


FIGURE 3-1 CIU 888 node data structure

3.1.1.1 Commands

The *Commands* node exposes method calls for the various supported CIU commands that can be executed from the host systems. For detailed information on the method calls and command integration refer to table 3-6

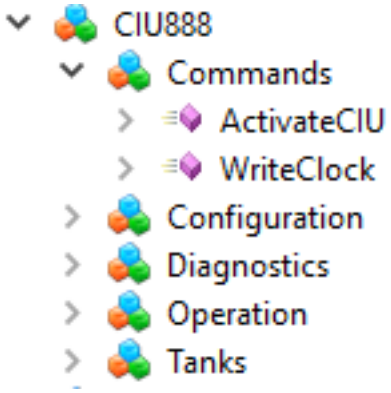


FIGURE 3-2 Commands node data structure

3.1.1.2 Configuration

The *Configuration* node exposes CIU configuration data relevant for the host systems. For detailed information on data integration refer to table 3-4.

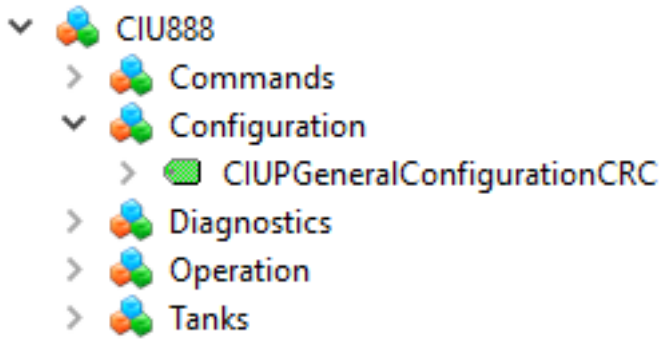


FIGURE 3-3 Configuration node data structure

3.1.1.3 Diagnostics

The *Diagnostics* node exposes CIU diagnostics data that can be used to monitor the health of the CIU. For detailed information on data integration refer to table 3-5.

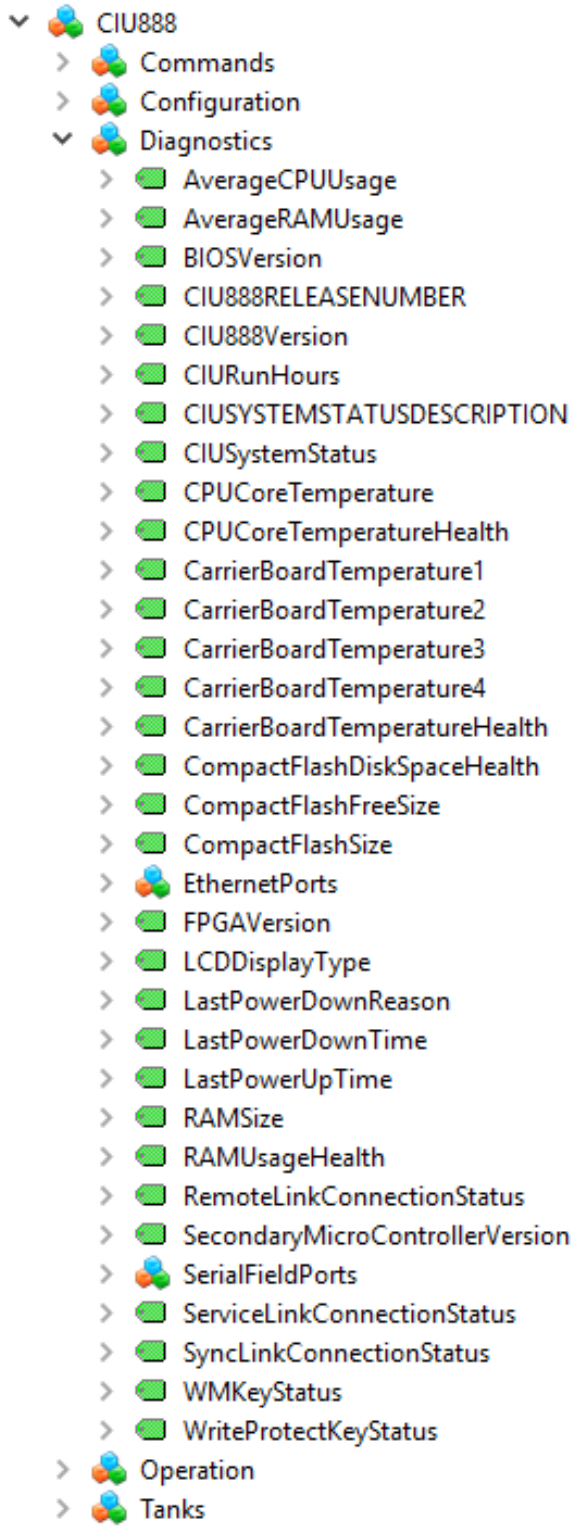


FIGURE 3-4 Diagnostics node data structure

3.1.1.4 Operation

The *Operation* node exposes CIU operation data like Hotstandbystatus, CIU clock etc..,for the host systems. For detailed information on data integration refer to table 3-4.

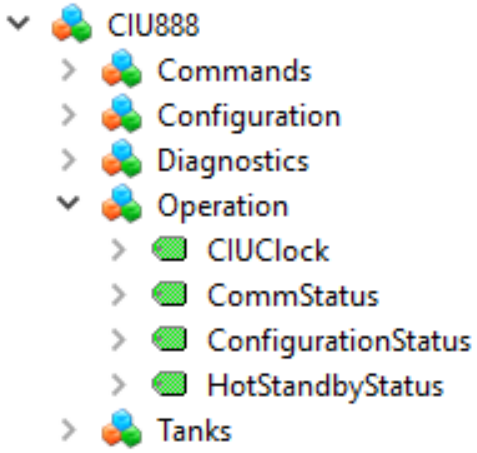


FIGURE 3-5 Operation node data structure

3.2 Tank Type

Tanks node under CIU888 node in OPC UA server represents a collection of tanks that are scanned by the CIU. Each tank object under Tanks node is of Tank Type. The following data w.r.t Tank site element are modeled in this type:

- Tank Configuration data
- Product Configuration data
- ENTIS specific tank data (atomic tank record)
- Tank Inventory data
- Temperature profiles data
- Density profiles data
- Tank commands
- Collection of Gauges

3.2.1 Data structure

This section provides a high-level overview of the data structure of the Tank node as exposed in OPC UA server. For more information on data integration, refer to section 3.5 and section 3.6.

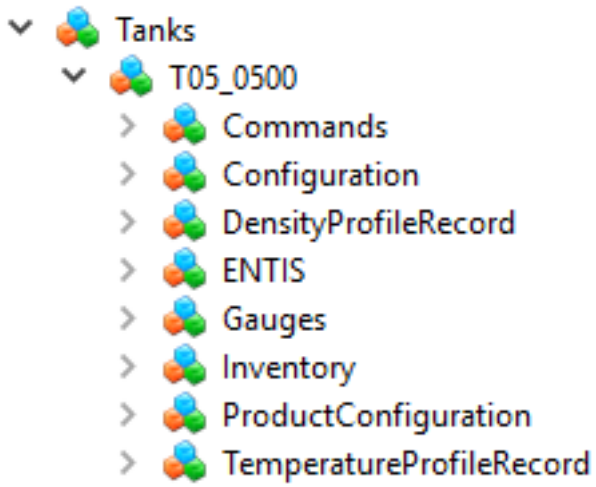


FIGURE 3-6 Tank node data structure

3.2.1.1 Commands

The *Commands* node exposes method calls for the various supported Tank commands that can be executed from the host systems. For detailed information on the method calls and command integration refer to table 3-7.

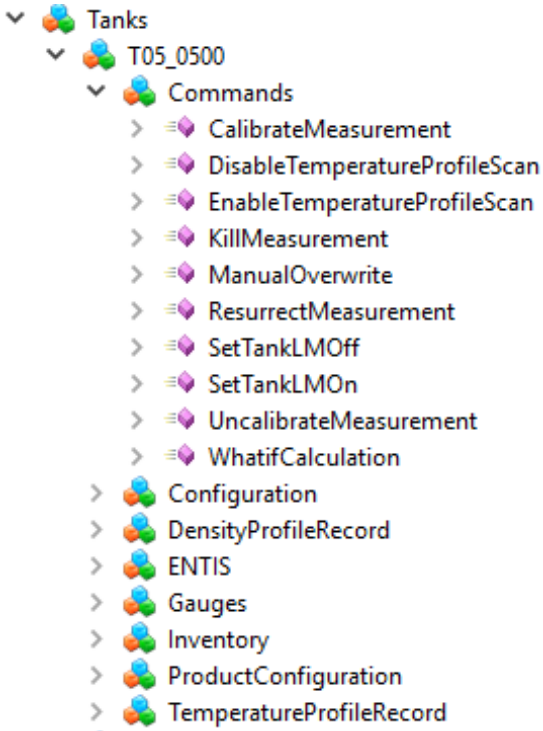
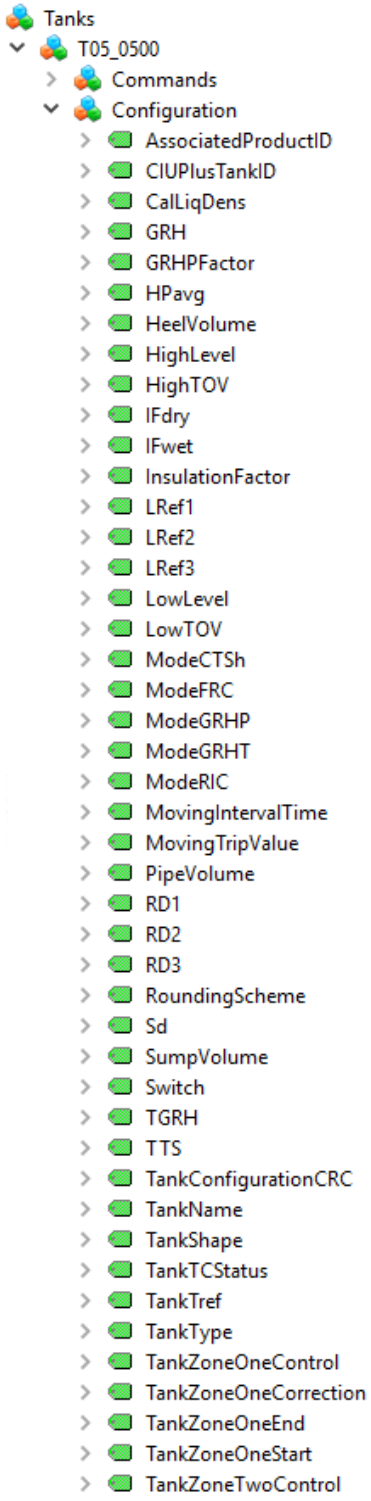


FIGURE 3-7 Commands node data structure

3.2.1.2 Configuration

The *Configuration* node exposes Tank configuration data relevant for the host systems. For detailed information on data integration refer to table 3-1.



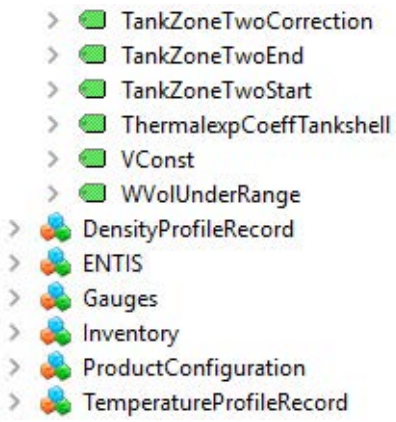


FIGURE 3-8 Configuration node data structure

3.2.1.3 DensityProfileRecord

The *DensityProfileRecord* node exposes Tank density profiles data for the host systems. Host systems shall issue relevant density or interface profile commands prior to density profiles data collection. For detailed information on data integration refer to table 3-3.

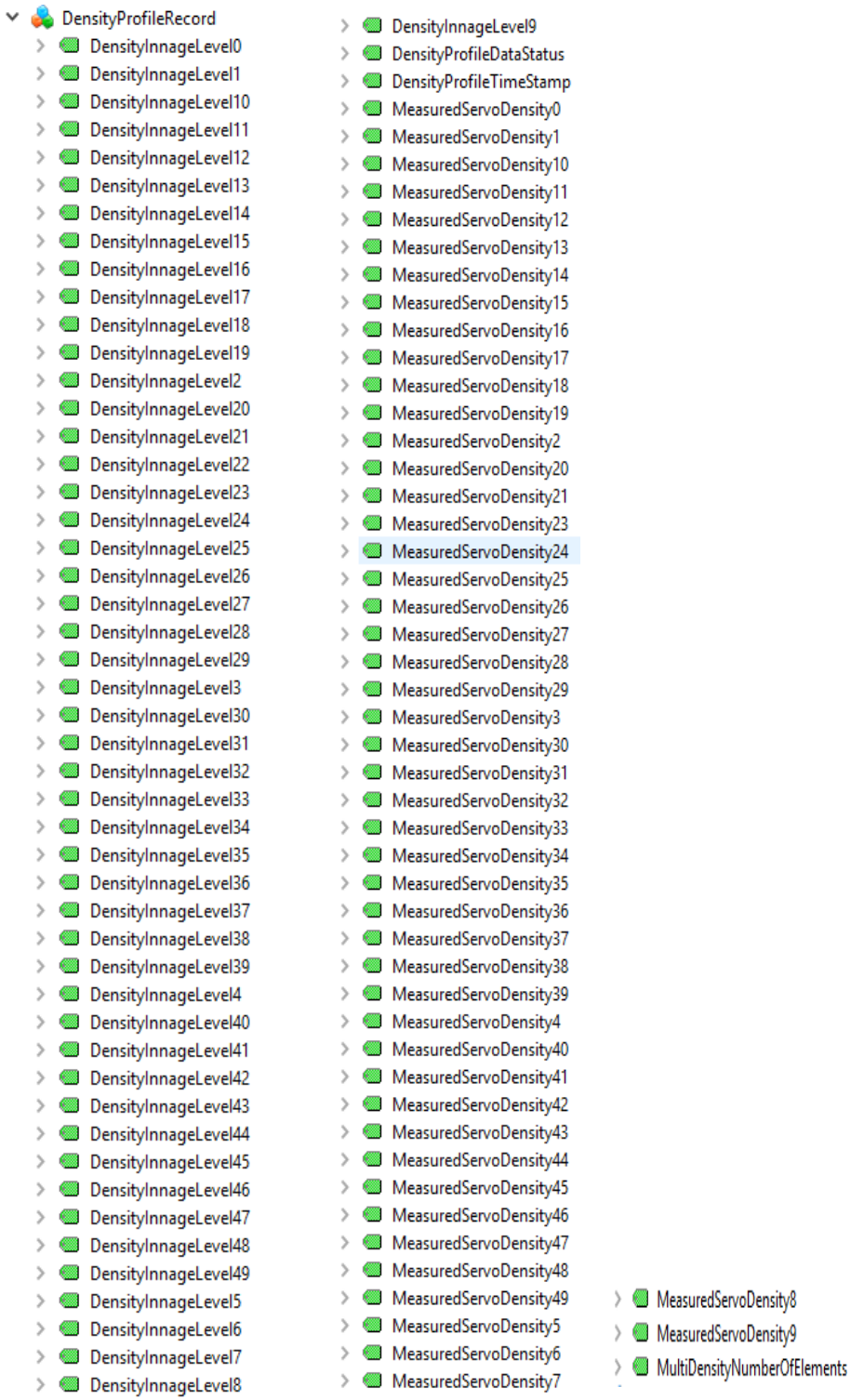


FIGURE 3-9 DensityProfileRecord node data structure

3.2.1.4 ENTIS

The *ENTIS* node exposes Tank record and Temperature profiles records in a JSON format for the ENTIS host system.

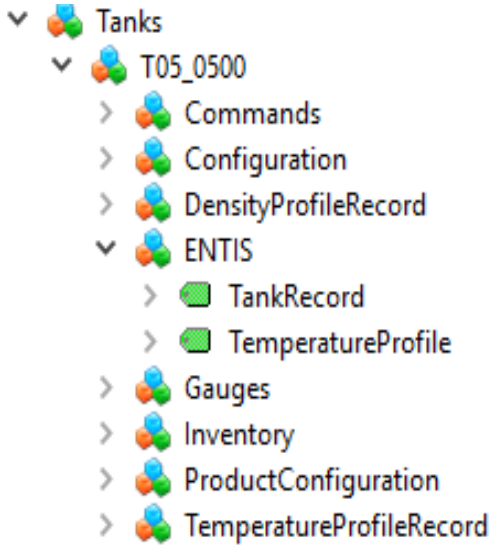


FIGURE 3-10 ENTIS node data structure

3.2.1.5 Inventory

The *Inventory* node exposes the Tank inventory data relevant for the host systems. For detailed information on data integration refer to table 3-1.

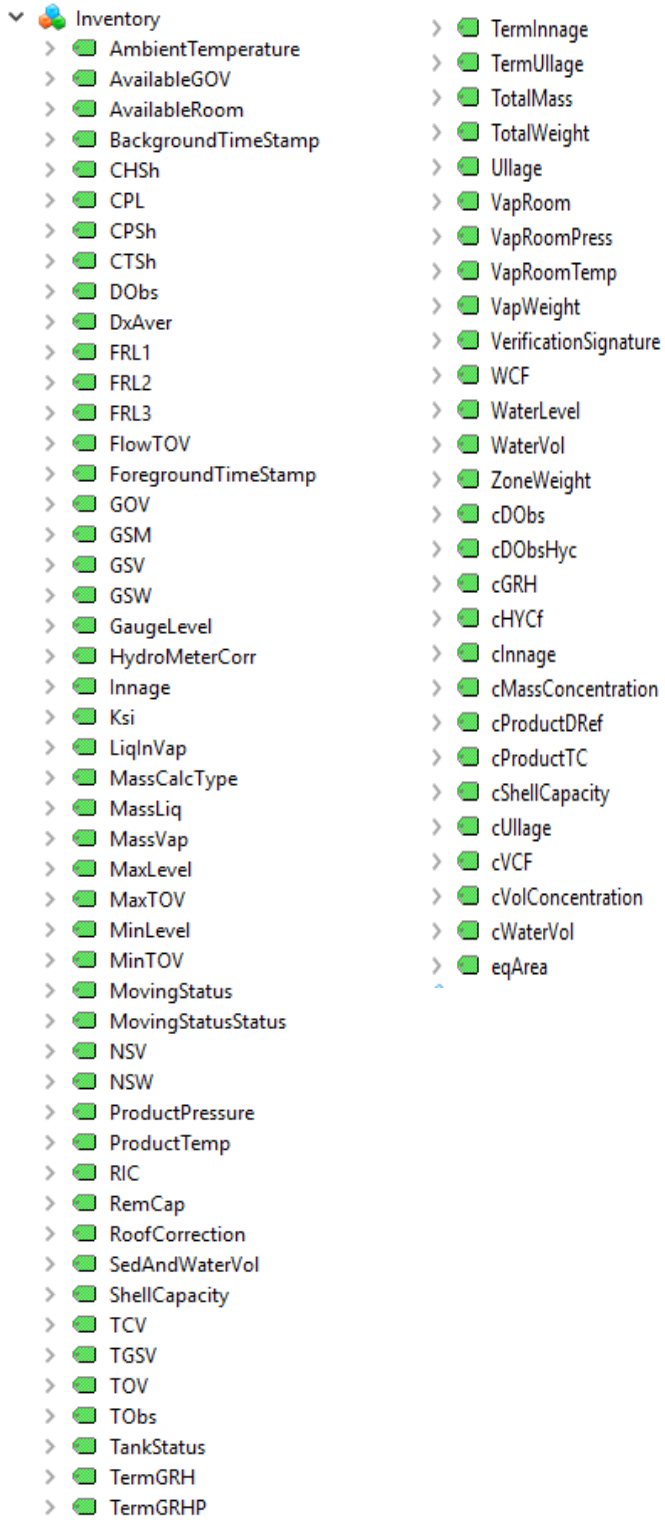


FIGURE 3-11 Inventory node data structure

3.2.1.6 ProductConfiguration

The *ProductConfiguration* node exposes the product configuration data relevant for the host systems. For detailed information on data integration refer to table 3-1.

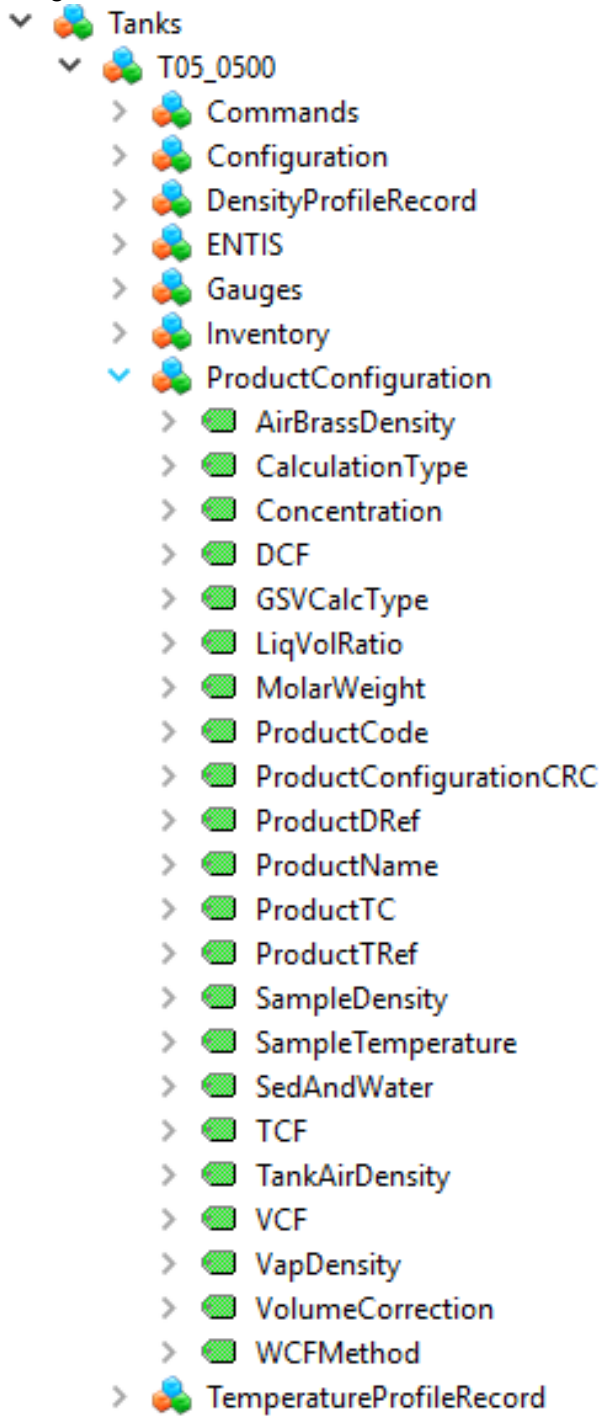


FIGURE 3-12 ProductConfiguration node data structure

3.2.1.7 TemperatureProfileRecord

The *TemperatureProfileRecord* node exposes the tank temperature profiles data for the host systems. For detailed information on data integration refer to table 3-2.

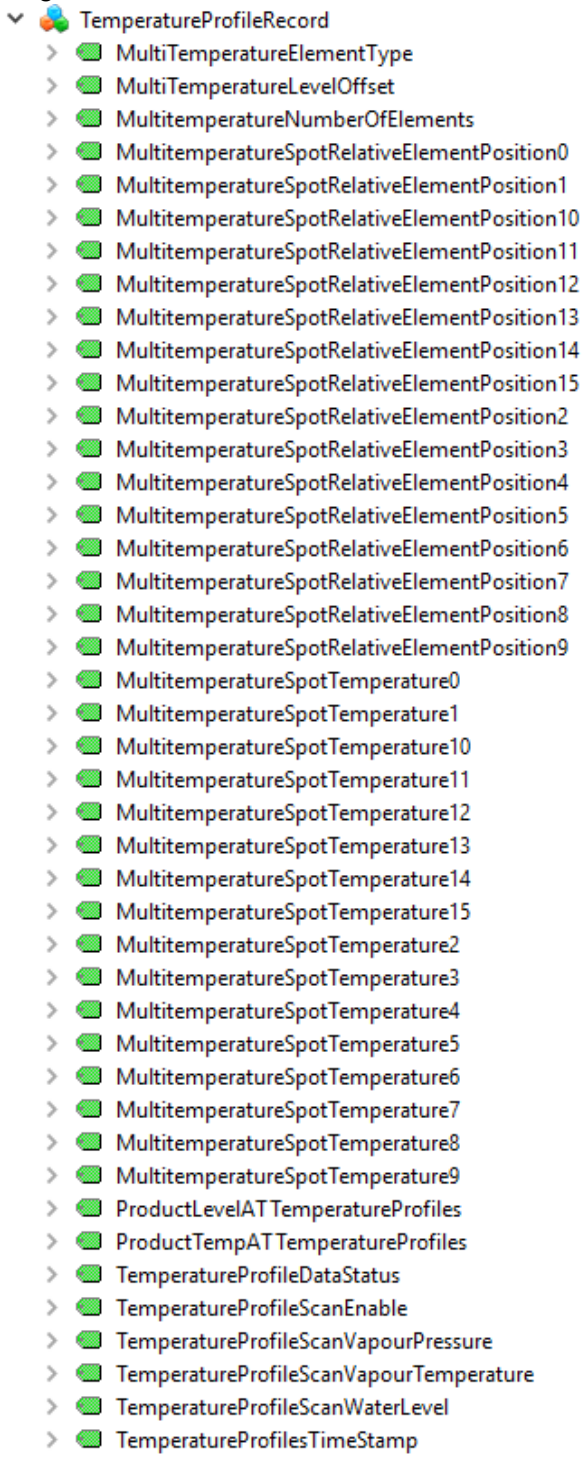


FIGURE 3-13 TemperatureProfileRecord node data structure

3.3 Gauge Type

Gauges node under Tank node in OPC UA server represents a collection of gauges that are mounted in the tank. Each gauge object under Gauges node is of Gauge Type. The following data w.r.t Gauge site element are modeled in this type:

- Operational and diagnostic commands
- Configuration data
- Measurement data

3.3.1 Data structure

This section provides a high-level overview of the data structure of the Gauges node as exposed in OPC UA server. For more information on data integration, refer to section 3.5 and section 3.6.

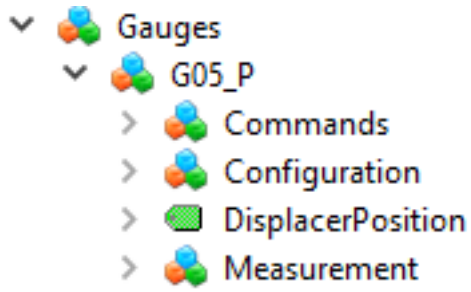


FIGURE 3-14 Gauges node data structure

3.3.1.1 Commands

The *Commands* node exposes method calls for the various supported Gauge commands that can be executed from the host systems. For detailed information on the method calls and command integration refer to table 3-8.

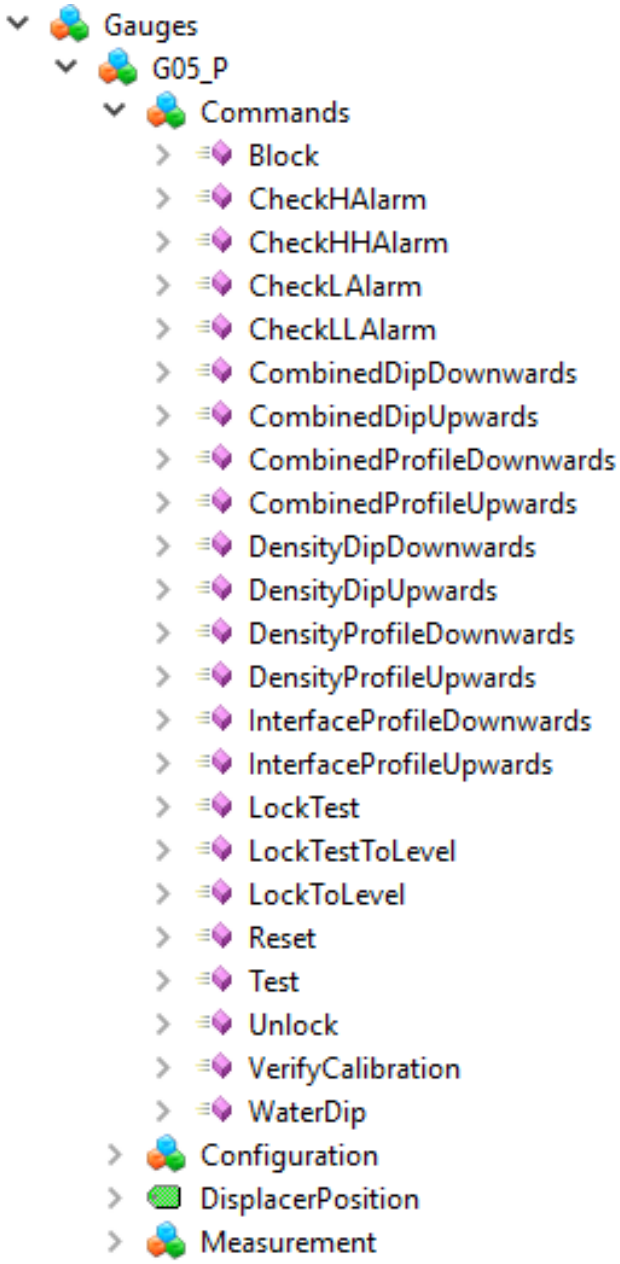


FIGURE 3-15 Commands node data structure

3.3.1.2 Configuration

The *Configuration* node exposes Gauge configuration data relevant for the host systems. For detailed information on data integration refer to table 3-1.

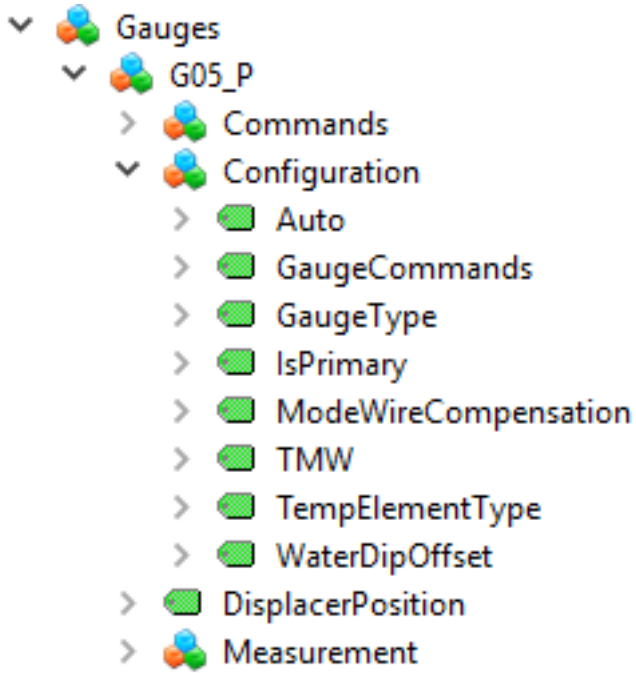


FIGURE 3-16 Configuration node data structure

3.3.1.3 Measurement

The *Measurement* node exposes the data collected from the gauge for the host systems. For detailed information on data integration refer to table 3-1.

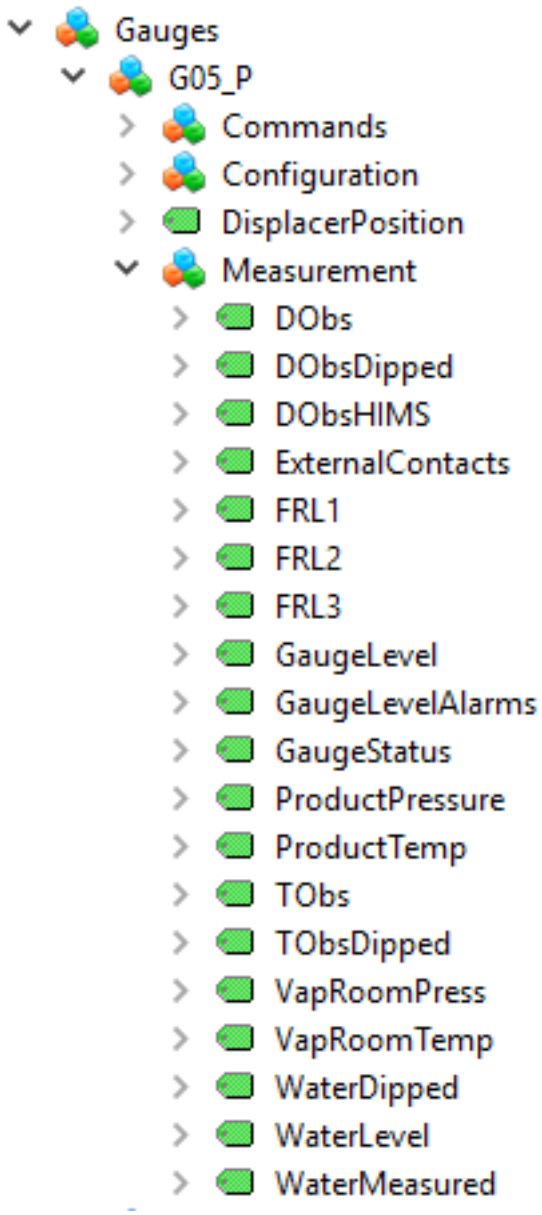


FIGURE 3-17 Measurement node data structure

3.4 NodeId Information

NodeId in OPC UA is composed of three elements that identify a Node within a Server.

- Namespace Index – The index for a namespace URI
- IdentifierType – Numeric, String, GUID, Opaque

- Identifier - The identifier value element is used within the context of the first three elements to identify the Node. Its data type and format are defined by the IdentifierType.

All nodes and entities in the address space are uniquely identified with a node id and are generated in a predictable user-friendly manner in such a way that they can completely describe the entity hierarchy in the system.

The following node id convention is used in CIU:

- All NodeIds are of string type
- All NodeIds are of namespace Index 1

NOTE: NOTE: For simplicity, the NodeId in the rest of the document refers to the Identifier section of the NodeId (That is, portion excluding Namespace Index and IdentifierType).

3.5 Information Model – Data

The following table provides information required for the data integration with the host systems. For definition of the entities exposed in OPC UA, refer to APPENDIX A and APPENDIX D.

3.5.1 Tank and Gauge data

This section provides information on the tank and gauge data exposed via OPC UA required for the integration with host systems.

TABLE 3-1 **Tank and Gauge data exposed in OPC UA**

ID	Name	Node ID	Data Type	Dimension TYPE
1	TankName	CIU888.Tanks.[TankName].Configuration.TankName	String	Text(ASCII or Unicode)
2	TankStatus	CIU888.Tanks.[TankName].Inventory.TankStatus	Byte	Bit coded
3	MovingStatus	CIU888.Tanks.[TankName].Inventory.MovingStatus	Byte	Index
4	TankType	CIU888.Tanks.[TankName].Configuration.TankType	Byte	Bit coded
5	GaugeType	CIU888.Tanks.[TankName].Gauges.[GaugeName].Configuration.GaugeType	Byte	Nodim
6	GaugeStatus	CIU888.Tanks.[TankName].Gauges.[GaugeName].Measurement.GaugeStatus	Byte	Index
7	GaugeCommands	CIU888.Tanks.[TankName].Gauges.[GaugeName].Configuration.GaugeCommands	UInt16	Bit Coded

ID	Name	Node ID	Data Type	Dimension TYPE
8	TempElementType	CIU888.Tanks.[TankName].Gauges.[GaugeName].Configuration.TempElementType	Byte	Index
16	TankShape	CIU888.Tanks.[TankName].Configuration.TankShape	Byte	Index
17	ShellCapacity	CIU888.Tanks.[TankName].Inventory.ShellCapacity	Double	Volume
18	LowTov	CIU888.Tanks.[TankName].Configuration.LowTOV	Double	Volume
19	HighTov	CIU888.Tanks.[TankName].Configuration.HighTOV	Double	Volume
20	HighLevel	CIU888.Tanks.[TankName].Configuration.HighLevel	Double	Level
22	GSVCalcType	CIU888.Tanks.[TankName].ProductConfiguration.GSVCalcType	Byte	Index
23	ProductCode	CIU888.Tanks.[TankName].ProductConfiguration.ProductCode	Byte	Index
24	VolumeCorrection	CIU888.Tanks.[TankName].ProductConfiguration.VolumeCorrection	Byte	Index
25	MassCalcType	CIU888.Tanks.[TankName].Inventory.MassCalcType	Byte	Bit Coded
26	ProductTRef	CIU888.Tanks.[TankName].ProductConfiguration.ProductTRef	Double	Temperature
30	Dref (ProductDRef)	CIU888.Tanks.[TankName].ProductConfiguration.ProductDRef	Double	Density
31	DrefStatus(ProductDRefStatus)	CIU888.Tanks.[TankName].ProductConfiguration.ProductDRef.Status	UInt16	Status
32	SedAndWater	CIU888.Tanks.[TankName].ProductConfiguration.SedAndWater	Double	Percentage
33	ProductTC	CIU888.Tanks.[TankName].ProductConfiguration.ProductTC	Double	Temperature coefficient
34	ProductTCStatus	CIU888.Tanks.[TankName].ProductConfiguration.ProductTC.Status	UInt16	status
35	LiqVolRatio	CIU888.Tanks.[TankName].ProductConfiguration.LiqVolRatio	Double	Nodim
36	GaugeLevelAlarms	CIU888.Tanks.[TankName].Gauges.[GaugeName].Measurement.GaugeLevelAlarms	Byte	Bit Coded
37	ExternalContacts	CIU888.Tanks.[TankName].Gauges.[GaugeName].Measurement.ExternalContacts	Byte	Bit Coded
38	DisplacerPosition	CIU888.Tanks.[TankName].Gauges.[GaugeName].DisplacerPosition	Double	Level
39	DisplacerPositionStatus	CIU888.Tanks.[TankName].Gauges.[GaugeName].DisplacerPosition.Status	UInt16	Status

ID	Name	Node ID	Data Type	Dimension TYPE
40	ProductLevel	CIU888.Tanks.[TankName].Inventory.ProductLevel	Double Level	Level
		Tanks.[TankName].Gauges.[GaugeName].Measurement.ProductLevel		
41	ProductLevelStatus	CIU888.Tanks.[TankName].Inventory.ProductLevel.Status	UInt16	Status
		Tanks.[TankName].Gauges.[GaugeName].Measurement.ProductLevel.Status		
42	WaterLevel	CIU888.Tanks.[TankName].Inventory.WaterLevel	Double	Level
		CIU888.Tanks.[TankName].Gauges.[GaugeName].Measurement.WaterLevel		
43	WaterLevelStatus	CIU888.Tanks.[TankName].Inventory.WaterLevel.Status	UInt16	Status
		CIU888.Tanks.[TankName].Gauges.[GaugeName].Measurement.WaterLevel.Status		
44	ProductTemp	CIU888.Tanks.[TankName].Inventory.ProductTemp	Double	Temperature
		CIU888.Tanks.[TankName].Gauges.[GaugeName].Measurement.ProductTemp		
45	ProductTempStatus	CIU888.Tanks.[TankName].Inventory.ProductTemp.Status	UInt16	Status
		CIU888.Tanks.[TankName].Gauges.[GaugeName].Measurement.ProductTemp.Status		
46	VapRoomTemp	CIU888.Tanks.[TankName].Inventory.VapRoomTemp	Double	Temperature
		CIU888.Tanks.[TankName].Gauges.[GaugeName].Measurement.VapRoomTemp		
47	VapRoomTempStatus	CIU888.Tanks.[TankName].Inventory.VapRoomTemp.Status	UInt16	Status
		CIU888.Tanks.[TankName].Gauges.[GaugeName].Measurement.VapRoomTemp.Status		
48	VapRoomPress	CIU888.Tanks.[TankName].Inventory.VapRoomPress	Double	Pressure
		CIU888.Tanks.[TankName].Gauges.[GaugeName].Measurement.VapRoomPress		
49	VapRoomPressStatus	CIU888.Tanks.[TankName].Inventory.VapRoomPress.Status	UInt16	Status
		CIU888.Tanks.[TankName].Gauges.[GaugeName].Measurement.VapRoomPress.Status		

ID	Name	Node ID	Data Type	Dimension TYPE
50	Dobs	CIU888.Tanks.[TankName].Inventory.Dobs	Double	6x density
		CIU888.Tanks.[TankName].Gauges.[GaugeName].Measurement.DObs		
51	DObsStatus	CIU888.Tanks.[TankName].Inventory.Dobs.Status	UInt16	Status
		CIU888.Tanks.[TankName].Gauges.[GaugeName].Measurement.Dobs.Status		
52	ForeGroundTemp-Stamp	CIU888.Tanks.[TankName].Inventory.ForegroundTimeStamp	DateTime	Time
53	BackgroundTemp- Stamp	CIU888.Tanks.[TankName].Inventory.BackgroundTimeStamp	DateTime	Time
54	TOV	CIU888.Tanks.[TankName].Inventory.TOV	Double	Volume
55	TOVStatus	CIU888.Tanks.[TankName].Inventory.TOV.Status	UInt16	Status
56	WaterVol	CIU888.Tanks.[TankName].Inventory.WaterVol	Double	Volume
57	WaterVolStatus	CIU888.Tanks.[TankName].Inventory.WaterVol.Status	UInt16	Status
58	GOV	CIU888.Tanks.[TankName].Inventory.GOV	Double	Volume
59	GOVStatus	CIU888.Tanks.[TankName].Inventory.GOV.Status	UInt16	Status
60	GSV	CIU888.Tanks.[TankName].Inventory.GSV	Double	Volume
61	GSVStatus	CIU888.Tanks.[TankName].Inventory.GSV.Status	UInt16	Status
62	NSV	CIU888.Tanks.[TankName].Inventory.NSV	Double	Volume
63	NSVStatus	CIU888.Tanks.[TankName].Inventory.NSV.Status	UInt16	Status
64	LiqInVap	CIU888.Tanks.[TankName].Inventory.LiqInVap	Double	Volume
65	LiqInVapStatus	CIU888.Tanks.[TankName].Inventory.LiqInVap.Status	UInt16	Status
66	TGSV	CIU888.Tanks.[TankName].Inventory.TGSV	Double	Volume
67	TGSVStatus	CIU888.Tanks.[TankName].Inventory.TGSV.Status	UInt16	Status
68	MassLiq (NSM)	CIU888.Tanks.[TankName].Inventory.MassLiq	Double	Mass
69	MassLiqStatus (NSMStatus)	CIU888.Tanks.[TankName].Inventory.MassLiq.Status	UInt16	Status
70	MassVap	CIU888.Tanks.[TankName].Inventory.MassVap	Double	Mass
71	MassVapStatus	CIU888.Tanks.[TankName].Inventory.MassVap.Status	UInt16	Status

ID	Name	Node ID	Data Type	Dimension TYPE
72	TotalMass (TNSM)	CIU888.Tanks.[TankName].Inventory.TotalMass	Double	Mass
73	TotalMassStatus (TNSMStatus)	CIU888.Tanks.[TankName].Inventory.TotalMass.Status	UInt16	Status
74	FlowTOV	CIU888.Tanks.[TankName].Inventory.FlowTOV	Double	Flow
75	AvailableRoom	CIU888.Tanks.[TankName].Inventory.AvailableRoom	Double	Volume
77	Verification Signature	CIU888.Tanks.[TankName].Inventory.VerificationSignature	UInt16	Nodim
79	Molar Weight	CIU888.Tanks.[TankName].ProductConfiguration.MolarWeight	Double	Mol. Val.
88	HydroMeterCorr	CIU888.Tanks.[TankName].Inventory.HydroMeterCorr	Byte	Nodim
89	TObsDipped	CIU888.Tanks.[TankName].Gauges.[GaugeName].Measurement.TObsDipped	Double	Temperature
90	TankTRef	CIU888.Tanks.[TankName].Configuration.TankTref	Double	Temperature
91	ThermalexpCoeffTankshell	CIU888.Tanks.[TankName].Configuration.ThermalexpCoeffTankshell	Double	TankShellCoefficient
92	TankAirDensity	CIU888.Tanks.[TankName].ProductConfiguration.TankAirDensity	Double	Density
93	VapRoom	CIU888.Tanks.[TankName].Inventory.VapRoom	Double	Volume
94	TankCRC (TankConfigurationCRC)	CIU888.Tanks.[TankName].Configuration.TankConfigurationCRC	UInt16	Nodim
97	LowLevel	CIU888.Tanks.[TankName].Configuration.LowLevel	Double	Level
100	AvailableRoomStatus	CIU888.Tanks.[TankName].Inventory.AvailableRoom.Status	UInt16	Status
102	VapRoomStatus	CIU888.Tanks.[TankName].Inventory.VapRoom.Status	UInt16	Status
103	AmbientTemperature	CIU888.Tanks.[TankName].Inventory.AmbientTemperature	Double	Temperature
104	AmbientTemperature Status	CIU888.Tanks.[TankName].Inventory.AmbientTemperature.Status	UInt16	Status
105	CIUPlus Tank ID	CIU888.Tanks.[TankName].Configuration.CIUPlusTankID	UInt16	Nodim
107	CTSh	CIU888.Tanks.[TankName].Inventory.CTSh	Double	Factor
108	CTShStatus	CIU888.Tanks.[TankName].Inventory.CTSh.Status	UInt16	Status

ID	Name	Node ID	Data Type	Dimension TYPE
109	InsulationFactor	CIU888.Tanks.[TankName].Configuration.InsulationFactor	Double	Insulation Factor
111	TObsDippedStatus	CIU888.Tanks.[TankName].Gauges.[GaugeName].Measurement.TObsDipped.Status	UInt16	Status
112	DObsDipped	CIU888.Tanks.[TankName].Gauges.[GaugeName].Measurement.DObsDipped	Double	Density
113	DObsDippedStatus	CIU888.Tanks.[TankName].Gauges.[GaugeName].Measurement.DObsDipped.Status	UInt16	Status
114	WaterDipped	CIU888.Tanks.[TankName].Gauges.[GaugeName].Measurement.WaterDipped	Double	Level
115	WaterDippedStatus	CIU888.Tanks.[TankName].Gauges.[GaugeName].Measurement.WaterDipped.Status	UInt16	Status
116	DobsHims	CIU888.Tanks.[TankName].Gauges.[GaugeName].Measurement.DObsHIMS	Double	Density
117	DobsHimsStatus	CIU888.Tanks.[TankName].Gauges.[GaugeName].Measurement.DObsHIMS.Status	UInt16	Status
118	Tobs	CIU888.Tanks.[TankName].Inventory.Tobs	Double	Temperature
		CIU888.Tanks.[TankName].Gauges.[GaugeName].Measurement.TObs		
119	TObsStatus	CIU888.Tanks.[TankName].Inventory.Tobs.Status	UInt16	Status
		CIU888.Tanks.[TankName].Gauges.[GaugeName].Measurement.Tobs.Status		
120	WaterMeasured	CIU888.Tanks.[TankName].Gauges.[GaugeName].Measurement.WaterMeasured	Double	Level
121	WaterMeasuredStatus	CIU888.Tanks.[TankName].Gauges.[GaugeName].Measurement.WaterMeasured.Status	UInt16	Status
124	CTL	CIU888.Tanks.[TankName].ProductConfiguration.VCF	Double	Factor
125	CTLStatus	CIU888.Tanks.[TankName].ProductConfiguration.VCF.Status	UInt16	Status
126	TCF	CIU888.Tanks.[TankName].ProductConfiguration.TCF	Double	Factor
127	TCFStatus	CIU888.Tanks.[TankName].ProductConfiguration.TCF.Status	UInt16	Status
128	DCF	CIU888.Tanks.[TankName].ProductConfiguration.DCF	Double	Factor
129	DCFStatus	CIU888.Tanks.[TankName].ProductConfiguration.DCF	UInt16	Status
130	TankNameStatus	CIU888.Tanks.[TankName].Configuration.TankName.Status	UInt16	Status
131	TankStatusStatus	CIU888.Tanks.[TankName].Inventory.TankStatus.Status	UInt16	Status

ID	Name	Node ID	Data Type	Dimension TYPE
132	MovingStatusStatus	CIU888.Tanks.[TankName].Inventory.MovingStatusStatus	Byte	Status
133	TankTypeStatus	CIU888.Tanks.[TankName].Configuration.TankType.Status	UInt16	Status
134	ShellCapacityStatus	CIU888.Tanks.[TankName].Inventory.ShellCapacity.Status	UInt16	Status
135	LowTOVStatus	CIU888.Tanks.[TankName].Configuration.LowTOV.Status	UInt16	Status
136	HighTOVStatus	CIU888.Tanks.[TankName].Configuration.HighTOV.Status	UInt16	Status
138	GSVCalcTypeStatus	CIU888.Tanks.[TankName].ProductConfiguration.GSVCalcType.Status	UInt16	Status
139	ProductCodeStatus	CIU888.Tanks.[TankName].ProductConfiguration.ProductCode.Status	UInt16	Status
140	VolumeCorrectionStatus	CIU888.Tanks.[TankName].ProductConfiguration.VolumeCorrection.Status	UInt16	Status
141	MassCalcTypeStatus	CIU888.Tanks.[TankName].Inventory.MassCalcType.Status	UInt16	Status
142	ProductTRefStatus	CIU888.Tanks.[TankName].ProductConfiguration.ProductTRef.Status	UInt16	Status
143	SedAndWaterStatus	CIU888.Tanks.[TankName].ProductConfiguration.SedAndWater.Status	UInt16	Status
144	LiqVolRatioStatus	CIU888.Tanks.[TankName].ProductConfiguration.LiqVolRatio.Status	UInt16	Status
145	MolarWeigthStatus	CIU888.Tanks.[TankName].ProductConfiguration.MolarWeight.Status	UInt16	Status
154	HydroMeterCorrStatus	CIU888.Tanks.[TankName].Inventory.HydroMeterCorr.Status	UInt16	Status
155	TankTrefStatus	CIU888.Tanks.[TankName].Configuration.TankTref.Status	UInt16	Status
156	TankTCStatus	CIU888.Tanks.[TankName].Configuration.TankTCStatus	UInt16	Status
157	TankAirDensityStatus	CIU888.Tanks.[TankName].ProductConfiguration.TankAirDensity.Status	UInt16	Status
158	InsulationFactorStatus	CIU888.Tanks.[TankName].Configuration.InsulationFactor.Status	UInt16	Status
166	RemCap	CIU888.Tanks.[TankName].Inventory.RemCap	Double	Volume
167	RemCapStatus	CIU888.Tanks.[TankName].Inventory.RemCap.Status	UInt16	Status
170	CHSh	CIU888.Tanks.[TankName].Inventory.CHSh	Double	Factor
171	CHShStatus	CIU888.Tanks.[TankName].Inventory.CHSh.Status	UInt16	Status

ID	Name	Node ID	Data Type	Dimension TYPE
172	CPSh	CIU888.Tanks.[TankName].Inventory.CPSh	Double	Factor
173	CPShStatus	CIU888.Tanks.[TankName].Inventory.CPSh.Status	UInt16	Status
176	CPL	CIU888.Tanks.[TankName].Inventory.CPL	Double	Factor
177	CPLStatus	CIU888.Tanks.[TankName].Inventory.CPL.Status	UInt16	Status
178	FRL1	CIU888.Tanks.[TankName].Gauges.[GaugeName].Measurement.FRL1	Double	Level
		CIU888.Tanks.[TankName].Inventory.FRL1		
179	FRL1Status	CIU888.Tanks.[TankName].Gauges.[GaugeName].Measurement.FRL1.Status	UInt16	Status
		CIU888.Tanks.[TankName].Inventory.FRL1.Status		
180	FRL2	CIU888.Tanks.[TankName].Gauges.[GaugeName].Measurement.FRL2	Double	Level
		CIU888.Tanks.[TankName].Inventory.FRL2		
181	FRL2Status	CIU888.Tanks.[TankName].Gauges.[GaugeName].Measurement.FRL2.Status	UInt16	Status
		CIU888.Tanks.[TankName].Inventory.FRL2.Status		
182	FRL3	CIU888.Tanks.[TankName].Gauges.[GaugeName].Measurement.FRL3	Double	Level
		CIU888.Tanks.[TankName].Inventory.FRL3.Status		
183	FRL3Status	CIU888.Tanks.[TankName].Gauges.[GaugeName].Measurement.FRL3.Status	UInt16	Status
		CIU888.Tanks.[TankName].Inventory.FRL3.Status		
186	RIC	CIU888.Tanks.[TankName].Inventory.RIC	Double	Volume
187	RICStatus	CIU888.Tanks.[TankName].Inventory.RIC.Status	UInt16	Status
188	AvailableGOV	CIU888.Tanks.[TankName].Inventory.AvailableGOV	Double	Volume
189	AvailableGOVStatus	CIU888.Tanks.[TankName].Inventory.AvailableGOV.Status	UInt16	Status
190	SedAndWaterVol	CIU888.Tanks.[TankName].Inventory.SedAndWaterVol	Double	Volume
192	TCV	CIU888.Tanks.[TankName].Inventory.TCV	Double	Volume
193	TCVStatus	CIU888.Tanks.[TankName].Inventory.TCV.Status	UInt16	Status
194	Ullage	CIU888.Tanks.[TankName].Inventory.Ullage	Double	Level

ID	Name	Node ID	Data Type	Dimension TYPE
195	UllageStatus	CIU888.Tanks.[TankName].Inventory.Ullage.Status	UInt16	Status
196	cUllage	CIU888.Tanks.[TankName].Inventory.cUllage	Double	Level
197	cUllageStatus	CIU888.Tanks.[TankName].Inventory.cUllage.Status	UInt16	Status
198	cInnage	CIU888.Tanks.[TankName].Inventory.cInnage	Double	Level
199	cInnageStatus	CIU888.Tanks.[TankName].Inventory.cInnage.Status	UInt16	Status
226	cGRH	CIU888.Tanks.[TankName].Inventory.cGRH	Double	Level
227	cGRHStatus	CIU888.Tanks.[TankName].Inventory.cGRH.Status	UInt16	Status
228	eqArea	CIU888.Tanks.[TankName].Inventory.eqArea	Double	Volume
229	eqAreaStatus	CIU888.Tanks.[TankName].Inventory.eqArea.Status	UInt16	Status
230	TotalWeight	CIU888.Tanks.[TankName].Inventory.TotalWeight	Double	Mass
231	TotalWeightStatus	CIU888.Tanks.[TankName].Inventory.TotalWeight.Status	UInt16	Status
238	NSW	CIU888.Tanks.[TankName].Inventory.NSW	Double	Mass
239	NSWStatus	CIU888.Tanks.[TankName].Inventory.NSW.Status	UInt16	Status
250	cDObs	CIU888.Tanks.[TankName].Inventory.cDObs	Double	Density
251	cDobsStatus	CIU888.Tanks.[TankName].Inventory.cDObs.Status	UInt16	Status
258	cProductDref	CIU888.Tanks.[TankName].Inventory.cProductDRef	Double	Density
259	cProductDrefStatus	CIU888.Tanks.[TankName].Inventory.cProductDRef.Status	UInt16	Status
260	cProductTC	CIU888.Tanks.[TankName].Inventory.cProductTC	Double	Temperature Coefficient
261	cProductTCStatus	CIU888.Tanks.[TankName].Inventory.cProductTC.Status	UInt16	Status
262	cVCF	CIU888.Tanks.[TankName].Inventory.cVCF	Double	Factor
263	cVCFStatus	CIU888.Tanks.[TankName].Inventory.cVCF.Status	UInt16	Status
264	cWaterVol	CIU888.Tanks.[TankName].Inventory.cWaterVol	Double	Volume
265	cWaterVolStatus	CIU888.Tanks.[TankName].Inventory.cWaterVol.Status	UInt16	Status
266	MaxLevel	CIU888.Tanks.[TankName].Inventory.MaxLevel	Double	Level

ID	Name	Node ID	Data Type	Dimension TYPE
267	MaxLevelStatus	CIU888.Tanks.[TankName].Inventory.MaxLevel.Status	UInt16	Status
268	MinLevel	CIU888.Tanks.[TankName].Inventory.MinLevel	Double	Level
269	MinLevelStatus	CIU888.Tanks.[TankName].Inventory.MinLevel.Status	UInt16	Status
270	MaxTOV	CIU888.Tanks.[TankName].Inventory.MaxTOV	Double	Volume
271	MaxTOVStatus	CIU888.Tanks.[TankName].Inventory.MaxTOV.Status	UInt16	Status
272	MinTOV	CIU888.Tanks.[TankName].Inventory.MinTOV	Double	Volume
273	MinTOVStatus	CIU888.Tanks.[TankName].Inventory.MinTOV.Status	UInt16	Status
274	ZoneWeight	CIU888.Tanks.[TankName].Inventory.ZoneWeight	Double	Mass
275	ZoneWeightStatus	CIU888.Tanks.[TankName].Inventory.ZoneWeight.Status	UInt16	Status
276	RoofCorrection	CIU888.Tanks.[TankName].Inventory.RoofCorrection	Double	Mass
277	RoofCorrectionStatus	CIU888.Tanks.[TankName].Inventory.RoofCorrection.Status	UInt16	Status
286	VapDensity	CIU888.Tanks.[TankName].ProductConfiguration.VapDensity	Double	Density
287	VapDensityStatus	CIU888.Tanks.[TankName].ProductConfiguration.VapDensity.Status	UInt16	Status
292	AirBrassDensity	CIU888.Tanks.[TankName].ProductConfiguration.AirBrassDensity	Double	Density
293	AirBrassDensityStatus	CIU888.Tanks.[TankName].ProductConfiguration.AirBrassDensity.Status	UInt16	Status
296	ProductPressure	CIU888.Tanks.[TankName].Gauges.[GaugeName].Measurement.ProductPressure	Double	Pressure
		CIU888.Tanks.[TankName].Inventory.ProductPressure		
297	ProductPressureStatus	CIU888.Tanks.[TankName].Gauges.[GaugeName].Measurement.ProductPressure.Status	UInt16	Status
		CIU888.Tanks.[TankName].Inventory.ProductPressure.Status		
298	Concentrtation	CIU888.Tanks.[TankName].ProductConfiguration.Concentrtation	Double	Percentage
299	ConcentrtationStatus	CIU888.Tanks.[TankName].ProductConfiguration.ConcentrtationStatus	UInt16	Status
300	GSM	CIU888.Tanks.[TankName].Inventory.GSM	Doube	Mass

ID	Name	Node ID	Data Type	Dimension TYPE
301	GSMStatus	CIU888.Tanks.[TankName].Inventory.GSM.Status	UInt16	Status
302	GSW	CIU888.Tanks.[TankName].Inventory.GSW	Double	Mass
303	GSWStatus	CIU888.Tanks.[TankName].Inventory.GSW.Status	UInt16	Status
304	VapWeight	CIU888.Tanks.[TankName].Inventory.VapWeight	Double	Mass
305	VapWeightStatus	CIU888.Tanks.[TankName].Inventory.VapWeight.Status	UInt16	Status
306	WCF	CIU888.Tanks.[TankName].Inventory.WCF	Double	Factor
307	WCFStatus	CIU888.Tanks.[TankName].Inventory.WCF.Status	UInt16	Status
308	cDObsHyc	CIU888.Tanks.[TankName].Inventory.cDObsHyc	Double	Density
309	cDObsHycStatus	CIU888.Tanks.[TankName].Inventory.cDObsHyc.Status	UInt16	Status
310	cHYCf	CIU888.Tanks.[TankName].Inventory.cHYCf	Double	Factor
311	cHYCfStatus	CIU888.Tanks.[TankName].Inventory.cHYCf.Status	UInt16	Status
312	Innage	CIU888.Tanks.[TankName].Inventory.Innage	Double	Level
313	InnageStatus	CIU888.Tanks.[TankName].Inventory.Innage.Status	UInt16	Status
314	cShellCapacity	CIU888.Tanks.[TankName].Inventory.cShellCapacity	Double	Volume
315	cShellCapacityStatus	CIU888.Tanks.[TankName].Inventory.cShellCapacity.Status	UInt16	Status
316	TermGRH	CIU888.Tanks.[TankName].Inventory.TermGRH	Double	Level
317	TermGRHStatus	CIU888.Tanks.[TankName].Inventory.TermGRH.Status	UInt16	Status
318	TermGRHP	CIU888.Tanks.[TankName].Inventory.TermGRHP	Double	Level
319	TermGRHPStatus	CIU888.Tanks.[TankName].Inventory.TermGRHP.Status	UInt16	Status
320	TermInnage	CIU888.Tanks.[TankName].Inventory.TermInnage	Double	Level
321	TermInnageStatus	CIU888.Tanks.[TankName].Inventory.TermInnage.Status	UInt16	Status
322	TermUllage	CIU888.Tanks.[TankName].Inventory.TermUllage	Double	Level
323	TermUllageStatus	CIU888.Tanks.[TankName].Inventory.TermUllage.Status	UInt16	Status

ID	Name	Node ID	Data Type	Dimension TYPE
2070	WaterDipOffset	CIU888.Tanks.[TankName].Gauges.[GaugeName].Configuration.WaterDipOffset	Double	Level
2089	WaterDipOffsetStatus	CIU888.Tanks.[TankName].Gauges.[GaugeName].Configuration.WaterDipOffset.Status	UInt16	Status
2100	MovingTripValue	CIU888.Tanks.[TankName].Configuration.MovingTripValue	Double	Level
2101	MovingIntervalTime	CIU888.Tanks.[TankName].Configuration.MovingIntervalTime	UInt32	Time
2102	GRH	CIU888.Tanks.[TankName].Configuration.GRH	Double	Level
2103	GRHStatus	CIU888.Tanks.[TankName].Configuration.GRH.Status	UInt16	Status
2104	SumpVolume	CIU888.Tanks.[TankName].Configuration. SumpVolume	Double	Volume
2105	SumpVolumeStatus	CIU888.Tanks.[TankName].Configuration. SumpVolume.Status	UInt16	Status
2106	HeelVolume	CIU888.Tanks.[TankName].Configuration.HeelVolume	Double	Volume
2107	HeelVolumeStatus	CIU888.Tanks.[TankName].Configuration.HeelVolume.Status	UInt16	Status
2108	PipeVolume	CIU888.Tanks.[TankName].Configuration.PipeVolume	Double	Volume
2109	PipeVolumeStatus	CIU888.Tanks.[TankName].Configuration.PipeVolume.Status	UInt16	Status
2114	TGRH	CIU888.Tanks.[TankName].Configuration.TGRH	Double	Temperature Coefficient
2115	TGRHStatus	CIU888.Tanks.[TankName].Configuration.TGRH.Status	UInt16	Status
2116	TMW	CIU888.Tanks.[TankName].Gauges.[GaugeName].Configuration. TMW	Double	Temperature Coefficient
2117	TMWStatus	CIU888.Tanks.[TankName].Gauges.[GaugeName].Configuration. TMW.Status	UInt16	Status
2118	IFDry	CIU888.Tanks.[TankName].Configuration.IFdry	Double	Factor
2119	IFDry Status	CIU888.Tanks.[TankName].Configuration. IFDry.Status	UInt16	Status
2120	IFWet	CIU888.Tanks.[TankName].Configuration.IFwet	Double	Factor
2121	IFWet Status	CIU888.Tanks.[TankName].Configuration. IFWet.Status	UInt16	Status
2122	TTS	CIU888.Tanks.[TankName].Configuration.TTS	Double	Volume

ID	Name	Node ID	Data Type	Dimension TYPE
2123	TTSStatus	CIU888.Tanks.[TankName].Configuration.TTS.Status	UInt16	Status
2132	LRef1	CIU888.Tanks.[TankName].Configuration.LRef1	Double	Level
2133	LRef1Status	CIU888.Tanks.[TankName].Configuration.LRef1.Status	UInt16	Status
2134	LRef2	CIU888.Tanks.[TankName].Configuration.LRef2	Double	Level
2135	LRef2Status	CIU888.Tanks.[TankName].Configuration.LRef2.Status	UInt16	Status
2136	LRef3	CIU888.Tanks.[TankName].Configuration.LRef3	Double	Level
2137	LRef3Status	CIU888.Tanks.[TankName].Configuration.LRef3.Status	UInt16	Status
2138	RD1	CIU888.Tanks.[TankName].Configuration.RD1	Double	Level
2139	RD1Status	CIU888.Tanks.[TankName].Configuration.RD1.Status	UInt16	Status
2140	RD2	CIU888.Tanks.[TankName].Configuration.RD2	Double	Level
2141	RD2Status	CIU888.Tanks.[TankName].Configuration.RD2.Status	UInt16	Status
2142	RD3	CIU888.Tanks.[TankName].Configuration.RD3	Double	Level
2143	RD3Status	CIU888.Tanks.[TankName].Configuration.RD3.Status	UInt16	Status
2148	Sd	CIU888.Tanks.[TankName].Configuration.Sd	Double	Area
2149	SdStatus	CIU888.Tanks.[TankName].Configuration.Sd.Status	UInt16	Status
2150	HPAvg	CIU888.Tanks.[TankName].Configuration.HPavg	Double	Level
2151	HPAvgStatus	CIU888.Tanks.[TankName].Configuration.HPavg.Status	UInt16	Status
2152	WCFMethod	CIU888.Tanks.[TankName].ProductConfiguration.WCFMethod	Byte	NoDim
2153	WCFMethodStatus	CIU888.Tanks.[TankName].Configuration.WCFMethod.Status	UInt16	Status
2156	GRHPFactor	CIU888.Tanks.[TankName].Configuration.GRHPFactor	Double	Nodim
2157	GRHPFactorStatus	CIU888.Tanks.[TankName].Configuration.GRHPFactor.Status	UInt16	Status
2158	ModeCTSh	CIU888.Tanks.[TankName].Configuration.ModeCTSh	Byte	Nodim

ID	Name	Node ID	Data Type	Dimension TYPE
2159	ModeCTShStatus	CIU888.Tanks.[TankName].Configuration.ModeCTSh.Status	UInt16	Status
2160	ModeFRC	CIU888.Tanks.[TankName].Configuration.ModeFRC	Byte	Nodim
2161	ModeFRCStatus	CIU888.Tanks.[TankName].Configuration.ModeFRC.Status	UInt16	Status
2162	ModeGRHP	CIU888.Tanks.[TankName].Configuration.ModeGRHP	Byte	Nodim
2163	ModeGRHPStatus	CIU888.Tanks.[TankName].Configuration.ModeGRHP.Status	UInt16	Status
2164	ModeGRHT	CIU888.Tanks.[TankName].Configuration.ModeGRHT	Byte	Nodim
2165	ModeGRHTStatus	CIU888.Tanks.[TankName].Configuration.ModeGRHT.Status	UInt16	Status
2166	ModeRIC	CIU888.Tanks.[TankName].Configuration.ModeRIC	Byte	Nodim
2167	ModeRICStatus	CIU888.Tanks.[TankName].Configuration.ModeRIC.Status	UInt16	Status
2168	ModeWireCompensation	CIU888.Tanks.[TankName].Gauges.[GaugeName].Configuration.ModeWireCompensation	Byte	NoDim
2169	ModeWireCompensationStatus	CIU888.Tanks.[TankName].Gauges.[GaugeName].Configuration.ModeWireCompensation.Status	UInt16	Status
2172	VConst	CIU888.Tanks.[TankName].Configuration.VConst	Double	Volume
2173	VConstStatus	CIU888.Tanks.[TankName].Configuration.VConst.Status	UInt16	Status
2174	DxAver	CIU888.Tanks.[TankName].Inventory.DxAver	Double	Level
2175	DxAverStatus	CIU888.Tanks.[TankName].Inventory.DxAver.Status	UInt16	Status
2176	cMassConcentration	CIU888.Tanks.[TankName].Inventory.cMassConcentration	Double	Percentage
2177	cMassConcentrationStatus	CIU888.Tanks.[TankName].Inventory.cMassConcentration.Status	UInt16	Status
2178	cVolConcentration	CIU888.Tanks.[TankName].Inventory.cVolConcentration	Double	Percentage
2179	cVolConcentrationStatus	CIU888.Tanks.[TankName].Inventory.cVolConcentration.Status	UInt16	Status
2180	CalLiqDens	CIU888.Tanks.[TankName].Configuration.CalLiqDens	Double	Density
2181	CalLiqDensStatus	CIU888.Tanks.[TankName].Configuration.CalLiqDens.Status	UInt16	Status
2182	Ksi	CIU888.Tanks.[TankName].Inventory.Ksi	Double	NoDim

ID	Name	Node ID	Data Type	Dimension TYPE
2183	KsiStatus	CIU888.Tanks.[TankName].Inventory.Ksi.Status	UInt16	Status
2542	IsPrimary	CIU888.Tanks.[TankName].Gauges.[GaugeName].Configuration. IsPrimary	Byte	NoDim
2600	Gauge2Status	CIU888.Tanks.[TankName].Gauges.[Gauge2Name].Measurement.GaugeStatus	UInt16	Nodim
2603	ProductLevel2	CIU888.Tanks.[TankName].Gauges.[Gauge2Name].Measurement.ProductLevel	Double	Level
2604	ProductLevel2Status	CIU888.Tanks.[TankName].Gauges.[Gauge2Name].Measurement.ProductLevel.Status	UInt16	Status

3.5.2 Temperature profiles

This section provides information on the temperature profiles data exposed via OPC UA required for the integration with host systems.

TABLE 3-2 Temperature profiles data exposed in OPC

ID	Name	Node ID	Data Type	Dimension TYPE
434	MultitemperatureSpotTemperature0	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotTemperature0	Double	Temperature
435	MultitemperatureSpotTemperature0Status	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotTemperature0.Status	UInt16	Status
436	MultitemperatureSpotTemperature1	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotTemperature1	Double	Temperature
437	MultitemperatureSpotTemperature1Status	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotTemperature1.Status	UInt16	Status
438	MultitemperatureSpotTemperature2	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotTemperature2	Double	Temperature
439	MultitemperatureSpotTemperature2Status	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotTemperature2.Status	UInt16	Status
440	MultitemperatureSpotTemperature3	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotTemperature3	Double	Temperature

ID	Name	Node ID	Data Type	Dimension TYPE
441	MultitemperatureSpotTemperature3Status	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotTemperature3.Status	UInt16	Status
442	MultitemperatureSpotTemperature4	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotTemperature4	Double	Temperature
443	MultitemperatureSpotTemperature4Status	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotTemperature4.Status	UInt16	Status
444	MultitemperatureSpotTemperature5	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotTemperature5	Double	Temperature
445	MultitemperatureSpotTemperature5Status	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotTemperature5.Status	UInt16	Status
446	MultitemperatureSpotTemperature6	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotTemperature6	Double	Temperature
447	MultitemperatureSpotTemperature6Status	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotTemperature6.Status	UInt16	Status
448	MultitemperatureSpotTemperature7	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotTemperature7	Double	Temperature
449	MultitemperatureSpotTemperature7Status	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotTemperature7.Status	UInt16	Status
450	MultitemperatureSpotTemperature8	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotTemperature8	Double	Temperature
451	MultitemperatureSpotTemperature8Status	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotTemperature8.Status	UInt16	Status
452	MultitemperatureSpotTemperature9	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotTemperature9	Double	Temperature
453	MultitemperatureSpotTemperature9Status	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotTemperature9.Status	UInt16	Status
454	MultitemperatureSpotTemperature10	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotTemperature10	Double	Temperature
455	MultitemperatureSpotTemperature10Status	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotTemperature10.Status	UInt16	Status

ID	Name	Node ID	Data Type	Dimension TYPE
456	MultitemperatureSpotTemperature11	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotTemperature11	Double	Temperature
457	MultitemperatureSpotTemperature11Status	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotTemperature11.Status	UInt16	Status
458	MultitemperatureSpotTemperature12	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotTemperature12	Double	Temperature
459	MultitemperatureSpotTemperature12Status	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotTemperature12.Status	UInt16	Status
460	MultitemperatureSpotTemperature13	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotTemperature13	Double	Temperature
461	MultitemperatureSpotTemperature13Status	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotTemperature13.Status	UInt16	Status
462	MultitemperatureSpotTemperature14	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotTemperature14	Double	Temperature
463	MultitemperatureSpotTemperature14Status	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotTemperature14.Status	UInt16	Status
464	MultitemperatureSpotTemperature15	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotTemperature15	Double	Temperature
465	MultitemperatureSpotTemperature15Status	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotTemperature15.Status	UInt16	Status
466	MultitemperatureSpotRelativeElementPosition0	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotRelativeElementPosition0	Double	Level
467	MultitemperatureSpotRelativeElementPosition0Status	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotRelativeElementPosition0.Status	UInt16	Status
468	MultitemperatureSpotRelativeElementPosition1	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotRelativeElementPosition1	Double	Level
469	MultitemperatureSpotRelativeElementPosition1Status	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotRelativeElementPosition1.Status	UInt16	Status
470	MultitemperatureSpotRelativeElementPosition2	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotRelativeElementPosition2	Double	Level

ID	Name	Node ID	Data Type	Dimension TYPE
471	MultitemperatureSpotRelativeElementPosition2Status	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotRelativeElementPosition2.Status	UInt16	Status
472	MultitemperatureSpotRelativeElementPosition3	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotRelativeElementPosition3	Double	Level
473	MultitemperatureSpotRelativeElementPosition3Status	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotRelativeElementPosition3.Status	UInt16	Status
474	MultitemperatureSpotRelativeElementPosition4	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotRelativeElementPosition4	Double	Level
475	MultitemperatureSpotRelativeElementPosition4Status	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotRelativeElementPosition4.Status	UInt16	Status
476	MultitemperatureSpotRelativeElementPosition5	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotRelativeElementPosition5	Double	Level
477	MultitemperatureSpotRelativeElementPosition5Status	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotRelativeElementPosition5.Status	UInt16	Status
478	MultitemperatureSpotRelativeElementPosition6	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotRelativeElementPosition6	Double	Level
479	MultitemperatureSpotRelativeElementPosition6Status	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotRelativeElementPosition6.Status	UInt16	Status
480	MultitemperatureSpotRelativeElementPosition7	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotRelativeElementPosition7	Double	Level
481	MultitemperatureSpotRelativeElementPosition7Status	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotRelativeElementPosition7.Status	UInt16	Status
482	MultitemperatureSpotRelativeElementPosition8	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotRelativeElementPosition8	Double	Level
483	MultitemperatureSpotRelativeElementPosition8Status	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotRelativeElementPosition8.Status	UInt16	Status
484	MultitemperatureSpotRelativeElementPosition9	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotRelativeElementPosition9	Double	Level
485	MultitemperatureSpotRelativeElementPosition9Status	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotRelativeElementPosition9.Status	UInt16	Status

ID	Name	Node ID	Data Type	Dimension TYPE
486	MultitemperatureSpotRelativeElementPosition10	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotRelativeElementPosition10	Double	Level
487	MultitemperatureSpotRelativeElementPosition10Status	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotRelativeElementPosition10.Status	UInt16	Status
488	MultitemperatureSpotRelativeElementPosition11	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotRelativeElementPosition11	Double	Level
489	MultitemperatureSpotRelativeElementPosition11Status	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotRelativeElementPosition11.Status	UInt16	Status
490	MultitemperatureSpotRelativeElementPosition12	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotRelativeElementPosition12	Double	Level
491	MultitemperatureSpotRelativeElementPosition12Status	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotRelativeElementPosition12.Status	UInt16	Status
492	MultitemperatureSpotRelativeElementPosition13	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotRelativeElementPosition13	Double	Level
493	MultitemperatureSpotRelativeElementPosition13Status	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotRelativeElementPosition13.Status	UInt16	Status
494	MultitemperatureSpotRelativeElementPosition14	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotRelativeElementPosition14	Double	Level
495	MultitemperatureSpotRelativeElementPosition14Status	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotRelativeElementPosition14.Status	UInt16	Status
496	MultitemperatureSpotRelativeElementPosition15	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotRelativeElementPosition15	Double	Level
497	MultitemperatureSpotRelativeElementPosition15Status	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureSpotRelativeElementPosition15.Status	UInt16	Status
498	MultiTemperatureLevelOffset	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultiTemperatureLevelOffset	Double	Level
499	MultiTemperatureElementType	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultiTemperatureElementType	String	120/121 text
2535	TemperatureProfilesScanEnable	CIU888.Tanks.[TankName].TemperatureProfileRecord.TemperatureProfileScanEnable	Byte	Nodim
10571	TemperatureProfileTimeStamp	CIU888.Tanks.[TankName].TemperatureProfileRecord.TemperatureProfilesTimeStamp	DateTime	Time

ID	Name	Node ID	Data Type	Dimension TYPE
10572	TemperatureProfilesScanProductLevel	CIU888.Tanks.[TankName].TemperatureProfileRecord.ProductLevelATTemperatureProfiles	Double	Level
10573	TemperatureProfilesScanProductLevelStatus	CIU888.Tanks.[TankName].TemperatureProfileRecord.ProductLevelATTemperatureProfiles.Status	UInt16	Status
10574	TemperatureProfilesScanProductTemperature	CIU888.Tanks.[TankName].TemperatureProfileRecord.ProductTempATTemperatureProfiles	Double	Temperature
10575	TemperatureProfilesScanProductTemperatureStatus	CIU888.Tanks.[TankName].TemperatureProfileRecord.ProductTempATTemperatureProfiles.Status	UInt16	Status
10584	TemperatureProfileDataStatus	CIU888.Tanks.[TankName].TemperatureProfileRecord.TemperatureProfileDataStatus	Byte	Nodim
10585	MultitemperatureNumberOfElements	CIU888.Tanks.[TankName].TemperatureProfileRecord.MultitemperatureNumberOfElements	Byte	Nodim
10595	TemperatureProfileScanWaterLevel	CIU888.Tanks.[TankName].TemperatureProfileRecord.TemperatureProfileScanWaterLevel	Double	Level
10596	TemperatureProfileScanWaterLevelStatus	CIU888.Tanks.[TankName].TemperatureProfileRecord.TemperatureProfileScanWaterLevel.Status	UInt16	Status
10597	TemperatureProfileScanVapourTemperature	CIU888.Tanks.[TankName].TemperatureProfileRecord.TemperatureProfileScanVapourTemperature	Double	Temperature
10598	TemperatureProfileScanVapourTemperatureStatus	CIU888.Tanks.[TankName].TemperatureProfileRecord.TemperatureProfileScanVapourTemperature.Status	UInt16	Status
10599	TemperatureProfileScanVapourPressure	CIU888.Tanks.[TankName].TemperatureProfileRecord.TemperatureProfileScanVapourPressure	Double	Pressure
10600	TemperatureProfileScanVapourPressureStatus	CIU888.Tanks.[TankName].TemperatureProfileRecord.TemperatureProfileScanVapourPressure.Status	UInt16	Status

3.5.3 Density profiles

This section provides information on the density profiles data exposed via OPC UA required for the integration with host systems.

TABLE 3-3 Density profile data exposed in OPC UA

ID	Name	Node ID	Data Type	Dimension TYPE
10651	DensityProfileDataStatus	CIU888.Tanks.[TankName].DensityProfileRecord.DensityProfileDataStatus	Byte	Nodim
390	DensityInnageLevel0	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel0	Double	Level
391	DensityInnageLevel0Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel0.Status	UInt16	Status
392	DensityInnageLevel1	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel1	Double	Level
393	DensityInnageLevel1Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel1.Status	UInt16	Status
394	DensityInnageLevel2	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel2	Double	Level
395	DensityInnageLevel2Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel2.Status	UInt16	Status
396	DensityInnageLevel3	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel3	Double	Level
397	DensityInnageLevel3Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel3.Status	UInt16	Status
398	DensityInnageLevel4	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel4	Double	Level
399	DensityInnageLevel4Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel4.Status	UInt16	Status
400	DensityInnageLevel5	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel5	Double	Level
401	DensityInnageLevel5Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel5.Status	UInt16	Status
402	DensityInnageLevel6	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel6	Double	Level
403	DensityInnageLevel6Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel6.Status	UInt16	Status
404	DensityInnageLevel7	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel7	Double	Level
405	DensityInnageLevel7Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel7.Status	UInt16	Status
406	DensityInnageLevel8	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel8	Double	Level
407	DensityInnageLevel8Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel8.Status	UInt16	Status
408	DensityInnageLevel9	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel9	Double	Level
409	DensityInnageLevel9Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel9.Status	UInt16	Status

ID	Name	Node ID	Data Type	Dimension TYPE
701	DensityInnageLevel10	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel10	Double	Level
702	DensityInnageLevel10Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel10.Status	UInt16	Status
703	DensityInnageLevel11	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel11	Double	Level
704	DensityInnageLevel11Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel11.Status	UInt16	Status
705	DensityInnageLevel12	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel12	Double	Level
706	DensityInnageLevel12Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel12.Status	UInt16	Status
707	DensityInnageLevel13	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel13	Double	Level
708	DensityInnageLevel13Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel13.Status	UInt16	Status
709	DensityInnageLevel14	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel14	Double	Level
710	DensityInnageLevel14Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel14.Status	UInt16	Status
711	DensityInnageLevel15	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel15	Double	Level
712	DensityInnageLevel15Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel15.Status	UInt16	Status
713	DensityInnageLevel16	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel16	Double	Level
714	DensityInnageLevel16Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel16.Status	UInt16	Status
715	DensityInnageLevel17	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel17	Double	Level
716	DensityInnageLevel17Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel17.Status	UInt16	Status
717	DensityInnageLevel18	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel18	Double	Level
718	DensityInnageLevel18Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel18.Status	UInt16	Status
719	DensityInnageLevel19	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel19	Double	Level
420	DensityInnageLevel19Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel19.Status	UInt16	Status
721	DensityInnageLevel20	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel20	Double	Level

ID	Name	Node ID	Data Type	Dimension TYPE
722	DensityInnageLevel20Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel20.Status	UInt16	Status
723	DensityInnageLevel21	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel21	Double	Level
724	DensityInnageLevel21Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel21.Status	UInt16	Status
725	DensityInnageLevel22	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel22	Double	Level
726	DensityInnageLevel22Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel22.Status	UInt16	Status
727	DensityInnageLevel23	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel23	Double	Level
728	DensityInnageLevel23Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel23.Status	UInt16	Status
729	DensityInnageLevel24	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel24	Double	Level
730	DensityInnageLevel24Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel24.Status	UInt16	Status
731	DensityInnageLevel25	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel25	Double	Level
732	DensityInnageLevel25Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel25.Status	UInt16	Status
733	DensityInnageLevel26	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel26	Double	Level
734	DensityInnageLevel26Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel26.Status	UInt16	Status
735	DensityInnageLevel27	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel27	Double	Level
736	DensityInnageLevel27Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel27.Status	UInt16	Status
737	DensityInnageLevel28	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel28	Double	Level
738	DensityInnageLevel28Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel28.Status	UInt16	Status
739	DensityInnageLevel29	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel29	Double	Level
740	DensityInnageLevel29Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel29.Status	UInt16	Status
741	DensityInnageLevel30	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel30	Double	Level
742	DensityInnageLevel30Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel30.Status	UInt16	Status

ID	Name	Node ID	Data Type	Dimension TYPE
743	DensityInnageLevel31	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel31	Double	Level
744	DensityInnageLevel31Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel31.Status	UInt16	Status
745	DensityInnageLevel32	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel32	Double	Level
746	DensityInnageLevel32Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel32.Status	UInt16	Status
747	DensityInnageLevel33	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel33	Double	Level
748	DensityInnageLevel33Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel33.Status	UInt16	Status
749	DensityInnageLevel34	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel34	Double	Level
750	DensityInnageLevel34Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel34.Status	UInt16	Status
751	DensityInnageLevel35	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel35.Status	Double	Level
752	DensityInnageLevel35Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel35.Status	UInt16	Status
753	DensityInnageLevel36	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel36	Double	Level
754	DensityInnageLevel36Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel36.Status	UInt16	Status
755	DensityInnageLevel37	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel37	Double	Level
756	DensityInnageLevel37Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel37.Status	UInt16	Status
757	DensityInnageLevel38	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel38	Double	Level
758	DensityInnageLevel38Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel38.Status	UInt16	Status
759	DensityInnageLevel39	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel39	Double	Level
760	DensityInnageLevel39Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel39.Status	UInt16	Status
761	DensityInnageLevel40	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel40	Double	Level
762	DensityInnageLevel40Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel40.Status	UInt16	Status
763	DensityInnageLevel41	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel41	Double	Level

ID	Name	Node ID	Data Type	Dimension TYPE
764	DensityInnageLevel41Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel41.Status	UInt16	Status
765	DensityInnageLevel42	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel42	Double	Level
766	DensityInnageLevel42Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel42.Status	UInt16	Status
767	DensityInnageLevel43	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel43	Double	Level
768	DensityInnageLevel43Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel43.Status	UInt16	Status
769	DensityInnageLevel44	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel44	Double	Level
770	DensityInnageLevel44Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel44.Status	UInt16	Status
771	DensityInnageLevel45	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel45	Double	Level
772	DensityInnageLevel45Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel45.Status	UInt16	Status
773	DensityInnageLevel46	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel46	Double	Level
774	DensityInnageLevel46Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel46.Status	UInt16	Status
775	DensityInnageLevel47	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel47	Double	Level
776	DensityInnageLevel47Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel47.Status	UInt16	Status
777	DensityInnageLevel48	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel48	Double	Level
778	DensityInnageLevel48Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel48.Status	UInt16	Status
779	DensityInnageLevel49	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel49	Double	Level
780	DensityInnageLevel49Status	CIU888.Tanks.[TankName].DensityProfileRecord.DensityInnageLevel49.Status	UInt16	Status
412	MeasuredServoDensity0	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity0	Double	Density
413	MeasuredServoDensity0 Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity0.Status	UInt16	Status
414	MeasuredServoDensity1	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity1	Double	Density
415	MeasuredServoDensity1 Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity	UInt16	Status

ID	Name	Node ID	Data Type	Dimension TYPE
416	MeasuredServoDensity2	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity	Double	Density
417	MeasuredServoDensity2 Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity	UInt16	Status
418	MeasuredServoDensity3	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity	Double	Density
419	MeasuredServoDensity3 Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity	UInt16	Status
420	MeasuredServoDensity4	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity	Double	Density
421	MeasuredServoDensity4 Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity	UInt16	Status
422	MeasuredServoDensity5	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity	Double	Density
423	MeasuredServoDensity5 Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity	UInt16	Status
424	MeasuredServoDensity6	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity	Double	Density
425	MeasuredServoDensity6 Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity	UInt16	Status
426	MeasuredServoDensity7	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity	Double	Density
427	MeasuredServoDensity7 Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity7.Status	UInt16	Status
428	MeasuredServoDensity8	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity8	Double	Density
429	MeasuredServoDensity8 Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity8.Status	UInt16	Status
430	MeasuredServoDensity9	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity9	Double	Density
431	MeasuredServoDensity9 Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity9.Status	UInt16	Status
781	MeasuredServoDensity10	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity10	Double	Density
782	MeasuredServoDensity10Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity10.Status	UInt16	Status
783	MeasuredServoDensity11	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity11	Double	Density
784	MeasuredServoDensity11Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity11.Status	UInt16	Status
785	MeasuredServoDensity12	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity12	Double	Density

ID	Name	Node ID	Data Type	Dimension TYPE
786	MeasuredServoDensity12Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity12.Status	UInt16	Status
787	MeasuredServoDensity13	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity13	Double	Density
788	MeasuredServoDensity13Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity13.Status	UInt16	Status
789	MeasuredServoDensity14	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity14	Double	Density
790	MeasuredServoDensity14Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity14.Status	UInt16	Status
791	MeasuredServoDensity15	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity15	Double	Density
792	MeasuredServoDensity15Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity15.Status	UInt16	Status
793	MeasuredServoDensity16	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity16	Double	Density
794	MeasuredServoDensity16Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity16.Status	UInt16	Status
795	MeasuredServoDensity17	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity17	Double	Density
796	MeasuredServoDensity17Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity17.Status	UInt16	Status
797	MeasuredServoDensity18	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity18	Double	Density
798	MeasuredServoDensity18Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity18.Status	UInt16	Status
799	MeasuredServoDensity19	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity19	Double	Density
800	MeasuredServoDensity19Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity19.Status	UInt16	Status
801	MeasuredServoDensity20	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity20	Double	Density
802	MeasuredServoDensity0Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity20.Status	UInt16	Status
803	MeasuredServoDensity21	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity21	Double	Density
804	MeasuredServoDensity21Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity21.Status	UInt16	Status
805	MeasuredServoDensity22	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity22	Double	Density
806	MeasuredServoDensity22Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity22.Status	UInt16	Status

ID	Name	Node ID	Data Type	Dimension TYPE
807	MeasuredServoDensity23	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity23	Double	Density
808	MeasuredServoDensity23Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity23.Status	UInt16	Status
809	MeasuredServoDensity24	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity24	Double	Density
810	MeasuredServoDensity24Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity24.Status	UInt16	Status
811	MeasuredServoDensity25	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity25	Double	Density
812	MeasuredServoDensity25Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity25.Status	UInt16	Status
813	MeasuredServoDensity26	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity26	Double	Density
814	MeasuredServoDensity26Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity26.Status	UInt16	Status
815	MeasuredServoDensity27	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity27	Double	Density
816	MeasuredServoDensity27Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity27.Status	UInt16	Status
817	MeasuredServoDensity28	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity28	Double	Density
818	MeasuredServoDensity28Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity28.Status	UInt16	Status
819	MeasuredServoDensity29	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity29	Double	Density
820	MeasuredServoDensity29Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity29.Status	UInt16	Status
821	MeasuredServoDensity30	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity30	Double	Density
822	MeasuredServoDensity30Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity30.Status	UInt16	Status
823	MeasuredServoDensity31	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity31	Double	Density
824	MeasuredServoDensity31Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity31.Status	UInt16	Status
825	MeasuredServoDensity32	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity32	Double	Density
826	MeasuredServoDensity32Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity32.Status	UInt16	Status
827	MeasuredServoDensity33	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity33	Double	Density

ID	Name	Node ID	Data Type	Dimension TYPE
828	MeasuredServoDensity33Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity33.Status	UInt16	Status
829	MeasuredServoDensity34	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity34	Double	Density
830	MeasuredServoDensity34Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity34.Status	UInt16	Status
831	MeasuredServoDensity35	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity35	Double	Density
832	MeasuredServoDensity35Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity35.Status	UInt16	Status
833	MeasuredServoDensity36	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity36	Double	Density
834	MeasuredServoDensity36Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity36.Status	UInt16	Status
835	MeasuredServoDensity37	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity37	Double	Density
836	MeasuredServoDensity37Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity37.Status	UInt16	Status
837	MeasuredServoDensity38	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity38	Double	Density
838	MeasuredServoDensity38Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity38.Status	UInt16	Status
839	MeasuredServoDensity39	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity39	Double	Density
840	MeasuredServoDensity39Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity39.Status	UInt16	Status
841	MeasuredServoDensity40	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity40	Double	Density
842	MeasuredServoDensity40Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity40.Status	UInt16	Status
843	MeasuredServoDensity41	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity41	Double	Density
844	MeasuredServoDensity41Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity41.Status	UInt16	Status
845	MeasuredServoDensity42	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity42	Double	Density
846	MeasuredServoDensity42Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity42.Status	UInt16	Status
847	MeasuredServoDensity43	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity43	Double	Density
848	MeasuredServoDensity43Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity43.Status	UInt16	Status

ID	Name	Node ID	Data Type	Dimension TYPE
849	MeasuredServoDensity44	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity44	Double	Density
850	MeasuredServoDensity44Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity44.Status	UInt16	Status
851	MeasuredServoDensity45	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity45	Double	Density
852	MeasuredServoDensity45Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity45.Status	UInt16	Status
853	MeasuredServoDensity46	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity46	Double	Density
854	MeasuredServoDensity46Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity46.Status	UInt16	Status
855	MeasuredServoDensity47	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity47	Double	Density
856	MeasuredServoDensity47Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity47.Status	UInt16	Status
857	MeasuredServoDensity48	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity48	Double	Density
858	MeasuredServoDensity48Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity48.Status	UInt16	Status
859	MeasuredServoDensity49	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity49	Double	Density
860	MeasuredServoDensity49Status	CIU888.Tanks.[TankName].DensityProfileRecord.MeasuredServoDensity49.Status	UInt16	Status
10652	DensityProfileTimeStamp	CIU888.Tanks.[TankName].DensityProfileRecord.DensityProfileTimeStamp	DateTime	Time
10655	MultiDensityNumberOfElements	CIU888.Tanks.[TankName].DensityProfileRecord.MultiDensityNumberOfElements	Byte	Nodim

3.5.4 CIU operational and configuration data

This section provides information on the CIU data (operational and configuration) exposed via OPC UA required for the integration with host systems.

TABLE 3-4 CIU operational and configuration data exposed in OPC UA

ID	Name	Node ID	Data Type	Dimension Type
9	HotStandbyStatus	CIU888.Operation.HotStandbyStatus	Byte	Bit Coded
10	CommStatus	CIU888.Operation.CommStatus	Byte	Bit Coded

ID	Name	Node ID	Data Type	Dimension Type
78	ConfigurationStatus	CIU888.Operation.ConfigurationStatus	Byte	Nodim
520	CIUClock	CIU888.Operation.CIUClock	DateTime	Time
96	CIUPGeneralConfigurationCRC	CIU888.Configuration.CIUPGeneralConfigurationCRC	UInt16	Nodim

3.5.5 CIU Diagnostics data

This section provides information on the CIU diagnostics data exposed via OPC UA required for the integration with host systems.

TABLE 3-5 CIU diagnostics data exposed in OPC UA

ID	Name	Node ID	Data Type	Dimension Type
532	CIURunHours	CIU888.Diagnostics.CIURunHours	Uint32	Nodim
1092	CIU888ReleaseNumber	CIU888.Diagnostics.CIU888RELEASENUMBER	String	Text
3033	WriteProtectKeyStatus	CIU888.Diagnostics.WriteProtectKeyStatus	Byte	Nodim
3034	WMKeyStatus	CIU888.Diagnostics.WMKeyStatus	Byte	Nodim
3517	FieldPortVersion	CIU888.Diagnostics.SerialFieldPorts.SerialFieldPort[FieldPortNumber]1.FieldPortVersion	String	Text
10015	CIUSystemStatus	CIU888.Diagnostics.CIUSystemStatus	Byte	Nodim
10050	CarrierBoardTemperature1	CIU888.Diagnostics.CarrierBoardTemperature1	Double	Temperature
10051	CarrierBoardTemperature2	CIU888.Diagnostics.CarrierBoardTemperature2	Double	Temperature
10052	CarrierBoardTemperature3	CIU888.Diagnostics.CarrierBoardTemperature3	Double	Temperature
10053	CarrierBoardTemperature4	CIU888.Diagnostics.CarrierBoardTemperature4	Double	Temperature
10054	CPUCoreTemperature	CIU888.Diagnostics.CPUCoreTemperature	Byte	Temperature
10055	RAMSize	CIU888.Diagnostics.RAMSize	UInt16	Nodim
10056	CompactFlashSize	CIU888.Diagnostics.CompactFlashSize	UInt16	Nodim
10057	CompactFlashFreeSize	CIU888.Diagnostics.CompactFlashFreeSize	UInt16	Nodim
10058	FPGAVersion	CIU888.Diagnostics.FPGAVersion	String	Text
10059	BIOSVersion	CIU888.Diagnostics.BIOSVersion	String	Text
10060	SecondaryMicrocontrollerVersion	CIU888.Diagnostics.SecondaryMicroControllerVersion	String	Text

ID	Name	Node ID	Data Type	Dimension Type
10062	AverageCPUUsage	CIU888.Diagnostics.AverageCPUUsage	UInt16	Nodim
10063	AverageRAMUsage	CIU888.Diagnostics.AverageRAMUsage	UInt16	Nodim
10064	LastPowerUpTime	CIU888.Diagnostics.LastPowerUpTime	DateTime	Time
10065	LastPowerDownTime	CIU888.Diagnostics.LastPowerDownTime	DateTime	Time
10066	LastPowerDownReason	CIU888.Diagnostics.LastPowerDownReason	UInt16	Nodim
10068	FieldCardType	CIU888.Diagnostics.SerialFieldPorts.SerialFieldPort[FieldPortNumber].FieldCardType	Byte	Nodim
10069	LCDDisplayType	CIU888.Diagnostics.LCDDisplayType	Byte	Nodim
10071	SyncLinkConnectionStatus	CIU888.Diagnostics.SyncLinkConnectionStatus	Byte	Nodim
10072	RemoteLinkConnectionStatus	CIU888.Diagnostics.RemoteLinkConnectionStatus	Byte	Nodim
10073	ServiceLinkConnectionStatus	CIU888.Diagnostics.ServiceLinkConnectionStatus	Byte	Nodim
10074	HostEthernetConnectionStatus	CIU888.Diagnostics.EthernetPorts.FTEA.EthernetConnectionStatus CIU888.Diagnostics.EthernetPorts.FTEB.EthernetConnectionStatus CIU888.Diagnostics.EthernetPorts.LAN.EthernetConnectionStatus	Byte	Text
10076	CarrierBoardTemperatureHealth	CIU888.Diagnostics.CarrierBoardTemperatureHealth	Byte	Nodim
10081	FieldSerialPortHealth	CIU888.Diagnostics.SerialFieldPorts.SerialFieldPort[FieldPortNumber].FieldSerialPortHealth	Byte	Nodim
10083	RAMUsageHealth	CIU888.Diagnostics.RAMUsageHealth	Byte	Nodim
10089	FieldCardFirmwareVersion	CIU888.Diagnostics.SerialFieldPorts.SerialFieldPort[FieldPortNumber].FieldCardFirmwareVersion	String	Text
10091	CIUSystemStatusDescription	CIU888.Diagnostics.CIUSYSTEMSTATUSDESCRIPTION	String	Text
10110	CPUCoreTemperatureHealth	CIU888.Diagnostics.CPUCoreTemperatureHealth	Byte	Nodim
10111	CompactFlashDiskSpaceHealth	CIU888.Diagnostics.CompactFlashDiskSpaceHealth	Byte	Nodim
10112	FTEAActiveClients	CIU888.Diagnostics.EthernetPorts.FTEA.ActiveClients	Byte	Nodim
10113	FTEATXPacketCount	CIU888.Diagnostics.EthernetPorts.FTEA.TXPacketCount	UInt32	Nodim
10114	FTEARXPacketCount	CIU888.Diagnostics.EthernetPorts.FTEA.RXPacketCount	UInt32	Nodim
10115	FTEAErrorPacketCount	CIU888.Diagnostics.EthernetPorts.FTEA.ErrorPacketCount	UInt32	Nodim

ID	Name	Node ID	Data Type	Dimension Type
10116	FTEBActiveClients	CIU888.Diagnostics.EthernetPorts.FTEB.ActiveClients	Byte	Nodim
10117	FTEBTXPacketCount	CIU888.Diagnostics.EthernetPorts.FTEB.TXPacketCount	UInt32	Nodim
10118	FTEBRXPacketCount	CIU888.Diagnostics.EthernetPorts.FTEB.RXPacketCount	UInt32	Nodim
10119	FTEBErrorPacketCount	CIU888.Diagnostics.EthernetPorts.FTEB.ErrorPacketCount	UInt32	Nodim
10120	LANActiveClients	CIU888.Diagnostics.EthernetPorts.LAN.ActiveClients	Byte	Nodim
10121	LANTXPacketCount	CIU888.Diagnostics.EthernetPorts.LAN.TXPacketCount	UInt32	Nodim
10122	LANRXPacketCount	CIU888.Diagnostics.EthernetPorts.LAN.RXPacketCount	UInt32	Nodim
10123	LANErrorPacketCount	CIU888.Diagnostics.EthernetPorts.LAN.ErrorPacketCount	UInt32	Nodim
10500	CIU888Version	CIU888.Diagnostics.CIU888Version	String	Text

NOTE: FieldPortVersion, FieldCardType, FieldCardFirmwareVersion, FieldSerialPortHealth entities are indexed entities. 6 Indexes are supported and the index number represents the field port number.

NOTE: HostEthernetConnectionStatus entity is an indexed entity (Index 1 - FTEA, Index 2 – FTEA and Index 3 - LAN)

3.6 Information Model – Commands

The following table provides information on all the commands supported through OPC UA.

3.6.1 CIU commands

TABLE 3-6 CIU commands supported in OPC UA

This section provides information on the CIU related commands supported via OPC UA required for the integration with host systems.

Name	Description	Input arguments	Output arguments	Node Id
ActivateCIU	This method sets the hotstandbystatus (Primary / Secondary) of the CIU.	isPrimary (bool) True – Host commanding CIU to become active. False – Host commanding CIU to become passive.	Status(Byte) 0 – operation completed successfully. Non-zero number – operation failed	CIU888.Commands.ActivateCIU
WriteClock	This method writes the Date and time to the CIU.	DateAndTime (DateTime) Date and time value to be set in CIU DST (Byte) 1 – Day light Savings ON 0 – Day light Savings OFF	Status(Byte) 0 – operation completed successfully. Non-zero number – operation failed	CIU888.Commands.WriteClock
ActivateCIU	This method sets the hotstandbystatus (Primary / Secondary) of the CIU.	isPrimary (bool) True – Host commanding CIU to become active. False – Host commanding CIU to become passive.	Status(Byte) 0 – operation completed successfully. Non-zero number – operation failed	CIU888.Commands.ActivateCIU

3.6.2 Tank commands

This section provides information on the Tank related commands supported via OPC UA required for the integration with host systems.

TABLE 3-7 Tank commands supported in OPC UA

Name	Description	Input arguments	Output arguments	Node Id
CalibrateMeasurement	This method calibrates a tank's measurement. That is, on execution of this command for the desired measurement, CIU presents the measurement value as calibrated in its status and validity. For example, ENTIS sends this command to calibrate Product Level, Product Temperature etc., This method call is for ENTIS host system.	EntityId (UInt16) EntityId of the measurement to be calibrated.	Status(Byte) 0 – operation completed successfully. Non zero number – operation failed	CIU888.Tanks.<Tank Name>.Commands.CalibrateMeasurement
DisableTemperatureProfileScan	This method disables Temperature profiles scan for a tank.	None	Status(Byte) 0 – operation completed successfully. Non zero number – operation failed	CIU888.Tanks.<Tank Name>.Commands.DisableTemperatureProfileScan
EnableTemperatureProfileScan	This method enables Temperature profiles scan for a tank.	None	Status(Byte) 0 – operation completed successfully. Non zero number – operation failed	CIU888.Tanks.<Tank Name>.Commands.EnableTemperatureProfileScan
KillMeasurement	This method kills a measurement of the tank. That is, on execution of this command for the desired measurement, CIU stops presenting the measurement value received from the gauge.	EntityId (UInt16) EntityId of the measurement to be killed	Status(Byte) 0 – operation completed successfully. Non zero number – operation failed	CIU888.Tanks.<Tank Name>.Commands.KillMeasurement
ManualOverwrite	This method manually overwrites the desired tank values (measurement and configuration) to user specified values.	EntityId (Array of UInt16) EntityId(s) of the measurement / configuration to be manually overwritten. Value (Array of String) User defined value(s) to be manually overwritten.	Status(Byte) 0 – operation completed successfully. Non zero number – operation failed	CIU888.Tanks.<Tank Name>.Commands.ManualOverwrite

Name	Description	Input arguments	Output arguments	Node Id
ResurrectMeasurement	This method resurrects a tank's measurement. That is, on execution of this command for the desired measurement, CIU presents resumes the measurement value scan from the gauge and presents the gauge value.	EntityId (Ulint16) EntityId of the measurement to be resurrected.	Status(Byte) 0 – operation completed successfully. Non zero number – operation failed	CIU888.Tanks.<Tank Name>.Commands.ResurrectMeasurement
SetTankLMOff	This method sets the Tank calibration status to uncalibrated. This method call is for ENTIS host system.	None	Status(Byte) 0 – operation completed successfully. Non zero number – operation failed	CIU888.Tanks.<Tank Name>.Commands.SetTankLMOff
SetTankLMOn	This method sets the Tank calibration status to calibrated. This method call is for ENTIS host system.	None	Status(Byte) 0 – operation completed successfully. Non zero number – operation failed	CIU888.Tanks.<Tank Name>.Commands.SetTankLMOn
UncalibrateMeasurement	This node method uncalibrates a tank's measurement. That is, on execution of this command for the desired measurement, CIU presents the measurement value as uncalibrated in its status and validity.	EntityId (Ulint16) EntityId of the measurement to be uncalibrated	Status(Byte) 0 – operation completed successfully. Non zero number – operation failed	CIU888.Tanks.<Tank Name>.Commands.UncalibrateMeasurement
WhatifCalculation	This method performs whatif calculations and provides the results back to the host system. This method call is for ENTIS host system and any future CEPS client.	WhatifRequest (String) Whatif Request in JSON format	WhatIfResponse (String) Exposes the Whatif calculation response record in JSON format Status(Byte) 0 – operation completed successfully. Non zero number – operation failed	CIU888.Tanks.<Tank Name>.Commands.WhatifCalculation

3.6.3 Gauge commands

This section provides information on the Gauge related commands (Operational and diagnostics) supported via OPC UA required for the integration with host systems.

TABLE 3-8 Gauge commands supported in OPC UA

Name	Description	Input arguments	Output arguments	Node Id
Unlock	This method executes the unlock command in the gauge.	None	Status(Byte) 0 – operation completed successfully. Non-zero number – operation failed	CIU888.Tanks.<TankName>.Gauges.<GaugeName>.Commands.Unlock
Test	This method executes the unlock command in the gauge.	None	Status(Byte) 0 – operation completed successfully. Non-zero number – operation failed	CIU888.Tanks.<TankName>.Gauges.<GaugeName>.Commands.Test
LockTest	This method executes the lock test command in the gauge.	None	Status(Byte) 0 – operation completed successfully. Non-zero number – operation failed	CIU888.Tanks.<TankName>.Gauges.<GaugeName>.Commands.LockTest
Block	This method executes the block command in the gauge.	None	Status(Byte) 0 – operation completed successfully. Non-zero number – operation failed	CIU888.Tanks.<TankName>.Gauges.<GaugeName>.Commands.Block
VerifyCalibration	This method executes lock test command in the gauge.	None	Status(Byte) 0 – operation completed successfully. Non-zero number – operation failed	CIU888.Tanks.<TankName>.Gauges.<GaugeName>.Commands.VerifyCalibration
CheckHHAlarm	This method executes the HighHigh Alarm test command in the gauge.	None	Status(Byte) 0 – operation completed successfully. Non-zero number – operation failed	CIU888.Tanks.<TankName>.Gauges.<GaugeName>.Commands.CheckHHAlarm
CheckHAlarm	This method executes the High alarm test command in the gauge.	None	Status(Byte) 0 – operation completed successfully. Non-zero number – operation failed	CIU888.Tanks.<TankName>.Gauges.<GaugeName>.Commands.CheckHAlarm
CheckLAlarm	This method executes the Low alarm test command in the gauge.	None	Status(Byte) 0 – operation completed successfully. Non-zero number – operation failed	CIU888.Tanks.<TankName>.Gauges.<GaugeName>.Commands.CheckLAlarm

Name	Description	Input arguments	Output arguments	Node Id
CheckLLAlarm	This method executes the LowLow alarm test command in the gauge.	None	Status(Byte) 0 – operation completed successfully. Non-zero number – operation failed	CIU888.Tanks.<TankName>.Gauges.<GaugeName>.Commands.CheckLLAlarm
WaterDip	This method executes the water dip command in the gauge.	None	Status(Byte) 0 – operation completed successfully. Non-zero number – operation failed	CIU888.Tanks.<TankName>.Gauges.<GaugeName>.Commands.WaterDip
DensityDipUpwards	This method executes the density dip upwards command in the gauge.	None	Status(Byte) 0 – operation completed successfully. Non-zero number – operation failed	CIU888.Tanks.<TankName>.Gauges.<GaugeName>.Commands.DensityDipUpwards
DensityDipDownwards	This method executes the density deip downwards command in the gauge.	None	Status(Byte) 0 – operation completed successfully. Non-zero number – operation failed	CIU888.Tanks.<TankName>.Gauges.<GaugeName>.Commands.DensityDipDownwards
CombinedDipUpwards	This method executes the combined dip upwards command in the gauge.	None	Status(Byte) 0 – operation completed successfully. Non-zero number – operation failed	CIU888.Tanks.<TankName>.Gauges.<GaugeName>.Commands.CombinedDipUpwards
CombinedDipDownwards	This method executes the combined dip downwards command in the gauge.	None	Status(Byte) 0 – operation completed successfully. Non-zero number – operation failed	CIU888.Tanks.<TankName>.Gauges.<GaugeName>.Commands.CombinedDipDownwards
Reset	This method executes the reset command in the gauge.	None	Status(Byte) 0 – operation completed successfully. Non-zero number – operation failed	CIU888.Tanks.<TankName>.Gauges.<GaugeName>.Commands.Reset
DensityProfileUpwards	This method executes the density profile upwards command in the gauge.	None	DensityProfileData (String) Density profile record in JSON format Status(Byte) 0 – operation completed successfully. Non-zero number – operation failed	CIU888.Tanks.<TankName>.Gauges.<GaugeName>.Commands.DensityProfileUpwards

Name	Description	Input arguments	Output arguments	Node Id
DensityProfile Downwards	This method executes the density profile downwards command in the gauge.	None	DensityProfileData (String) Density profile record in JSON format Status(Byte) 0 – operation completed successfully. Non-zero number – operation failed	CIU888.Tanks.<TankName>.Gauges.<GaugeName>.Commands.DensityProfileDownwards
CombinedProfileUpwards	This method executes the combined profile upwards command in the gauge.	None	DensityProfileData (String) Density profile record in JSON format Status(Byte) 0 – operation completed successfully. Non-zero number – operation failed	CIU888.Tanks.<TankName>.Gauges.<GaugeName>.Commands.CombinedProfileUpwards
CombinedProfileDownwards	This method executes the combined profile downwards command in the gauge.	None	DensityProfileData (String) Density profile record in JSON format Status(Byte) 0 – operation completed successfully. Non-zero number – operation failed	CIU888.Tanks.<TankName>.Gauges.<GaugeName>.Commands.CombinedProfileDownwards
LockTestToLevel	This method executes the lock test to level command in the gauge.	ProductLevel (Double) Product level to be locked	Status(Byte) 0 – operation completed successfully. Non-zero number – operation failed	CIU888.Tanks.<TankName>.Gauges.<GaugeName>.Commands.LockTestToLevel
LockToLevel	This method executes the lock to level command in the gauge.	ProductLevel (Double) Product level to be locked	Status(Byte) 0 – operation completed successfully. Non-zero number – operation failed	CIU888.Tanks.<TankName>.Gauges.<GaugeName>.Commands.LockToLevel
InterfaceProfile Upwards	This method executes the interface profile upwards command in the gauge.	ProductLowLevel (Double) Lower product level limit for the interface profiles. ProductHighLevel (Double) Higher product level limit for the interface profiles.	DensityProfileData (String) Density profile record in JSON format Status(Byte) 0 – operation completed successfully. Non-zero number – operation failed	CIU888.Tanks.<TankName>.Gauges.<GaugeName>.Commands.InterfaceProfileUpwards

Name	Description	Input arguments	Output arguments	Node Id
InterfaceProfile Downwards	This method executes the interface profile downwards command in the gauge.	ProductLowLevel (Double) Lower product level limit for the interface profiles. ProductHighLevel (Double) Higher product level limit for the interface profiles.	DensityProfileData (String) Density profile record in JSON format Status(Byte) 0 – operation completed successfully. Non-zero number – operation failed	CIU888.Tanks.<TankName>.Gauges.<GaugeName>.Commands.InterfaceProfileDownwards

3.7 OPC Quality mapping

The OPC UA Server maps the Data status of an entity on the OPC Quality Flags as described in the table below.

TABLE 3-9 OPC Quality – CIU data status mapping when validity < 0x80

Validity < 0x80		
Status bit number	**Description**	**OPC Quality mapping**
7	Uncalibrated	Good
6	Manual	Good_LocalOverride
1	Stored	Uncertain_LastUsableValue
0	Reduced Accuracy	Uncertain_SensorNotAccurate
NOTE: OPC Quality is mapped to Good in all other cases		

TABLE 3-10 OPC Quality – CIU data status mapping when validity >= 0x80

Validity >= 0x80		
Status bit number	**Description**	**OPC Quality mapping**
6	No Data Available	Bad_NotConnected
5	Killed	Bad_OutOfService
4	Over Range	Uncertain_EngineeringUnitsExceeded
3	Under Range	Uncertain_EngineeringUnitsExceeded
2	Not Initialized	Bad_WaitingForInitialData
NOTE: OPC Quality is mapped to Bad_NotConnected in all other cases		

3.8 Profiles data integration to OPC UA Host system

This section depicts the interface between OPC UA host system and CIU w.r.t temperature and density profiles data.

3.8.1 Temperature profiles data interface

CIU collects temperature profiles data from the gauges periodically based on the configuration and presents the data in the OPC UA address space.

3.8.1.1 Temperature profiles data read

OPC UA TCP host system shall read the TemperatureProfileRecord node contents for the desired tank from the OPC UA address space to get the temperature profile data. The host system can also subscribe to the TemperatureProfileRecord node for the desired tank for the data updates.

3.8.1.2 Temperature profiles scan enable / disable

OPC UA TCP host system shall enable temperature profile data scan per tank by executing EnableTemperatureProfileScan method call in the OPC UA address space.

OPC UA TCP host system shall disable temperature profile data scan per tank by executing DisableTemperatureProfileScan method call in the OPC UA address space.

3.8.2 Density profiles data interface

OPC UA host issues the desired density profiles command to CIU 888 via OPC UA method call execution (similar to other gauge commands). Refer to section 3.2.1 Profile commands for the various density profile commands supported in CIU 888.

3.8.2.1 Density profiles command

Density profiles can take longer time for execution and hence host system shall configure the timeout for the command execution accordingly.

OPC UA TCP/IP host system shall directly execute the desired interface profile method call and wait for operation completion. CIU monitors for completion of the command in the gauge, collects the density profiles data from the gauge and presents the data in the DensityProfileRecord node in the address space. CIU also sets “DensityProfileDataStatus” entity under DensityProfileRecord node to 2 to indicate density profile command execution is completed.

Once the method execution is completed, OPC UA host system shall read the density profiles data (individual density points and density

values with status & validity) and present it to the user in the intended graphical format. OPC UA host system shall pick up other values like Product Level, Product temperature, Vapour Temperature, Vapour Pressure, Water Level, Reference density from the tank record retrieved from the CIU.

3.8.2.2 Interface profiles command

In case of interface profile command, the user has to provide the Upper and lower tank limits for the command execution. “InterfaceProfileUpperTankLimit” and “InterfaceProfileLowerTankLimit” are input arguments to the interface profile method (command) call exposed in OPC UA information model. Interface profiles can take longer time for execution and hence host system shall configure the timeout for the command execution accordingly.

When interface profiles need to be executed, OPC UA TCP/IP host system shall directly execute the desired interface profile method call and wait for operation completion. CIU monitors for completion of the command in the gauge, collects the density profiles data from the gauge and presents the data in the DensityProfileRecord node in the address space. CIU also sets “DensityProfileDataStatus” entity under DensityProfileRecord node to 2to indicate density profile command execution is completed.

Once the method execution is completed, OPC UA host system shall read the density profiles data (individual density points and density values with status & validity) and present it to the user in the intended graphical format. OPC UA host system shall pick up other values like Product Level, Product temperature, Vapour Temperature, Vapour Pressure, Water Level, Reference density from the tank record retrieved from the CIU.

APPENDIX A ENTITIES EXPOSED IN OPC UA

TABLE A-1 gives a description of the entities exposed in OPC UA interface.

TABLE A-1 Description of entities exposed in OPC UA

ID	Name	Description	Dimension Type
1	TankName	Tank name: • The Tank Name as being entered in the commission byone of the service tools.	Text (ASCII orUnicode)
2	TankStatus	The Status of the tank: • Bit 0 = 1 Tank shell is calibrated by W&M (Treated as General Tank calibrated Flag) • Bit 1 = 1 Maintenance (future) • Bit 2 = 1 Tank is disabled • Bit 3 = 1 Tank is not available Note: Default = 6 (bit 2+3). Because of the representation as combined entity the length is fixed to 4 bits.	Bit coded
3	MovingStatus	The level moving status: • 0 = Tank level is stable • 1 = Tank level is moving up • 2 = Tank level is moving down • 3 = No valid movement status can be detected (e.g. manual level)	Index
4	TankType	Tank type: • Bit 0 = 1 Level measurement is Ullage if bit is set : the Level value decreases when product is pumped into the tank, level 0 is at or near the top of the tank [Innage (0): level increases] In CIU-2 Needed for level calculations. • Bit 1 = 1 WAP tank (Water Above Product) (future) • Bit 2 = 1 MassLiq must be calculated in Air (0: MassLiq in vacuum) • Bit 3 = 1 MassVap must be calculated in Air (0: MassVapin vacuum) • Bit 4 = 1 HIMS calculation not allowed. If bit is set MassLiq is not calculated from [Dobs] x GOV • Bit 5 = 1 HTG measurement. If this bit is set the Liquid Mass will be calibrated even if [Dobs] and/or GOV is not calibrated. Measurement of [Dobs] is a HIMS/HTG measurement: MassLiq, calculated from [Dobs] x GOV, is calibrated if the Tank Shell is calibrated (see above), even when the volume, from which MassLiq is calculated (GOV), is not calibrated • Bit 6 Future • Bit 7 Tank Shell is not calibrated. Therefore, calculated TOV and WaterVol are also not calibrated. If the TankShell is calibrated, TOV and WaterVol can still be not calibrated because other input, e.g. [ProductLevel], or Free Water Level, is not calibrated.	Bit coded

ID	Name	Description	Dimension Type
5	GaugeType	Type of level measuring instrument. To get the instrumenttype number add 800 (decimal) to the Gauge Type value.	Nodim
6	GaugeStatus	The (servo) gauge active status: • 0 = Level gauge is measuring level • 1 = Level gauge is in test • 2 = Level gauge is in lock test • 3 = Level gauge is blocked • 4 = Level gauge is busy with a density profilemeasurement • 5 = Level gauge is searching water level • 6 = Level gauge end switch reached • 10 = Level gauge has found water level and is measuringit • 255 = Level gauge is in failure	Index
7	GaugeCommands	Allowed Gauge Commands: • Bit 0 = 1 Test not allowed • Bit 1 = 1 Lock test not allowed • Bit 2 = 1 Block not allowed • Bit 3 = 1 Calibration not allowed • Bit 4 = 1 Alarm test not allowed • Bit 5 = 1 Tank profile not allowed • Bit 6 = 1 Interface profile not allowed • Bit 7 = 1 Water dip not allowed • Bit 8 = 1 Reset Gauge not allowed • Bit 9 = 1 Interface 2 command not allowed • Bit 10..15 Future	Bit coded
8	TempElementType	Type of temperature element: • 0 = No element available • 1 = MRT • 2 = MRT with bottom spot • 3 = MRT with bottom and top spot • 4 = One Spot element • 5 = Two spot elements • 6 = Future • 7 = Future • 8 = MTT	Index
9	HotStandbyStatus	The Hot Standby status: • Bit 0 = 1 Primary CIU Prime is scanning this tank • Bit 1 = 1 Primary CIU Prime is available for this tank • Bit 2 = 1 Secondary CIU Prime is scanning this tank • Bit 3 = 1 Secondary CIU Prime is available for this tank • Bit 4 = 1 CIU Plus is passive member of a Hot Standbypair	Bit coded

ID	Name	Description	Dimension Type
10	CommStatus	The communication status: • Bit 0 = 1 CIU Prime to Gauge comm. OK. (Future) (Bit 0 does not change when bit 1 = 0) • Bit 1 = 1 CIU Plus to (active or passive) CIU Prime comm. OK • Bit 2 = 1 Field port on (active) CIU Prime OK Note: Because of the representation as combined entity, the useful length is fixed to 3 bits.	Bit coded
11	CIUPrimeAddress	Host Port Address of the CIU prime where the most recent data of this tank is measured.	Nodim
16	TankShape	Tank shape: • 0 = No shape defined • 1 = Cylindrical fixed roof • 2 = Cylindrical with floating roof • 3 = Cylindrical with internal floater • 4 = Spherical tank • 5 = Bullet • 6 = Underground bullet • 7 = Irregular cavern • 8..99 • Reserved (future) • 100..255 Free configurable by the user These values are used to display a picture of the tank by ENTIS Pro or Scada systems	Index
17	ShellCapacity	Tank Shell Capacity: The Tank Shell Capacity is the total volume of the Tank (Used for Gas calculations).	Volume
18	LowTOV	Low Total Observed Volume: This value, which is not necessarily the volume of the lowest strap (see TCT) or 0.0 in case of a true cylindrical or spherical tank, is the TOV to which the tank safely can be emptied, without the risk of pumping water or vapour instead of product.	Volume
19	HighTOV	High Total Observed Volume: This entity contains the Total Observed Volume (TOV) to which the tank safely can be filled, without the risk of overflow of the product. HighTOV, is not necessarily the volume of the highest strap (see TCT) or the maximum volume of the true cylindrical or spherical tank.	Volume
20	HighLevel	Level corresponds to HighTOV This level is only used for graphical display purposes.	Level
21	ProductName	The name of the product in the tank (20 characters ASCII or10 characters UNICODE)	Text (ASCII orUnicode)

ID	Name	Description	Dimension Type
8122	GSVCalcType	GSVCalcType (Product Calculation Type): This entity indicates how ProdDRef and CTL must be calculated: • 0 = No GSV calculation • 1 = CTL Calculation according to ASTM D1250 (1980) table 6, Dref according to ASTM D1250 (1980) table 5 • 2 = CTL Calculation according to ASTM D1250 (1980) table 24, Dref according to ASTM D1250 (1980) table 23 • 3 = CTL Calculation according to • ASTM D1250 (1980) table 54, Dref according to ASTM D1250 (1980) table 53 • 4 = DCF calculation • 5 = TCF calculation • 6 = CTL Calculation according to ASTM D4311 (1990)table 1 • 7 = CTL Calculation according to ASTM D4311 (1990)table 2 • 8 = M - manual entry of CTL • 9 = CTL Calculation according to ASTM D4311 (1996)table 1 (implemented using formula) • 100..255 GSV calculation according defined chemical formulas (future implementation)	Index
8123	ProductCode	ProductCode: • 0 = Not applicable • 1 = Product Code A (use subsection A of the table specified in [GSVCalcType]) • 2 = Product Code B (use subsection B of the table specified in [GSVCalcType]) • 3 = Product Code C (use subsection C of the table specified in [GSVCalcType]) • 4 = Product Code D (use subsection D of the table specified in [GSVCalcType]) • 5 = Product Code E (use subsection E of the table specified in [GSVCalcType]) • Bit 7= 1 Range checking disabled	Index
24	VolumeCorrections	VolumeCorrections This entity is used to indicate which correction must beapplied to the calculated volume: • 0 = NONE. a) • 1 = S&W correction applied. a) • 2 = LiqVap calculations according Liq/Vol Ratio ISO DP 4267/1 1982 (ISO/TC28/SC 3 N 411). c) • 3 = LiqVap calculations according Molar method according to ISO DP 4267/1 1982 (ISO/TC28/SC 3 N411). c) • 4 = LiqVap calculations according Molar method according to API research project 44. c) • 5 = LiqVap calculations according Molar method according to ISO 6578. c) • 6..255 Other vapour calculations (reserved, future). C)	Index

ID	Name	Description	Dimension Type
25	MassCalcType	Mass calculation type: • Bit 0 = 1 Liquid mass directly calculated from G.O.V. * Observed Density • Bit 1 = 1 Liquid mass calculated from NSV • Bit 2 = 1 Liquid mass calculated in air. • Bit 3 = 1 Vapour mass calculated in air. • Bit 4 = 1 HTG measurement (Liquid Mass always calibrated)	Bit coded
26	ProductTRef	Product Reference Temperature: The volume of the product in a tank varies with changes of ProdTemp. This causes changes in the product level which result in incorrect volume calculations. ProdTRef is used to get calculation results (volumes, mass) which are independent of the temperature of the product in the tank at the time of the measurement. The base temperature of a metric system is 15 OC. The base temperature of an imperial system is 60 OF.Normally ProdTRef is equal to the base temperature.	Temperature
30	Dref	The reference density for the product in the tank.	Density
31	DRefStatus	The status of entity ID#26, ProductTRef.	Status
32	SedAndWater	The volume of emulsified water in the product. The absolute volume is calculated from the sediment and water percentage (%) and is used when calculating the Net Standard Volume (NSV).	Percentage
33	ProductTC	The product temperature coefficient.	Temperature coefficient
34	ProductTCStatus	The status of entity ID#33, ProductTC.	Status
35	LiqVolRatio	The factor by which a product in gaseous form reduces in volume when converted to a liquid.	Nodim
36	GaugeLevelAlarms	The gauge level alarms: • Bit 0 = 1 Low Level alarm tripped • Bit 1 = 1 High Level alarm tripped • Bit 2 = 1 Alarm failure • Bit 3 = 1 Gauge alarms not available in this instrument	Bit coded
37	ExternalContacts	The external contacts: • Bit 0 = 1 External contact 1 active • Bit 1 = 1 External contact 2 active • Bit 2 = 1 External contact failure • Bit 3 = 1 External contact not available in this instrument	Bit coded
38	DisplacerPosition	The value of the physical servo displacer position.	Level
39	DisplacerStatus	The status of entity ID#38, DisplacerPosition.	Status
40	ProductLevel	The value of the product level.	Level
41	ProductLevelStatus	The status of entity ID#40, ProductLevel.	Status
42	WaterLevel	The value of the water level (copy of entity ID#114, WaterDipped or entity ID#120, WaterMeasured).	Level

ID	Name	Description	Dimension Type
43	WaterLevelStatus	The status of entity ID#42, WaterLevel (copy of entity ID#115, WaterDippedStatus or entity ID#121, WaterMeasuredStatus).	Status
44	ProductTemp	The value of the product temperature	Temperature
45	ProductTempStatus	The status of entity ID#44, ProductTemp	Status
46	VapRoomTemp	The value of the product vapor temperature	Temperature
47	VapRoomTempStatus	The status of entity ID#46, VapRoomTemp.	Status
48	VapRoomPress	The value of the product vapor pressure.	Pressure
49	VapRoomPressStatus	The status of entity ID#48, VapRoomPress.	Status
50	DObs	The value of the product density (copy of entity ID#116, DObsHIMS or entity ID#112, DObsDipped).	Density
51	DObsStatus	The status of entity ID#50, Dobs (copy of entity ID#117, DObsHIMSStatus or entity ID#113, DObsDippedStatus).	Status
52	ForeGroundTimeStamp	The (absolute) time when, in the foreground scan, the most recent item was scanned.	Absolute time
53	BackGroundTimeStamp	The (absolute) time when, in the background scan, the most recent item was scanned.	Absolute time
54	TOV	The Total Observed Volume (TOV).	Volume
55	TOVStatus	The status of entity ID#54, TOV.	Status
56	WaterVol	The water volume.	Volume
57	WaterVolStatus	The status of entity ID#56, WaterVol.	Status
58	GOV	The Gross Observed Volume (GOV). The GOV is the total volume of all petroleum liquids and sediment and water, excluding free water, at observed temperature and pressure.	Volume
59	GOVStatus	The status of entity ID#59, GOV	Status
60	GSV	The Gross Standard Volume (GSV). The GSV is the total volume of all petroleum liquids and sediment and water, excluding free water, corrected by the appropriate volume correction factor (VCF = CTL) for the observed temperature and API gravity, relative density, or density to a standard temperature, and also corrected by the applicable pressure correction factor (Cpl) and meter factor.	Volume
61	GSVStatus	The status of entity ID#61, GSV	Status
62	NSV	The Net Standard Volume (NSV). The NSV is the total volume of all petroleum liquids, excluding sediment and water and free water, corrected by the appropriate volume correction factor (VCF = CTL) for the observed temperature and API Gravity, relative density, or density to a standard temperature, and also corrected by the applicable pressure correction factor (Cpl) and meter factor.	Volume
63	NSVStatus	The status of entity ID#63, NSV	Status
64	LiqInVap	The vapor volume in the tank, if it was liquefied.	Volume
65	LiqInVapStatus	The status of entity ID#64, LiqInVap.	Status

ID	Name	Description	Dimension Type
66	TGSV	The Total Gross Standard Volume (TGSV).	Volume
67	TGSVStatus	The status of entity ID#66, TGSV.	Status
68	MassLiq	The product volume weight.	Mass
69	MassLiqStatus	The status of entity ID#68, MassLiq.	Status
70	MassVap	The vapor volume weight.	Mass
71	MassVapStatus	The status of entity ID#70, MassVap.	Status
72	TotalMass	The product plus vapor volume weight.	Mass
73	TotalMassStatus	The status of entity ID#72, TotalMass.	Status
74	FlowTOV	The Total Observed Volume (TOV) of the product per timeunit.	Flow
75	AvailableRoom	The spare capacity of the tank.	Volume
76	Available TOV	The Total Observed Volume (TOV) of the available product.	Volume
77	Verification Signature	Calculated over all entities in the default tank record. The patented calculation algorithm verifies the contents of the transmitted tank records.	Nodim
78	ConfigurationStatus	The CIU and tank configuration status: • Bit 0 = 1 Gauge configuration mismatch (Future) • Bit 1 = 1 CIU Prime general configuration mismatch • Bit 2 = 1 CIU Prime tank configuration mismatch • Bit 3 = 1 CIU Plus general configuration mismatch • Bit 4 = 1 CIU Plus tank configuration mismatch for thistank • Bit 5 = 1 Ensite Pro general configuration mismatch • Bit 6 = 1 Ensite Pro tank configuration mismatch • Bit 7 = 1 CIU Prime record contains invalid verification Note: Because of the representation as combined entity, the length is fixed to 8 bits.	Bit coded
79	MolarWeight	Molar weight of the gas composition: In some tanks (pressurized) the room above the product is filled with vapour which, in condensed form and it would take a certain amount of product (volume). This volume can be calculated.	Molar weight value

ID	Name	Description	Dimension Type
80	AutomaticMeasurableVal-ues	The values that can be automatically measured (this doesn't necessarily mean that they are actually measured). Bit n = 1: value can be measured automatically: • Bit 0 = 1 Level [entity ID#38, entity ID#40] • Bit 1 = 1 Temperature [entity ID#44] • Bit 2 = 1 Water level [entity ID#42] • Bit 3 = 1 Density [entity ID#50] • Bit 4 = 1 Vapor temperature [entity ID#46] • Bit 5 = 1 Vapor pressure [entity ID#48] • Bit 6 = 1 Ambient Temperature [entity ID#103] • Bit 7 = 1 Dummy scan (now used for FDI scan) • Bit 14 ProductTC calc.mode: 0 = manual, 1 = calculated • Bit 15 CTL calc. mode: 0 = manual, 1 = calculated • Note: Bits 14 and 15 are for internal use of the CIU Plus. Thelength is fixed to 16 bits.	Bit coded
88	HydroMeterCorr	'0' is false, '>1' means true.	Nodim
89	TObsDipped	Temperature of the dipped density.	Temperature
90	TankTRef	Tank Shell Reference Temperature: Tanks undergo expansion and contraction, due to variations in AmbientTemp and ProdTemp. This results in incorrect level readings, which makes it necessary to correct the calculated volumes.	Temperature
91	ThermalexpCoeffTankshell	Tank shell expansion coefficient (TankTC): Tanks undergo expansion and contraction, due to variations in AmbientTemp and ProdTemp. This results in incorrect level readings, which makes it necessary to correct the calculated volumes. TankTC is the expansion coefficient of the Tank Shell material.	TankShellCo-efficient
92	TankAirDensity	Air density: The Air Density is always in kg/m3, regardless of the units in which the system is configured. At creation of the tank this entity gets populated with the actual value of entity AirDen-sity] [3027]	Density
93	VapRoom	Vapour Room: The Vapour Room, not necessarily equal to AvaRoom, is the volume of the empty space above the liquid in the tank (amount of empty gas space in a tank), needed to assess the amount of product vapours in a tank at any specific moment.	Volume
94	TankConfigurationCRC	Checksum, calculated over tank related configuration param-eters by the CIU Prime (for W&M purposes).	Nodim
95	CIUPrimeGeneralConfigura-tionCRC	Checksum, calculated over general CIU Prime configuration parameters (for W&M purposes).	Nodim
96	CIUPrimeGeneralConfigura-tionCRC	Checksum, calculated over general CIU Prime configuration parameters (for W&M purposes).	Nodim
97	LowLevel	Level corresponds to Low TOV.	Level
99	FlowStatus	The status of entity ID#74, FlowTOV.	Status

ID	Name	Description	Dimension Type
100	AvailableRoomStatus	The status of entity ID#75, AvailableRoom.	Status
101	AvailableTOVStatus	Status and Validity of entity [76] (Available TOV).	Status
102	VapRoomStatus	Status and Validity of entity [93] (Vapour Room).	Status
103	Ambient Temperature	The value of the tank's ambient temperature.	Temperature
104	Ambient Temperature Sta-tus	The status of entity ID#103, AmbientTemperature.	Status
105	CIUPlusTankID	Unique Identifier for a tank: The range is between 1 to 6553	Nodim
106	CIU2TankID	Ensite Pro's elementID. A unique number between 0 and 65535.	Nodim
107	CTSh	The correction for the expansion of the shell.	CTSh
108	CTShStatus	The status of entity ID#107, CTSh.	Status
109	InsulationFactor	Tank Shell Insulation Factor. The Insulation Factor (0 < Insulation <= 1.0) indicates howwell the tank shell is insulated from the environmental tem-pera-ture (AmbientTemp) outside the tank. For a fully insulated tank (TankShellTemp = ProdTemp), Insu-lation = 1.0.	Insulation Factor
111	TObsDippedStatus	Status and Validity of entity [89] (observed temperature of the dipped density).	Status
112	DObsDipped	Observed (dipped) Density. The Dipped Density is acuired by CIU 888 through GPUrecord ZSC.	Density
113	DObsDippedStatus	Status and Validity of entity [112] (Dipped Density).	Status
114	WaterDipped	The value of the dipped water level.	Level
115	WaterDippedStatus	Status and Validity of entity [114] (Water dipped).	Status
116	DObsHIMS	Observed (HIMS) Density. Density input from ATG (such as HIMS, HTG or Servo).	Density
117	DObsHIMSStatus	Status and Validity of entity [116] (Observed Hims Density).	Status
118	Tobs	The value of the observed temperature (copy of entity ID#44, ProductTemp or entity ID#89, TObsDipped).	Temperature
119	Tobs Status	The status of entity ID#118, TObs (copy of entity ID#45, Pro-ductTempStatus or entity ID#111, TObsDippedStatus).	Status
120	WaterMeasured	The continuous water level directly measured by a Water Scout.	Level
121	WaterMeasuredStatus	Status and Validity of entity [120] (Measured Water)	Status
124	VolumeCorrectionFactor	The Volume Correction Factor (= Correction for the Tempera-ture of the Liquid).	VCF (= CTL)
125	VolumeCorrectionFactorSta-tus	The status of entity ID#124, VCF.	Status
126	TemperatureCorrection-Fac-tor	Product Temperature Correction Factor (TCF).	TCF

ID	Name	Description	Dimension Type
127	TemperatureCorrection-FactorStatus	Status and Validity of entity [126] (TCF).	Status
128	DensityCorrectionFactor	Product Density Correction Factor (DCF).	DCF
129	DensityCorrectionFac-torStatus	Status and Validity of entity [128] (DCF).	Status
131	TankStatusStatus	Status and Validity of entity [2] (TankStatus).	Status
132	MovingStatusStatus	Status and Validity of entity [3]]MovingStatus].	Status
133	TankTypeStatus	Status and Validity of entity [4] [TankType].	Status
134	ShellCapacityStatus	Status and Validity of entity [17] (ShellCapacity).	Status
135	LowTOVStatus	Status and Validity of entity [18] (LowTOV).	Status
136	HighTOVStatus	Status and Validity of entity [19] (HighTOV).	Status
137	ProductNameStatus	Status and Validity of entity [21] (ProductName).	Status
138	GSVCalcTypeStatus	Status and Validity of entity [22] (GSVCalcType).	Status
139	ProductCodeStatus	Status and Validity of entity [23] (ProductCode).	Status
140	VolumeCorrectionStatus	Status and Validity of entity [24] (VolumeCorrection).	Status
141	MassCalcTypeStatus	Status and Validity of entity [25] (MassCalcType).	Status
142	ProductTRefStatus	Status and Validity of entity [26] (ProductTRef).	Status
143	SedAndWaterStatus	Status and Validity of entity [32] (SedAndWater).	Status
144	LiqVolRatioStatus	Status and Validity of entity [35] (LiqVolRatio).	Status
145	MolarWeightStatus	Status and Validity of entity [79] (MolarWeight).	Status
146	AutomaticMeasurableValuesStatus	Status and Validity of entity [80] (AutomaticMeasurableValues).	Status
154	HydroMeterCorrStatus	The status of entity ID#88, HydroMeterCorr.	Status
155	TankTrefStatus	Status and Validity of entity [90] (TankTref).	Status
156	TankTCStatus	Status and Validity of entity [91] (TankTC).	Status
157	TankAirDensityStatus	Status and Validity of entity [92] [AirDensity].	Status
158	InsulationFactorStatus	Status and Validity of entity [109] (InsulationFactor).	Status
166	RemCap	Remaining Tank Capacity Amount of extra (non-used) tank capacity, which can be used safely. Indicates how much more product can be pumped into the tank safely (i.e. w/o tripping max safe fill). RemCap is not used with other calculations.	Volume
167	RemCapStatus	Status and Validity of entity [165] (RemCap).	Status

ID	Name	Description	Dimension Type
178	FRL1	Floating Roof Level 1 FRL is needed for Floating Roof Immersion compensation, but it can also be used for floating roof alarming. FRI is assumed to be an accurate immersion measurement done with for example magnetostrictive, capacitive or guided wave radar probes. Preferable 3 are used, but it should also be possible with 2 or even only 1 probe. Manual overwrite is not useful for operational purpose but might be needed for verification of the compensation. FRL1 is used with the calculation of: • RIC.	Level
179	FRL1Status	Status and Validity of entity [178] (FRL1).	Status
180	FRL2	Floating Roof Level 2 FRL is needed for Floating Roof Immersion compensation, but it can also be used for floating roof alarming. FRI is assumed to be an accurate immersion measurement done with for example magnetostrictive, capacitive or guided wave radar probes. Preferable 3 are used, but it should also be possible with 2 or even only 1 probe.Manual overwrite is not useful for operational purpose but might be needed for verification of the compensation. FRL2 is used with the calculation of: • RIC	Level
181	FRL2Status	Status and Validity of entity [180] (FRL2).	Status
182	FRL3	Floating Roof Level 3 FRL is needed for Floating Roof Immersion compensation, but it can also be used for floating roof alarming. FRI is assumed to be an accurate immersion measurement done with for example magnetostrictive, capacitive or guided wave radar probes. Preferable 3 are used, but it should also be possible with 2 or even only 1 probe. Manual overwrite is not useful for operational purpose but might be needed for verification of the compensation. FRL3 is used with the calculation of: • RIC	Level
183	FRL3Status	Status and Validity of entity [182] (FRL3).	Status
184	FRA	Floating Roof Adjustment Correction of volume and weight of by floating roof dis- placed liquid.Based on equation, some TCT's have a already correction in for static density only. Note: some tanks need add. Correction for roof ladder. FRA is not used with other calculations.	Level
185	FRAStatus	Status and Validity of entity [184] (FRA).	Status

ID	Name	Description	Dimension Type
186	RIC	Correction where the actual immersion of the FR is measured with 1, 2 or 3 sensors to correct for variable roof loading (i.e. caused by rain, snow, wind and fric- tion). RIC is not used with other calculations.	Volume
187	RICStatus	Status and Validity of entity [186] (RIC).	Status
190	SedAndWaterVol	Sediment and Water Volume. Amount of entrailed (suspended) water & sediment, i.e. not precipitated or sediment yet! Note: Sometimes S&W is % of GOV and GSV, and requires slightly different computation. SedAndWaterVol is used with the calculation of: • NSV	Volume
192	TCV	Total Calculated Volume. The sum of GSV and FWV	Volume
193	TCVStatus	Status and Validity of entity [180] (TCV).	Status
194	Ullage	Ullage When bit 0 of entity [4] [TankType] is 1, the ullage gets acquired and this entity gets a copy of the acquired data (entity [40]). When the [ProductLevel] entity [40] contains an innage, the value of this entity gets calculated by the acquired innage and [GRH]. Ullage is used with the calculation of: • [cUllage] • [TOV]	Level
195	UllageStatus	Status and Validity of entity [194] [Ullage]	Status
196	cUllage	Corrected Ullage. Ullage corrected for thermal expansion or contraction of servo measuring wire. See also [cSWire]. Note This is thermal correction of measuring wire. Thermal correction of tank wall and/or stilling well is assumed to be done in cGRH. Ullage is used with the calculation of: • [TOV]	Level
197	cUllageStatus	Status and Validity of entity [196] [cUllage]	Status
198	cInnage	cInnage is used with the calculation of: • [TOV]	Level
199	cInnageStatus	Status and Validity of entity [198] [cInnage]	Status

ID	Name	Description	Dimension Type
200	Alarms	Combined entity that represents entity ID#37, ExternalContacts and entity ID#36, GaugeLevel Alarms. High byte: entity ID#37; Indicates (bit coded) the ExternalContacts Bit 0 = 1: External contact 1 active Bit 1 = 1: External contact 2 active Bit 2 = 1: External contact failure Bit 3 = 1: External contact not available in this instrument Low byte: entity ID#36; Indicates (bit coded) GaugeLeve- lAlarms: Bit 0 = 1: Low Level alarm tripped Bit 1 = 1: High Level alarm tripped Bit 2 = 1: Alarm failure Bit 3 = 1 Gauge alarms not available in this instrument Note: Because of the representation as combined entity the length of each individual entity (#36 and #37) is fixed to 8 bits.	Nodim
201	Dynamic tank status	Combined entity that represents entity ID#6, Gauge Status (Byte 1) and Bit 0-3 of entity ID#3, MovingStatus + Bit 4-7 of entity ID#2, TankStatus (Byte 2). Byte 1 = Low-order byte (bit 7..0) Byte 2 = High-order byte (bit 15..8) Remark: The CIU 888 takes this information of the primary level gauge.	Nodim
202	StaticTankDefinitions	Tank definitions This entity combines data of other entities. The main reaon for having combined entities is to publish data in Modbus efficiently: • Byte 1 Entity [4] [TankType] • Byte 2 Entity [16] [TankShape] • Byte 1 = Low-order byte (bit 7..0) • Byte 2 = High-order byte (bit 15..8)	Nodim
203	FieldInstrumentDetails	Field instruments details. This entity combines data of other entities. The main reaon for having combined entities is to publish data in Modbus efficiently: • Byte 1 Entity [5] [GaugeType] • Byte 2 Entity [8] [TempElementType] • Byte 1 = Low-order byte (bit 7..0) • Byte 2 = High-order byte (bit 15..8)	Nodim
204	CombinedVolumeCorrections	Volume corrections. This entity combines data of other entities. The main reaon for having combined entities is to publish data in Modbus efficiently. In case of CIU 880: • Byte 1 Entity [22] [GSVCalcType] • Byte 2 Entity [23] [ProductCode] Note that the CIU 888 maintains entity [8122] and [8123]. For compliancy this CIU will constuct this entity based on the format of [22] and [23] • Byte 1 = Low-order byte (bit 7..0) • Byte 2 = High-order byte (bit 15..8)	Nodim

ID	Name	Description	Dimension Type
205	MassAndVolumeCorrec-tions	Mass- and volume corrections. This entity combines data of other entities. The main reaon for having combined entities is to publish data in Modbus effi-ciently: • Byte 1 Entity [24] [VolumeCorrections] • Byte 2 Entity [25] [MassCalcType] • Byte 1 = Low-order byte (bit 7..0) • Byte 2 = High-order byte (bit 15..8)	Nodim
206	CommAndConfStatus	Communications- and configuration status. This entity combines data of other entities. The main reaon for having combined entities is to publish data in Modbus effi-ciently: • Byte 1 Entity [78] [ConfigurationStatus] • Byte 2: • Bit 0..4 Entity [9] [HotStandbyStatus] • Bit 5..7 Entity [10] [CommStatus] • Byte 1 = Low-order byte (bit 7..0) • Byte 2 = High-order byte (bit 15..8)	Nodim
226	cGRH	Corrected GRH GRH corrected for tank shell/stilling well temperature. Calcu-lation method depends on tank type and gauge installation details. [GRH] is used with the calculation of: • TOV	Level
227	cGRHStatus	Status and Validity of entity [226] [cGRH]	Status
228	eqArea	Equivalent Area The equivalent area of a tank is the theoretical area at a spe-cific level, assuming the tank would have an ideal vertical cylindrical shape.	Volume
229	eqAreaStatus	Status and Validity of entity [228] [eqArea]	Status
230	TotalWeight	Total of liquid and vapor weight (in air) in tank. Note: for products in open containers (tanks) the use of NSW is preferred	Mass
231	TotalWeightStatus	Status and Validity of entity [231] [TotalWeight]	Status
238	NSW	Net Standard Weight	Mass
239	NSWStatus	Status and Validity of entity [238] [NSW]	Status
250	cDObs	Calculated observed density	Density
251	cDobsStatus	Calculated observed density status	Status
258	cProductDref	Calculated product reference density	Density
259	cProductDrefStatus	Status and Validity of entity [30] (Reference Density).	Status
260	cProductTC	calculated Product Temperature Coefficient.	Temperature Coefficient

ID	Name	Description	Dimension Type
261	cProductTCStatus	Status and Validity of entity [260] (calculated Product Temperature Coefficient).	Status
262	cVCF	CTL (Correction for the effect of Temperature fon Liquid)	Factor
263	cVCFStatus	Status and Validity of entity [262] (cVCF).	Status
264	cWaterVol	Calculated Water Volume.	Volume
265	cWaterVolStatus	Status and Validity of entity [264] (Water Volume).	Status
266	MaxLevel	MaxLev (Maximum Level) is: • the Level of the highest (lowest in case of ullage) strap • tank height (cylinder) • 2 x radius (sphere)	Level
267	MaxLevelStatus	Status and Validity of entity [266] (Max Level).	Status
268	MinLevel	MinLev (minimum Level) is: • the Level of the lowest (highest in case of ullage) strap • (cylinder, sphere) MinLev is used internally to check the integrity of the • Zones	Level
269	MinLevelStatus	Status and Validity of entity [268] (Minimum Level).	Status
270	MaxTOV	Maximum Total Observed Volume	Volume
271	MaxTOVStatus	Status and Validity of entity [270] (Maximum Total Observed Volume).	Status
272	MinTOV	MinLev (Minimum Level) MinLev is: • the Level of the lowest (highest in case of ullage) strap • (cylinder, sphere)	Volume
273	MinTOVStatus	Status and Validity of entity [272] (Minimum Total Observed Volume).	Status
274	ZoneWeight	ZoneWeight is the correction value of a zone which is used for the correction of the floating roof immersion in the product.	Mass
275	ZoneWeightStatus	Status and Validity of entity [274] (Zone Weight).	Status
276	RoofCorrection	When the tank is equipped with a floating roof, this roof will displace a certain amount of product, unless the tank is (nearly) empty, so that the roof rests on its legs. This results in an incorrect level measurement: the measured level, and therefore the calculated volume, is too high (measured ullage level is too low).	Mass
277	RoofCorrectionStatus	Status and Validity of entity [276] (Floating Roof Weight Correction).	Status
286	VapDensity	Vapor Density	Density
287	VapDensityStatus	Status and Validity of entity [286] (VapDensity).	Status
292	AirBrassDensity	It is the density of used calibration weights	Density

ID	Name	Description	Dimension Type
293	AirBrassDensityStatus	Status and Validity of entity [292] (AirBrassDensity).	Status
296	ProductPressure	Value of the product pressure.	Pressure
297	ProductPressureStatus	Status of entity ID#296	Status
298	Concentrtation	The concentartion of the product	Percentage
299	ConcentrtationStatus	Status and Validity of entity [298] (Concentration).	Status
300	GSM	The calculated Gross Standard Mass	Mass
301	GSMStatus	Status and Validity of entity [300] (GSM).	Status
302	GSW	The calculated Gross Statndard Weight	Mass
303	GSWStatus	Status and Validity of entity [302] (GSW).	Status
304	VapWeight	The calculated vapor weight	Mass
305	VapWeightStatus	Status and Validity of entity [304] (VapWeight).	Status
306	WCF	Weight Correction Factor	Factor
307	WCFStatus	Status and Validity of entity [307] (WCF).	Status
308	cDObsHyc	Density of the product corrected by the hydrometer correction factor	Density
309	cDObsHycStatus	Status and Validity of entity [308] (cDObsHyc).	Status
310	cHYCf	Calculated Hydrometer correction factor	Factor
311	cHYCfStatus	Status and Validity of entity [310] (cHYCf).	Status
312	Innage	Innage	Level
313	InnageStatus	Status and Validity of entity [312] (innage).	Status
314	cShellCapacity	Caculated Shell Capacity	Volume
315	cShellCapacityStatus	Status and Validity of entity [314] (cShellCapacity).	Status
318	TermGRHP	Correction of the Gauge Reference Height by influence of pressure	Level
319	TermGRHPStatus	Status and Validity of entity [318] (TermGRHP).	Status
320	TermInnage	The Term of innage	Level
321	TermInnageStatus	Status and Validity of entity [320] (TermInnage).	Status
322	TermUllage	The Term of Ullage	Level
323	TermUllageStatus	Status and Validity of entity [322] (TermUllage).	Status
520	CIUClock	The Real -Time clock	Time
2070	WaterDipOffset	Water Dip Offset The Offset will be subtracted from the measured Free Water Level. This is especially useful for the 811 type Servo Gauge, where the Water detection Device can be on a position which differs from that of the Displacer.	Level
2089	WaterDipOffsetStatus	Status and Validity of entity 2070	Status
2100	MovingTripValue	Movement Detection Trip Value.	Level
2101	MovingIntervalTime	Interval Time for MoveDir Calculation.	Time

ID	Name	Description	Dimension Type
2102	GRH	Gauge Reference Height	Level
2103	GRHStatus	Status and Validity of entity [2102] (GRH).	Status
2114	TGRH	Temperature GRH	Temperature Coefficient
2115	TGRHStatus	Status and Validity of entity [2114] (Tgrh).	Status
2116	TMW	Thermal wire compensation	Temperature Coefficient
2117	TMWStatus	Status and Validity of entity [2116] (Tmw).	Status
2118	IFDry	Insulation factor of the tank shell for vapor portion.	Factor
2119	IFDry Status	Status and Validity of entity [2116] (IfDry).	Status
2120	IFWet	Insulation factor of the tank shell for portion under liquid.	Factor
2121	IFWet Status	Status and Validity of entity [2116] (IFWet).	Status
2122	TTS	Total tank space	Volume
2123	TTSStatus	Status and Validity of entity [2122] (TTS).	Status
2132	LRef1	Reference floating roof level sensors 1	Level
2133	LRef1Status	Status and Validity of entity [2132] (LRef1).	Status
2134	LRef2	Reference floating roof level sensors 2	Level
2135	LRef2Status	Status and Validity of entity [2134] (LRef2).	Status
2136	LRef3	Reference floating roof level sensors 3	Level
2137	LRef3Status	Status and Validity of entity [2136] (LRef3).	Status
2138	RD1	Reference distance from top surface measuring pipe 1 to liquid level	Level
2139	RD1Status	Status and Validity of entity [2138] (RD1).	Status
2140	RD2	Reference distance from top surface measuring pipe 2 to liquid level	Level
2141	RD2Status	Status and Validity of entity [2140] (RD2).	Status
2142	RD3	Reference distance from top surface measuring pipe 3 to liquid level	Level
2143	RD3Status	Status and Validity of entity [2142] (RD3).	Status
2148	Sd	Total cross section area of floating roof	Area
2149	SdStatus	Status and Validity of entity [2148] (Sd).	Status
2150	HPAvg	Average height top measuring pipe to lowest edge pontoon bottom	Level
2151	HPAvgStatus	Status and Validity of entity [2150] (Hpaver).	Status
2152	WCFMethod	Define the WCF Method to select Select: None | OIML R125 | API MPMS CH11 5 | Simplyfied | Cutom	-
2153	WCFMethodStatus	Status and Validity of entity [2152] (WCFMethod).	Status

ID	Name	Description	Dimension Type
2156	GRHPFactor		nodim
2157	GRHPFactorStatus	Status and Validity of entity [2156] (GRHPFactor).	Status
2158	ModeCTSh	Enable the calculation of the Correction of the Tank Shell	nodim
2159	ModeCTShStatus	Status and Validity of entity [2158] (SelectCTSH).	Status
2160	ModeFRC	Enable the calculation of the Flotiong Roof Compensation	Nodim
2161	ModeFRCStatus	Status and Validity of entity [2160] (SelectFRCStatus).	Status
2162	ModeGRHP	Enable the calculation of Gauge Reference Height for Pressure	nodim
2163	ModeGRHPStatus	Status and Validity of entity [2162] (SelectGRHP).	Status
2164	ModeGRHT	Enable the calculation of Gauge Reference Height for Temperature	nodim
2165	ModeGRHTStatus	Status and Validity of entity [2164] (SelectGRHT).	Status
2166	ModeRIC	Enable the calculation of Roof Immersion Compnsationon	nodim
2167	ModeRICStatus	Status and Validity of entity [2168] (SelectRIC).	Status
2168	ModeWireCompensation	Enable the calculation of Wire Compensation	-
2169	ModeWireCompensationStatus	Status and Validity of entity [2168] (SelectWiireCompensation).	Status
2172	VConst	Liquid volume under the pontoon membrane and bottom, calculated during tank calibration.	Volume
2173	VConstStatus	Status and Validity of entity [2172] (VConst).	Status
2174	DxAver	Roof immersion relative to reference level (FRLn - LRefn) Δxaver = (Δx1+Δx2+Δx3) / 3	Level
2175	DxAverStatus	Status and Validity of entity [2174] (DxAver).	Status
2176	cMassConcentration	Calculated concentration of Mass	percentage
2177	cMassConcentrationStatus	Status and Validity of entity [2176] (cMassConcentration).	Status
2178	cVolConcentration	Calculated concentration of Volume	percentage
2179	cVolConcentrationStatus	Status and Validity of entity [2178] (cVolConcentration).	Status
2180	CalLiqDens	Calibration Liquid Density This is the density (observed) of the product under a roof, used during tank calibration, in kg/m3	Density
2181	CalLiqDensStatus	Status and Validity of entity [2180] (cVolConcentration).	Status
2182	Ksi	Volume growth coefficient (for the interstice section between the floating roof and the tank wall) in the range between the values (hz + Xaver +DeltaXAver - Hp avver) and hz, as read from the tank capacity table in dm/3/mm	
2183	KsiStatus	Status and Validity of entity [2182] (Ksi).	Status

ID	Name	Description	Dimension Type
2535	TemperatureProfilesScanEnable	This indicates whether temperature profiles is enabled / disabled for a tank. 0 – Temperature profile data scan disabled 1 – Temperature profile data scan enabled This is a read/write entity. Modbus Host system can write to this entity to enable / disable temperature profile scan for a tank in CIU.	Nodim
2542	IsPrimary		NoDim
2600	Gauge2Status	Level Gauge Status (servo). 0 = Level gauge is measuring level1 = Level gauge is in test 2 = Level gauge is in lock test3 = Level gauge is blocked 4 = Level gauge is busy with a density profile measurement. 5 = Level gauge is searching water level 6 = Level gauge end switch reached 7 = Reserved for future use 8 = Level gauge is in interface mode 2 9 = Level gauge is in interface dip mode 10 = Level gauge has found water level and is measuring it 11 = 253 Future 254 = Uninitialized 255 = Level gauge is in failure	NoDim
2603	ProductLevel2	The product level from secondary gauge in the tank.	Level
2604	ProductLevel2Status	The status of entity ID#2603, ProductLevel2.	Status
2535	TemperatureProfilesS-canEnable	This indicates whether temperature profiles is enabled / disabled for a tank. 0 – Temperature profile data scan disabled 1 – Temperature profile data scan enabled This is a read/write entity. Modbus Host system can write to this entity to enable / disable temperature profile scan for a tank in CIU.	Nodim
3033	WriteProtectKeyStatus	0x00 = NOT write protected (switch open) 0x01 = Write protected (switch closed)	Nodim
3034	WMKeyStatus	0x00 = NOT write protected (switch open) 0x01 = Write protected (switch closed)	Nodim
3517	FieldPortVersion	Version information of the CIU 888 field card.	Text

ID	Name	Description	Dimension Type
4003	TankZoneControl	Tank Zone Control: Bit 1/0 0 0 zone not used 0 1 Floating roof weight 1 0 Volume correction value (not supported by Ensite Pro) 1 1 reserved Bit 2 1 = No calculation (interpolation) allowed for Water Volume Bit 3 1 = No calculation (interpolation) allowed for TOV Bit 4 reserved Bit 5 = derived data: manual (not supported by Ensite Pro) Bit 6 1 = derived data: Not calibrated. (not supported by Ensite Pro) Bit 7 1 = Error (used internally).	Nodim
4004	TankZoneStart	TankZoneStart	Level
4005	TankZoneEnd	TankZoneEnd	Level
4006	TankZoneOneCorrection	Zone Correction This Value is the Weight of the Floating Roof. The Volume which is displaced by the (part of) the Floating Roof which is submerged in the Product, will be calculated and subtracted from the “Coarse GOV” (TOV - WaterVol) This entity is configured by the service tool..	
5041	WVolUnderRange	Water Volume under Range. Whenever the Free Water Level drops below the minimum Value, the Water Volume will no longer be calculated. The “WaterVolumeUnderRange” will be used instead. This entity is configured by the service tool.	Volume
5060	CalculationType	The TC calculator is updated to the latest calclations. With this figure the CIU can to perform calculations to be compliant to former versions e.g. the output according the CIU880 or CIU888 R101. 0 = Compliant to the CIU880 and CIU888 R10x.x 1 = CIU888 R102	

ID	Name	Description	Dimension Type
8140	Switch	Switches Switch, which does not have a validity and status, gives the following information: • how the status of a number of entities must be processed • whether [ProdDRef] must be calculated or entered manually • how [CTL] must be calculated whether CTSh calculations must be executed	Bit Coded
8181	Auto	Automatic measured/calculated values. This entity does not have a validity and/or Status. For some calculations the DLL needs to know if an entity, e.g. [DObs], is normally measured automatically. The host must (re)set the bits, except bit 15 and 14, which are (re)set by the DLL. Automatic must be set whenever the appropriate instrument is installed on the tank, even when the instrument is temporarily out of use, or if the scan for this entity is disabled (killed) and the value of the entity evt. Entered manually. Bit, Set by, Description (bit is set: 1) 15, DLL, CTL is calculated, not entered manually (see ProdCalcType) 14, DLL, ProdTC is calculated, not entered manually (see ProdCode) 13, (n.a.), 12, (n.a.), 11, (n.a.), 10, (n.a.), 09, (n.a.), 08, (n.a.), 07, (n.a.), 06, (n.a.), 05, Host, AmbientTemp is measured automatically 04, Host, VapPress and VapTemp are measured automatically 03, Host, [DObs] and [TObs] are measured automatically (Note) 02, Host, WaterLevel is measured automatically (Note) 01, Host, ProdTemp is measured automatically 0 Host [ProductLevel] is measured automatically Note: a dipped WaterLevel and a dipped [DObs] should be marked as “measured automatically” Automatic is used with numerous calculations.	Bit Coded
9128	SampleDensity	Sample density refers to density data obtained from a manual sample. Sample density always needs to be provided in combination with the sample temperature. This is not the temperature of the sample when it was taken, but the temperature when the density was determined (for example using a hydrometer.	Density

ID	Name	Description	Dimension Type
9129	SampleTemperature	sample temperature. This is not the temperature of the sample when it was taken, but the temperature when the density was determined (for example using a hydrometer.	Temperature
9130	AssociatedProductID	This entity is used to indicate the Product associated with a Tank	nodim
9133	SampleDensityStatus	Status and validity of entity [9128] SampleDensity	Status
9135	SampleTemperatureStatus	Status and validity of entity [9129] SampleTemperature	Status
9143	ProductNameStatus	Status and Validity of entity [21] (ProductName).	Status
9160	ProductConfigurationCRC	The legal relevant entities* of the Product, defined by IsIn9160 column of the D_Entity888 table, will be calculated into a CRC. The CIU888 will distribute the CRC by the blob towards ENTIS. The same mechanism as used for tank CRC's will be used by ENTIS determine the product has not been tampered with. A changed CRC is ok when the legal metrology entity 9112 is not set. If it is set, ENTIS verifies the CRC against what have been stored during migration. If there is a mismatch ENTIS will raise a PCAL (Product CRC Alarm) and propagate this to the Status and validity of approved values. *Some entities of a product may be overwritten at any time.	
13100	RoundingScheme	Defines the CIU rounding scheme. 0 – CIU880 compatible Round (deafult) 1 – Bankers rounding 2 – Symmetric rounding 3 – Asymmetric rounding 4 – Nearest rounding	nodim
10584	TemperatureProfileData-Status	This indicates the status of the temperature profiles data scan in CIU. – Temperature profiles data not scanned – Temperature profiles data scan in progress – Temperature profiles data scan completed	Nodim
10571	TemperatureProfileTime-Stamp	This indicates the timestamp at which temperature profiles data was collected from the field device.	Absolute time

ID	Name	Description	Dimension Type
10585	MultitemperatureNumberOfElements	This indicates the configured number of temperature elements in the gauge.	Nodim
466	MultitemperatureSpotRelativeElementPosition0	This indicates multitemperature spot 0 sensor position.	Level
467	MultitemperatureSpotRelativeElementPosition0Status	This indicates multitemperature spot 0 sensor position's status.	Status
468	MultitemperatureSpotRelativeElementPosition1	This indicates multitemperature spot 1 sensor position.	Level
469	MultitemperatureSpotRelativeElementPosition1Status	This indicates multitemperature spot 1 sensor position's status.	Status
470	MultitemperatureSpotRelativeElementPosition2	This indicates multitemperature spot 2 sensor position.	Level
471	MultitemperatureSpotRelativeElementPosition2Status	This indicates multitemperature spot 2 sensor position's status.	Status
472	MultitemperatureSpotRelativeElementPosition3	This indicates multitemperature spot 3 sensor position.	Level
473	MultitemperatureSpotRelativeElementPosition3Status	This indicates multitemperature spot 3 sensor position's status.	Status
474	MultitemperatureSpotRelativeElementPosition4	This indicates multitemperature spot 4 sensor position.	Level
475	MultitemperatureSpotRelativeElementPosition4Status	This indicates multitemperature spot 4 sensor position's status.	Status
476	MultitemperatureSpotRelativeElementPosition5	This indicates multitemperature spot 5 sensor position.	Level
477	MultitemperatureSpotRelativeElementPosition5Status	This indicates multitemperature spot 5 sensor position's status.	Status
478	MultitemperatureSpotRelativeElementPosition6	This indicates multitemperature spot 6 sensor position.	Level
479	MultitemperatureSpotRelativeElementPosition6Status	This indicates multitemperature spot 6 sensor position's status.	Status
480	MultitemperatureSpotRelativeElementPosition7	This indicates multitemperature spot 7 sensor position.	Level
481	MultitemperatureSpotRelativeElementPosition7Status	This indicates multitemperature spot 7 sensor position's status.	Status
482	MultitemperatureSpotRelativeElementPosition8	This indicates multitemperature spot 8 sensor position.	Level
483	MultitemperatureSpotRelativeElementPosition8Status	This indicates multitemperature spot 8 sensor position's status.	Status
484	MultitemperatureSpotRelativeElementPosition9	This indicates multitemperature spot 9 sensor position.	Level
485	MultitemperatureSpotRelativeElementPosition9Status	This indicates multitemperature spot 9 sensor position's status.	Status

ID	Name	Description	Dimension Type
486	MultitemperatureSpotRelativeElementPosition10	This indicates multitemperature spot 10 sensor position.	Level
487	MultitemperatureSpotRelativeElementPosition10Sta-tus	This indicates multitemperature spot 10 sensor position's status.	Status
488	MultitemperatureSpotRelativeElementPosition11	This indicates multitemperature spot 11 sensor position.	Level
489	MultitemperatureSpotRelativeElementPosition11Sta-tus	This indicates multitemperature spot 11 sensor position's status.	Status
490	MultitemperatureSpotRelativeElementPosition12	This indicates multitemperature spot 12 sensor position.	Level
491	MultitemperatureSpotRelativeElementPosition12Sta-tus	This indicates multitemperature spot 12 sensor position's status.	Status
492	MultitemperatureSpotRelativeElementPosition13	This indicates multitemperature spot 13 sensor position.	Level
493	MultitemperatureSpotRelativeElementPosition13Sta-tus	This indicates multitemperature spot 13 sensor position's status.	Status
494	MultitemperatureSpotRelativeElementPosition14	This indicates multitemperature spot 14 sensor position.	Level
495	MultitemperatureSpotRelativeElementPosition14Sta-tus	This indicates multitemperature spot 14 sensor position's status.	Status
496	MultitemperatureSpotRelativeElementPosition15	This indicates multitemperature spot 15 sensor position.	Level
497	MultitemperatureSpotRelativeElementPosition15Sta-tus	This indicates multitemperature spot 15 sensor position's status.	Status
434	MultitemperatureSpotTemperature0	This indicates multitemperature spot 0 sensor value.	Temperature
435	MultitemperatureSpotTemperature0Status	This indicates multitemperature spot 0 sensor value's status.	Status
436	MultitemperatureSpotTemperature1	This indicates multitemperature spot 1 sensor value.	Temperature
437	MultitemperatureSpotTemperature1Status	This indicates multitemperature spot 1 sensor value's status.	Status
438	MultitemperatureSpotTemperature2	This indicates multitemperature spot 2 sensor value.	Temperature
439	MultitemperatureSpotTemperature2Status	This indicates multitemperature spot 2 sensor value's status.	Status
440	MultitemperatureSpotTemperature3	This indicates multitemperature spot 3 sensor value.	Temperature

ID	Name	Description	Dimension Type
441	MultitemperatureSpotTemperature3Status	This indicates multitemperature spot 3 sensor value's status.	Status
442	MultitemperatureSpotTemperature4	This indicates multitemperature spot 4 sensor value.	Temperature
443	MultitemperatureSpotTemperature4Status	This indicates multitemperature spot 4 sensor value's status.	Status
444	MultitemperatureSpotTemperature5	This indicates multitemperature spot 5 sensor value.	Temperature
445	MultitemperatureSpotTemperature5Status	This indicates multitemperature spot 5 sensor value's status.	Status
446	MultitemperatureSpotTemperature6	This indicates multitemperature spot 6 sensor value.	Temperature
447	MultitemperatureSpotTemperature6Status	This indicates multitemperature spot 6 sensor value's status.	Status
448	MultitemperatureSpotTemperature7	This indicates multitemperature spot 7 sensor value.	Temperature
449	MultitemperatureSpotTemperature7Status	This indicates multitemperature spot 7 sensor value's status.	Status
450	MultitemperatureSpotTemperature8	This indicates multitemperature spot 8 sensor value.	Temperature
451	MultitemperatureSpotTemperature8Status	This indicates multitemperature spot 8 sensor value's status.	Status
452	MultitemperatureSpotTemperature9	This indicates multitemperature spot 9 sensor value.	Temperature
453	MultitemperatureSpotTemperature9Status	This indicates multitemperature spot 9 sensor value's status.	Status
454	MultitemperatureSpotTemperature10	This indicates multitemperature spot 10 sensor value.	Temperature
455	MultitemperatureSpotTemperature10Status	This indicates multitemperature spot 10 sensor value's status.	Status
456	MultitemperatureSpotTemperature11	This indicates multitemperature spot 11 sensor value.	Temperature
457	MultitemperatureSpotTemperature11Status	This indicates multitemperature spot 11 sensor value's status.	Status
458	MultitemperatureSpotTemperature12	This indicates multitemperature spot 12 sensor value.	Temperature
459	MultitemperatureSpotTemperature12Status	This indicates multitemperature spot 12 sensor value's status.	Status
460	MultitemperatureSpotTemperature13	This indicates multitemperature spot 13 sensor value.	Temperature
461	MultitemperatureSpotTemperature13Status	This indicates multitemperature spot 13 sensor value's status.	Status

ID	Name	Description	Dimension Type
462	MultitemperatureSpotTemperature14	This indicates multitemperature spot 14 sensor value.	Temperature
463	MultitemperatureSpotTemperature14Status	This indicates multitemperature spot 14 sensor value's status.	Status
464	MultitemperatureSpotTemperature15	This indicates multitemperature spot 15 sensor value.	Temperature
465	MultitemperatureSpotTemperature15Status	This indicates multitemperature spot 15 sensor value's status.	Status
498	MultiTemperatureLevelOff-set	This indicates the position of the anchoring-eye in respectwith the zero-level of the tank. level = actual_level - M_T_offset (if INNAGE) orlevel = M_T_offset - Actual_level (if ULLAGE)	Level
499	MultiTemperatureElement-Type	This item indicates the type of connected multi-temperature element.	Text (ASCII orUnicode)
10572	TemperatureProfilesScan-ProductLevel	This indicates the product level for a tank when temperature profiles data for that tank was scanned by CIU 888.	Level
10573	TemperatureProfilesScan-ProductLevelStatus	This indicates the product level status for a tank when temperature profiles data for that tank was scanned by CIU 888.	Status
10574	TemperatureProfilesScan-ProductTemperature	This indicates the product temperature for a tank when temperature profiles data for that tank was scanned by CIU 888.	Temperature
10574	TemperatureProfilesScan-ProductTemperatureStatus	This indicates the product temperature for a tank when temperature profiles data for that tank was scanned by CIU 888.	Status
10595	TemperatureProfileScan-WaterLevel	This indicates the water level for a tank when temperatureprofiles data for that tank was scanned by CIU 888.	Level
10596	TemperatureProfileScan-WaterLevelStatus	This indicates the water level status for a tank when temperature profiles data for that tank was scanned by CIU 888.	Status
10597	TemperatureProfileScan-VapourTemperature	This indicates the vapour temperature for a tank when temperature profiles data for that tank was scanned by CIU 888.	Temperature
10598	TemperatureProfileScan-VapourTemperatureStatus	This indicates the vapour temperature status for a tank when temperature profiles data for that tank was scanned by CIU 888.	Status
10599	TemperatureProfileScan-VapourPressure	This indicates the vapour pressure for a tank when temperature profiles data for that tank was scanned by CIU 888.	Pressure
10600	TemperatureProfileScan-VapourPressureStatus	This indicates the vapour pressure status for a tank when temperature profiles data for that tank was scanned by CIU 888.	Status
10651	DensityProfileDataStatus	This indicates the status of the density profile command execution in CIU. – Density profiles command not executed – Density profiles command execution in progress2 – Density profiles command execution complete	Nodim
10652	DensityProfileTimeStamp	This indicates the timestamp at which density profiles datawas collected from the field device.	Absolute time
10655	MultiDensityNumberOfElements	This indicates the configured number of Density points in the gauge.	Nodim

ID	Name	Description	Dimension Type
390	DensityInnageLevel0	This indicates position 0 at which density is measured.	Level
391	DensityInnageLevel0Status	This indicates position 0 status.	Status
392	DensityInnageLevel1	This indicates position 1 at which density is measured.	Level
393	DensityInnageLevel1Status	This indicates position 1 status.	Status
394	DensityInnageLevel2	This indicates position 2 at which density is measured.	Level
395	DensityInnageLevel2Status	This indicates position 2 status.	Status
396	DensityInnageLevel3	This indicates position 3 at which density is measured.	Level
397	DensityInnageLevel3Status	This indicates position 3 status.	Status
398	DensityInnageLevel4	This indicates position 4 at which density is measured.	Level
399	DensityInnageLevel4Status	This indicates position 4 status.	Status
400	DensityInnageLevel5	This indicates position 5 at which density is measured.	Level
401	DensityInnageLevel5Status	This indicates position 5 status.	Status
402	DensityInnageLevel6	This indicates position 6 at which density is measured.	Level
403	DensityInnageLevel6Status	This indicates position 6 status.	Status
404	DensityInnageLevel7	This indicates position 7 at which density is measured.	Level
405	DensityInnageLevel7Status	This indicates position 7 status.	Status
406	DensityInnageLevel8	This indicates position 8 at which density is measured.	Level
407	DensityInnageLevel8Status	This indicates position 8 status.	Status
408	DensityInnageLevel9	This indicates position 9 at which density is measured.	Level
409	DensityInnageLevel9Status	This indicates position 9 status.	Status
701	DensityInnageLevel10	This indicates position 10 at which density is measured.	Level
702	DensityInnageLevel10Sta-tus	This indicates position 10 status.	Status
703	DensityInnageLevel11	This indicates position 11 at which density is measured.	Level
704	DensityInnageLevel11Sta-tus	This indicates position 11 status.	Status
705	DensityInnageLevel12	This indicates position 12 at which density is measured.	Level
706	DensityInnageLevel12Sta-tus	This indicates position 12 status.	Status
707	DensityInnageLevel13	This indicates position 13 at which density is measured.	Level
708	DensityInnageLevel13Sta-tus	This indicates position 13 status.	Status
709	DensityInnageLevel14	This indicates position 14 at which density is measured.	Level
710	DensityInnageLevel14Sta-tus	This indicates position 14 status.	Status
711	DensityInnageLevel15	This indicates position 15 at which density is measured.	Level
712	DensityInnageLevel15Sta-tus	This indicates position 15 status.	Status

ID	Name	Description	Dimension Type
713	DensityInnageLevel16	This indicates position 16 at which density is measured.	Level
714	DensityInnageLevel16Sta-tus	This indicates position 16 status.	Status
715	DensityInnageLevel17	This indicates position 17 at which density is measured.	Level
716	DensityInnageLevel17Sta-tus	This indicates position 17 status.	Status
717	DensityInnageLevel18	This indicates position 18 at which density is measured.	Level
718	DensityInnageLevel18Sta-tus	This indicates position 18 status.	Status
719	DensityInnageLevel19	This indicates position 19 at which density is measured.	Level
720	DensityInnageLevel19Sta-tus	This indicates position 19 status.	Status
721	DensityInnageLevel20	This indicates position 20 at which density is measured.	Level
722	DensityInnageLevel20Sta-tus	This indicates position 20 status.	Status
723	DensityInnageLevel21	This indicates position 21 at which density is measured.	Level
724	DensityInnageLevel21Sta-tus	This indicates position 21 status.	Status
725	DensityInnageLevel22	This indicates position 22 at which density is measured.	Level
726	DensityInnageLevel22Sta-tus	This indicates position 22 status.	Status
727	DensityInnageLevel23	This indicates position 23 at which density is measured.	Level
728	DensityInnageLevel23Sta-tus	This indicates position 23 status.	Status
729	DensityInnageLevel24	This indicates position 24 at which density is measured.	Level
730	DensityInnageLevel24Sta-tus	This indicates position 24 status.	Status
731	DensityInnageLevel25	This indicates position 25 at which density is measured.	Level
732	DensityInnageLevel25Sta-tus	This indicates position 25 status.	Status
733	DensityInnageLevel26	This indicates position 26 at which density is measured.	Level
734	DensityInnageLevel26Sta-tus	This indicates position 26 status.	Status
735	DensityInnageLevel27	This indicates position 27 at which density is measured.	Level
736	DensityInnageLevel27Sta-tus	This indicates position 27 status.	Status
737	DensityInnageLevel28	This indicates position 28 at which density is measured.	Level
738	DensityInnageLevel28Sta-tus	This indicates position 28 status.	Status
739	DensityInnageLevel29	This indicates position 29 at which density is measured.	Level

ID	Name	Description	Dimension Type
740	DensityInnageLevel29Sta-tus	This indicates position 29 status.	Status
741	DensityInnageLevel30	This indicates position 30 at which density is measured.	Level
742	DensityInnageLevel30Sta-tus	This indicates position 30 status.	Status
743	DensityInnageLevel31	This indicates position 31 at which density is measured.	Level
744	DensityInnageLevel31Sta-tus	This indicates position 31 status.	Status
745	DensityInnageLevel32	This indicates position 32 at which density is measured.	Level
746	DensityInnageLevel32Sta-tus	This indicates position 32 status.	Status
747	DensityInnageLevel33	This indicates position 33 at which density is measured.	Level
748	DensityInnageLevel33Sta-tus	This indicates position 33 status.	Status
749	DensityInnageLevel34	This indicates position 34 at which density is measured.	Level
750	DensityInnageLevel34Sta-tus	This indicates position 34 status.	Status
751	DensityInnageLevel35	This indicates position 35 at which density is measured.	Level
752	DensityInnageLevel35Sta-tus	This indicates position 35 status.	Status
753	DensityInnageLevel36	This indicates position 36 at which density is measured.	Level
754	DensityInnageLevel36Sta-tus	This indicates position 36 status.	Status
755	DensityInnageLevel37	This indicates position 37 at which density is measured.	Level
756	DensityInnageLevel37Sta-tus	This indicates position 37 status.	Status
757	DensityInnageLevel38	This indicates position 38 at which density is measured.	Level
758	DensityInnageLevel38Sta-tus	This indicates position 38 status.	Status
759	DensityInnageLevel39	This indicates position 39 at which density is measured.	Level
760	DensityInnageLevel39Sta-tus	This indicates position 39 status.	Status
761	DensityInnageLevel40	This indicates position 40 at which density is measured.	Level
762	DensityInnageLevel40Sta-tus	This indicates position 40 status.	Status
763	DensityInnageLevel41	This indicates position 41 at which density is measured.	Level
764	DensityInnageLevel41Sta-tus	This indicates position 41 status.	Status
765	DensityInnageLevel42	This indicates position 42 at which density is measured.	Level
766	DensityInnageLevel42Sta-tus	This indicates position 42 status.	Status

ID	Name	Description	Dimension Type
767	DensityInnageLevel43	This indicates position 43 at which density is measured.	Level
768	DensityInnageLevel43Sta-tus	This indicates position 43 status.	Status
769	DensityInnageLevel44	This indicates position 44 at which density is measured.	Level
770	DensityInnageLevel44Sta-tus	This indicates position 44 status.	Status
771	DensityInnageLevel45	This indicates position 45 at which density is measured.	Level
772	DensityInnageLevel45Sta-tus	This indicates position 45 status.	Status
773	DensityInnageLevel46	This indicates position 46 at which density is measured.	Level
774	DensityInnageLevel46Sta-tus	This indicates position 46 status.	Status
775	DensityInnageLevel47	This indicates position 47 at which density is measured.	Level
776	DensityInnageLevel47Sta-tus	This indicates position 47 status.	Status
777	DensityInnageLevel48	This indicates position 48 at which density is measured.	Level
778	DensityInnageLevel48Sta-tus	This indicates position 48 status.	Status
779	DensityInnageLevel49	This indicates position 49 at which density is measured.	Level
780	DensityInnageLevel49Sta-tus	This indicates position 49 status.	Status
412	MeasuredServoDensity0	This indicates density measured at position 0.	Density
413	MeasuredServoDensi-ty0Sta-tus	This indicates density status measured at position 0.	Status
414	MeasuredServoDensity1	This indicates density measured at position 1.	Density
415	MeasuredServoDensi-ty1Sta-tus	This indicates density status measured at position 1.	Status
416	MeasuredServoDensity2	This indicates density measured at position 2.	Density
417	MeasuredServoDensi-ty2Sta-tus	This indicates density status measured at position 2.	Status
418	MeasuredServoDensity3	This indicates density measured at position 3.	Density
419	MeasuredServoDensi-ty3Sta-tus	This indicates density status measured at position 3.	Status
420	MeasuredServoDensity4	This indicates density measured at position 4.	Density
421	MeasuredServoDensi-ty4Sta-tus	This indicates density status measured at position 4.	Status
422	MeasuredServoDensity5	This indicates density measured at position 5.	Density
423	MeasuredServoDensi-ty5Sta-tus	This indicates density status measured at position 5.	Status
424	MeasuredServoDensity6	This indicates density measured at position 6.	Density

ID	Name	Description	Dimension Type
425	MeasuredServoDensi-ty6Sta-tus	This indicates density status measured at position 6.	Status
426	MeasuredServoDensity7	This indicates density measured at position 7.	Density
427	MeasuredServoDensi-ty7Sta-tus	This indicates density status measured at position 7.	Status
428	MeasuredServoDensity8	This indicates density measured at position 8.	Density
429	MeasuredServoDensi-ty8Sta-tus	This indicates density status measured at position 8.	Status
430	MeasuredServoDensity9	This indicates density measured at position 9.	Density
431	MeasuredServoDensi-ty9Sta-tus	This indicates density status measured at position 9.	Status
781	MeasuredServoDensity10	This indicates density measured at position 10.	Density
782	MeasuredServoDensi-ty10Status	This indicates density status measured at position 10.	Status
783	MeasuredServoDensity11	This indicates density measured at position 11.	Density
784	MeasuredServoDensi-ty11Status	This indicates density status measured at position 11.	Status
785	MeasuredServoDensity12	This indicates density measured at position 12.	Density
786	MeasuredServoDensi-ty12Status	This indicates density status measured at position 12.	Status
787	MeasuredServoDensity13	This indicates density measured at position 13.	Density
788	MeasuredServoDensi-ty13Status	This indicates density status measured at position 13.	Status
789	MeasuredServoDensity14	This indicates density measured at position 14.	Density
790	MeasuredServoDensi-ty14Status	This indicates density status measured at position 14.	Status
791	MeasuredServoDensity15	This indicates density measured at position 15.	Density
792	MeasuredServoDensi-ty15Status	This indicates density status measured at position 15.	Status
793	MeasuredServoDensity16	This indicates density measured at position 16.	Density
794	MeasuredServoDensi-ty16Status	This indicates density status measured at position 16.	Status
795	MeasuredServoDensity17	This indicates density measured at position 17.	Density
796	MeasuredServoDensi-ty17Status	This indicates density status measured at position 17.	Status
797	MeasuredServoDensity18	This indicates density measured at position 18.	Density
798	MeasuredServoDensi-ty18Status	This indicates density status measured at position 18.	Status
799	MeasuredServoDensity19	This indicates density measured at position 19.	Density

ID	Name	Description	Dimension Type
800	MeasuredServoDensi-ty19Status	This indicates density status measured at position 19.	Status
801	MeasuredServoDensity20	This indicates density measured at position 20.	Density
802	MeasuredServoDensi-ty0Sta-tus	This indicates density status measured at position 20.	Status
803	MeasuredServoDensity21	This indicates density measured at position 21.	Density
804	MeasuredServoDensi-ty21Status	This indicates density status measured at position 21.	Status
805	MeasuredServoDensity22	This indicates density measured at position 22.	Density
806	MeasuredServoDensi-ty22Status	This indicates density status measured at position 22.	Status
807	MeasuredServoDensity23	This indicates density measured at position 23.	Density
808	MeasuredServoDensi-ty23Status	This indicates density status measured at position 23.	Status
809	MeasuredServoDensity24	This indicates density measured at position 24.	Density
810	MeasuredServoDensi-ty24Status	This indicates density status measured at position 24.	Status
811	MeasuredServoDensity25	This indicates density measured at position 25.	Density
812	MeasuredServoDensi-ty25Status	This indicates density status measured at position 25.	Status
813	MeasuredServoDensity26	This indicates density measured at position 26.	Density
814	MeasuredServoDensi-ty26Status	This indicates density status measured at position 26.	Status
815	MeasuredServoDensity27	This indicates density measured at position 27.	Density
816	MeasuredServoDensi-ty27Status	This indicates density status measured at position 27.	Status
817	MeasuredServoDensity28	This indicates density measured at position 28.	Density
818	MeasuredServoDensi-ty28Status	This indicates density status measured at position 28.	Status
819	MeasuredServoDensity29	This indicates density measured at position 29.	Density
820	MeasuredServoDensi-ty29Status	This indicates density status measured at position 29.	Status
821	MeasuredServoDensity30	This indicates density measured at position 30.	Density
822	MeasuredServoDensi-ty30Status	This indicates density status measured at position 30.	Status
823	MeasuredServoDensity31	This indicates density measured at position 31.	Density
824	MeasuredServoDensi-ty31Status	This indicates density status measured at position 31.	Status
825	MeasuredServoDensity32	This indicates density measured at position 32.	Density

ID	Name	Description	Dimension Type
826	MeasuredServoDensity32Status	This indicates density status measured at position 32.	Status
827	MeasuredServoDensity33	This indicates density measured at position 33.	Density
828	MeasuredServoDensity33Status	This indicates density status measured at position 33.	Status
829	MeasuredServoDensity34	This indicates density measured at position 34.	Density
830	MeasuredServoDensity34Status	This indicates density status measured at position 34.	Status
831	MeasuredServoDensity35	This indicates density measured at position 35.	Density
832	MeasuredServoDensity35Status	This indicates density status measured at position 35.	Status
833	MeasuredServoDensity36	This indicates density measured at position 36.	Density
834	MeasuredServoDensity36Status	This indicates density status measured at position 36.	Status
835	MeasuredServoDensity37	This indicates density measured at position 37.	Density
836	MeasuredServoDensity37Status	This indicates density status measured at position 37.	Status
837	MeasuredServoDensity38	This indicates density measured at position 38.	Density
838	MeasuredServoDensity38Status	This indicates density status measured at position 38.	Status
839	MeasuredServoDensity39	This indicates density measured at position 39.	Density
840	MeasuredServoDensity39Status	This indicates density status measured at position 39.	Status
841	MeasuredServoDensity40	This indicates density measured at position 40.	Density
842	MeasuredServoDensity40Status	This indicates density status measured at position 40.	Status
843	MeasuredServoDensity41	This indicates density measured at position 41.	Density
844	MeasuredServoDensity41Status	This indicates density status measured at position 41.	Status
845	MeasuredServoDensity42	This indicates density measured at position 42.	Density
846	MeasuredServoDensity42Status	This indicates density status measured at position 42.	Status
847	MeasuredServoDensity43	This indicates density measured at position 43.	Density
848	MeasuredServoDensity43Status	This indicates density status measured at position 43.	Status
849	MeasuredServoDensity44	This indicates density measured at position 44.	Density
850	MeasuredServoDensity44Status	This indicates density status measured at position 44.	Status
851	MeasuredServoDensity45	This indicates density measured at position 45.	Density

ID	Name	Description	Dimension Type
852	MeasuredServoDensi-ty45Status	This indicates density status measured at position 5.	Status
853	MeasuredServoDensity46	This indicates density measured at position 46.	Density
854	MeasuredServoDensi-ty46Status	This indicates density status measured at position 46.	Status
855	MeasuredServoDensity47	This indicates density measured at position 47.	Density
856	MeasuredServoDensi-ty47Status	This indicates density status measured at position 47.	Status
857	MeasuredServoDensity48	This indicates density measured at position 48.	Density
858	MeasuredServoDensi-ty48Status	This indicates density status measured at position 48.	Status
859	MeasuredServoDensity49	This indicates density measured at position 49.	Density
860	MeasuredServoDensi-ty49Status	This indicates density status measured at position 49.	Status

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APPENDIX B STATUS AND VALIDITY OF DATA

Measured and calculated data is accompanied by validity and status information. Each measured and each calculated entity in the CIU 888 contains a 16 bits status register:

- The high byte (validity byte) is used to indicate if the data of this entity is available (valid) and, if not valid, to indicate why the data is not available (invalid).
- The low byte is used to indicate the status of the data.

B.1 Validity byte

The data validity byte is a hexadecimal number. If the validity byte is $\geq 80_{HEX}$, the related data is invalid. If the data of an entity is invalid, all derived data shows the same code in its data validity byte and the status indicates how the data field should be displayed (FFFF, blanks, etc.). If the validity byte is $< 80_{HEX}$, the related data is valid. In this case, additional information is given.

Some examples are listed in TABLE B-1.

TABLE B-1 Description of validity bytes

Validity Byte (HEX)	Description	Additional Details
0...56	Reserved for future use	
57	Zone not calibrated	
58	Zone data is manual	The zone and therefore the calculated TOV (zone is used for volume correction), or GOV (zone is used for floating roof weight correction) and further derived data are not approved
59	Water level is past one or more zones	The correction values of these zones (volume correction only) are applied completely to the calculated Water Volume.Therefore the Water Volume can be different from what one might have expected,
5A	Product level is past one or more zones	The correction values of these zones are applied completely to the calculated TOV (zones used for volume correction) or GOV (zones used for roof weight correction) Therefore the volume can be different from what one might have expected,
5B	Water level under range	The manually entered WVolUnderRange, if available, is used in further calculations.
5C	Reserved for future use	
5D	Reserved for future use	
5E	Water level not approved	The water level and therefore the entities which are calculated using WaterLevel are not approved.
5F	Product level not approved	The product level and therefore the entities which are calculated using ProdLevel are not approved.

Validity Byte (HEX)	Description	Additional Details
60	Product temperature not approved	The Product Temperature and therefore the entities which are calculated using ProdTemp are not approved.
61	Ambient temperature not approved	The Ambient Temperature and therefore the entities which are calculated using AmbientTemp are not approved.
62	Vapor pressure not approved	The Vapor Pressure and therefore the entities which are calculated using VapPress are not approved.
63	Vapor temperature not approved	The Vapor Temperature and therefore the entities which are calculated using VapTemp are not approved.
64	Product observed density not approved	The Product Observed Density and therefore the entities which are calculated using ProdDObs are not approved.
65	Temperature of product observed density not approved	The Temperature of the Product Observed Density and therefore the entities which are calculated using ProdTObs are not approved.
66	Reserved for future use	
67	Tank Shell not calibrated	The Tank Shell and therefore the calculated volumes (TOV, Water Volume) and derived data is not approved.
68	No HIMS calculation because of status of observed density	If, with HIMS calculations, the status of ProdDObs or ProdTObs is manual or stored, MassLiq is calculated from ProdDRef and GSV (not from Prod DObs and GOV),
69	Mass type not complete because of volume correction	Mass Type could not be calculated completely because Vol Corr is invalid. This makes it impossible to check if Mass Liq must be calculated from NSV. The appropriate bit is set to zero.
6A	Mass type not complete because of Tank Type	MassType could not be calculated completely because TankType is invalid. The bits which normally would have been copied from TankType are set to zero.
6B	Mass type not complete because of product calculation type	MassType could not be calculated completely because ProdCalcType is invalid. This makes it impossible to check if the DCF calculation method is used, in which case MassLiq must be calculated from GOV. The appropriate bit is set to zero.
6C	Water measurement not supported on this tank	Water measurement is not supported on this tank. Only manual data entry of water level or Water Volume is possible.
6D	Reduced accuracy due to resolution mismatch	This validity occurs with data conversions.
6E	Water level is within a zone or Product level is within one or two zones	On Water level The (interpolated) correction value of this zone (volume correction only) is applied to the calculated WaterVolume. Therefore the volume can be different from what one might have expected. Note that zones which have already been passed are also involved in the correction.
6F	Reduced accuracy in ambient temperature	
70	Stored because of water dip	Whenever a WaterDip is executed the last known Product Level and Product Temperature (only with MRT) and Vapour Temperature (only with MRT) will be used with Volume Calculations. To indicate this, the Status is set to Stored.

Validity Byte (HEX)	Description	Additional Details
71	Stored because of density dip	
72	Contamination detected by Instrument	
73	Reduced accuracy detected by level gauge	
74	Stored because of test command	
75	Product level below lowest temperature element	The measured temperature is the temperature of the vapor in the tank. This results in a product temperature with reduced accuracy.
76	Limit switch hit	
77	Water dip aborted	
78	Manual value used by Instrument	
79	Last valid value used by Instrument	
7A	Stored because of dipped product level	
7B	Warning from radar gauge	
7C	Reduced accuracy in product temperature	
7D	Alternative temperature element selected	
7E	Low supply in level gauge	
7F	Reduced accuracy in vapor temperature	
80	Illegal use of 0xFF	The host used value 0xFF, which is reserved for special purposes, to set the validity and/or the status of an entity. The DLL replaces the validity of this entity with 0x80 and the status to 0x00.
81	No data available (not required)	No data available because the entity is not required for the calculations, e.g. if CTSh calculation is not required, the Insulation Factor is also not required. This validity is also indicated in the Data Status.
82	Data is not scanned	No data available because (the scan for) the primary (measured) item has been killed (disabled). Data will be available again as soon as the scan is resumed again or when the data is entered manually. This validity is also indicated in the Data Status.
83	Required data is not initialized yet	The data is required to properly perform all calculations, however: The instrument has not yet been scanned for this entity, e.g. Product Level or A required manual value has not yet been entered, e.g. Product Reference Temperature.
84	Product reference temperature not supported	A not standard ProdTRef is only supported for ASTM tables 53/54. This is due to the lack of the calculation description with other tables.

Validity Byte (HEX)	Description	Additional Details
85	Product calculation type does not exist	
86	Product code does not exist or is not supported	
87	Volume correction does not exist	
88	Manual input not allowed	An attempt was made to manually enter data for an entity which does not allow this, e.g. Product Level whilst the scan is not killed for this tank, or ProdDRef where ProdDRef can be calculated from ProdDObs and ProdTObs (ASTM).
89	Molar weight out of range	
8A	Flow interval out of range	
8B	Reserved for future use	
8C	Level measuring type unknown	
8D	Reserved for future use	
8E	The Water Level is within a zone and interpolation is not allowed	
8F	The Product Level is within a zone and interpolation is not allowed.	
90	Reserved for future use	
91	Tank radius out of range	Can only occur with a mathematically calculated tank.
92	Tank height out of range	Can only occur with a mathematically calculated cylindrical tank.
93	Volume out of range	For most volumes, a dedicated validity is available to indicate that the volume is out of range. This validity is applied if one of the following, manually entered volumes, is less than zero: WaterVol, HighTOV, LowTOV or ShellCapacity.
94	Liquid volume ratio out of range	The Liquid/Volume ratio must be chosen from a table, which is not implemented in this DLL. The only check which is done here is if the value is positive.
95	CTL out of range	This validity can only occur with manual data entry of CTL (see ProdCalcType).
96	Tank Shell temperature coefficient out of range	
97	Local gravity out of range	
98	S&W percentage out of range	
99	Flow rate calculation multiplication factor out of range	

Validity Byte (HEX)	Description	Additional Details
9A	Reserved for future use	
9B	Zone correction resulted in volume < 0.0	A zone is used for volume correction (TOV, or WaterVol). The corrected volume is negative.
9C	Temperature correction factor out of range	
9D	Density correction factor out of range	
9E	Insulation factor out of range	
9F	Tank shell reference temperature out of range	
A0	Return code indicates: not successful	The internally used return code indicates that some error was detected. Mostly, a dedicated validity is available to indicate the cause of the error.
A1	Error in strapping data	The levels of straps must be incremental (innage) or decremental (ullage), this will be checked by the DLL and the appropriate bit in TankType is (re)set. Volumes must always be incremental and >= 0.0. One or more irregularities were detected and because of this TOV and WaterVol (GOV in case of WAP) will not be calculated. The usError field in the strap data contains the number of the strap where the error was detected, which is not necessarily the erroneous strap itself.
A2	Error in zone data	The begin and end levels of a zone must be incremental (innage) or decremental (ullage) and zones of the same type may not overlap.
A3	Product reference density equals air density	This would result in a Divide by Zero error.
A4	General data conversion failure	The DLL tried to convert numerical data to other units, but the units of the input or output data could not be found. For most data conversions, a dedicated validity is available to indicate the failure. This error, as well as the dedicated ones, should never occur.
A5	Error in conversion of displacer value to tank units	
A6	Error in conversion of product level to tank units	
A7	Error in conversion of dipped water level to tank units	
A8	Error in conversion of air density to kg/m3	
A9	Error in conversion of density to kg/m3	The conversion from Tank units, e.g. API, to kg/m3 is used with the calculation of: RoofCorr, LiqVap, MassLiq, MassVap or CTL.
AA	Error in conversion of product temperature to tank units	
AB	Error in conversion of reference temperature to Kelvin	This conversion is used with Gas calculations.

Validity Byte (HEX)	Description	Additional Details
AC	Error in conversion of vapor temperature to tank units	
AD	Error in conversion of vapor temperature to Kelvin	This conversion is used with Gas calculations.
AE	Error in conversion of vapor pressure to tank units	
AF	Error in conversion of vapor pressure to kPa	This conversion is used with Gas calculations.
B0	Error in conversion of HIMS density (ZQQ) to tank units	
B1	Error in conversion of dipped density (ZSC) to tank units	
B2	Error in conversion of volume to tank units	This conversion is used when a mathematically (cylinder, sphere) calculated volume is converted to e.g. bbls.
B3	Error in conversion of volume to m3	With mass calculations, the volume, e.g. bbls, is converted to m3.
B4	Error in conversion of mass to kg	The conversion Tank units to kg is used with the calculation of: RoofCorr or LiqVap according to ISO,
B5	Error in conversion of ambient temperature to tank units	
B6	Error in conversion of water level to tank units	
B7	Error in conversion of reference density	This conversion is used whenever e.g. tank units are metric and ASTM table 5/6 is used.
B8	Error in conversion of product reference temperature	This conversion is used whenever e.g. tank units are metric and ASTM table 5/6 is used.
B9	Error in conversion of observed product density	This conversion is used to convert the measured value to tank units and whenever e.g. tank units are metric and ASTM table 5/6 is used.
BA	Error in conversion of temperature of observed density	This conversion is used to convert the measured value to tank units and whenever e.g. tank units are metric and ASTM table 5/6 is used.
BB	Divide by zero error	
BC	Reserved for use by a host	
BD	Reserved for use by a host	
BE	Reserved for use by a host	
BF	Reserved for use by a host	
C0	Water level out of range	When water level is measured automatically, the error is in the TCT or, if the tank is calculated according to the mathematical formula, in the Tank Height (cylinder), or Radius (sphere).

Validity Byte (HEX)	Description	Additional Details
C1	Measured product temperature out of range	Note: when product temperature is outside ASTM ranges, this is indicated in a dedicated validity.
C2	Vapor pressure out of range	This error can occur with the: Density as obtained from the field instrument, manual entry of ProdDRef, calculation of RoofCorr (ProdDRef - DAir) or calculation of LiqVap (ProdDRef or ProdDRef - DAir).
C3	Density out of range	
C4	Ambient temperature out of range	
C5	Product level out of range	When product level is measured automatically, the error is in the TCT or, if the tank is calculated according to the mathematical formula, in the Tank Height (cylinder), or Radius (sphere).
C6	Vapor temperature out of range	When VapTemp is used to calculate LiqVap or MassVap (according to API44), it is converted to Kelvin. To prevent dividing by zero, the result of this conversion may not be zero. When VapTemp is used with the calculation of MassVap (according to ISO), the calculation formula may not give a zero result, again to prevent dividing by zero.
C7	Tank shell temperature correction factor out of range	The calculated CTSh is less than, or equal to, zero.
C8	Gross observed volume out of range	
C9	Time out received from instrument	Action: Monitor field communication (e.g. Instrument address).
CA	Total observed volume exceeds HighTOV	The calculated TOV exceeds the high safety limit: possibly overflow of the tank. Action: Check HighTOV against TankShellCapacity.
CB	Total observed volume exceeds tank shell capacity	The calculated TOV does not fit in the tank, according to the Shell Capacity.
CC	Water volume exceeds LowTOV	Low TOV is the volume to which product can safely be pumped out of the tank. If WaterVol exceeds this value, water will be pumped i.s.o. product.
CD	Water volume exceeds TOV	It is very unlikely that this error ever will occur. However, with manual data entry of Product and/or Water Level (or WaterVol), there is a possibility that the entered values are not correct, which may give unpredictable results.
CE	Port access error	The field scan encountered a problem with the I/O port.
CF	Max total observed volume exceeds tank shell capacity	
D0	None volatile RAM failure	
D1	Code flash failure	
D2	Configuration failure	
D3	IP Module failure	
D4	External RAM failure	
D5	Clock failure	
D6	CRC error detected	

Validity Byte (HEX)	Description	Additional Details
D7	Error in conversion of product temperature coefficient	
D8	Error in conversion of air density	
D9	Reserved for future use	
DA	Water dip aborted internally	A new command was received by the instrument.
DB	Density dip aborted internally	A new command was received by the instrument.
DC	Limit switch hit	If during normal Level measurement the upper or lower Limit Switch is hit, this is indicated in the Validity. If a Limit Switch is hit during a Water Bottom measurement (dip), this will be indicated in the Status.
DD	Floating roof correction volume exceeds coarse GOV	RoofCorr will be subtracted from CoarseGOV, which is TOV WaterVol, evt. corrected with CTSh, to obtain GOV, which must be >= 0.0.
DE	Available gross observed volume out of range	The calculated AvaGOV is <= 0.0,
DF	Reply from instrument contains error code	
E0	TOR, as received from instrument, not supported	The instrument returned an unknown Type Of Record.
E1	Reserved for future use	
E2	Error in received displacer status	
E3	Error in received HIMS density (ZQQ) status	
E4	Error in received product level status	811, 813, 854, 873 etc. ---------- Check the Level status (LS) Bit Error (STIC central) ---------- 7 (parity) 6 1 5 (not used) 4 Temp. out of range (no level correction) 3 Product level out of range 2 Contamination 1 No good data 0 Bad connection

Validity Byte (HEX)	Description	Additional Details
E5	Error in received (scanned, not dipped) water level status	Water Scout --- Bit Error (STIC central) --- 7 (parity) 6 1 5 (not used) 4 (not used) 3 (not used) 2 No Water found 1 No good data 0 Bad connection
E6	Error in product temperature status	811, 813, 854, 873 etc. --- Check the Temperature status (TS) Bit Error (STIC central) --- 7 (parity) 6 1 5 (not used) 4 (not used) 3 (not used) 2 Temperature out of range 1 No good data 0 Bad connection
E7	Error in received vapor temperature status	TS1 Bit Error --- 7 0 6 1 5 One or more temp. elements defective 4 Level exceeds highest temp. element 3 Level exceeds lowest temp. element 2 Failure in average gas temp. reading 1 Failure in average product reading 0 Failure in Temp. reading TS2 Bit Error --- 7 0 6 1 5 Temperature out of specified range 4 MTC: specified differential temp. exceeded 3 MTC: device not calibrated 2 Level timeout 1 Manual level used 0 Last valid level used

Validity Byte (HEX)	Description	Additional Details
E8	Reserved for future use	
E9	Reserved for future use	
EA	Error in received vapor pressure status	PS0 Bit Error ------ ---------- 7 0 6 1 5 Level timeout (HIMS only) 4 HiHi alarm 3 High alarm 2 LoLo alarm 1 Low alarm 0 General F/H/OPU failure PS1 Bit Error ------ ---------- 7 0 6 1 5 Exceeding range P3 4 Exceeding range P2 3 Exceeding range P1 2 P3 exceeds min. or max. trip value 1 P2 exceeds min. or max. trip value 0 P1 exceeds min. or max. trip value PS2 Bit Error ------ ---------- 7 0 6 1 5 Manual level used (HIMS only) 4 Last valid P3 used 3 Manual P3 used 2 P3 failure 1 P2 failure 0 P1 failure
EB	Error in conversion of volume from m3 to tank units	Used with the calculations of RoofCorr and LiqVap.
EC	Error in conversion of mathematically calculated volume to tank units	This conversion is used with mathematically (cylinder, sphere) calculated volumes, whilst the tank units are e.g. bbls.
ED	Error in received ambient temperature status	

Validity Byte (HEX)	Description	Additional Details
EE	Error in received dipped density status (ZSC, ZR0...ZR9)	Bit Error ------ ---------- 7 0 6 1 5 Conversion underflow 4 Conversion overflow 3 No measuring point or out of range 2 0: Tank profile; 1: Interface profile 1 Measurement not complete 0 General fail / Default setting
EF	Error in received density profile level status (ZD0...ZD9)	Status 0 Bit Error -------- ---------- 7 0 6 1 5 0 4 0 3 Level/Trajectory exceeds [ML] level 2 Level/Trajectory exceeds [MH] level 1 No valid [Y4] level 0 General fail / default setting Status 1 Bit Error -------- ---------- 7 0 6 1 5 0 4 0 3 0 2 No or invalid [DK] and/or [DN] level(s) (TP only) 1 Density trajectory stops below [DZ] or [EZ] level (TP only) 0 Trajectory exceeds [Y4] level, [DB] level too small (TP only)
F0	Reserved for future use	
F1	Error in received dipped water level status (811, 854, etc.)	
F2	Error in conversion of density (kg/m3) to tank units	The conversion from kg/m3 to Tank units is used by the What If calculator with the calculation of MassLiq.
F3	Error in conversion of mass (kg) to tank units	MassLiq and MassVap are always calculated in kg and will, after they have been calculated, be converted to Tank units.
F4	Input string too long	This validity is used by DLL functions, which receive an input string, when the number of input characters exceeds the length of an internally used buffer.It is used by e.g. ENRAF_ConvertNumber, when the number of input characters exceeds 4 (hex input), or 5 (decimal input).

Validity Byte (HEX)	Description	Additional Details
F5	ASTM no solution	NBR15639_2016 ---------- 789.24 <= DRef <= 998.2 (Dref as input) 793.51 <= Dobs <= 999.09 (Dobs as an input)"
F6	ASTM supercritical fluid	
F7	ASTM no reference fluids	
F8	Local gravity missing	Local gravity is used with pressure conversions and is not in the tank record.
F9	Product temperature coefficient out of range	p ASTM D1250-1980 Table 6 - ---------- C 2700 <= ProdTC <= 9300 p ASTM D1250-1980 Table 24 - ---------- C 2700 <= ProdTC <= 9300 p ASTM D1250-1980 Table 54 - ---------- C 4860 <= ProdTC <= 16740

Validity Byte (HEX)	Description	Additional Details
FA	Product temperature out of range	ASTM D4311-1983: Table 1 --- 0.0 <= Temp <= 500.0 ASTM D4311-1983: Table 2 --- -25.0 <= Temp <= 275.0 ASTM D4311-1996: Table 1 --- -25.0 <= Temp <= 275.0 p ASTM D1250-1980: Table 6 - --- A 0.0 <= APIRef <= 40.0 0.0 <= Temp <= 300.0 40.1 <= APIRef <= 50.0 0.0 <= Temp <= 250.0 50.1 <= APIRef <= 85.0 0.0 <= Temp <= 200.0 B 0.0 <= APIRef <= 40.0 0.0 <= Temp <= 300.0 40.1 <= APIRef <= 50.0 0.0 <= Temp <= 250.0 50.1 <= APIRef <= 85.0 0.0 <= Temp <= 200.0 C 2700 <= ProdTC <= 5100 0.0 <= Temp <= 300.0 5101 <= ProdTC <= 5300 0.0 <= Temp <= 250.0 5301 <= ProdTC <= 9300 0.0 <= Temp <= 200.0 D -10.0 <= APIRef <= 45.0 0.0 <= Temp <= 300.0 p ASTM D1250-1980: Table 24 - --- A 0.6110 <= DRef60/60 <= 0.7990 0.0 <= Temp <= 200.0 0.7995 <= DRef60/60 <= 0.8250 0.0 <= Temp <= 250.0 0.8255 <= DRef60/60 <= 1.0760 0.0 <= Temp <= 300.0 B 0.6535 <= DRef60/60 <= 0.7790 0.0 <= Temp <= 200.0 0.7995 <= DRef60/60 <= 0.8250 0.0 <= Temp <= 250.0 0.8255 <= DRef60/60 <= 1.0760 0.0 <= Temp <= 300.0 C 2700 <= ProdTC <= 5100 0.0 <= Temp <= 300.0 5101 <= ProdTC <= 5300 0.0 <= Temp <= 250.0 5301 <= ProdTC <= 9300 0.0 <= Temp <= 200.0 D (n.a.) (n.a.)

Validity Byte (HEX)	Description	Additional Details
		p ASTM D1250-1980: Table 54 - ---------- A 610.5 <= DRef <= 778.5 -18.0 <= Temp <= 95.0 779.0 <= DRef <= 824.0 -18.0 <= Temp <= 125.0 824.5 <= DRef <= 1075.0 -18.0 <= Temp <= 150.0 B 653.0 <= DRef <= 778.5 -18.0 <= Temp <= 95.0 779.0 <= DRef <= 824.0 -18.0 <= Temp <= 125.0 824.5 <= DRef <= 1075.0 -18.0 <= Temp <= 150.0 C 4860 <= ProdTC <= 9180 -18.0 <= Temp <= 95.0 9180 <= ProdTC <= 9540 -18.0 <= Temp <= 125.0 9540 <= ProdTC <= 16740 -18.0 <= Temp <= 150.0 D 800.0 <= DRef <= 1164.0 -20.0 <= Temp <= 150.0 E 0.500 <= DRef <= 0.595 -46.0 <= Temp <= 60.0 0.600 <= DRef <= 0.835 -25.0 <= Temp <= 75.0 0.840 <= DRef <= 0.865 -25.0 <= Temp <= 100.0 0.870 <= DRef <= 0.955 -25.0 <= Temp <= 125.0 0.960 <= DRef <= 1.100 -25.0 <= Temp <= 150.0 ASTM D4311M-2015 (@ 15ºC) ---------- -25.0 <= Temp <= 275.0 ASTM D4311-2015 ºAPI (@ 60 º F) ---------- 0.0 <= Temp <= 500.0 Aromatic HC — ASTM D1555M-2016 kg/m3 (@ 15 ºC) ---------- BE (Benzene) 5.0 <= Temp <= 60.0 CU (Cumene) -15.0 <= Temp <= 60.0 CY (Cyclohexane) 6.0 <= Temp <= 60.0 ET (Ethylbenzene) -15.0 <= Temp <= 60.0 ST (Styrene) -9.0 <= Temp <= 60.0 TO (Toluene) -20.0 <= Temp <= 60.0 MI (Mixed Xylenes) -15.0 <= Temp <= 60.0 MX (m-Xylene) -15.0 <= Temp <= 60.0 OX (o-Xylene) -15.0 <= Temp <= 60.0 PX (p-Xylene) 13.0 <= Temp <= 65.0 (300-350°F) Arom.HC -15.0 <= Temp <= 60.0 (350-400°F) Arom.HC -15.0 <= Temp <= 60.0

Validity Byte (HEX)	Description	Additional Details
		Aromatic HC — ASTM D1555-2016 ºAPI (@ 60 º F) BE (Benzene) 43.0 <= Temp <= 140.0 CU (Cumene) 5.0 <= Temp <= 140.0 CY (Cyclohexane) 44.0 <= Temp <= 140.0 ET (Ethylbenzene) 5.0 <= Temp <= 140.0 ST (Styrene) 15.0 <= Temp <= 140.0 TO (Toluene) -5.0 <= Temp <= 140.0 MI (Mixed Xylenes) 5.0 <= Temp <= 140.0 MX (m-Xylene) 5.0 <= Temp <= 140.0 OX (o-Xylene) 5.0 <= Temp <= 140.0 PX (p-Xylene) 56.0 <= Temp <= 150.0 (300-350°F)Arom. HC 5.0 <= Temp <= 140.0 (350-400°F)Arom. HC 5.0 <= Temp <= 140.0 SGS-2021 -35.0 <= Temp <= 30.0 NBR15639_2016 -20.0 <= Temp <= 50.0 EN15940_2019 -20.0 <= Temp <= 50.0
FB	Too many iterations	ASTM functions allow only a maximum number of iterations in order to calculate the Reference density.
FC	Observed density (or API) out of range	p ASTM D1250-1980 Table 5 A 0.0 <= API <= 100.0 B 0.0 <= API <= 85.0 D -10.0 <= API <= 45.0 p ASTM D1250-1980 Table 23 A 0.6110 <= DObs60/60 <= 1.0760 B 0.6535 <= DObs60/60 <= 1.0760 D (n.a.) p ASTM D1250-1980 Table 53 A 610.5 <= DObs <= 1075.0 B 653.0 <= DObs <= 1075.0 D 800.0 <= DObs <= 1164.0 EN15940_2019(Dobs/Tobs as an Input) 670.8 >= Dobs >= 851.6
FD	Reference density (or API) out of range	ASTM D4311-1983 Table 1 APIRef <= 34.9

Validity Byte (HEX)	Description	Additional Details
		ASTM D4311-1983 Table 2 ---------- 850.0 <= Dref ASTM D4311-1996 Table 1 ---------- 850.0 <= DRef p ASTM D1250-1980 Table 5 (see note) - ---------- A 610.627 <= DRef <= 1074.982 B 652.934 <= DRef <= 1074.982 D 800.0 <= DRef <= 1164.0 p ASTM D1250-1980 Table 23 (see note) - ---------- A 610.627 <= DRef <= 1074.982 B 652.934 <= DRef <= 1074.982 D (n.a.) p ASTM D1260-1980 Table 53 (see note) - ---------- A 610.627 <= DRef <= 1074.982 B 652.934 <= DRef <= 1074.982 D 800.0 <= DRef <= 1164.0 p ASTM D1250-1980 Table 6 - ---------- A 0.0 <= APIRef <= 100.0 B 0.0 <= APIRef <= 85.0 D -10.0 <= APIRef <= 45.0 E (n.a) p ASTM D1250-1980 Table 23 (see note) - ---------- A 610.627 <= DRef <= 1074.982 B 652.934 <= DRef <= 1074.982 D (n.a.) p ASTM D1260-1980 Table 53 (see note) - ---------- A 610.627 <= DRef <= 1074.982 B 652.934 <= DRef <= 1074.982 D 800.0 <= DRef <= 1164.0 Note: API is internally converted to Dref ASTM D4311M-2015 kg/m3 @ 15ºC ---------- 850.0 <= DRef

Validity Byte (HEX)	Description	Additional Details
		D4311-15 ºAPI (@60ºF) --- Dref <= 34.9 EN15940_2019 --- 700 >= Dref >= 830
FE	Temperature of observed density out of range	p ASTM D1250-1980: Table 5 - --- A 0.0 <= APIObs <= 40.0 0.0 <= TObs <= 300.0 40.1 <= APIObs <= 50.0 0.0 <= TObs <= 250.0 50.1 <= APIObs <= 85.0 0.0 <= TObs <= 200.0 B 0.0 <= APIObs <= 40.0 0.0 <= TObs <= 300.0 40.1 <= APIObs <= 50.0 0.0 <= TObs <= 250.0 50.1 <= APIObs <= 85.0 0.0 <= TObs <= 200.0 D -10.0 <= APIObs <= 45.0 0.0 <= TObs <= 300.0 p ASTM D1250-1980: Table 23 - --- A 0.6110 <= DObs60/60 <= 0.7990 0.0 <= TObs <= 200.0 0.7995 <= DObs60/60 <= 0.8250 0.0 <= TObs <= 250.0 0.8255 <= DObs60/60 <= 1.0760 0.0 <= TObs <= 300.0 B 0.6535 <= DObs60/60 <= 0.7790 0.0 <= TObs <= 200.0 0.7995 <= DObs60/60 <= 0.8250 0.0 <= TObs <= 250.0 0.8255 <= DObs60/60 <= 1.0760 0.0 <= TObs <= 300.0 D (n.a.) (n.a.) p ASTM D1250-1980: Table 53 - --- A 610.5 <= DObs <= 778.5 -18.0 <= TObs <= 95.0 779.0 <= DObs <= 824.0 -18.0 <= TObs <= 125.0 824.5 <= DObs <= 1075.0 -18.0 <= TObs <= 150.0 B 653.0 <= DObs <= 778.5 -18.0 <= TObs <= 95.0 779.0 <= DObs <= 824.0 -18.0 <= TObs <= 125.0 824.5 <= DObs <= 1075.0 -18.0 <= TObs <= 150.0 D 800.0 <= DObs <= 1164.0 -20.0 <= TObs <= 150.0 SGS-2021(Dobs, Tobs as an input) --- -35 <= Tobs <= 30 EN15940_2019(Dobs/Tobs as an Input) --- -20 <= Tobs <= 50

Validity Byte (HEX)	Description	Additional Details
FF	Reserved (may not be used to indicate invalid data)	Reserved (may not be used to indicate invalid data)

B.2 Status byte

The data status byte is bit coded. The meaning of the bits depends on the validity byte ($< 80_{HEX}$ or $\geq 80_{HEX}$). TABLE B-2 describes the possible status bytes.

TABLE B-2 Description of status bytes

Status Byte (bit)	Validity $< 80_{HEX}$ Description (bit set)	Validity $\geq 80_{HEX}$ Description (bit set)
7	Uncalibrated	Generate Alarm
6	Manual	No Data Available
5		Killed
4		Over Range
3		Under Range
2		Uninitialized
1	Stored	
0	Reduced Accuracy	

REMARKS:

1. Validity $< 80_{HEX}$ represents valid data. Suggested characters to display depending on the contents of the status byte:
   - uncalibrated = '#'
   - manual = '&'
   - stored = 'S'
   - reduced accuracy = '?'

   The data status basically exists of two parts which should be displayed in tabular data in two separate columns:
   - bit 7, which indicates whether the data is calibrated or not
   - bit 6...0, which (in decreasing priority) tell something about the physical status of the data
2. Validity $\geq 80_{HEX}$ represents invalid data. Suggested characters to display: 'FFFF' or 'blanks'.

APPENDIX C ENGINEERING UNITS

ID	Name	Type	Units	Range	Reso-lution	Details
1	Meters	5	m	-999.999 9...+999.999 9	-4	SI unit
2	Millimeters	5	mm	-999 999.9...+999 999.9	-1	1 mm = 0.001 m
3	Feet	5	ft	-999.999 9...+999.999 9	-4	1 ft = 12 inch
4	Inches	5	in	-9 999.999...+9 999.999	-3	1 inch = 0.0254 m
5	Sixteenth	5	in/16	-999 999.9...+999.999 9	-1	1 inch/16 = 1/16 inch
6	Fractions	5	fis	-999’11”15...+999’11”15	0	Feet, inches, inches/16 ID06 in its pure form are used for CIU Prime field communication and Entis Pro display only. Anywhere else in the CIU's, it is represented as a straight inch/16 integer.
7	FII256	5	fii/256	-99’11”255...+99’11”255	0	Feet, inches, inches/256 ID07 in its pure form are used for CIU Prime field communication only. Anywhere else in the CIU's, it is represented as a straight inch/256 integer.
8	TwoFiveSixth	5	in256	- 9 999 999...+9 999 999	0	For internal use only
20	Celsius	12	°C	-300.00...+300.00	-2	Derived SI unit
21	Fahrenheit	12	°F	-400...+572.0	-1	x °F = (x - 32.0) * 5/9 °C
22	Kelvin	12	K	0...573.15	-2	x K = x - 273.15 °C
23	Kelvin (rounded)	12	K273	0...573.00	-2	x K = x - 273.00 °C
30	Kgf cm sq	17	kgf/cm^2	0...65.535	-3	1 kgf/cm² = (10 * 9,80665) kPa
31	Pascal	17	Pa	0...6 553 500	2	SI unit
32	Kilo Pascal	17	kPa	0...6 553.5	-1	1 kPa = 1000 Pa
33	PSI	17	psi	0...655.35	-2	1 psi = 0.45359237 * 10* (9,80665) / (2.54)² kPa. (psi is an abbreviation for 1 lbs/in2)
34	Atm	17	atm	0...65.535	-3	1 atm = 101.325 kPa
35	Bar	17	bar	0...65.535	-3	1 bar = 100 kPa
37	ATM relative	17	atm(rel)	-1.000...+64.535	-3	x at(rel) = x + atmospheric pressure

ID	Name	Type	Units	Range	Reso-lution	Details
39	PSIG	17	psig	-15.00...+630.35	-2	x psig = x + atmospheric pressure
41	PSI range 100	17	psi r100	0...99.99999	0	psi hundred range (item_PI=I) for field communication only Note: ENSITE is capable of configuring this number, but not communicating in it.
42	PSI range 1000	17	psi r1000	0...999.9999	0	psi thousand range (item_PI=S) for field communication only Note: ENSITE is capable of configuring this number, but not communicating in it.
50	Liter	11	L	0...999 999 999	0	1 liter = 1/1000 m3
51	Cubic meter	11	m^3	0...999 999.999	-3	SI unit
52	US gallon	11	US gal	0...99 999 999.9	-1	1 US gallon = 231 cubic inches = 231*(0.0254)^3 m^3
53	Barrel	11	bbls	0...9 999 999.99	-2	1 bbls = 42 US gal
54	UK gallon	11	UK gal	0...99 999 999.9	-1	1 UK gallon = 4.546092 liter (ref. API MPMS Chapter 15, page 10)
55	Cubic centimeters	11	cm^3	0...999 999.99	-2	1000 cm^3 = 1 liter
56	Cubic decimeters		dm^3	0...999 999 990	0	1 dm^3 = 1 liter
60	Kilogra cubic meters	14	kg/m^3	0...9 999.99	-2	SI unit
61	Degrees API	14	API	-50.00...+600.00	-2	x °API = (141,5 / Spec. gravity 60/60) - 131,5 = {141,5 / (D60'F/999.012)} - 131.5 = {141,5*999.012/ D60'F} - 131.5 = 141360.198 / (D60'F)-131.5 in which: D60'F is density in kg/m3 by 60'F
62	Pounds cubic feet	14	lbs/ft^3	0...999.999	-3	= 0.45359237 / 0.3048^3 kg/m^3
63	DENS_60_60	14	RD60	0...9.999 99	-5	= (Density in kg/m3) / 999.012 Also called Gravity 60/ 60
64	Lbs US gallon	14	lbs/ US gal	0...99.999 9	-4	= x * 0.45359237/(231*0.0254^3) [kg/m^3] (see dimensions 103 and 52)
65	Kilogram liters	14	kg/l	0...9.999 99	-5	1 kg/l = 1000 kg/m^3 For internal use only
70	Cubic meter minute	18	m^3/min	-9 999.99...+9 999.99	-2	
71	Cubic meter hour	18	m^3/h	-99 999.9...+99 999.9	-1	
72	Liter minute	18	l/min	-999 999...+999 999	0	

ID	Name	Type	Units	Range	Reso-lution	Details
73	Liter hour	18	l/hr	-999 999...+999 999	0	
74	Barrel minute	18	bbls/min	-9 999.99...+9 999.999	-2	
75	Barrel hour	18	bbls/hr	-99 999.9...+99 999.9	-1	
76	US gallon minute	18	US gal/ min	-999 999...+999 999	0	
77	US gallon hour	18	Us gal/hr	-999 999...+999 999	0	
78	UK gallon minute	18	UK gal/ min	-999 999...+999 999	0	
90	Meter second sq	20	m/s^2	0...99.999 9	-5	SI unit
100	Kilogram	10	kg	0...999 999 999	0	SI unit
101	Metric ton	10	ton	0...999 999.999	-3	x (metric) ton = 1000x kg
102	Short ton	10	US ton	0...999 999.999	-3	x UStон = 2000 x lbs
103	Lbs	10	lbs	0...999 999 999	0	x lbs = 0.45359237x kg
104	Long ton	10	long ton	0...999 999.999	-3	x Long ton = 2240x lbs
105	Gram	10	gram		0	
106	Pound	10	lbs		0	
110	Second	9	sec	0...59	0	seconds
11	Minute	9	min	0...59	0	minutes
112	Hour	9	hr	0...23	0	hours

ID	Name	Type	Units	Range	Reso-lution	Details
113	Abs time	9	AbsTime	0	0	Reg. 1: Bit 15 Daylight Saving Bit 14 Un-initialized Bit 0..13 Year Reg. 2: Bit 14..15 Reserved Bit 10..13 Month Bit 5..9 Day Bit 0..4 Hour Reg. 3: Bit 8..15 Minutes Bit 0..7 Seconds
114	Day	9	dd	1...31	0	Day in the month
115	Month	9	MM	1...12	0	Month
116	Year	9	YYYY	0...65535	0	Year
117	Daylight Saving	9		0...1	0	Daylight saving active
120	ASCII	7	ASCII		0	1 char = 1 byte
121	Unicode	7	Unicode		0	1 char = 2 bytes
130	Mola value	19	kg/kmol	0...99.999 9	-4	Molar value
140	Percentage	15	%	0...100.00	-2	Resolution depends on entity
150	Temp coeff celsius	16	10E-7/°C	0...99 999.999	-3	
151	Temp coeff fahrenheit	16	10E-7/°F	0...99 999.999	-3	
152	Temp coeff celsius	45	10E-5/°C	0...99 999.999	-3	

ID	Name	Type	Units	Range	Reso-lution	Details
153	Temp coeff fahrenheit	45	10E-5/°F	0...99 999.999	-3	
160	Nodim	6	Nodim	0...2#bits	0	No dimension, unsigned value
161	Bit coded	1	Bit coded	0...2#bits	0	Separate bits
162	Index	4	Index	0...2#bits	0	Index refers to row number in a table
163	Status	8	Status	0...65535	0	See "entity Status Description Doc.nr 43"
170	Factor	13	Factor	0.00000...9.999 99	-5	No dimension, unsigned value
171	Factor (Entis Pro only)	49	Factor 100	0.00000...9 999.99	-2	No dimension, unsigned value
172	Factor_1000	48	Factor 1000	0.00000...999.999	-3	No dimension, unsigned value
180	Air density	47	kg/m^3 (air)	0...9.999	-3	Air density unit (fixed to kg/m3; no conversion to any other unit allowed)
200	Kilogram	10	kg	-999 999 999... +999 999 999	0	SI unit
201	Metric ton	10	metric ton	-999 999 999... +999 999.999	-3	x (metric) ton = 1000 x kg
202	US ton	10	US ton	-999 999 999... +999 999.999	-3	x US ton = 2000 x lbs
203	Lbs	10	lbs	-999 999 999... +999 999 999	0	x lbs = 0.45359237 x kg
204	Long ton	10	long ton	-999 999 999... +999 999.999	-3	x Long ton = 2240 x lbs
210	Liter	11	Liters	-999 999 999... +999 999 999	0	1 liter = 1/1000 m^3
211	Cubic meter	11	m^3	-999 999 999... +999 999.999	-3	SI unit
212	US gallon	11	US gal	-99 999 999.9... +99 999 999.9	-1	1 US gallon = 231 cubic inches = 231*(0.0254)^3 m^3
213	Barrel	11	bbls	-9 999 999.99... +9 999 999.99	-2	1 bbls = 42 US gallon

ID	Name	Type	Units	Range	Reso-lution	Details
214	UK gallon	11	UK gal	-99 999 999.9... +99 999 999.9	-1	1 UK gallon = 4.546092 liter (ref. API MPMS Chapter 15, page 10)
250	Acc. tot. liter	11	L	N/A	0	1 liter = 1/1000 m^3
251	Acc. tot. cubic meter	11	m^3	N/A	0	SI unit
252	Acc. tot. centimeters	11	cm^3	N/A	0	1000 cm^3 = 1 liter
253	Acc. tot. decimeters	11	dm^3	N/A	0	1 dm^3 = 1 liter
254	Acc. tot. US gallon	11	US gal	N/A	0	1 US gallon = 231 cubic inches = 231*(0.0254)^3 m^3
255	Acc. tot. UK gallon	11	UK gal	N/A	0	1 UK gallon = 4.546092 liter (ref. API MPMS Chapter 15, page 10)
256	Acc. tot. barrel	11	bbls	N/A	0	1 bbls = 42 US gal
257	Millimeter	11	mm	N/A	0	
258	Cubic centimeter	11	cc	N/A	0	
259	Parts per million	15	ppm	N/A	0	
260	Milliliter per minute	56	ml/min	N/A	0	
261	Cubic centimeter per minute	56	cc/min	N/A	0	
262	UK Gallons per minute	18	UK gal/ min	N/A	0	
263	Cubic centimeter per minute	18	cm^3/min	N/A	0	
264	Cubic decimeter per minute	18	dm^3/min	N/A	0	
265	Liter	58	L	N/A	0	
266	Cubic meter	58	m^3	N/A	0	
267	Cubic centimeter	58	cm^3	N/A	0	
268	Cubic decimeter	58	dm^3	N/A	0	
269	US Gallons	58	US gal	N/A	0	
270	UK Gallons	58	UK gal	N/A	0	

ID	Name	Type	Units	Range	Reso-lution	Details
271	Barrel	58	bbl	N/A	0	
272	Litre	59	L	N/A	0	
273	Cubic meter	59	m^3	N/A	0	
274	Cubic centimeter	59	cm^3	N/A	0	
275	Cubic decimeter	59	dm^3	N/A	0	
276	US Gallons	59	US gal	N/A	0	
277	UK Gallons	59	gal	N/A	0	
278	Barrel	59	bbl	N/A	0	
279	Liter	60	L	N/A	0	
280	Cubic meter	60	m^3	N/A	0	
281	Cubic centimeter	60	cm^3	N/A	0	
282	Cubic decimeter	60	dm^3	N/A	0	
283	US Gallons	60	US gal	N/A	0	
284	UK Gallons	60	UK gal	N/A	0	
285	Barrel	60	bbl	N/A	0	
286	Milliliter	61	ml	N/A	0	
287	Cubic centimeter	61	cc	N/A	0	
288	Kilogram per min	62	kg/min	N/A	0	
289	Metric ton per min	62	metric ton/min	N/A	0	
290	Pounds per min	62	Lb/min	N/A	0	
291	long ton per min UK	62	UK Long tn/min	N/A	0	
292	Short ton per min US	62	US short ton/min	N/A	0	
293	Pulses per Liter	63	Pulses/L	N/A	0	
294	Pulses per cubic meter	63	Pulses/m^3	N/A		

ID	Name	Type	Units	Range	Reso-lution	Details
295	Pulses per US Gal	63	Pulses/ gal	N/A	0	
296	Pulses per Barrel	63	Pulses/ bbl	N/A	0	
297	Pulses per UK Gal	63	Pulses/ Ugal	N/A	0	
298	Pulses per cubic centimeters	63	Pulses/ cm^3	N/A	0	
299	Pulses per cubic decimeters	63	Pulses/ dm^3	N/A	0	
300	Pulses per Kilogram	64	Pulses/kg	N/A	0	
301	Pulses per metric ton	64	Pulses/ ton	N/A	0	
302	Pulses per Short ton	64	Pulses/ US ton	N/A	0	
303	Pulses per lbs	64	Pulses/lb	N/A	0	
304	Pulses per long ton	64	Pulses/ long ton	N/A	0	
305	CTPL(VCF)	65		0.00000	1.99999	

APPENDIX D GENERAL CIU DIAGNOSTICS DETAILS AREA

TABLE D-1 <XREF>gives a description of diagnostics entities available to the user via OPC UA.

TABLE D-1 Description of diagnostics entities available to the user via OPC UA

ID	Name	Description	Units	Dimension Type
10015	CIUSystemStatus	This parameter indicates the overall CIU 888 system status. • 0 = Unknown • 1 = Normal (Green LED) • 2 • = Warning (Orange LED) • 3 = Fail (Red LED) Note: This is a CIU diagnostics entity	-	Nodim
10081	FieldSerialPortH-ealth	This health parameter indicates the health of field serial communication. If any of the field serial cables are disconnected but are config-ured to be used, then the health of this parame-ter is reduced. • 1 = Normal (Green LED) • 2 = Warning (Orange LED) • 3 = Fail (Red LED) • 4 = Not configured (Grey LED)	-	Nodim
10068	FieldCardType	Type of field card installed on the device. This is an indexedentity. • 0 = No field card • 1 = BPM field card • 2 = TRL2 field card • 3 = Serial field card • 4 = Unknown field card	-	Nodim
3517	FieldPortVersion	Version information of the CIU 888 field card. This is of the format x. For example, the version is 2.	-	text (ASCII)
10089	FieldCardFirm-ware-Version	Firmware version of the installed field card. This is anindexed entity. "This is of the format x.y.z For example, the version is 1.0.4"	-	text (ASCII)
10071	SyncLinkConnec-tionStatus	Devices in a redundant setup will sync their data over a synclink. For several software mod-ules it is important to know thestatus of the sync link. • 1 = Disconnected • 2 = Connected	-	Nodim

ID	Name	Description	Units	Dimension Type
10073	ServiceLinkCon-nec-tionStatus	Connection Status of the Service link ethernet cable. Differ-ent values for this entity are: • 1 = Disconnected • 2 = Connected	-	Nodim
10074	HostEthernetCon-nectionStatus	Connection Status of the ethernet cable con-nected to the host ports. It is an indexed param-eter. Different values for thisentity are : • 1 = Disconnected • 2 = Connected	-	Nodim
10112	FTEAActiveClients	This indicates number of active Modbus clients over FTEAinterface of CIU 888. possible val-ues of 0 to 15.	-	Nodim
10113	FTEATXPacket-Count	This indicates number of Modbus tx packets over FTEA inter-face of CIU 888. Possbile val-ues of 0 to 2147483647	-	PacketCount
10114	FTEARXPacket-Count	This indicates number of Modbus Rx packets over FTEA interface of CIU 888. Possbile val-ues of 0 to 2147483647	-	PacketCount
10115	FTEAErrorPacket-Count	This indicates number of Modbus error packets over FTEAinterface of CIU 888. Possbile val-ues of 0 to 2147483647	-	PacketCount
10074	HostEthernetCon-nectionStatus	Connection Status of the ethernet cable con-nected to the host ports. It is an indexed param-eter. Different values for thisentity are : • 1 = Disconnected • 2 = Connected	-	Nodim
10116	FTEBActiveClients	This indicates number of active Modbus clients over FTEBinterface of CIU 888. possible val-ues of 0 to 15.	-	Nodim
10117	FTEBTXPacket-Count	This indicates number of Modbus tx packets over FTEB inter-face of CIU 888. Possbile val-ues of 0 to 2147483647	-	PacketCount
10118	FTEBRXPacket-Count	This indicates number of Modbus Rx packets over FTEB interface of CIU 888. Possbile val-ues of 0 to 2147483647	-	PacketCount
10119	FTEBErrorPacket-Count	This indicates number of Modbus error packets over FTEBinterface of CIU 888. Possbile val-ues of 0 to 2147483647	-	PacketCount
10074	FieldEthernetCon-nectionStatus	Connection Status of the ethernet cable con-nected to the host ports. It is an indexed param-eter. Different values for thisentity are : • 1 = Disconnected • 2 = Connected	-	Nodim
10120	LANActiveClients	This indicates number of active Modbus clients over LANinterface of CIU 888. possible values of 0 to 15.	-	Nodim

ID	Name	Description	Units	Dimension Type
10212	LANTXPacket-Count	This indicates number of Modbus tx packets over LAN inter-face of CIU 888. Possbile values of 0 to 2147483647	-	PacketCount
10122	LANRXPacket-Count	This indicates number of Modbus Rx packets over LAN inter-face of CIU 888. Possbile values of 0 to 2147483647	-	PacketCount
10123	LANErrorPacket-Count	This indicates number of Modbus error packets over LANinterface of CIU 888. Possbile values of 0 to 2147483647	-	PacketCount
10072	RemoteLinkCon-nectionStatus	Connection Status of the ethernet cable connected to the host ports. It is an indexed parameter. Different values for thisentity are : • 1 = Disconnected • 2 = Connected	-	Nodim
10111	CompactFlash- Disk-SpaceHealth	This parameter indicates the overall compact disk spacehealth “0 - Unknown • 1 = Normal (Green LED) • 2 = Warning (Orange LED) • 3 = Fail (Red LED)	-	Nodim
10056	CompactFlash-Size	Total size of compact flash card in mega bytes installed onthis device. Possible values are 0 to 4096	-	Nodim
10057	CompactFlash-Free-Size	Total size of compact flash card in mega bytes installed onthis device. Possible values are 0 to 4096	MB	Nodim
10083	RAMUsageHealth	This parameter indicates the health of RAM. • 0 = Unknown • 1 = Normal (Green LED) • 2 = Warning (Orange LED) • 3 = Fail (Red LED)	MB	Nodim
10055	RAMSize	Total size of RAM in mega bytes installed on this device. Pos-sbile values are 0 to 4096	MB	Nodim
10063	AverageRA-MUsage	Average RAM used in percentage by the device. Possbilevalues are 0 to 100	%	Nodim
10076	CarrierBoardTem-peratureHealth	Health of Carrier board temperature. This health parameter will be affected by any or all of the carrier board temperaturevalues. • 0 = Unknown • 1 = Normal (Green LED) • 2 = Warning (Orange LED) • 3 = Fail (Red LED)	-	Nodim
10050	CarrierBoardTem-perature1	Carrier board temperature for sensor 1 on the device. Possible values are -300 degree C to 300 degree C (or) -400 degree F to 572 degree F"	degreeC / degreeF	Tempera-ture

ID	Name	Description	Units	Dimension Type
10051	CarrierBoardTem-perature2	Carrier board temperature for sensor 2 on the device.Possible values are -300 degree -400 degree F to 572 degree F"	degre eC / degre eF	Tempera-ture
10052	CarrierBoardTem-perature3	Carrier board temperature for sensor 3 on the device. Possible values are -300 degree C to 300 degree C (or) -400 degree F to 572 degree F"	degre eC / degre eF	Tempera-ture
10053	CarrierBoardTem-perature4	Carrier board temperature for sensor 4 on the device. Possible values are -300 degree C to 300 degree C (or) -400 degree F to 572 degree F"	degre eC / degre eF	Tempera-ture
10110	CPUCoreTem-pera-tureHealth	This parameter indicates the overall CPU core temperaturehealth • 0 = Unknown • 1 = Normal (Green LED) • 2 = Warning (Orange LED) • 3 = Fail (Red LED)	-	Nodim
10054	CPUCoreTem-pera-ture	Temperature of the CPU core of the device Possible values are -300 degree C to 300 degree C (or) -400 degree F to 572 degree F”	degre eC / degre eF	Tempera-ture
3034	WMKeyStatus	Shows the status of WM Key • 0 = Unlocked • 1 = Locked	-	Tempera-ture
3033	WriteProtectKey-Sta-tus	Shows the status of configuration Key • 0 = Unlocked • 1 = Locked	-	Nodim
10062	Aver- ageCPUUsage	Average CPU in percentage used by the device. Possiblevalues are 0 to 100	%	Nodim
532	CIURunHours	Total hours on power on since last default reset. Possbile val-ues are 0 to 2147483647	hours	hours
10500	CIU888Version	Version of this process in the format xxx.xxx.xxxx.x e.g.1.0.5021.0	-	text (ASCII)
1092	CIU888Re-leaseNumber	CIU 888 release number in the format Rabc.d e.g. R140.1	-	text (ASCII)
10064	LastPowerUpTime	Last time when the device was powered up.	-	Absolutetime
10065	LastPowerDown-Time	Last time when the device was powered down.	-	Absolutetime

ID	Name	Description	Units	Dimension Type
10066	LastPowerDown-Reason	Reason for the last power down. possbile values are • 0 = Power cycled (1) • 1 = Power cycled (2) • 2 = Power cycled (3) • 3 = Power cycled (4) • 4 = Power cycled (5) • 5 = Power cycled (6) • 6 = Internal FPGA failure • 7 = Overheated core processor • 8 = Restart by watchdog due to COMe issue • 9 = Restart by watchdog due to secondary controllerissue • 10 = User initiated shutdown/restart • 11 = Unknown	-	Nodim
10058	FPGAVersion	Version of FPGA installed on this device “Format is abc e.g. 3d8”	-	text (ASCII)
10059	BIOSVersion	Version of BIOS installed on this device."Format is abcdefe.g. 080015"	-	text (ASCII)
10060	SecondaryMicro-controllerVersion	Version of secondary microcontroller installed on this device“Format is x.y.z e.g. 2.1.2"	-	text (ASCII)
10069	LCDDisplayType	Type of LCD installed on the device. Different values for thisentity are: • 0 = NewHaven • 1 = NewHaven1 • 2 = Unknown	-	Nodim
10091	CIUSystemStatus-Description	This parameter indicated the reason for CIU system status incase CIU System status indicates Warning / Fail. Text limitedto 250 characters	-	text (ASCII)

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APPENDIX E LIST OF ABBREVIATIONS

Abbreviation	Description
ASCII	American Standard Code for Information Interchange
CIU	Communication Interface Unit
CRC	Cyclic Redundancy Check
CTL	Correction for Temperature Liquid
DCS	Distributed Control System
GOV	Gross Observed Volume
GSV	Gross Standard Volume
HEX	Hexadecimal
LRC	Longitudinal Redundancy Check
LSB	Least Significant Bit
MSB	Most Significant Bit
NSV	Net Standard Volume
PDU	Protocol Data Unit
PLC	Programmable Logic Controller
RTU	Remote Terminal Unit
SCADA	Supervisory Control and Data Acquisition
TGSV	Total Gross Standard Volume
TOV	Total Observed Volume
VCL	Volume Correction Factor
W&M	Weights and Measures
LM	Legal Metrology

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