INSTRUCTION MANUAL

FOR

BE1-11 Protection Systems

IEC 61850 Protocol

Publication: 9424200892
Revision: N Feb-19

BE1-11*d*, IT-D, and RTD Module

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Preface

This instruction manual provides detailed information about BE1-11 Protection Systems with the IEC 61850 Protocol. To accomplish this, the following information is provided:

- IEC 61850 engineering
- Logic inputs and outputs configuration
- Operation of BEST61850 software
- File transfer
- Data tags
- Conformance Statements

Conventions Used in this Manual

Important safety and procedural information is emphasized and presented in this manual through Warning, Caution, and Note boxes. Each type is illustrated and defined as follows.

Warning!
Warning boxes call attention to conditions or actions that may cause personal injury or death.

Caution
Caution boxes call attention to operating conditions that may lead to equipment or property damage.

Note
Note boxes emphasize important information pertaining to installation or operation.

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Warning!

READ THIS MANUAL. Read this manual before installing, operating, or maintaining the BE1-11. Note all warnings, cautions, and notes in this manual as well as on the product. Keep this manual with the product for reference. Only qualified personnel should install, operate, or service this system. Failure to follow warning and cautionary labels may result in personal injury or property damage. Exercise caution at all times.

Basler Electric does not assume any responsibility to compliance or noncompliance with national code, local code, or any other applicable code. This manual serves as reference material that must be well understood prior to installation, operation, or maintenance.

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It is not the intention of this manual to cover all details and variations in equipment, nor does this manual provide data for every possible contingency regarding installation or operation. The availability and design of all features and options are subject to modification without notice. Over time, improvements and revisions may be made to this publication. Before performing any of the following procedures, contact Basler Electric for the latest revision of this manual.

The English-language version of this manual serves as the only approved manual version.

Contents

General Information

This document describes the Basler Electric IEC 61850 Protocol implementation in the BE1-11 series of protection systems. A BE1-11 is classified as an intelligent electronic device (IED) that is capable of sending and receiving IEC 61850 messages simultaneously.

The IEC 61850 protocol is an option available when ordering a BE1-11. An Ethernet connection is required for operation of IEC 61850.

IEC 61850 is a communications infrastructure that allows seamless integration of IEDs into higher level devices. IEDs from different vendors can be integrated together in this vendor independent infrastructure. A typical station bus is illustrated in Figure 1.

Protection, control, and metering for the substation are defined in an SCL (Substation Configuration Language) file. The BE1-11 comes with an SCL compatible ICD (IED Capability Description) file that is uploaded to the BE1-11 as a CID (configured ICD) file. The substation design developer uses the CID file to create the portion of the SCD (Substation Configuration Description) file for the overall substation design.

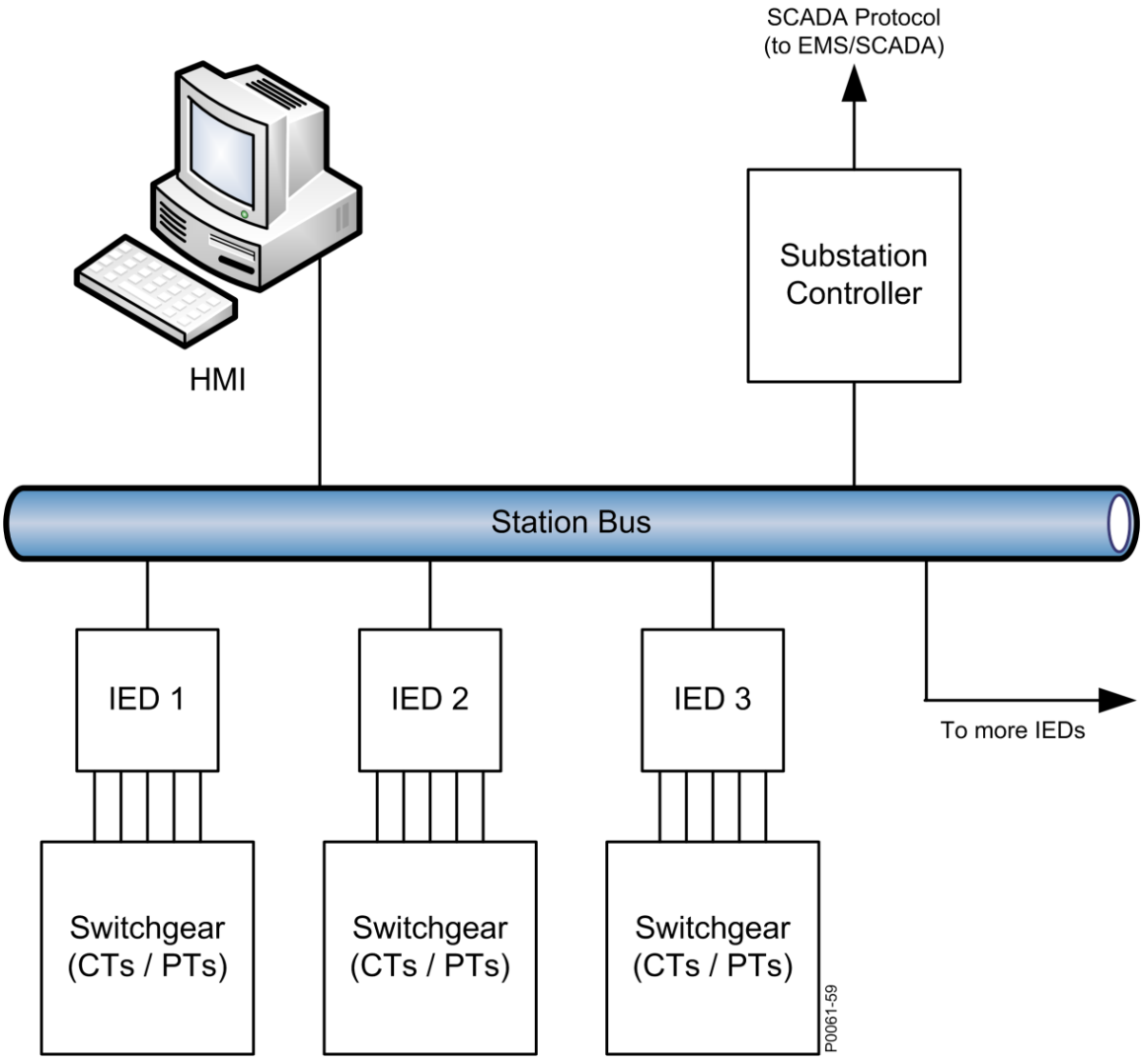


Figure 1. Typical Station Bus

The BE1-11 is capable of transmitting the following items on an IEC 61850 network:

- Configuration Settings
- Metering
- Status
- Alarms
- Targets
- Breaker Operations
- Direct Control
- Fault Records
- Load Profile
- Oscillographic Records
- Sequence of Events Reports
- Unsolicited Reports
- Peer to Peer Control GOOSE
- Device Discovery

Caution

This product contains one or more *nonvolatile memory* devices. Nonvolatile memory is used to store information (such as settings) that needs to be preserved when the product is power-cycled or otherwise restarted. Established nonvolatile memory technologies have a physical limit on the number of times they can be erased and written. In this product, the limit is 100,000 erase/write cycles. During product application, consideration should be given to communications, logic, and other factors that may cause frequent/repeated writes of settings or other information that is retained by the product. Applications that result in such frequent/repeated writes may reduce the useable product life and result in loss of information and/or product inoperability.

IEC 61850 Configuration

IEC 61850 Standard

The IEC 61850 standard defines the parts for communicating information between IEDs in a substation.

Figure 2 illustrates the Basler IEC 61850 configuration process.

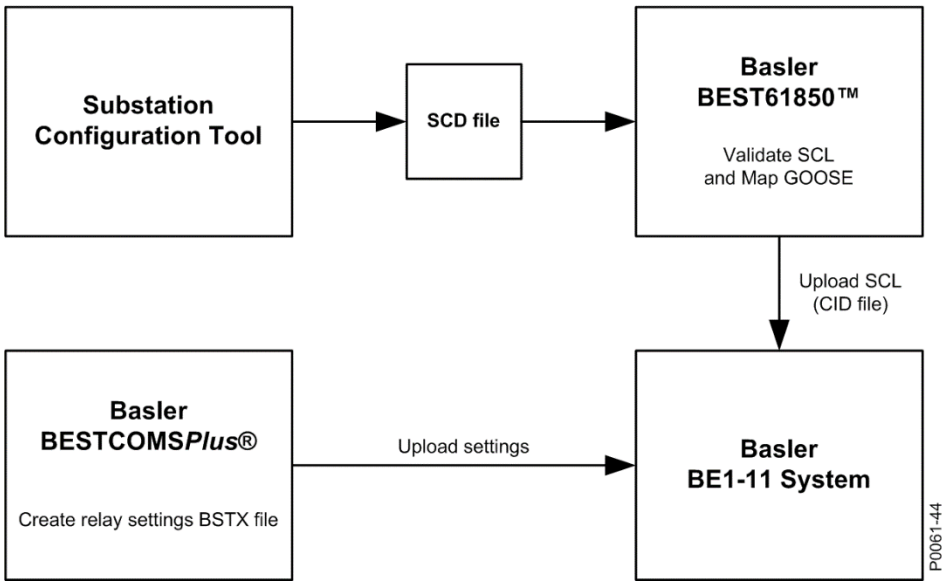


Figure 2. Basler IEC 61850 Configuration Process

BESTCOMS*Plus*®

BESTCOMS*Plus* software is provided with the BE1-11. Refer to the *BESTCOMSPlus* chapter for more information.

BESTCOMS*Plus* performs the following tasks:

- Maps BE1-11 inputs and outputs to IEC 61850 data points that can be read directly with an IEC 61850 browser
- Uses a point-and-click method to configure BE1-11 settings and logic
- Uploads and downloads BE1-11 settings files
- Provides metering and reports from the BE1-11

BEST61850™

BEST61850 software is provided with the BE1-11. Refer to the *BEST61850* chapter for more information.

BEST61850 performs the following functions:

- Imports an SCD file and extracts the necessary information for each IED in the system
- Maps subscribed GOOSE messages between devices
- Configures published GOOSE messages
- Configures DataSets
- Configures Report Control Blocks (RCB)
- Creates a CID file and uploads it to the IED or exports it to a file
- Performs any additional engineering operations

References

- BE1-11d, DC Power Protection System, Publication 9424200761
- BE1-11f, Feeder Protection System, Publication 9424200990
- BE1-11g, Generator Protection System, Publication 9424200994
- BE1-11i, Intertie Protection System, Publication 9424200993
- BE1-11m, Motor Protection System, Publication 9424200996
- BE1-11t, Transformer Protection System, Publication 9424200995
- IEC 61850: Communication networks and systems in substations (See Table 1)

Table 1. Parts to IEC 61850

Part	Title
1	*Introduction and overview*
2	*Glossary*
3	*General requirements*
4	*System and project management*
5	*Communication requirements for functions and device models*
6	*Configuration description language for communication in electrical substations related to IEDs*
7-1	*Basic communication structure for substation and feeder equipment – Principles and models*
7-2	*Basic communication structure for substation and feeder equipment – Abstract communication service interface (ACSI)*
7-3	*Basic communication structure for substation and feeder equipment – Common data classes*
7-4	*Basic communication structure for substation and feeder equipment – Compatible logical node classes and data classes*
8-1	*Specific Communication Service Mapping (SCSM) – Mappings to MMS (ISO 9506-1 and ISO 9506-2) and to ISO/IEC 8802-3*
9-1	*Specific Communication Service Mapping (SCSM) – Sampled values over serial unidirectional multidrop point to point link*
9-2	*Specific Communication Service Mapping (SCSM) – Sampled values over ISO/IEC 8802-3*
10	*Conformance testing*

IEC 61850 Engineering

The engineering process and configuration of a substation is described in IEC 61850-Part 6: *Configuration description language for communication in electrical substations related to IEDs.*

This section contains information about the standard that may be referenced when working with BESTCOMS*Plus*® and BEST61850™ software.

Engineering Process in IEC 61850

Figure 3 illustrates the reference model for information flow in the configuration process.

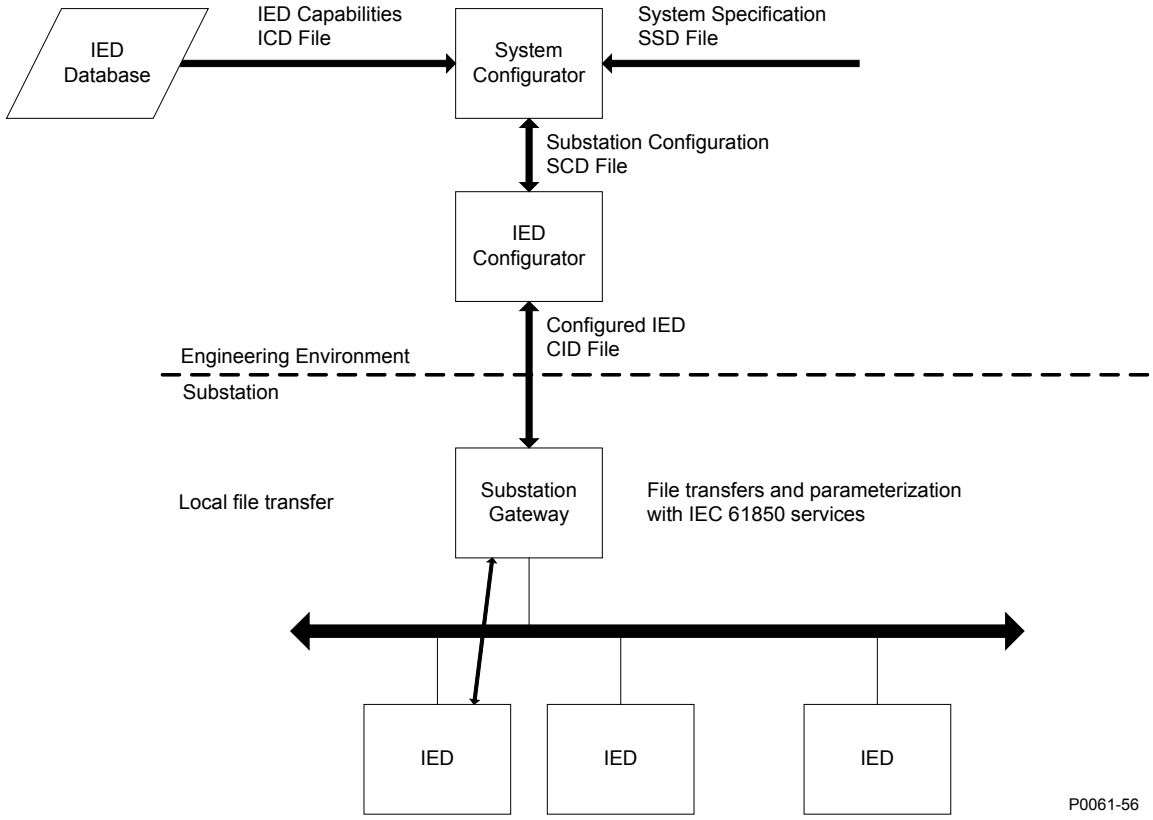


Figure 3. Reference Model for Information Flow in the Configuration Process

The IEC 61850 standard defines two tools and four file types for Engineering as illustrated in Figure 3. The tools and file types are defined below.

System Configurator

The System Configurator performs the following functions:

- Imports and exports configuration files
- Imports configuration files from several IEDs for system level engineering
- Generates a substation related configuration file
- Reads an SSD file as a base for starting system engineering or for comparisons

The complete station configuration is exported in the SCD file for further use by the various IED configuration tools.

IED Configurator Tool (BEST61850™)

BEST61850 performs the following functions:

- Imports an SCD file and extracts the necessary information for each IED in the system
- Maps subscribed GOOSE messages between devices
- Configures published GOOSE messages
- Configures DataSets
- Configures Report Control Blocks (RCB)
- Creates a CID file and uploads it to the IED or exports it to a file
- Performs any additional engineering operations

ICD File (IED Capability Description File)

The capabilities of an IED are described in this file. The file contains logical node type definitions and may contain an optional substation section.

SSD File (System Specification Description File)

This file describes the single line diagram of the substation and the required logical nodes. It contains a substation description section and the data templates and logical node definitions.

SCD File (Substation Configuration Description File)

This file contains the data exchanged from the system configuration tool to the IED configuration tool. It contains all IEDs, a communication configuration section, and a substation description.

CID File (Configured IED Description File)

This file contains the data exchanged from the IED configuration tool to the IED.

SCL Object Model

The SCL (Substation Configuration Language) object model consists of the following parts:

- The primary (power) system structure
- The communications system
- The application level communication
- Each IED
- Instantiable logical node (LN) type definitions
- The relations between instantiated logical nodes and their hosting IEDs on one side and the switchyard (function) parts on the other side

Figure 4 shows an instance of the SCL object model: a simple example of an SA (Substation Architecture) system used for a switchyard. The switchyard has a 110 kV voltage level E1. It is a double bus bar system with two line bays =E1Q1 and =E1Q3, and a bus coupler =E1Q2. The IEDs are already assigned to switchyard functionality (for example the bay controller –E1Q1SB1 as a product is assigned to bay =E1Q1, and its Logic Node CSWI1 controls the circuit breaker =E1Q1QA1 via the Logic Node XCBR1 on the IED –E1Q1QA1B1). Figure 4 uses a – (minus) sign to indicate the product-related designations. The functional name is not repeated. The station level communication sub network is named W1. There are three additional sub networks at process level (W2, W3, and W4).

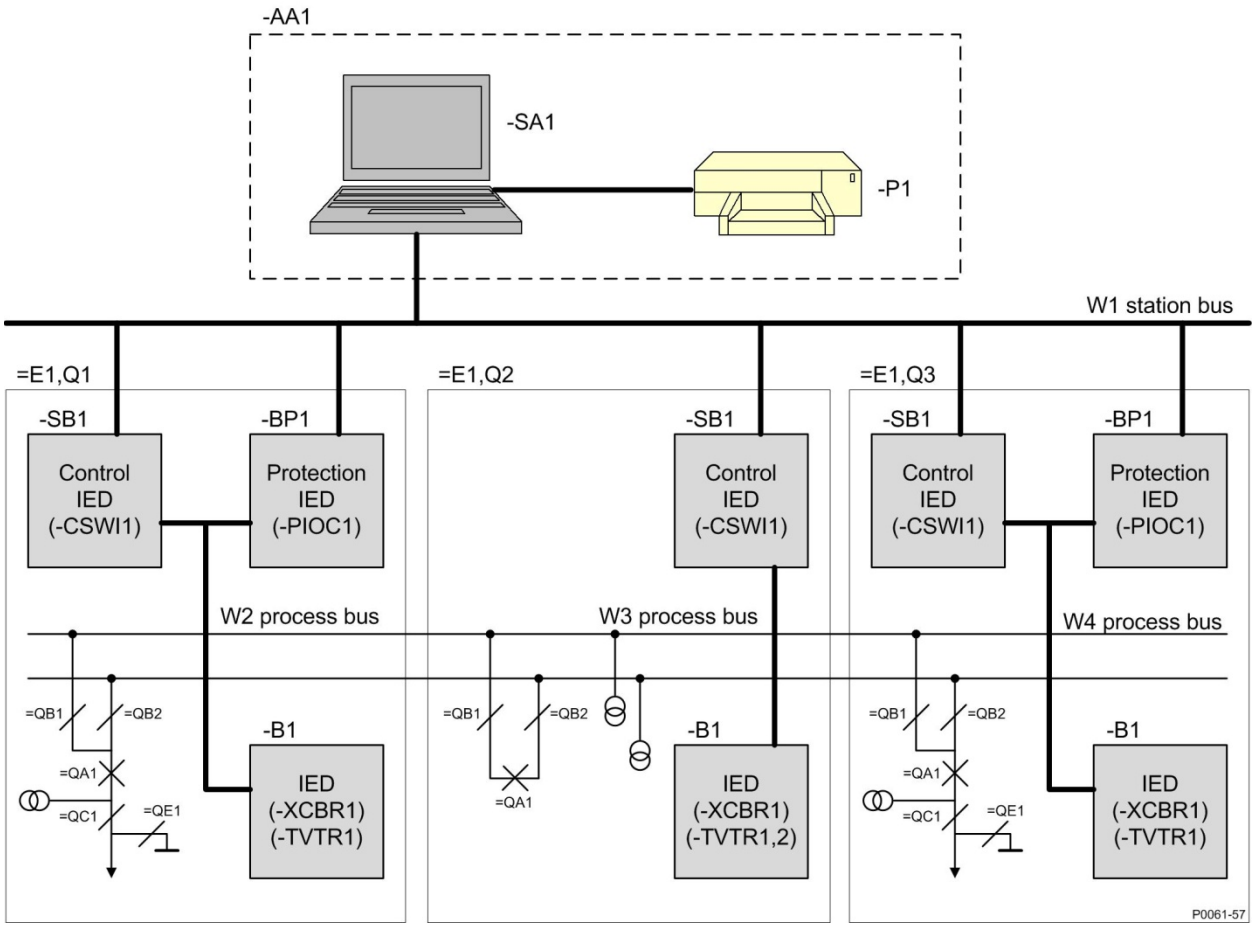


Figure 4. Configuration Example (from IEC 61850-6)

The IEC 61850 standard is based on the hierarchical addressing and information model in a station. It follows, in this way, the structure of the substation equipment independent of IED structure and organization. This information and addressing model is also visible in the IEC 61850 telegrams because the address is presented in MMS (Manufacturing Message Specification) as an ASCII string, so the address can be seen directly in a readable form.

The IEC 61850 standard defines the information and its exchange in a way that it is independent of a concrete implementation (i.e., it uses abstract models). The standard also uses the concept of virtualization. Virtualization provides a view of those aspects of a real device that are of interest for the information exchange with other devices. Only those details that are required to provide interoperability of devices are defined in the IEC 61850 standard.

The approach of the standard is to decompose the application functions into the smallest entities, which are used to exchange information. These entities are called logical nodes (for example, a virtual representation of a circuit breaker class, with the standardized class name XCBR). Several logical nodes build a logical device (for example, a representation of a Bay unit). A logical device is always implemented in one IED; therefore logical devices are not distributed.

Real devices on the right-hand side of Figure 5 are modeled as a virtual model in the middle of the figure. The logical nodes defined in the logical device (for example, Bay) correspond to well-known functions in the real devices. In this example, the logical node XCBR represents a specific circuit breaker of the bay to the right.

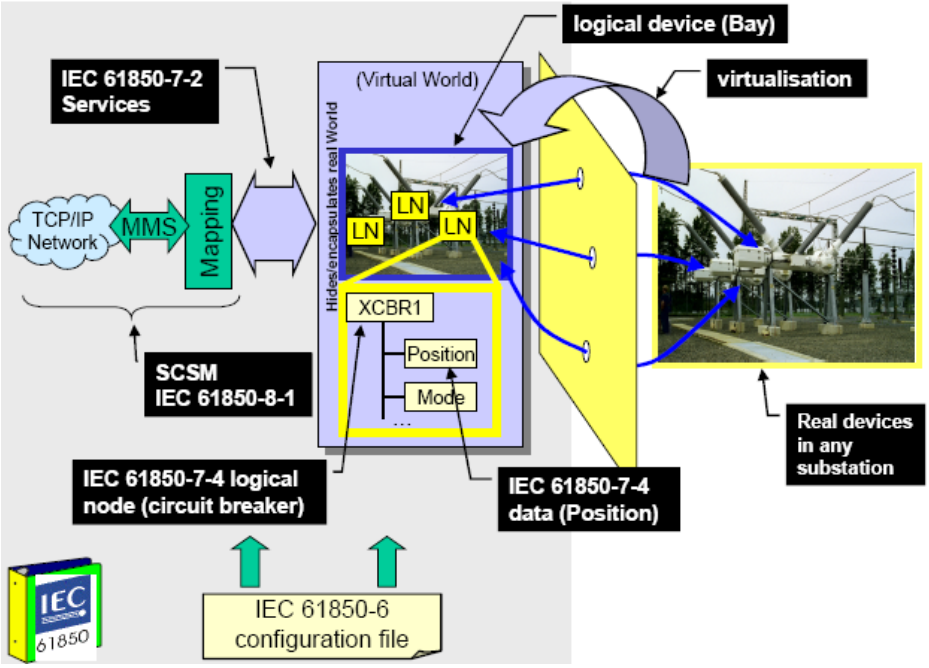


Figure 5. Modeling Approach Example

Substation Configuration Description Language (SCL)

The SCL language is based on XML (Extensible Markup Language). Detailed knowledge about an XML file is not required, but the information within the file may be of interest. An SCL XML file is divided into the following five sections as specified in IEC 61850-6:

- Header
- Substation description
- Communication system description
- IED description
- Data Type Templates

The Header identifies an SCL configuration file and version, and specifies options for the mapping of names to signals. The Substation section describes the functional structure of a substation, and defines the primary devices and their electrical connections.

Default ICD files in BEST61850 software are used to define the Header and Substation description sections. Logical nodes of the IED are logically linked to the substation section. BEST61850 software is used for signal engineering and routing of the signals. BESTCOMS*Plus* must be used to define the substation and communication sections prior to using BEST61850. BEST61850 is used to configure the DataSets and Control Blocks that are located in the IED section. The DataSets and Control Blocks (Report, GOOSE, and Setting) are logically defined as part of the logical nodes per IEC 61850-7-2. GOOSE engineering requires that BEST61850 has the correct configured Communication description section. The Data Type Templates section gives the correct content description of each logical node type to the clients. Logical node type definitions may vary between each IED and vendor.

Figure 6 shows the principle structure of the SCL XML file. The arrows show the link between the different sections given when an IED is integrated in the substation structure and/or in the communication structure. All available logical nodes of an IED are linked to the substation section.

A reference to the GoCB (GOOSE Control Block) is included in the communication section when the GoCB is configured. The graphical presentation of the XML file is a standard view of XML editors. It gives a better picture about the structure of the XML contents.

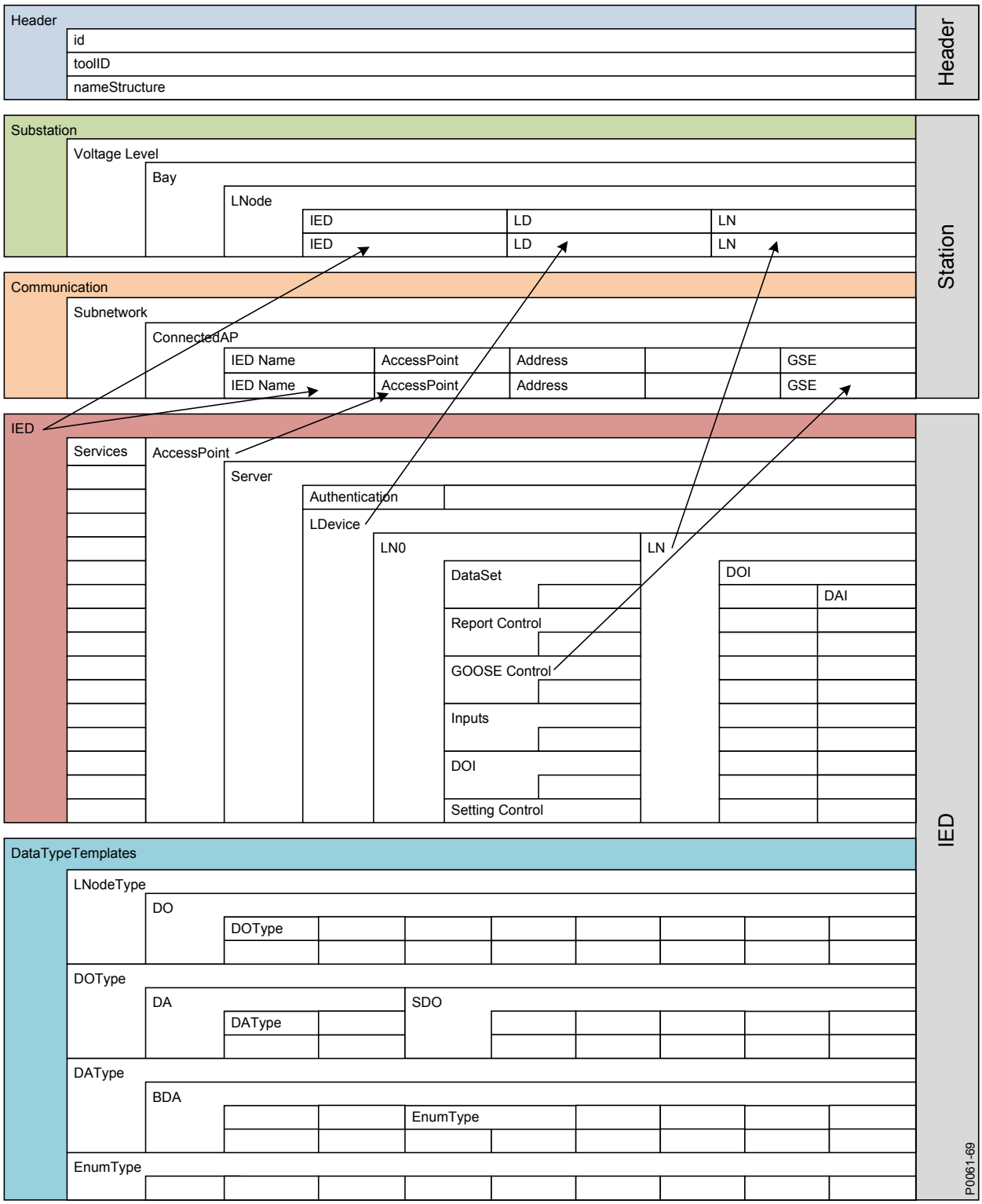
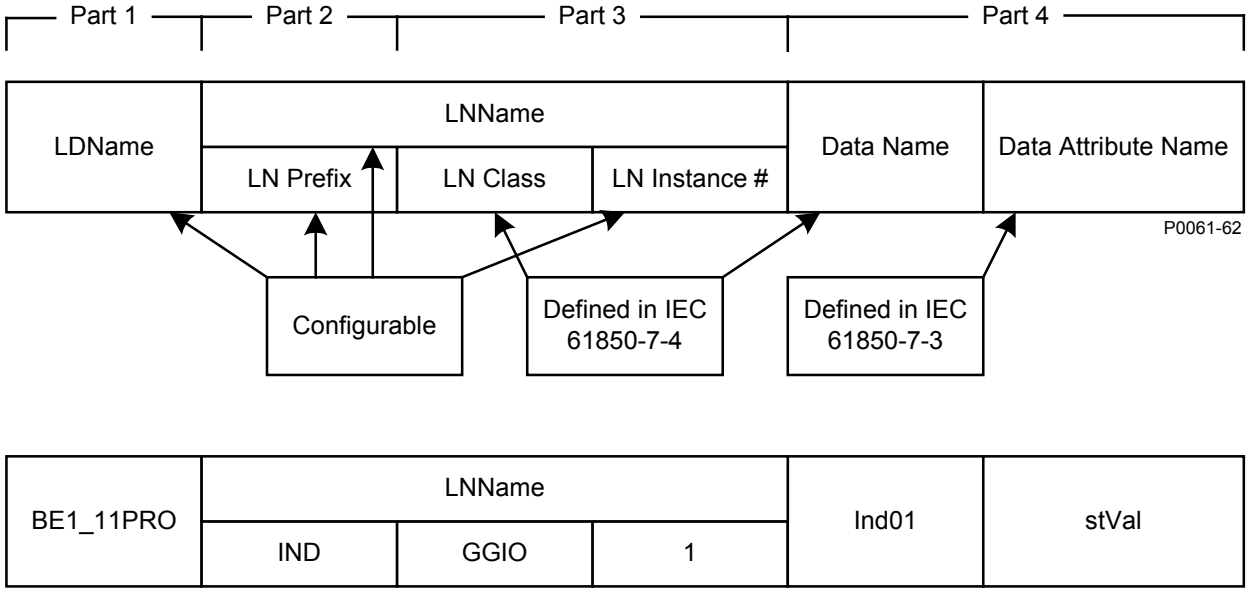


Figure 6. Principle Structure of the SCL XML File

Signal Identification

Elements of the signal identification as defined in IEC 61850–7–2 are illustrated in Figure 7.



BE1-11 XML Example: BE1_11PRO.INDGGIO1$Ind01$stVal

Figure 7. Elements of the Signal Identification as Defined in IEC 61850-7-2

The signal designation consists of the following four parts:

1. A user defined part identifying the Logical Device LD in the process (LDName).
2. A function related part to distinguish several LNs of the same class within the same LD/IED (LN-Prefix).
3. The standardized LN class name and the LN instance number, which distinguishes several LNs of the same class and prefix within the same LD/IED.
4. A signal identification inside a LN consisting of data and attribute name as defined in IEC 61850–7–3 and IEC 61850–7–4.

IED Related Naming

The LDName part is built out of the objects IED and LDevice. The LNName is the LN Prefix, the LN class and the LN instance #.

The LN prefix is used to identify several versions of a LN class. The link between the IED and the primary process (Substation, Voltage level, Bay) is given in the substation section of the station SCD file but not in the signal identification in the telegram. The IED name may be extended with a short form of the three missing levels. See Figure 8.

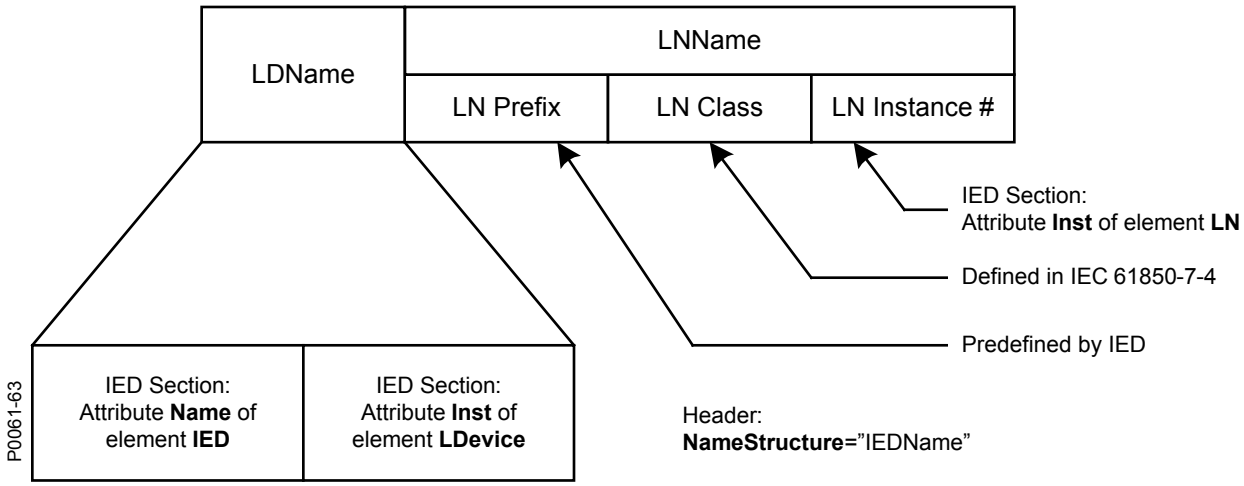


Figure 8. Elements of the Signal Name Using Product Naming

Figure 9 shows an example of an IED (SB1) with logical devices LD1 and LD2. Each logical device (LD1 and LD2) contain logical nodes LN1 and LN2, which control a circuit breaker QA1 of bay Q1 in voltage level E1.

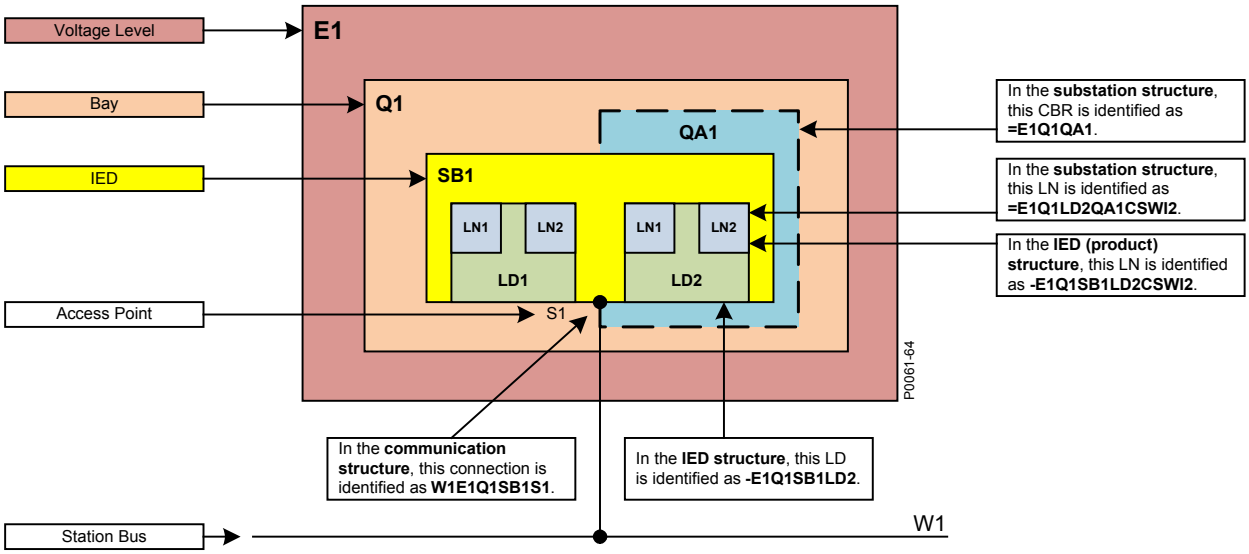


Figure 9. Names within Different Structures of the Object Model

Communication Network Section

The organization of the physical IEDs to the communication network is independent of the substation structure. The IEC 61850 standard defines the communication network with no relation to an existing media and protocol. The first mapping to an existing media and protocol is done in IEC 61850–8–1 with:

- Ethernet as medium
- MMS (Manufacturing Message Specification) protocol as defined in ISO 9506–1 and ISO 9506–2

The IEC 61850 standard describes in part 7–2 the Abstract Communication Service Interface (ACSI) in a media and protocol independent form. Part 8–1 specifies the mapping of this ACSI to the existing MMS.

The communication section in the SCL file describes the minimum of what is needed to identify how information is routed between the IEDs in a project. This is:

- the used sub networks
- the IEDs connected to the different sub networks

- the access points per IED to the sub networks
- the address
- the IP address of the LAN network is an exception also part of the address elements
- extended during signal engineering and routing, the link to the GoCB message in transmission direction

Figure 10 shows the IEC 61850-6: Communication Network.

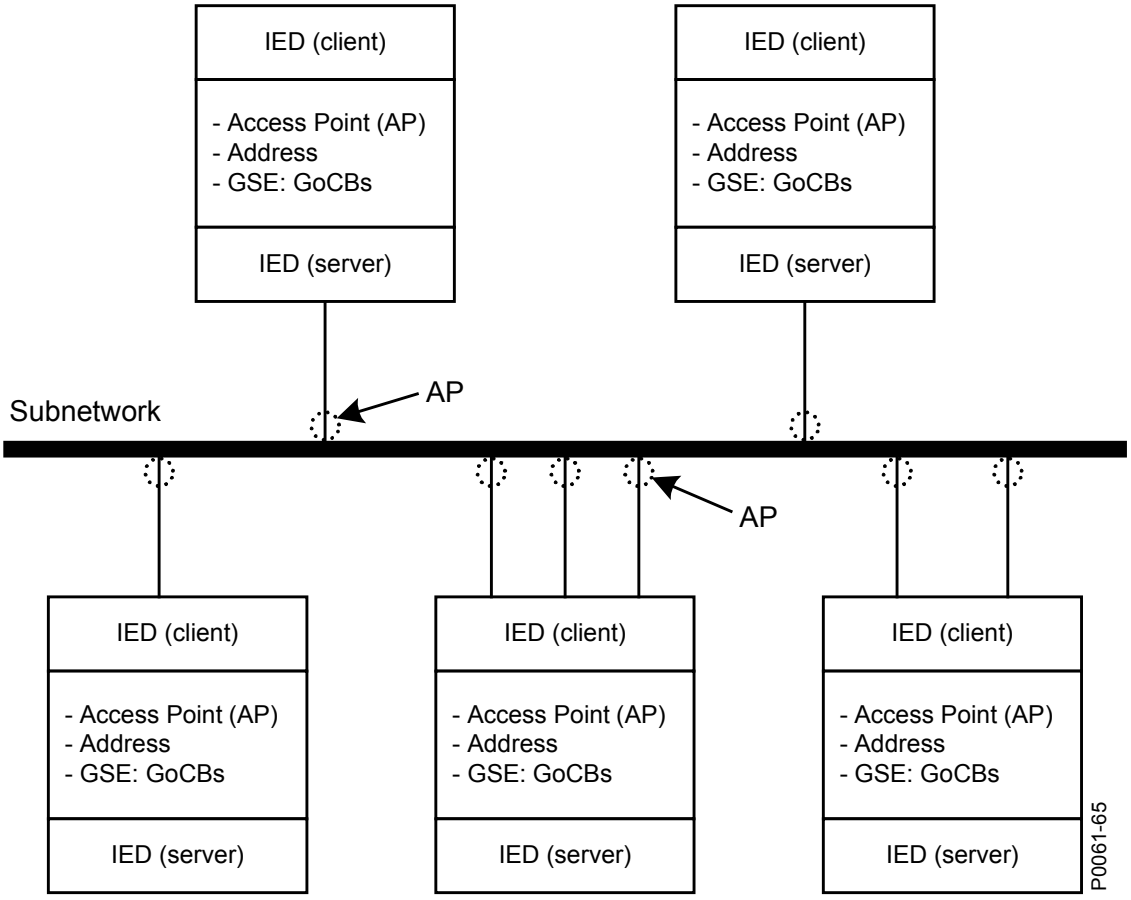


Figure 10. IEC 61850-6: Communication Network

IED Section

The IED section describes the complete IED as it is needed for IEC 61850 communication. The Data Type Template part of an IED may be seen as part of the IED, even when separated in its own section. The IED's ICD file includes the description of the LNs, their Data Type Templates, and the used/supported services. The structure of the IED section follows the definitions made in the IEC 61850 standard.

Figure 11 illustrates organization of LDs, LNs, DOs, and DAs in an IED.

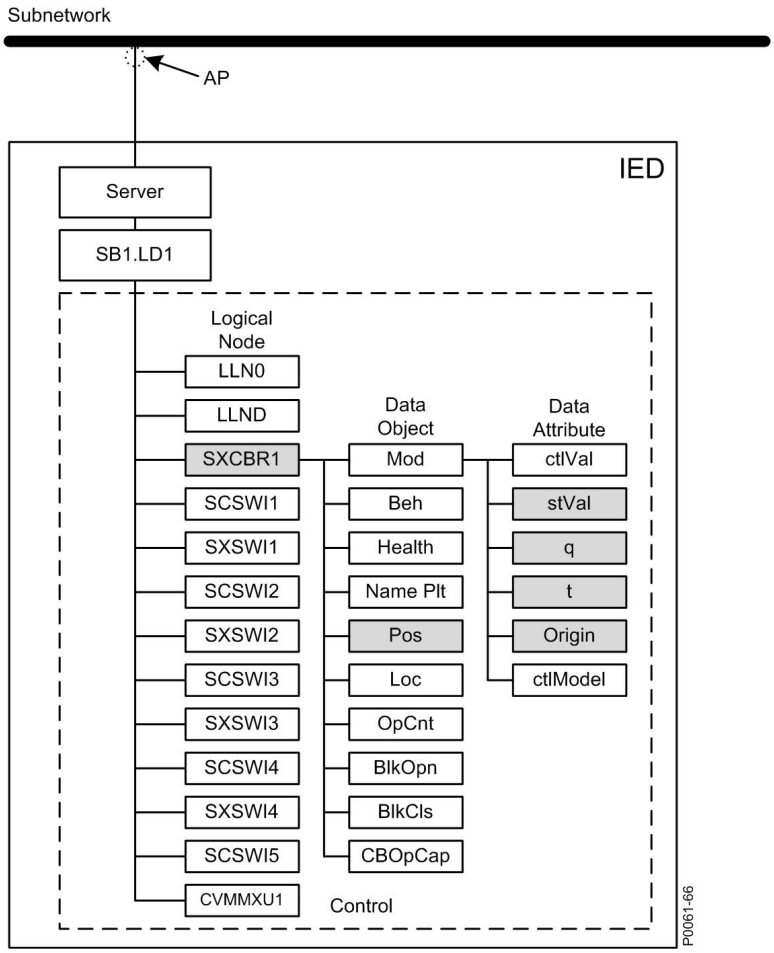


Figure 11. Organization of LDs, LNs, DOs, and DAs in an IED

An IED server represents the communication interface to the sub network (Ethernet).

- One or more Logical device(s) are connected to a server
- A set of Logical Nodes belong to a Logical Device
- The Logic Node LLN0 is a special Logic Node per Logic Device and contains the DataSets, GOOSE Control Blocks (GoCB), Report Control Blocks (RCB), and Setting Group Control Block (SGCB)
- The Logic Node LPHD is a special Logic Node per Logic Device and contains Data Objects (DO) which describe the status of the physical device (the IED)
- Each Logical Node represents a function and contains a number of Data Objects (DO)
- Each DO is represented by a number of Data Attributes (DA)

The data objects are representing information signals which may be routed to station level IEDs.

The signal engineering task is to select the requested signals (DOs) and link them to the client IEDs as receiver. The control services are not directly engineered. They are included in the data objects which handle both directions the command (control) and the response (monitoring). When routing the DO in monitoring direction the control is known by the clients. The organization of the IED from LD down to DAs can be viewed in the BEST61850 tool. This organization concept must be taken into consideration when DataSets are configured.

The number of data objects and data attributes per Logical Node is defined by the used LN type in this IED. The contents are taken from the Data Type Templates which belong to an IED type.

Signal Engineering

Signal engineering consists of DataSets, Report Control Blocks (RCB), and Goose Control Blocks (GoCB).

DataSets

IEC 61850 has defined DataSets for signal transmission in Report Control Blocks. DataSets are also used for GOOSE messages. Figure 12 shows a DataSet where all position information of the apparatuses of a bay are put into one DataSet.

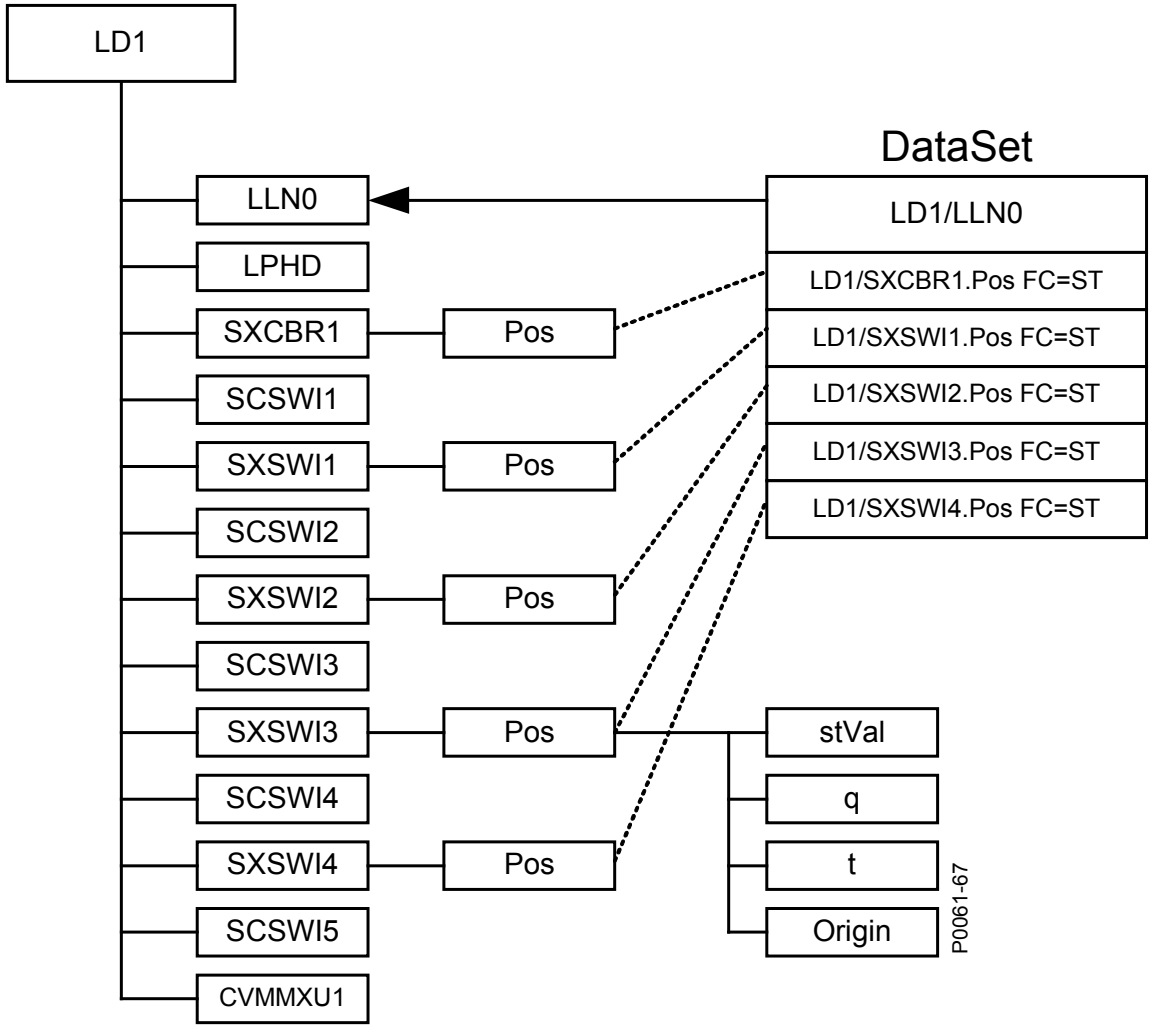


Figure 12. DataSet Example

General rules for DataSet configuration:

- All data objects or their data attributes can be selected for a DataSet.
- Only those data attributes of a data object are selected which have the same functional constraint (FC).
- Data objects with different FC can be selected for a DataSet. For example DOs with FC=ST and DOs with FC=MX can be members in one DataSet.
- A single data attribute can be selected when it is specified with a trigger option. For example the data attribute stVal of the data object Pos can be selected as a member of a DataSet, because it is specified with the trigger option data change detected (dchg).

The description of the DataSets and the list of data object members or FCDAs (Functionally Constrained Data Attributes) is included in the SCL file in the IED section in the Logical Device subsection. FCDAs are

also referred to as Data Tags. As specified in IEC 61850–7–2 clause 9, the DataSets are part of a Logical Node. They are included in the LLN0.

Report Control Blocks (RCB)

The contents of an RCB are listed in IEC 61850– 7–2 in clause 14, table 23. The RCB contains a list of attributes which handle and secure the communication between the client and the server.

- Buffer Time - This parameter describes how long the report should wait for other expected events before it sends the report to the client. When known, additional events are generated as a follow up. It is useful to wait for approximately 500 ms for additional events stored in the report. This feature reduces the number of telegrams transmitted in case of a burst of changes. But it increases the overall transaction time for events from IED input to presentation on HMI which is normally one second.
- Trigger Options - Data attributes have three trigger options (dchg, qchg, dupd). Within the RCB, two others can be defined integrity and general interrogation. The attribute Trigger Option is a multiple choice and allows masking of the supported trigger options in this RCB.
- Integrity Period - When period is selected in the trigger option attribute, it is needed to define an integrity period to force the transmission of all data listed in the DataSet. This is done by the attribute Integrity Period. This feature can be used as a background cycle to ensure that the process image in all partners is the same.
- General Interrogation - A general interrogation is only done on request from a client. Not all DataSets contain information which is needed for a general update of the client. For example, data with T(ransient) = TRUE are not part of a GI. When the RCB attribute general interrogation is set to TRUE a GI request from the client will be handled. The report handler will transmit all data defined in the DataSet with their actual values. The IEC 61850 standard defines that all buffered events are transmitted first before the GI is started. A running GI is stopped and a new GI is started, when a new GI request is received while a GI is running.

Trigger Options

IEC 61850 has defined five different TrgOp. Three of them belong to data attributes and they are marked per data attribute in the column TrgOp of the CDC tables in part 7–3. The other two belong to the configuration of control blocks. The five trigger options are:

- dchg = data-change - The classical trigger. Whenever a process value has changed its value either binary or a measurement a transmission is done.
- qchg = quality change - Looking to the possibilities of the quality data attribute type (q) any changes in the quality description are transmitted.
- dupd = data value update - This trigger option gives the possibility to define that a transmission should be done on a condition which can be controlled by the application.
- Period - This trigger forces the transmission of all process values defined in the DataSet when a timer value (the integrity period) expires. For example, it can be used to do a process signal update in the background (e.g. every 15 minutes).
- General Interrogation - This trigger is forced by the clients (= station level IED; NCC gateway, station HMI, ...). Normally a GI is asked for when the client and the server start or restart a session. When the client is able to receive the actual values and when the Logical Device has scanned all process values at least once, an image of the actual process signal status can be transmitted to the client.

Goose Control Blocks (GoCB)

The Generic Object Oriented Substation Event (GOOSE) class model is used to distribute input and output data values between IEDs on bay level through the use of multicast services. GOOSE messages bypass the server which results in a fast transmission from publisher to one or several subscribers (receivers).

The GOOSE message concept is used for all application functions where two or more IEDs are involved.

To send GOOSE messages, a GoCB must be defined and a DataSet is needed which contains the data objects of single data attributes to be sent. A GOOSE message is forced to be transmitted when a trigger change is detected for a data attribute. All members of the DataSet will be copied in the send buffer with their actual value and the message is sent. All subscribers which know the address of this GOOSE message will receive the telegram. The GOOSE message includes a sequence number and a state number to verify that all messages are received.

In the SCL communication section in the GSE element, the GoCB is listed under the ConnectedAP.

The IEDs which should receive a GOOSE message are informed in the SCL private section that they will receive GOOSE messages. This is given when the external Reference, the name of the IED, and the member of the DataSet is included in the LLN0 logic node under the structure of the Logic Device (LD) of the receiving IED. The IEDs which receive the GOOSE are selected by BEST61850.

The IEC 61850 principle operation of GOOSE messages is illustrated in Figure 13.

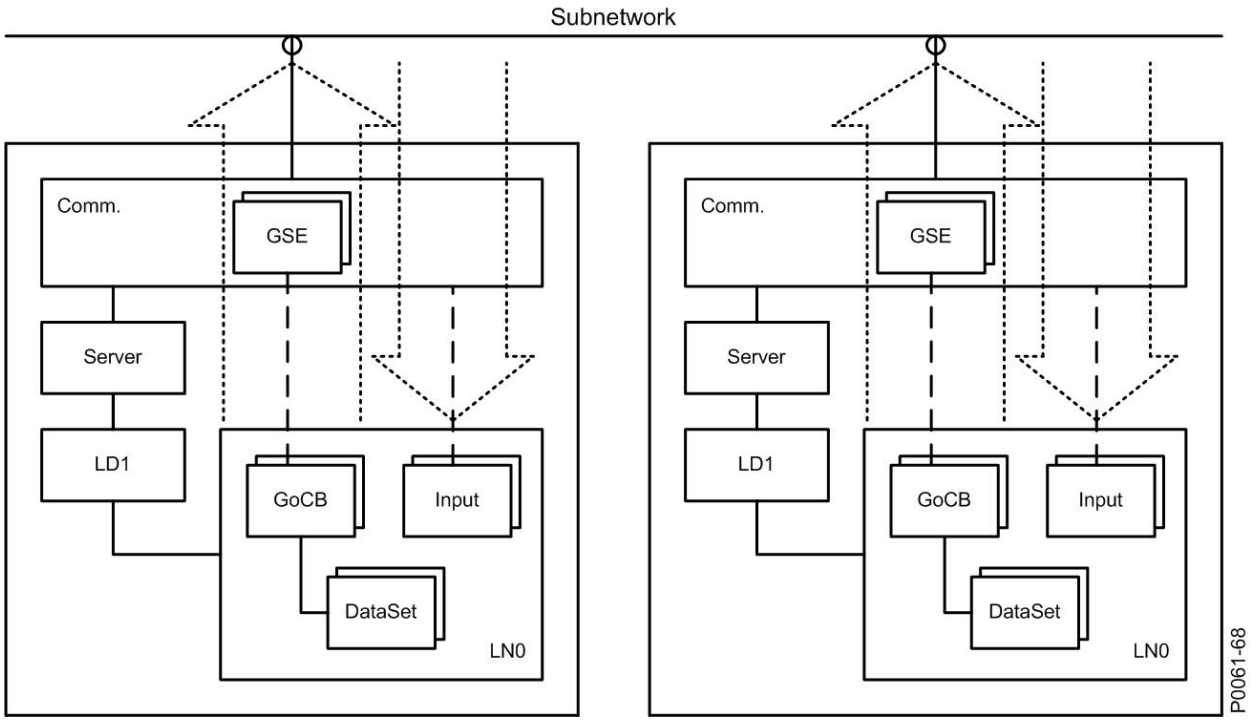


Figure 13. IEC 61850: Principle Operation of GOOSE Messages

BESTCOMS*Plus*®

BESTCOMS*Plus* is a Windows®-based, PC application that provides a user-friendly, graphical user interface (GUI) for use with Basler Electric communicating products. BESTCOMS*Plus* is used to program IEC 61850 logic. It is also used to program BE1-11 operational settings and other logic. For more information, refer to the *BESTCOMSPlus Software* chapter in the appropriate BE1-11 instruction manual below:

- 9424200990 - Instruction Manual for BE1-11*f*
- 9424200993 - Instruction Manual for BE1-11*i*
- 9424200994 - Instruction Manual for BE1-11*g*
- 9424200995 - Instruction Manual for BE1-11*t*
- 9424200996 - Instruction Manual for BE1-11*m*
- 9424200761 - Instruction Manual for BE1-11*d*

CTLGGIO OPER Output and INDGGIO OPER Input

The IEC 61850 GGIO IND outputs and OPER inputs in BESTCOMS*Plus* are used to map BE1-11 inputs and outputs to IEC 61850 data points. These data points can be read directly with an IEC 61850 browser such as IED Scout made by Omicron. The GGIO inputs and outputs can be used in an IEC 61850 DataSet which is tied to GOOSE Control Blocks (GoCB) for sending/receiving GOOSE messages.

A CTLGGIO 61850 logic output and INDGGIO logic input are shown in Figure 14.

Figure 14. 61850 Logic Output and Input

CTLGGIO OPER Alarm

The CTLGGIO OPER ALARM is set if the device has subscribed to a GOOSE message, mapped it to the corresponding CTL GGIO, and the device has not received the subscribed GOOSE message within the TTL (Time To Live). The TTL for the next reception is included within a GOOSE message. If the TTL timer expire and the alarm is set, the CTLGGIO OPER logic input will switch over to the default that is configured within the BE1-11 settings. If the device starts receiving GOOSE messages again, the alarm will be reset and the CTLGGIO OPER logic input will be set to the value in the GOOSE message.

A CTLGGIO 61850 logic output and INDGGIO logic input are shown in Figure 14.

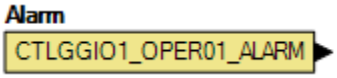


Figure 15. CTLGGIO Alarm

IEC61850PTRC Logic Block

The IEC61850PTRC logic block is available to set the corresponding status outputs in the IEC61850 PTRC node. The trip output for the BE1-11 should be connected to the Operate-General input of the block. If trip statuses of individual phases are known (BE1-11*f*, BE1-11*i*, BE1-11*g*, BE1-11*m*, and BE1-11*t* only), use BESTlogic™*Plus* to connect them to the Phase A, Phase B, and Phase C logic inputs.

The IEC 61850 PTRC logic block for the BE1-11*f*, BE1-11*i*, BE1-11*g*, BE1-11*m*, and BE1-11*t* is shown in Figure 16. The IEC 61850 PTRC logic block for the BE1-11*d* is shown in Figure 17.

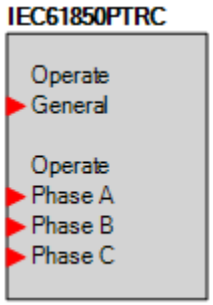


Figure 16. IEC61850PTRC Logic Block (BE1-11*f*, BE1-11*i*, BE1-11*g*, BE1-11*m*, BE1-11*t*)

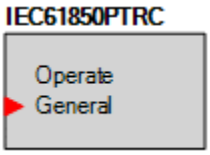


Figure 17. IEC61850PTRC Logic Block (BE1-11*d*)

BEST61850™

BEST61850 is a Windows®-based, PC application that provides a user-friendly, graphical user interface (GUI) for use with Basler Electric communicating products. The name BEST61850 is an acronym that stands for Basler Electric Software Tool for IEC 61850.

BEST61850 provides the user with a point-and-click means to configure IEC 61850 settings for the BE1-11. BEST61850 performs the following tasks:

- Reads a SCD file and extracts the CID file
- Downloads/uploads a CID file from/to the BE1-11
- Opens a CID file from a PC or network location
- Configures IED network settings
- Configures datasets for report control blocks (RCB) and GOOSE control blocks (GoCB)
- Creates and configures Report Control Blocks (RCB)
- Maps GOOSE messages between IED subscribers
- Creates and configures GoCB for each GOOSE message
- Exports a CID file to a PC or network location

Installation

BEST61850 software is built on the Microsoft® .NET Framework. The setup utility that installs BEST61850 on your PC also installs the required version of .NET Framework (if not already installed). BEST61850 operates with systems using Windows® XP 32-bit SP3, Windows Vista 32-bit SP1 (all editions), Windows 7 32-bit (all editions), Windows 7 64-bit (all editions), Windows 8, and Windows 10. System recommendations for the .NET Framework and BEST61850 are listed in Table 2.

Table 2. System Recommendations for BEST61850 and the .NET Framework

System Type	Component	Recommendation
32-/64-bit	Processor	2.0 GHz
32-/64-bit	RAM	1 GB (minimum), 2 GB (recommended)
32-bit	Hard Drive	30 MB (if .NET Framework is already installed on PC)
		880 MB (if .NET Framework is not already installed on PC)
64-bit	Hard Drive	30 MB (if .NET Framework is already installed on PC)
		2.1 GB (if .NET Framework is not already installed on PC)

To install BEST61850, a Windows user must have Administrator rights.

Install BEST61850™

NOTE

Do not connect a USB cable until setup completes successfully. Connecting a USB cable before setup is complete may result in unwanted or unexpected errors.

1. Insert the BEST61850 CD-ROM into the PC CD-ROM drive.
2. When the BEST61850 Setup and Documentation CD menu appears, click the Install button for the BEST61850 application. The setup utility installs BEST61850, the .NET Framework (if not already installed), and the USB driver on your PC.

When BEST61850 installation is complete, a Basler Electric folder is added to the Windows programs menu. This folder is accessed by clicking the Windows Start button and then accessing the Basler Electric folder in the Programs menu. The Basler Electric folder contains an icon that starts BEST61850 when clicked.

Menu Bar

The menu bar located near the top of the BEST61850 screen (see Figure 19) has four pull-down menus. The menu bar is described in Table 3.

Table 3. Menu Bar (BEST61850)

Menu Item	Description
File	
New Workspace	Creates a new workspace
Open Workspace	Opens a saved workspace
Save Workspace	Saves the workspace
Save Workspace As	Saves the workspace with a different file name
Open SCL File	Opens a CID, ICD, or SCD file
Exit	Closes BEST61850 software
View	
Workspace	Opens the Workspace window
Status	Opens the Status window
Default Layout	Opens both the Workspace and the Status windows
Communication	
Download CID From Device	Downloads a CID file from the device
Tools	
Compare Files	Compares two CID files
Event Log - View	View the BESTCOMS*Plus* event log
Accepted Devices	View and delete accepted devices
Help	
Check for Updates	Check for BEST61850 updates via the internet
Check for Update Settings	Enable or change automatic checking for updates
About	View general, detailed build, and system information

Authenticity and Encryption

The BE1-11 supports authentication and encryption of communications with BEST61850. This is done using the Transport Layer Security protocol, version 1.2 (TLS 1.2). To enable this mode, an X.509 certificate and private key must be uploaded to the BE1-11 using BESTCOMS*Plus*. For more information, refer to the BE1-11 instruction manual.

Remove Accepted Device

To remove a previously accepted device, click on the Tools drop-down menu in BESTCOMS*Plus* and select Accepted Certificates. See Figure 18.

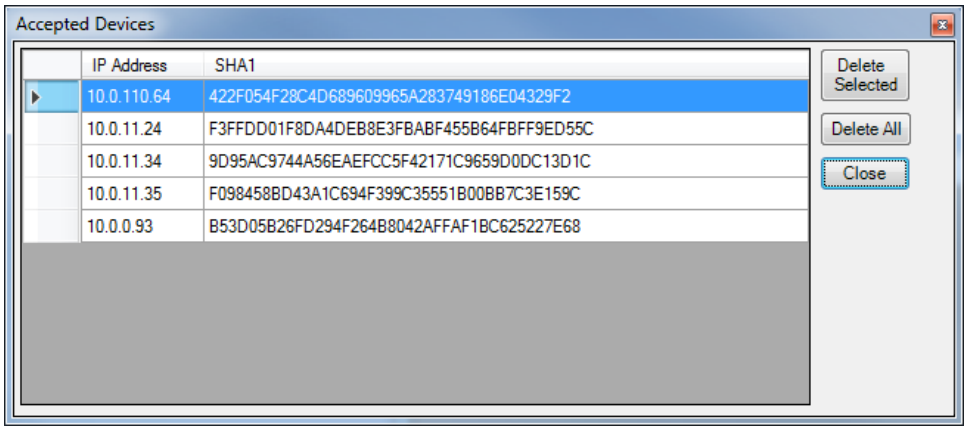


Figure 18. Accepted Devices

BEST61850™ Settings

Device Info

The Device Info tab is illustrated in Figure 19.

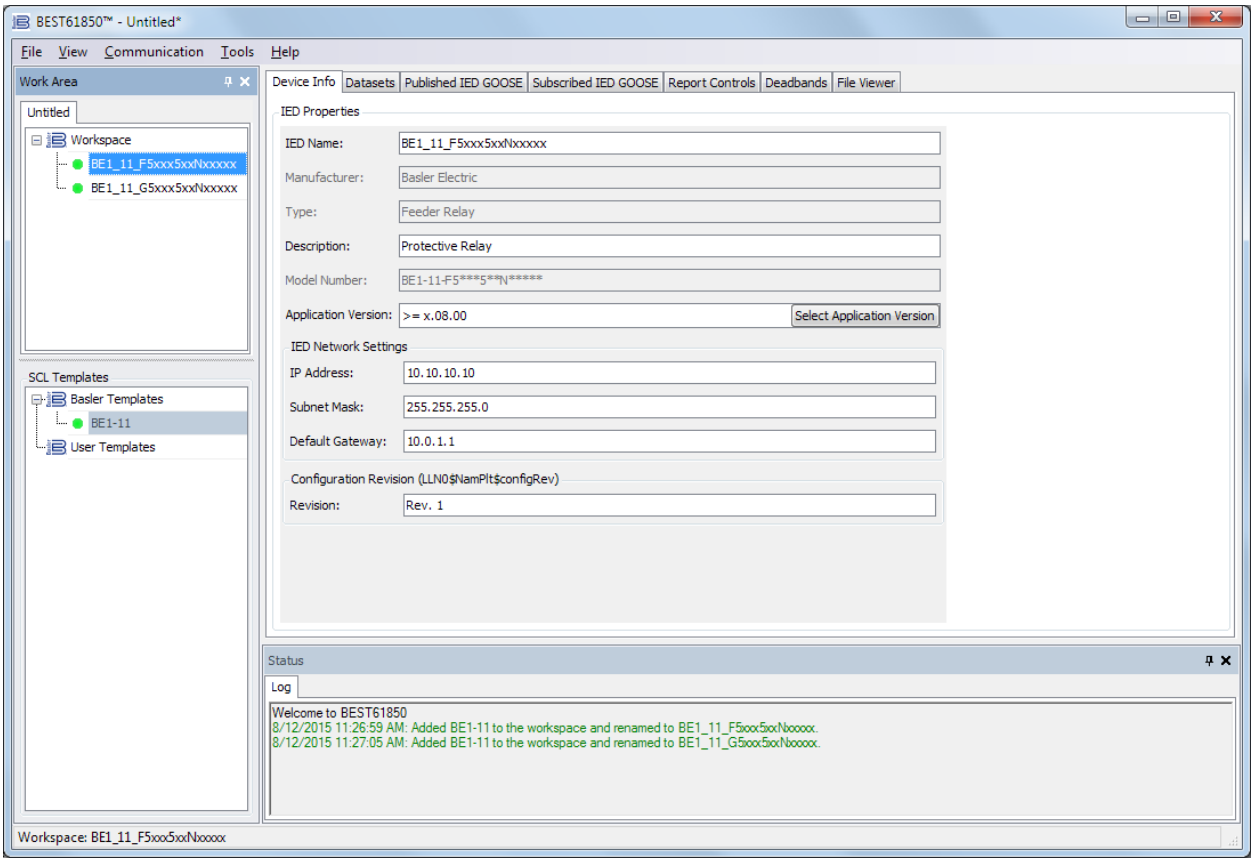


Figure 19. Device Info Tab

Device Info Settings

The Device Info settings are described in Table 4.

Table 4. Device Info Settings

Setting	Range	Description
IED Name	String (32)	Name of IED (only alphanumeric and underscore characters)

Setting	Range	Description
Manufacturer	n/a	Manufacturer of the IED (read only)
Type	n/a	Type of IED (read only)
Description	String (255)	Description of IED (not sent to IED, only saved in BEST61850)
Model Number	n/a	BE1-11 Style Number
Application Version	n/a	BE1-11 firmware application verison
IP Address	Dotted Decimal	IP Address of IED
Subnet Mask	Dotted Decimal	Subnet Mask of IED
Default Gateway	Dotted Decimal	Default Gateway of IED
Revision	n/a	Configuration revision

Datasets

The Datasets tab is illustrated in Figure 20.

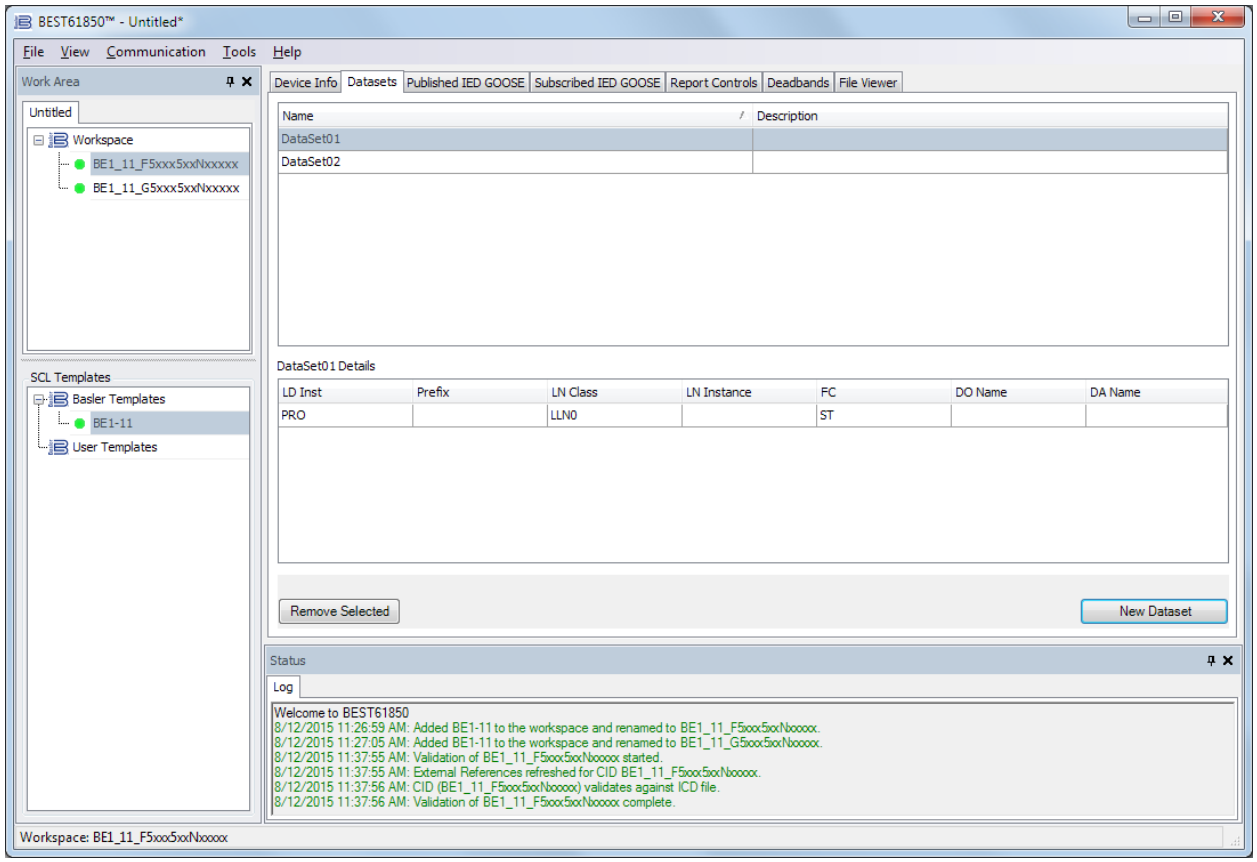


Figure 20. Datasets Tab

Functional Constraints

The IEC 61850 standard defines a number of functional constraints that indicate the data attribute is used for some particular purpose, such as reporting (BR/RP), configuration (CF), control (CO), description (DC), extended definition (EX), GOOSE control (GO), logging (LG), measured analog value (MX), setting groups (SG), setpoint (SP), and status (ST). The functional constraints of a DATA instance determines the rights of services to read and/or write the DATA.

DATA OBJECT

The DATA OBJECT or DATA class (abbreviated DO) like the LN class, is a key element of the IEC 61850 standard. Values of DATA instances represent meaningful information about substation devices, such as currents, voltages, power, phases, temperatures, status, timestamps, and so on. The DATA OBJECT may contain attributes which are themselves instances of the DATA class. Hence, it can be said that the DATA class is recursively defined.

DATA ATTRIBUTE

The DATA ATTRIBUTE class (abbreviated DA) contains the smallest piece of data that can be defined in IEC 61850. The DA class includes definition of instance name, reference, type, and presence. Presence indicates whether or not the data is mandatory or optional.

Datasets Settings

The Datasets settings are described in Table 5.

Table 5. Datasets Settings

Setting	Range
LDevice Inst	List selectable
Logical Node	List selectable
FC	List selectable
DO Name	List selectable
DA Name	List selectable

Published IED GOOSE

The Published IED GOOSE tab is illustrated in Figure 21.

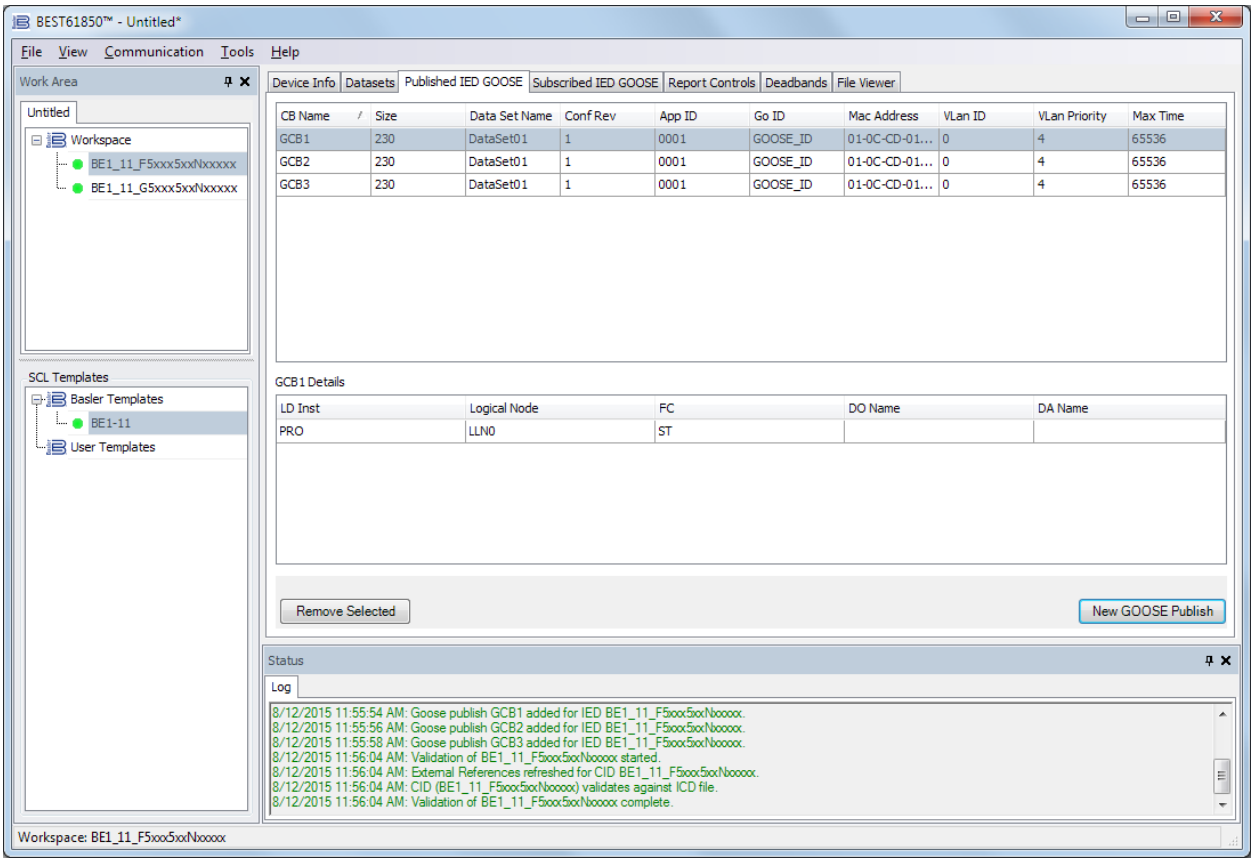


Figure 21. Published IED GOOSE Tab

Published IED GOOSE Settings

The Published IED GOOSE settings are described in Table 6.

Table 6. Published IED GOOSE Settings

Setting	Range
GOOSE Control Name	String (65)
Dataset	String (255)
Configuration Revision	1 to 65535
APPID	00 to FF
GoID	String (65)
MAC Address	00 to FF (per each hexadecimal group)
VLAN ID	000 to FFF
VLAN Priority	0 to 7
Max Time	1 to 65536

Subscribed IED GOOSE

The Subscribed IED GOOSE tab is illustrated in Figure 22.

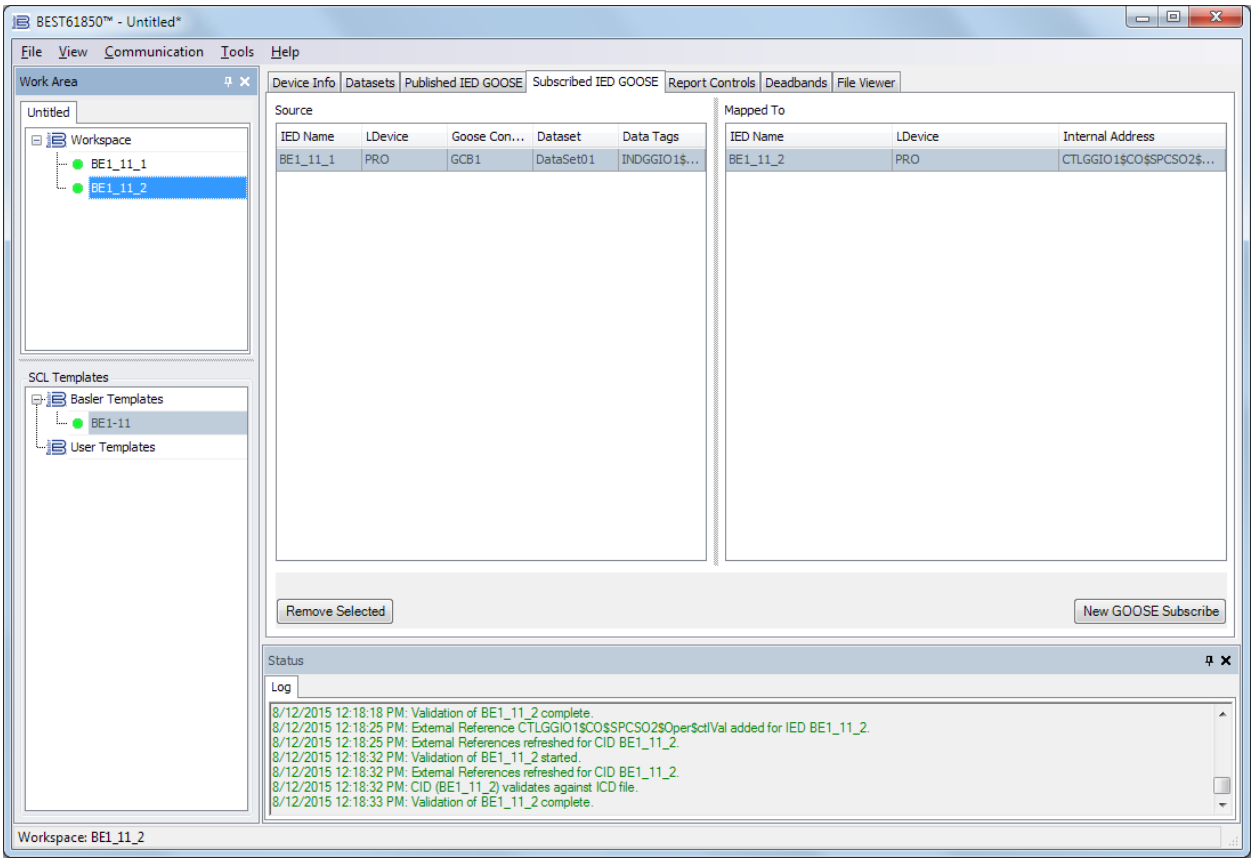


Figure 22. Subscribed IED GOOSE Tab

Subscribed IED GOOSE Settings

The Subscribed IED GOOSE settings are described in Table 7.

Table 7. Subscribed IED GOOSE Settings

Setting	Range
Source	
IED Name	List selectable
LDevice Inst	List selectable
GOOSE Block	List selectable
Dataset	List selectable
Data Tags	List selectable
Mapped To	
IED Name	List selectable
LDevice Inst	List selectable
Logical Node	List selectable
FC	CO
DO Name	List selectable
DA Name	Oper.ctlVal

Report Controls

The Report Controls tab is illustrated in Figure 23.

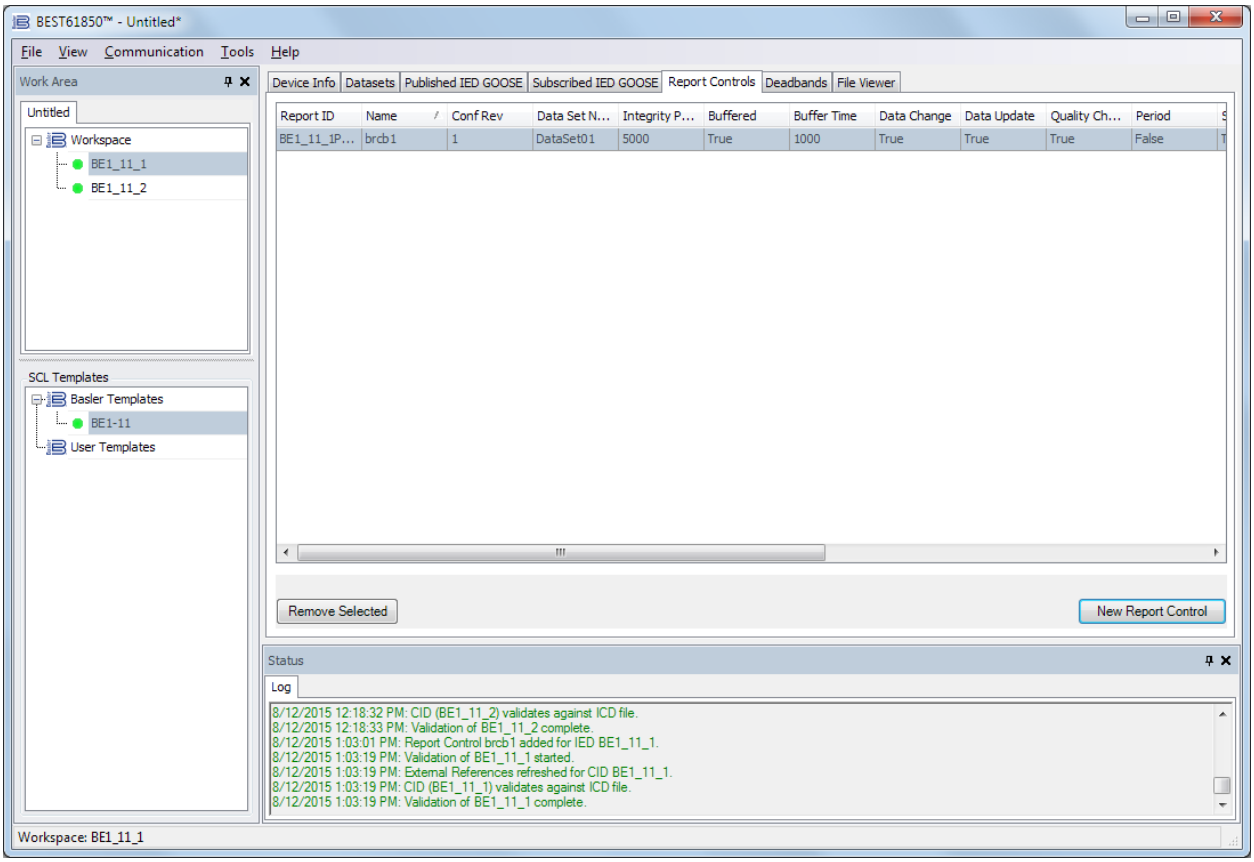


Figure 23. Report Controls Tab

Reporting is handled by the REPORT-CONTROL-BLOCK class of the ACSI. This class controls the procedures that are required for reporting values of DATA from one or more LNs to one client.

Three trigger options (data-change, quality-change, and data-update) can cause a report to be sent to a client. Report control is divided into two classes: BUFFERED-REPORTCONTROLBLOCK (abbreviated BRCB) and UNBUFFERED-REPORT-CONTROLBLOCK abbreviated (URCB).

The class BRCB allows for the sending of reports to be issued immediately, or for the events to be buffered for transmission after an amount of time specified by the Buffered Time setting. Furthermore, BRCB provides the sequence-of-events (SOE) functionality. If the connection is broken when reporting is to take place, the report is buffered and sent when the connection is re-established.

The class URCB only allows transmission of reports according to the time specified by the Buffered Time setting. If the connection is lost, buffering is terminated and the reports are discarded. URCB does not provide SOE functionality.

For both types of reporting, the server must restrict access to an instance of a report control block to one client at a time. The client will be associated with the control block and that client will be the only one receiving reports from the control until the association is released or aborted. In order for more than one client to receive reports of the same values of DATA, multiple instances of the report control block classes must be made available. (The BE1-11 contains four instances.) It is also defined in the standard how this should be achieved. In this context, it must be discerned between buffered reporting and unbuffered reporting.

In the case of buffered reporting, it is important that a client, whose connection is lost in the middle of the transmission of the report, is associated with the same report control instance the next time the client reconnects. For this reason, the report control can keep track of which report was successfully transmitted last, and thus, which reports are yet to be transmitted. For unbuffered reporting, this is not necessary. The class provides services for sending a buffered report and reading or writing attributes of a BRCB.

Figure 19 illustrates the client/server interface for RCB Reports.

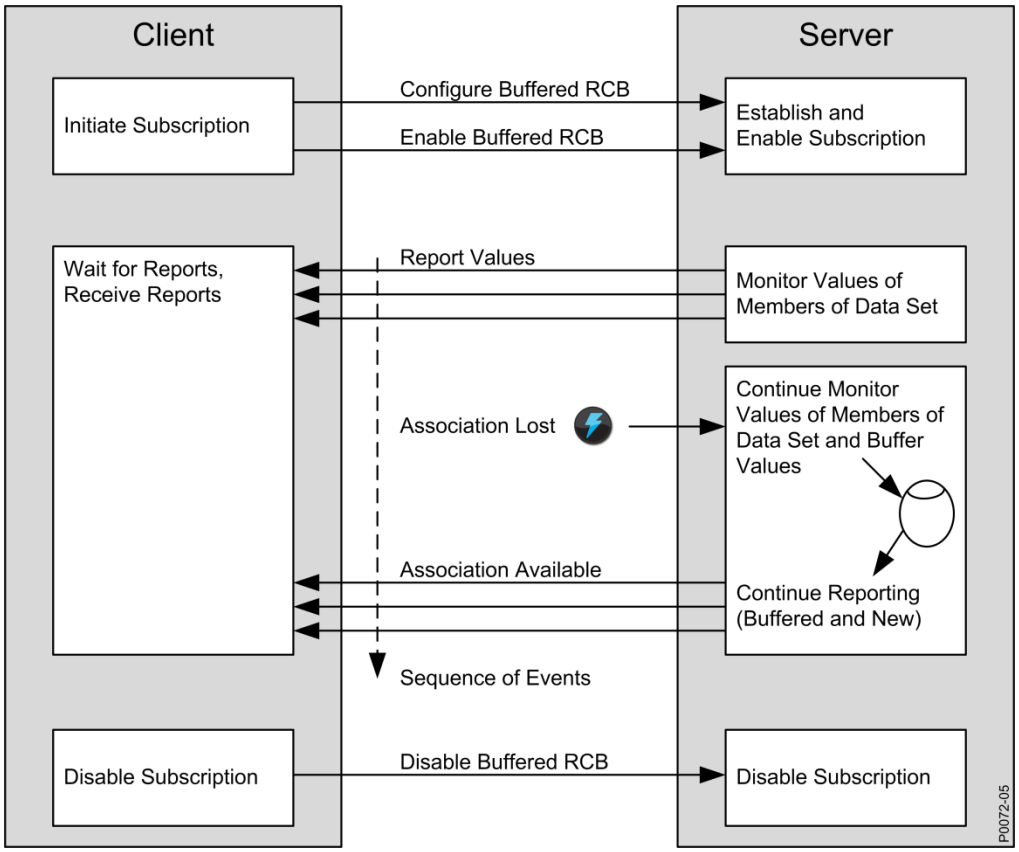


Figure 24. Client/Server Interface for RCB Reports

Report Controls Settings

The Report Controls settings are described in Table 8.

Table 8. Report Controls Settings

Setting	Range
Report ID	n/a
Name	String (65)
Configuration Revision	1 to 65535
DataSet	String
Integrity Period	0 to 65535
Buffered	True (Buffered) or False (Unbuffered)
Buffered Time	0 to 65535
Report Enabled Max	1 to 4
Trigger Options: Data Change, Quality Change, Data Uploaded, Period	check box selectable
Optional Fields: Sequence Number, Time Stamp, DataSet, Reason Code, Data Reference, Entry ID, Configuration Revision	check box selectable

Deadbands

The Deadbands tab is illustrated in Figure 25. Double-click on a row to edit deadband settings.

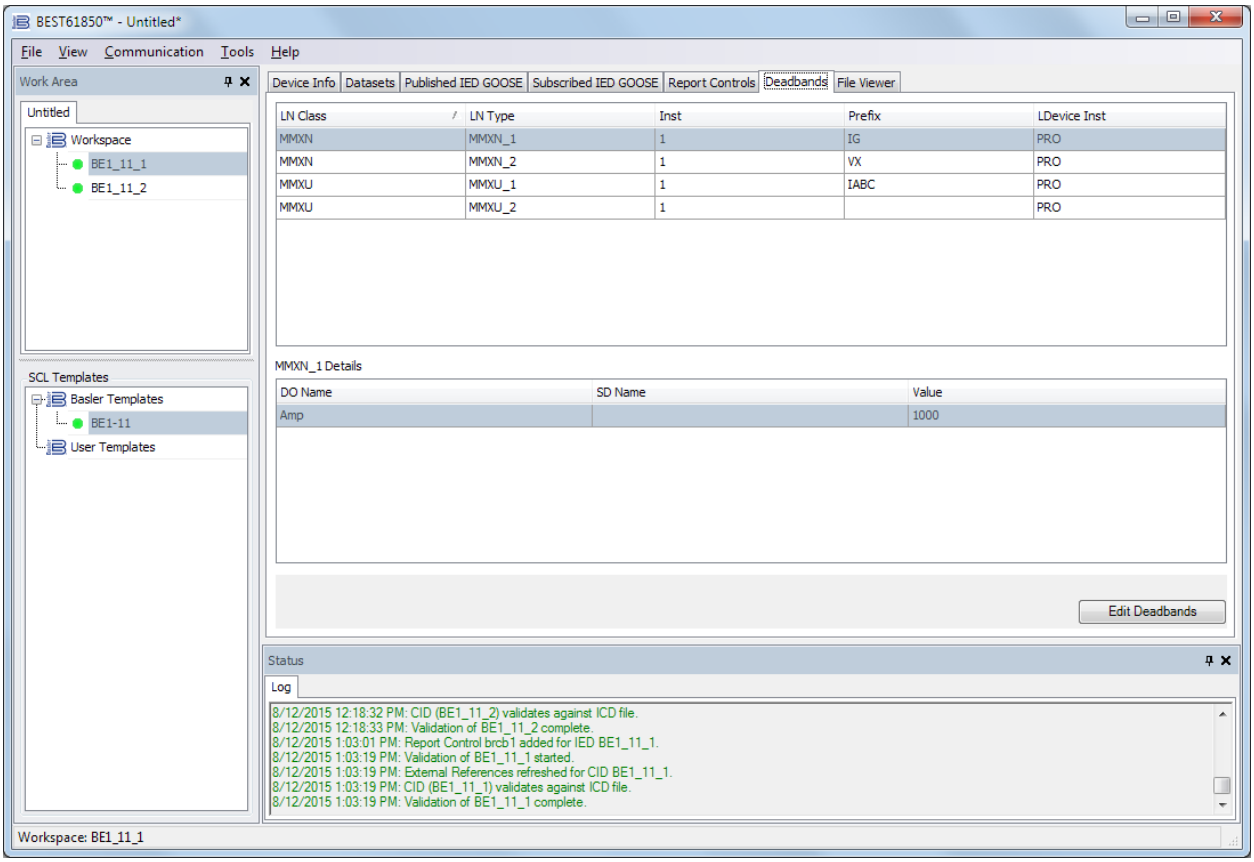


Figure 25. Deadbands Tab

File Viewer

The File Viewer tab is illustrated in Figure 26. Click on ⊟ to collapse the branches. Click on ⊞ to expand the branches.

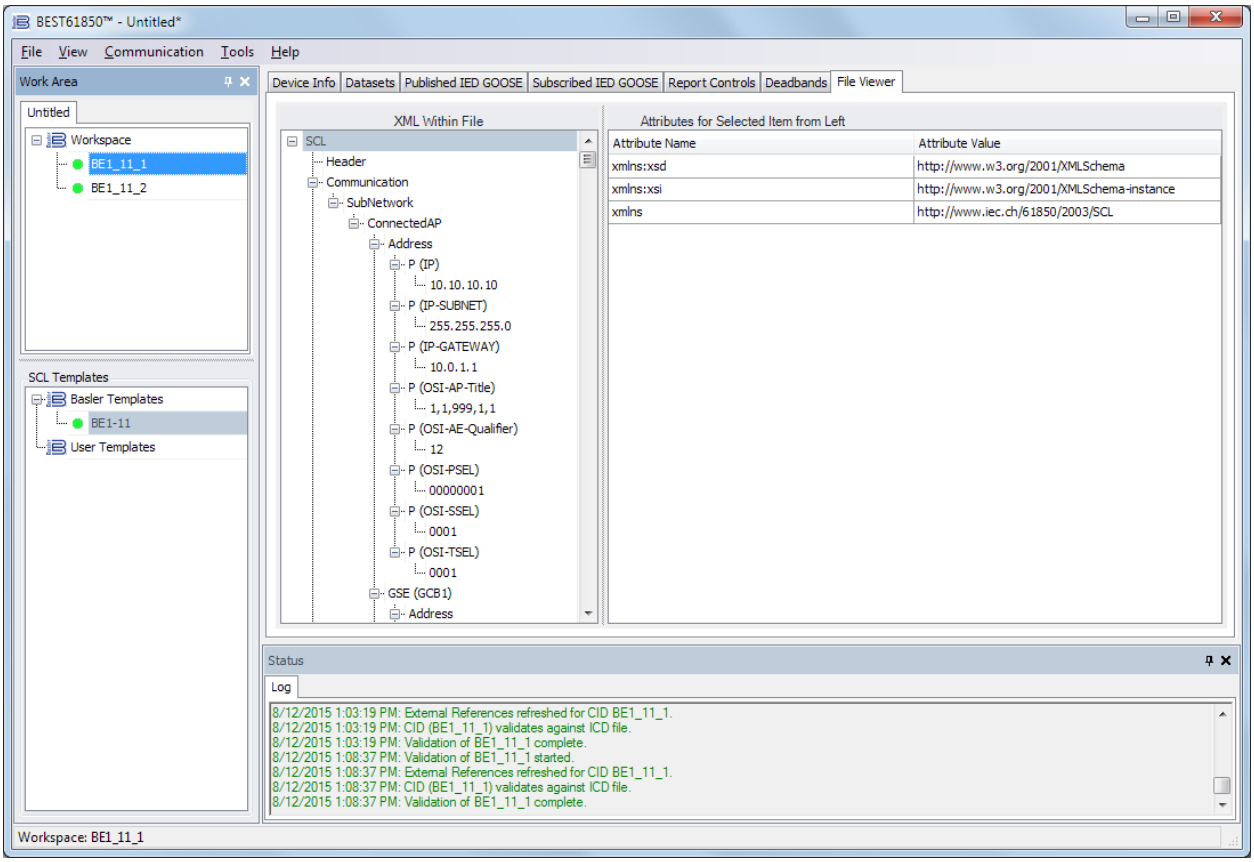


Figure 26. File Viewer Tab

Configuration Example

This configuration example provides step-by-step instructions on how to configure two separate CIDs.

Configure Communication Parameters and Names

Step 1: Start BEST61850 software.

Step 2: Using the mouse, left-click on and hold the BE1-11 SCL Template. While holding down the left mouse button, drag the template into the Workspace area and release. See Figure 27.

Step 3: The BE1-11 BEST61850 Template Selection screen appears as shown in Figure 28. Use the drop-down buttons to select the style number of the BE1-11 and click OK.

Step 4: Under IED Properties, enter **BE1_11_1** for IED Name and **Protective Relay 1** for Description. Enter the IED Network Settings for the IED being configured.

Step 5: The CID should be validated against the ICD file before proceeding. Right-click on the BE1_11_1 file in the Workspace and select Validate. The round indicator located on the left side of the file name changes from yellow to green if validation is successful.

Step 6: Repeat Steps 2 and 3 to add a second SCL Template to the Workspace. See Figure 29.

Step 7: Under IED Properties, enter **BE1_11_2** for IED Name and **Protective Relay 2** for Description. Enter the IED Network Settings for the IED being configured.

Step 8: Right-click on the BE1_11_2 file in the Workspace and select Validate. The round indicator located on the left side of the file name changes from yellow to green if validation is successful.

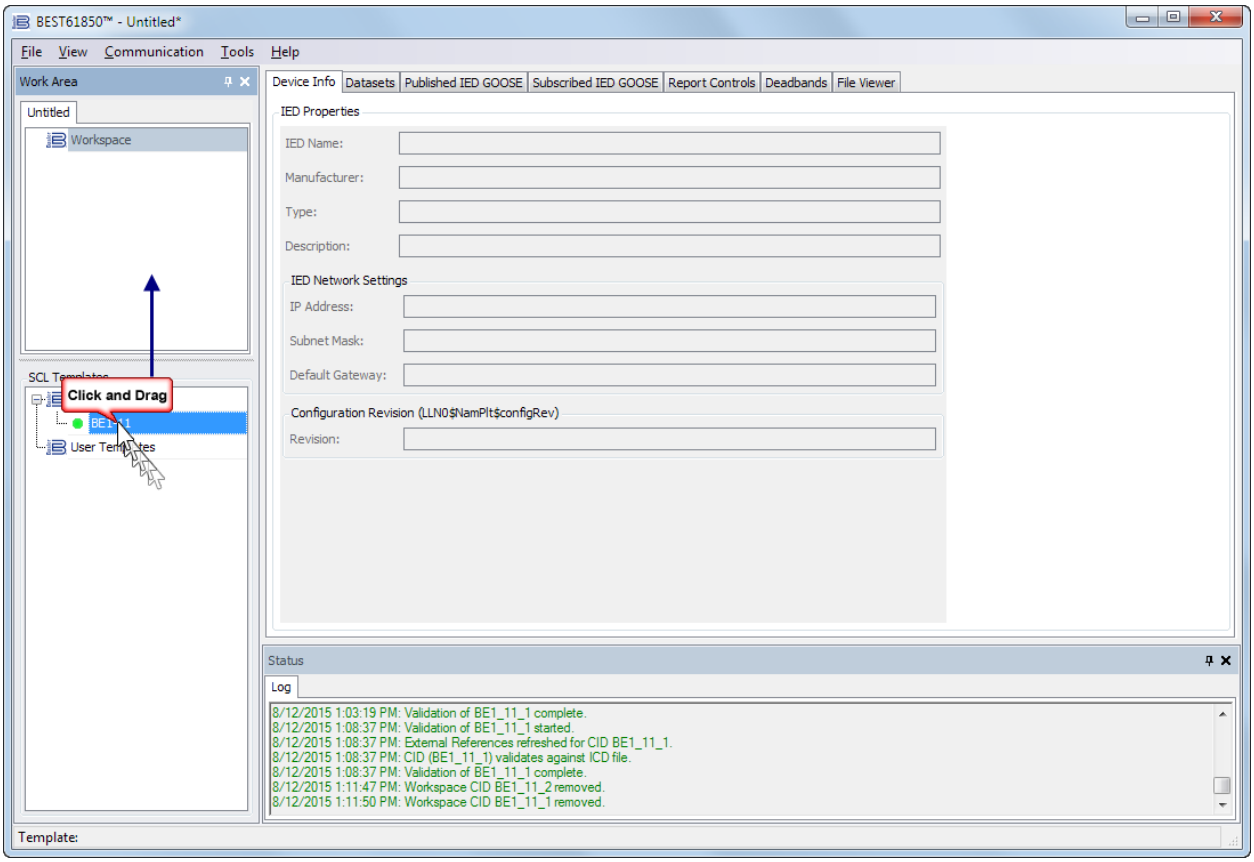


Figure 27. Adding an SCL Template to the Workspace

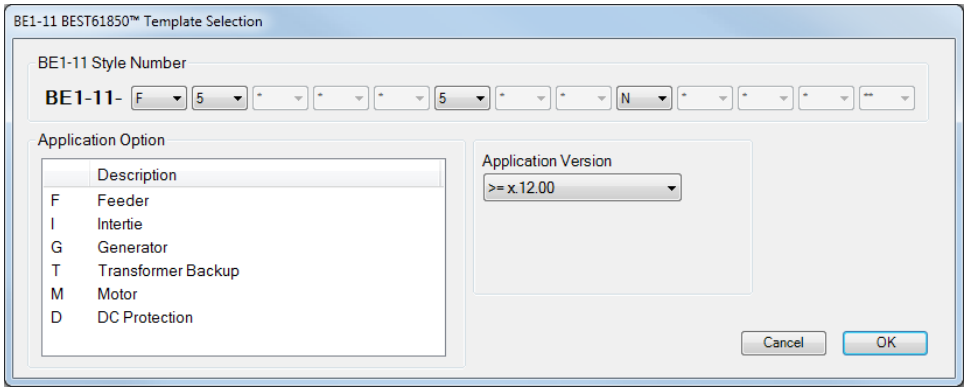


Figure 28. BE1-11 BEST61850 Template Selection Screen

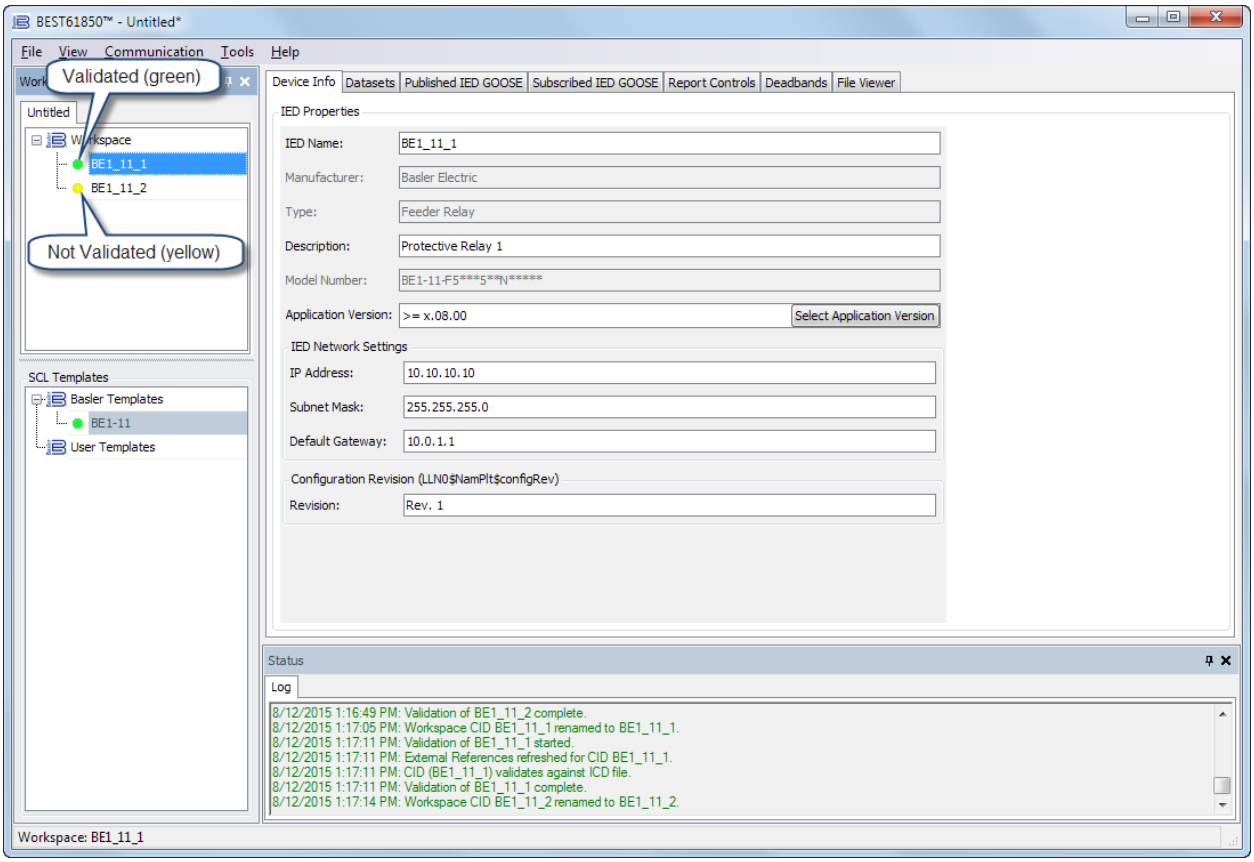


Figure 29. Adding a Second SCL Template to the Workspace

Configure DataSets

Step 1: Select the DataSets tab in BEST61850. See Figure 30. A maximum of 16 DataSets is allowed.

Step 2: Highlight the BE1_11_1 file in the Workspace and click the New Dataset button. The Add New Dataset screen appears. See Figure 31.

Step 3: Enter a dataset description and select **PRO$INDGGIO1$ST$Ind01$stVal** by selecting the individual parts of the FCDA (Functionally Constrained Data Attribute) information as shown in Figure 31. The FC (Functional Constraint) is automatically set to ST.

Step 4: Click the Add→ button to add the FCDA information to the current FCDA.

Step 5: Click the Add button in the lower-right corner of the Add New Dataset window.

Step 6: Right-click on the BE1_11_1 file in the Workspace and select Validate. The round indicator located on the left side of the file name changes from yellow to green if validation is successful.

Step 7: Repeat Steps 1 through 5 to configure **DataSet02** using a different FCDA in Step 3.

Step 8: Repeat Steps 1 through 7 to configure the DataSets for the BE1_11_2 CID file.

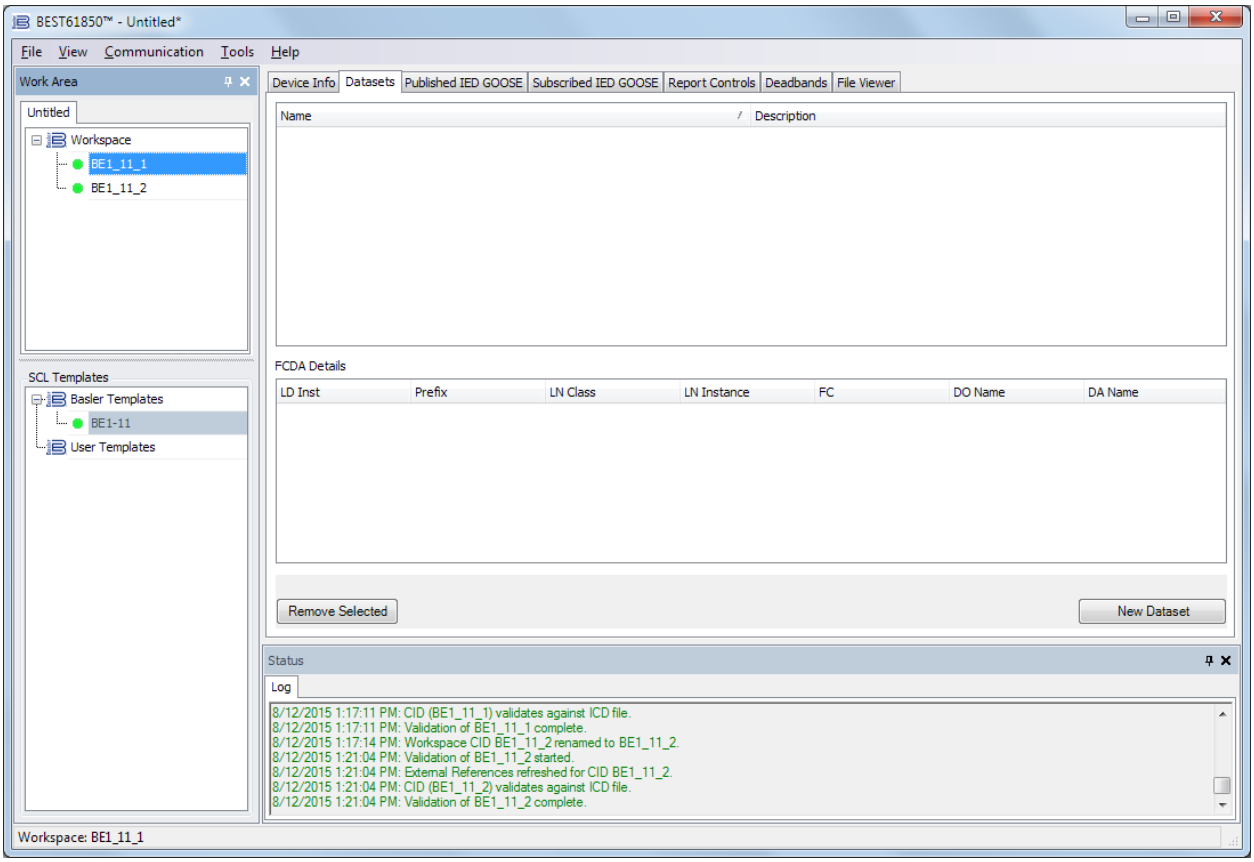


Figure 30. Datasets Tab

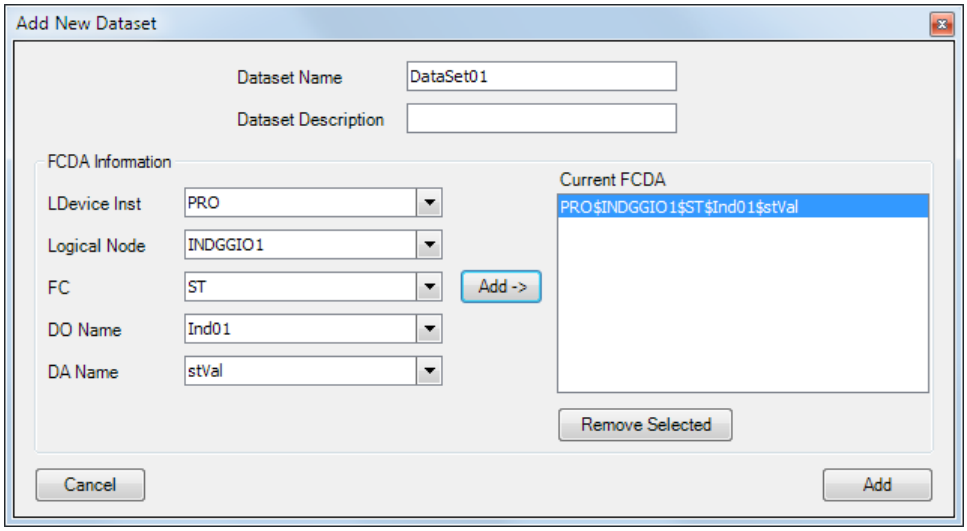


Figure 31. Add New Dataset Screen

Configure Published IED GOOSE

Step 1: Select the Published IED GOOSE tab in BEST61850. See Figure 32. A maximum of four Published IED GOOSE messages is allowed.

Step 2: Highlight the BE1_11_1 file in the Workspace. Click the New GOOSE Publish button. The Add New Published GOOSE screen appears. See Figure 33.

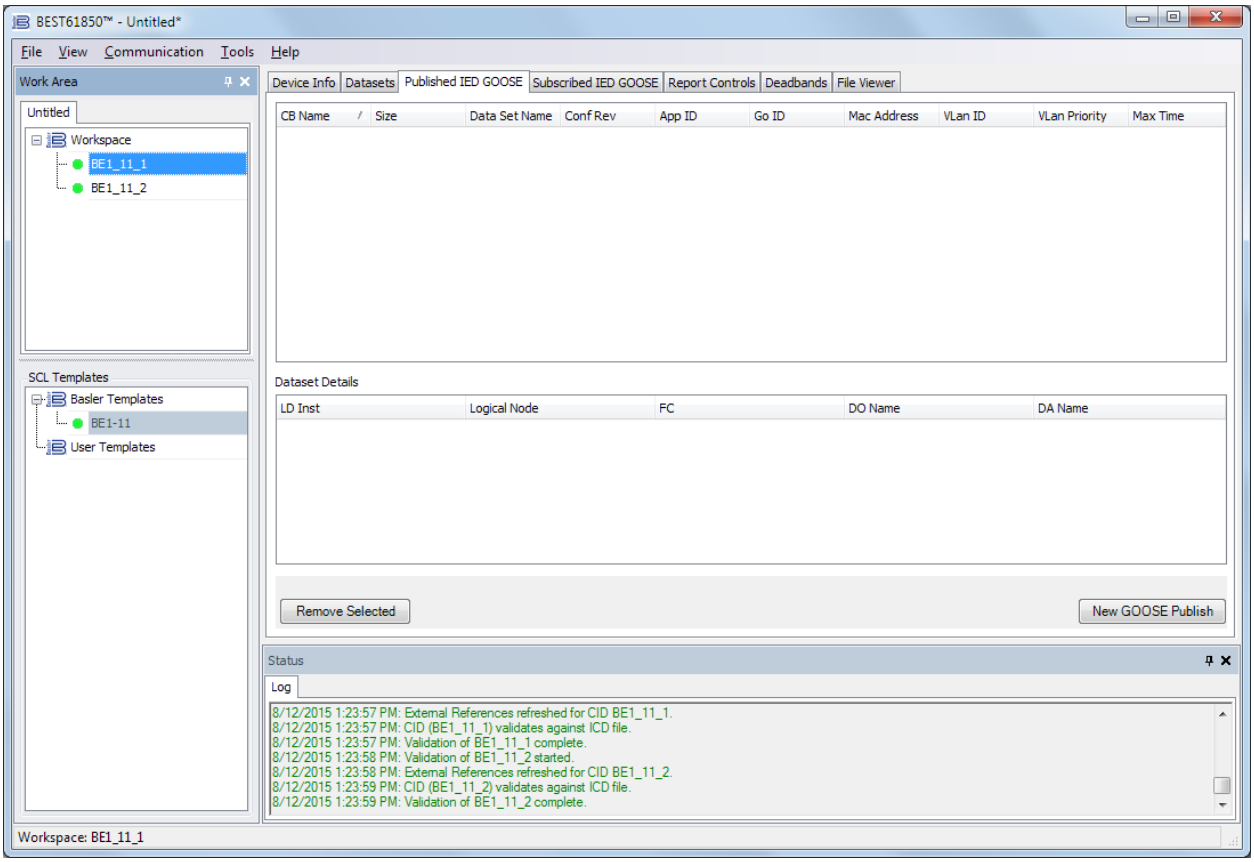


Figure 32. Published IED GOOSE Tab

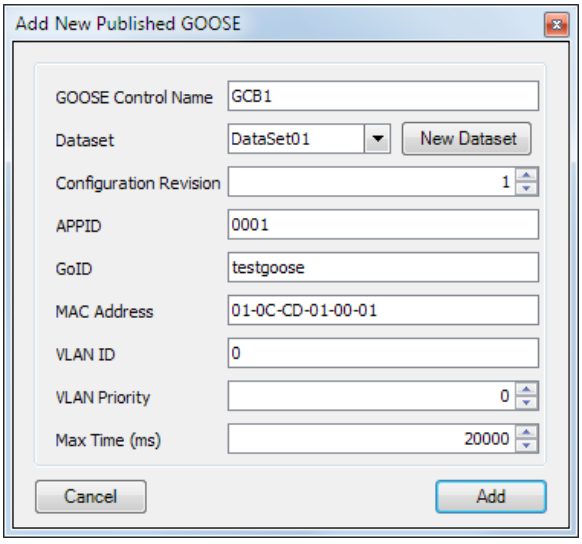


Figure 33. Add New Published GOOSE Screen

Step 3: Make the appropriate settings as shown in Table 9 and click the Add button.

Table 9. Published IED GOOSE Example Values

Setting	Range	Value
GOOSE Control Name	String (65)	GCB1
Dataset	String (255)	DataSet01
Configuration Revision	1 to 65535	1
App ID	00 to FF	0001

Setting	Range	Value
Go ID	String (65)	testgoose
MAC Address	00 to FF (per each hexadecimal group)	01-0C-CD-01-00-01
VLAN ID	000 to FFF	0
VLAN Priority	0 to 7	0
Max Time	1 to 65536	20000

Step 4: Right-click on the BE1_11_1 file in the Workspace and select Validate. The round indicator located on the left side of the file name changes from yellow to green if validation is successful.

Step 5: Repeat Steps 1 through 4 to configure additional Published IED GOOSE messages.

Configure Subscribed IED GOOSE

Step 1: Select the Subscribed IED GOOSE tab in BEST61850. See Figure 34. A maximum of 20 Subscribed IED GOOSE messages is allowed.

Step 2: Highlight the BE1_11_2 file in the Workspace. Click the New GOOSE Subscribe button. The Add New Subscribed GOOSE screen appears. See Figure 35.

Step 3: Make the appropriate settings changes by selecting the **Source** IED (BE1_11_1) Data Tags (INDGGIO1$Ind01$stVal) **Mapped To** (BE1_11_2) FCDA CTLGGI01COSPCSO1$Oper$ctlVal and click the Add button.

Step 4: Right-click on the BE1_11_2 file in the Workspace and select Validate. The round indicator located on the left side of the file name changes from yellow to green if validation is successful.

Step 5: Repeat Steps 1 through 4 to configure additional Subscribed IED GOOSE messages.

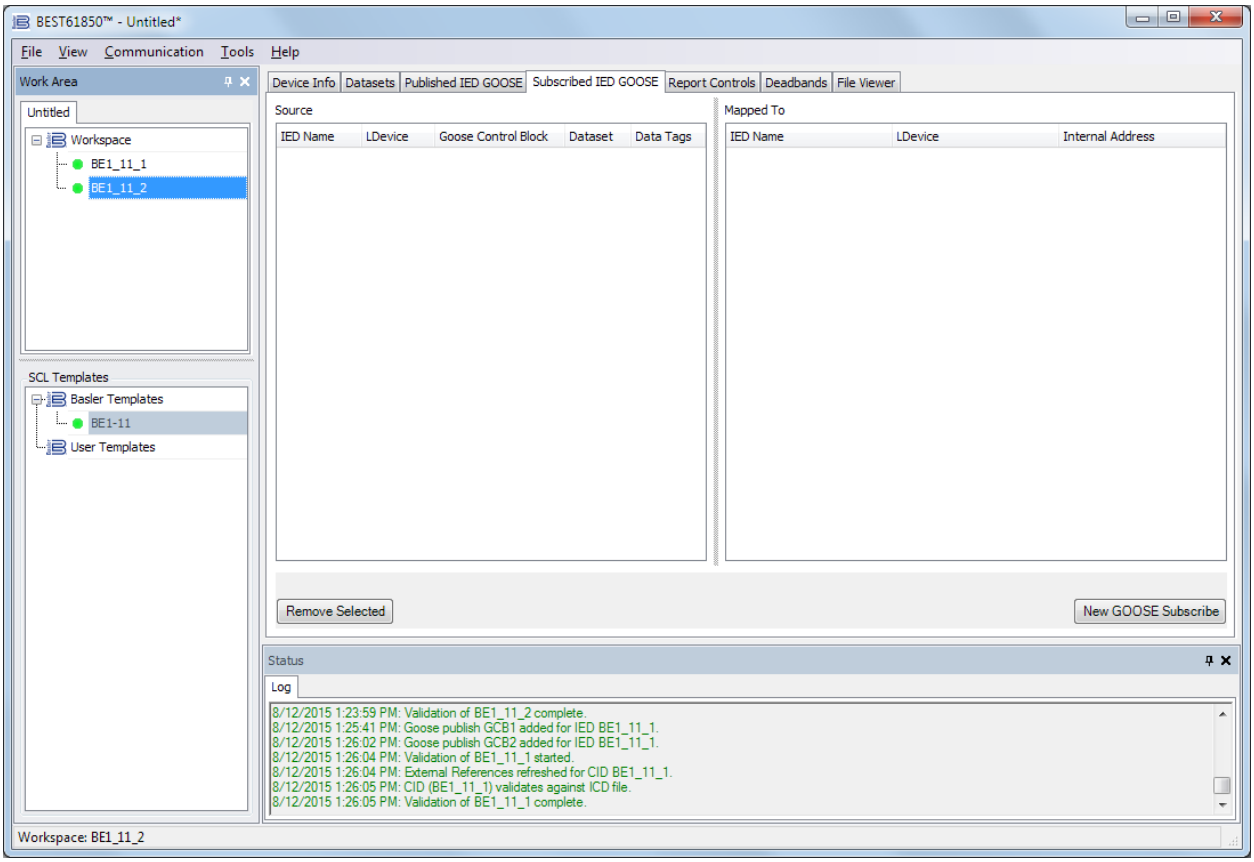


Figure 34. Subscribed IED GOOSE Tab

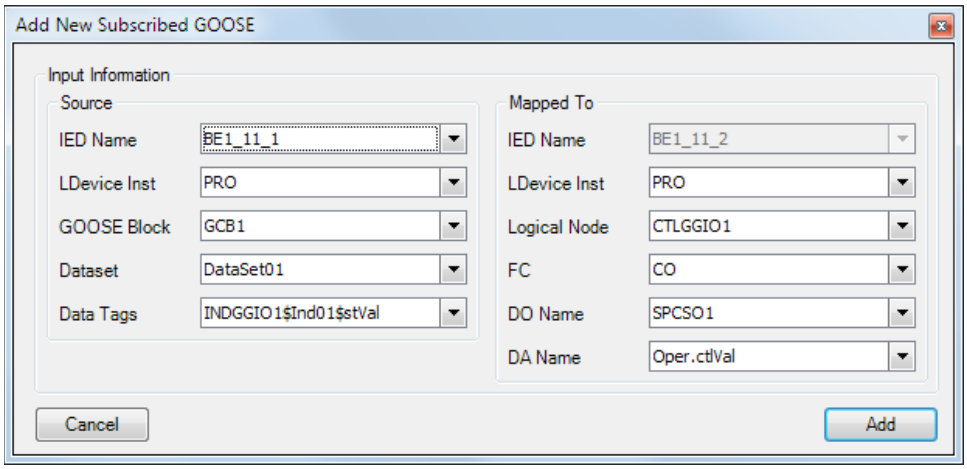


Figure 35. Add New Subscribed GOOSE Screen

Configure Report Control Blocks

Step 1: Select the Report Controls tab in BEST61850. See Figure 36. A maximum of eight Report Control Blocks is allowed.

Step 2: Highlight the BE1_11_1 file in the Workspace.

Step 3: Click the New Report Control button. The Add New Report Control screen appears. See Figure 37.

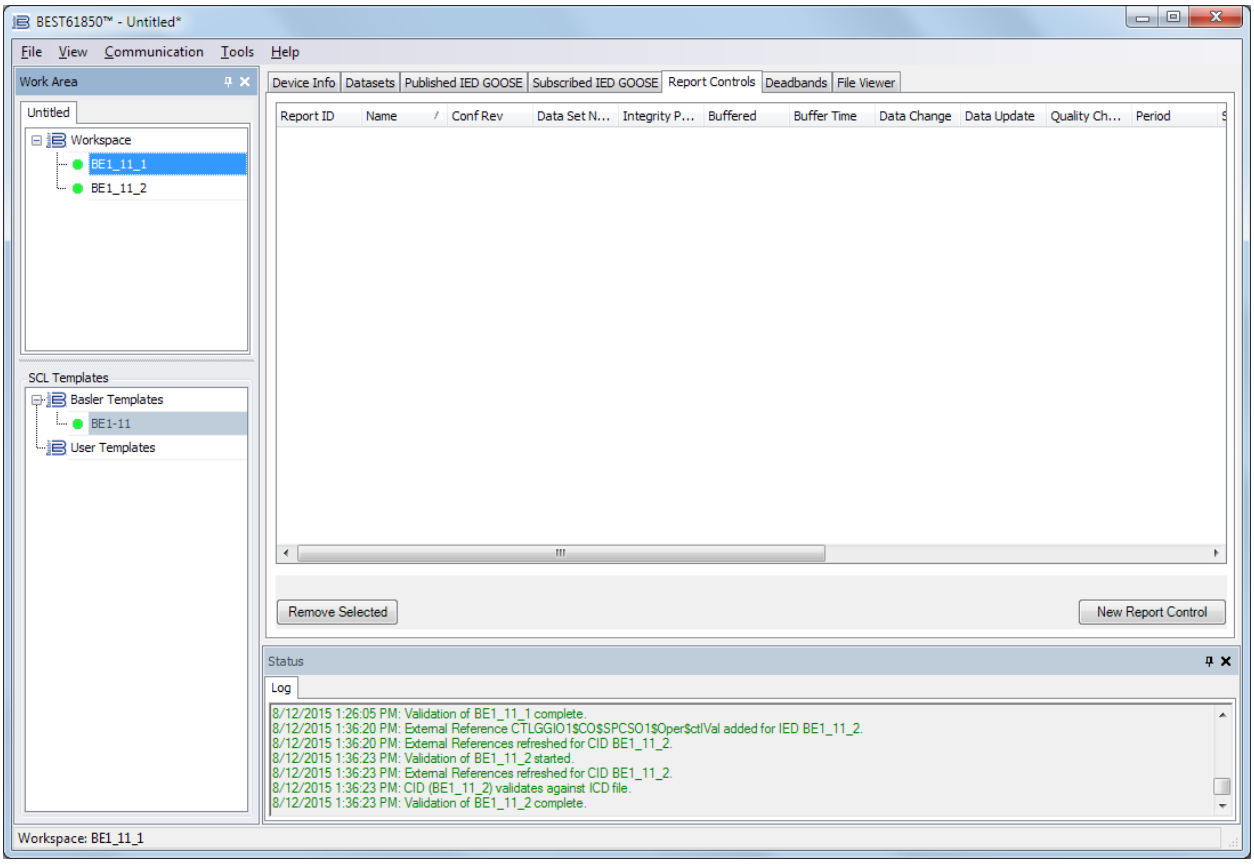


Figure 36. Report Controls Tab

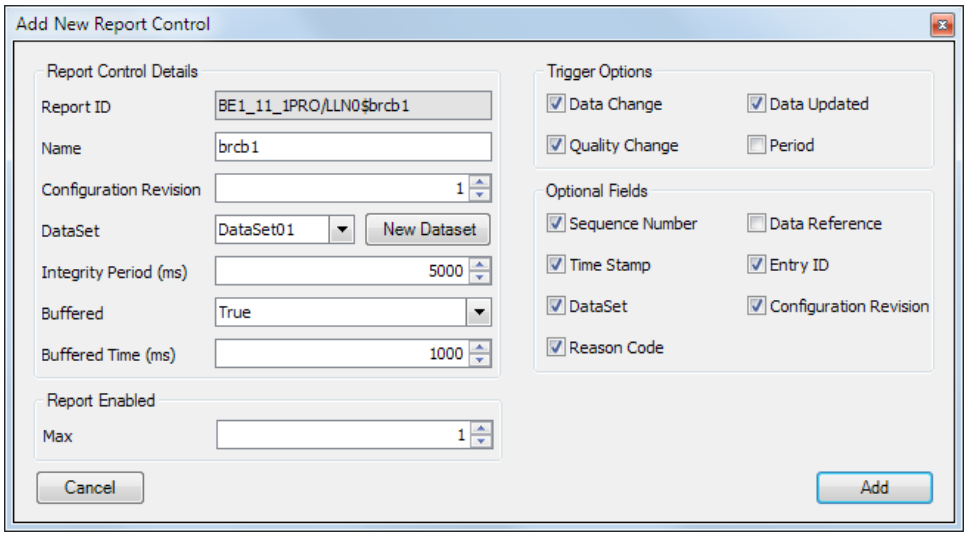


Figure 37. Add New Report Control Screen

Step 4: Make the appropriate settings as shown in Table 10 and click the Add button.

Step 5: Right-click on the BE1_11_1 file in the Workspace and select Validate. The round indicator located on the left side of the file name changes from yellow to green if validation is successful.

Step 6: Repeat Steps 1 through 5 to configure additional Report Control Blocks.

Table 10. Report Controls Settings Example Values

Setting	Range	Value
Report ID	n/a	BE1_11_1PRO/LLNO$bcrb1
Name	String (65)	bcrb1
Configuration Revision	1 to 65535	1
DataSet	String	DataSet01
Integrity Period	0 to 65535	5000
Buffered	True (Buffered) or False (Unbuffered)	True
Buffered Time	0 to 65535	1000
Report Enabled Max	1 to 4	1
Trigger Options: Data Change (√), Quality Change (√), Data Uploaded (√), Period ( )	check box selectable	N/a
Optional Fields: Sequence Number (√), Time Stamp (√), DataSet (√), Reason Code (√), Data Reference ( ), Entry ID (√), Configuration Revision	check box selectable	N/a

Save a CID File as a User Template

Using the mouse, left-click on and hold the BE1_11_1 file in the Workspace. While holding down the left mouse button, drag the file under User Templates and release. A dialog box will pop up asking you to enter a template name. A unique name must be entered or an error will occur. See Figure 38.

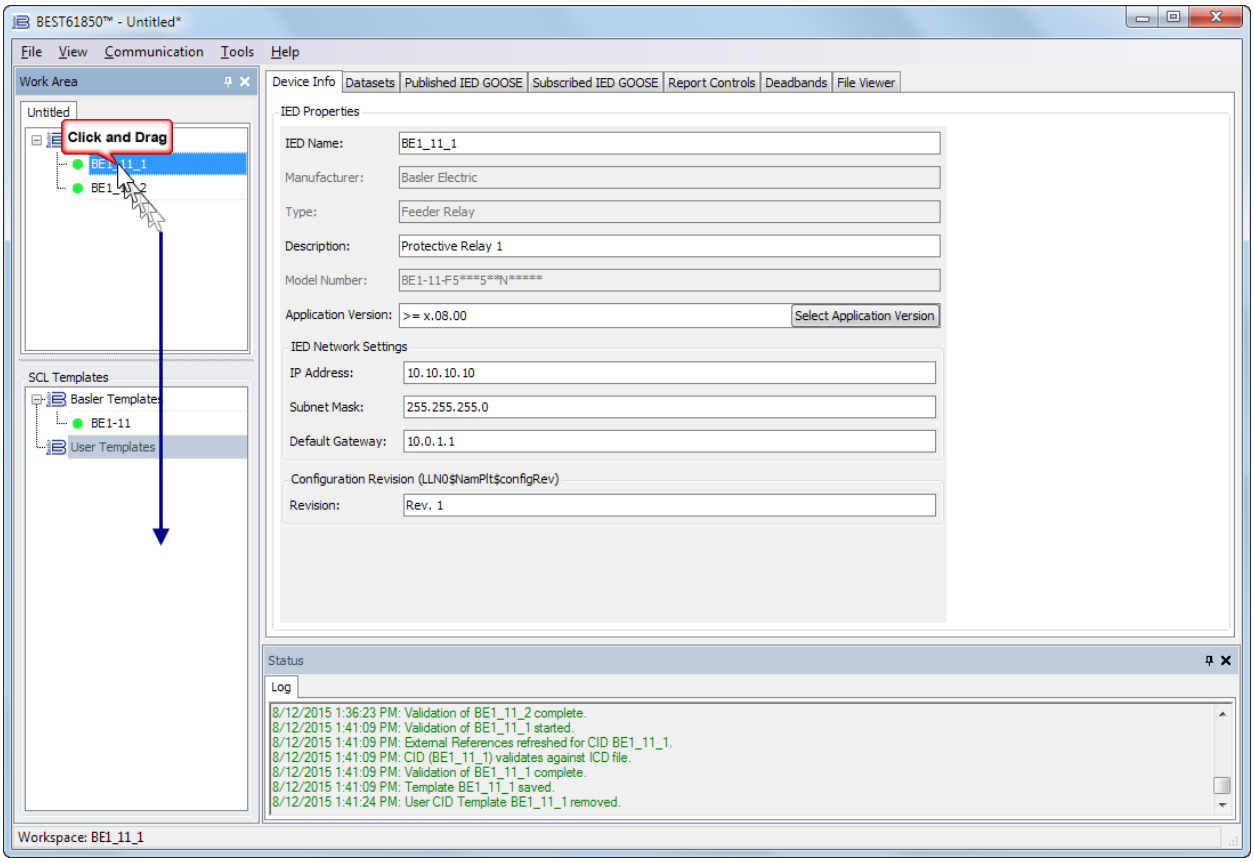


Figure 38. Save a CID as a User Template

Save a CID File

Right-click on the BE1_11_1 file in the Workspace and select Save CID. See Figure 39.

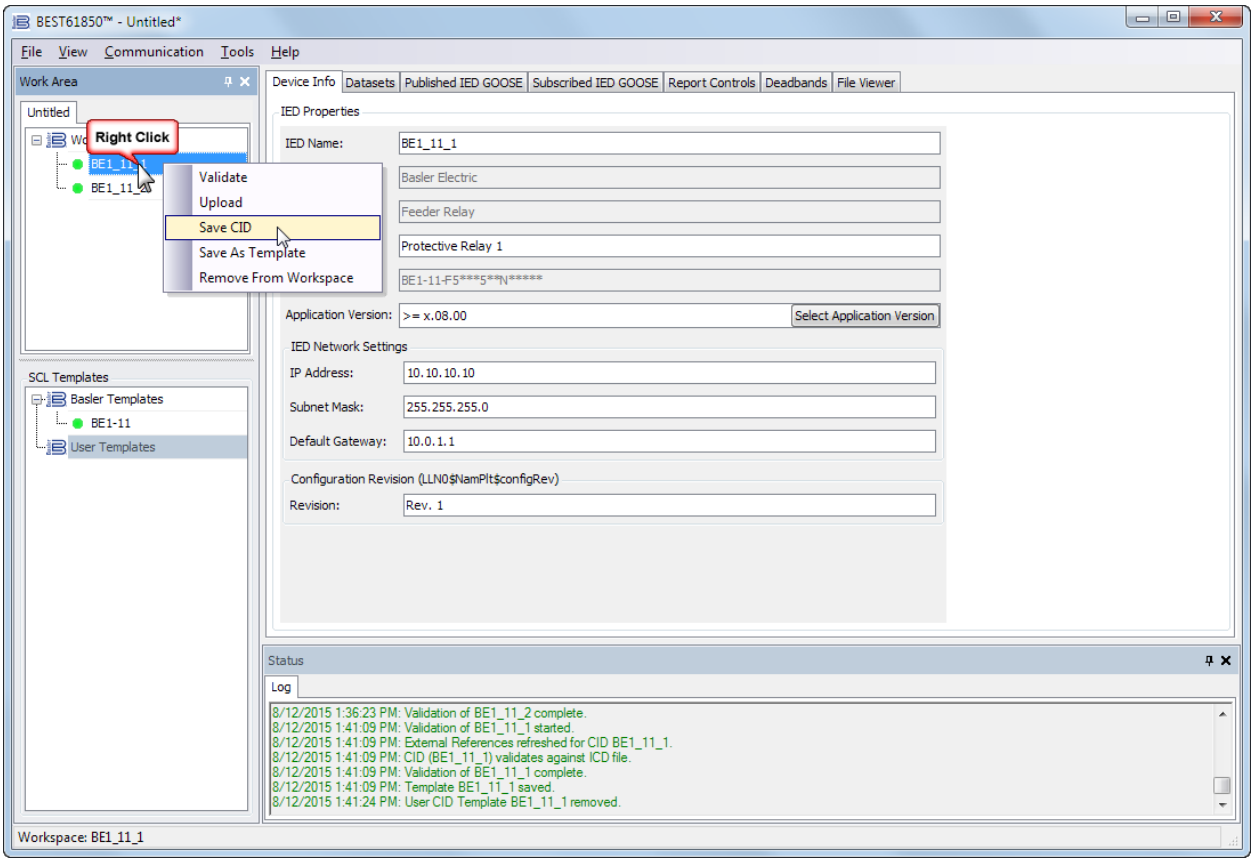


Figure 39. Save a CID File

Upload a CID File to the BE1-11

Right-click on the BE1_11_1 file in the Workspace and select Upload. See Figure 40.

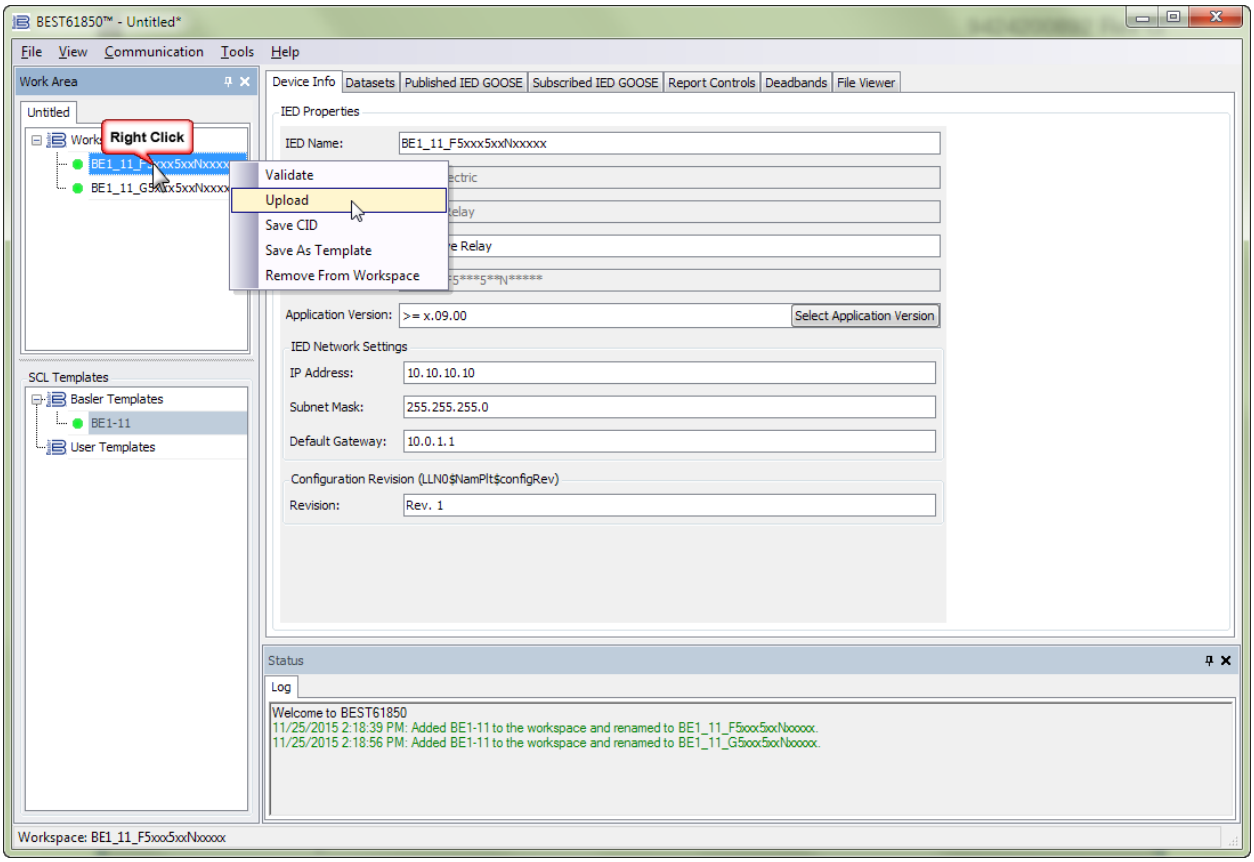


Figure 40. Upload a CID File to the BE1-11

Compare CID Files

BEST61850 has the ability to compare two CID files. To compare files, pull down the Tools menu and select Compare Files. The BEST61850 File Compare Setup dialog box appears (Figure 41). Select the location of the first file under Left Source and select the location of the second file under Right Source. If you are comparing a CID file located on your PC hard drive or portable media, click the folder button and navigate to the file. If you want to compare a CID file from a unit, click the Download file from unit button to set up the communication port. Click the Compare button to compare the selected CID files.

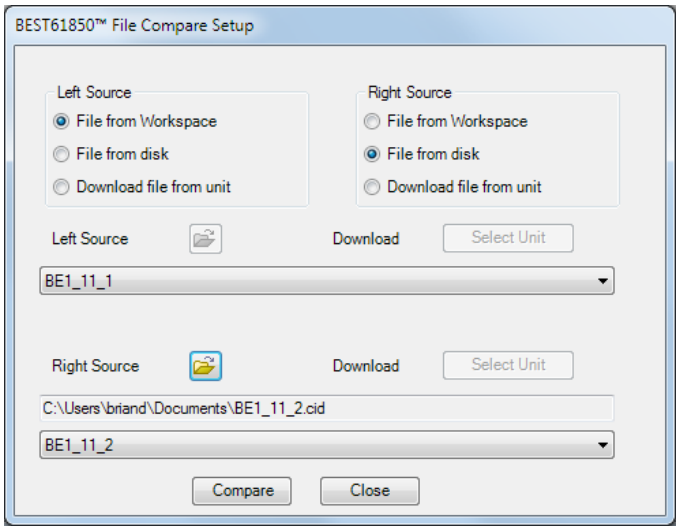


Figure 41. BEST61850 File Compare Setup

A dialog box will appear and notify you if any differences were found. The BEST61850 File Compare dialog box (Figure 42) is displayed where you can select to view all values or only differences. Click Print to print a report or click Close to close the window.

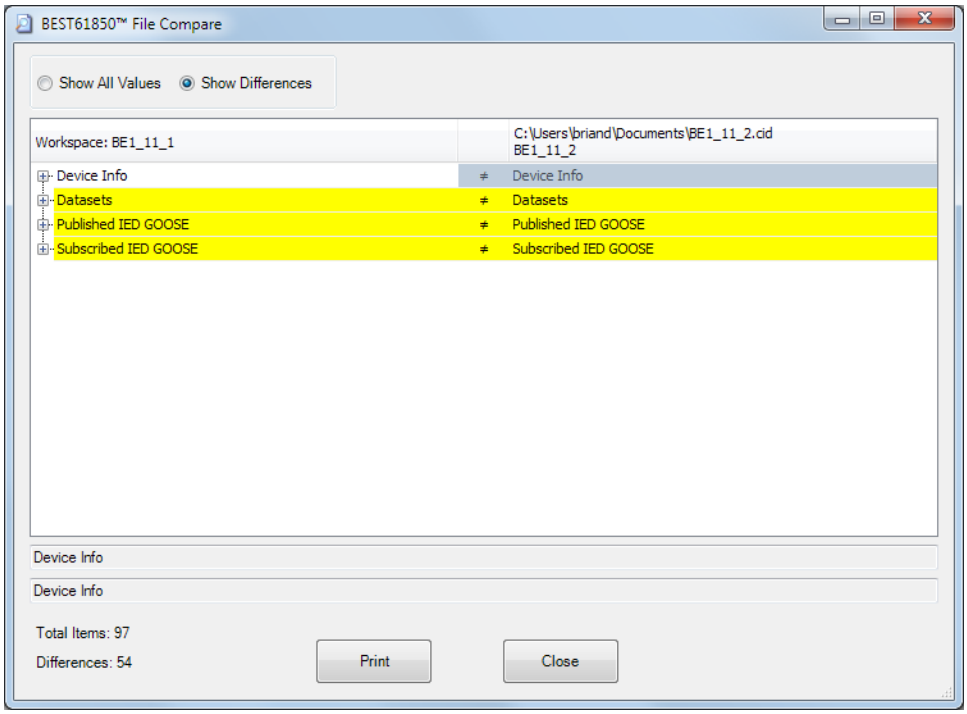


Figure 42. BEST61850 File Compare

Measurement Logic Node Configuration

The MMXU, IGMMXU, IABCMMXU, VXMMXN, and MSQI measurement (metering) logic nodes have Functional Constraint (FC) Configuration (CF) data attributes used to identify the control model (ctlModel), metering unit (units), scale (multiplier), and deadband (db) of the metered logic node. See Figure 43.

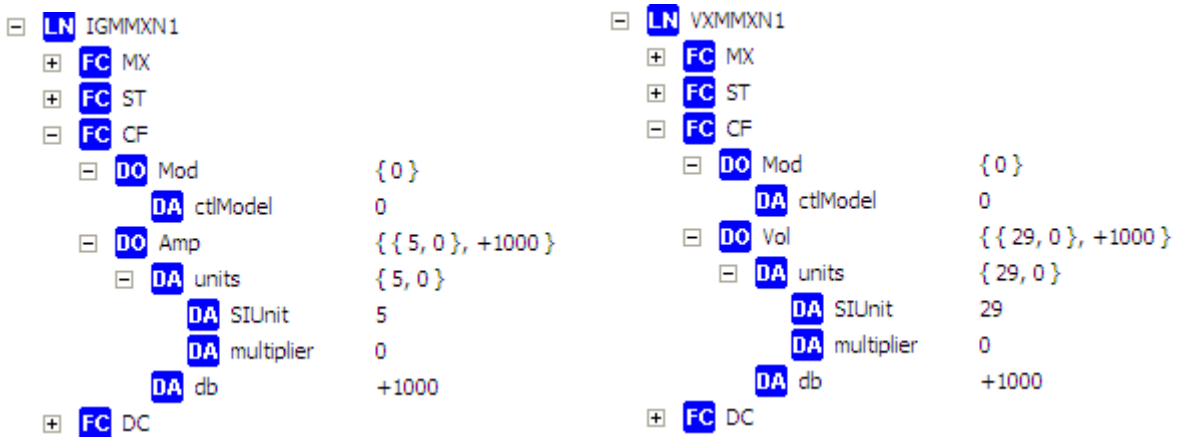


Figure 43. IGMMXN and VXMMXN Measurement Node Configuration Data Attributes

The **ctlModel** enumeration lists a control type for values listed in Table 11.

Table 11. ctlModel Symbols

Value	Definition
0	status-only
1	direct-with-normal-security
2	sbo-with-normal-security

Value	Definition
3	direct-with-enhanced-security
4	sbo-with-enhanced-security

The **SIUnit** enumeration lists an International Standard Unit symbol for values listed in Table 12.

Table 12. SIUnit Symbols

Value	Quantity	Unit name	Symbol
1	None	dimensionless	none
2	Length	meter	m
3	Mass	kilogram	kg
4	Time	second	s
5	Current	ampere	A
6	Temperature	Kelvin	K
7	Amount of substance	mole	mol
8	Luminous intensity	candela	cd
9	Plane angle	degrees	deg
10	Plane angle	radian	rad
11	Solid angle	steradian	sr
21	Absorbed dose	Gray (J/Kg)	Gy
22	Activity	becquerel (l/s)	q
23	Relative temperature	degrees Celsius	°C
24	Dose equivalent	sievert (J/kg)	Sv
25	Electric capacitance	farad (C/V)	F
26	Electric charge	coulomb (AS)	C
27	Electric conductance	siemens (A/V)	S
28	Electric inductance	henry (Wb/A)	H
29	Electric potential	volt (W/A)	V
30	Electric resistance	ohm (VA)	Ω
31	Energy	joule (N m)	J
32	Force	newton (kg m/s^2)	N
33	Frequency	hertz (1/s)	Hz
34	Illuminance	lux (lm/m^2)	lx
35	Luminous flux	lumen (cd sr)	Lm
36	Magnetic flux	weber (V s)	Wb
37	Magnetic flux density	tesla (Wb/m^2)	T
38	Power	watt (J/s)	W
39	Pressure	pascal (N/m^2)	Pa
41	Area	square meter (m^2)	m^2
42	Volume	cubic meter (m^3)	m^3
43	Velocity	meters per second (m/s)	ms^{-1}
44	Acceleration	meters per second^2 (m/s^2)	ms^{-2}
45	Volumetric flow rate	cubic meters per second (m^3/s)	m^{3}s^{-1}
46	Fuel efficiency	meters/cubic meter (m/m^3)	m/m^3
47	Moment of mass	kilogram meter (kg m)	M
48	Density	kilogram/cubic meter (kg/m^3)	kg/m^3
49	Viscosity	meter square/second (m^2/s)	m^2/s
50	Thermal conductivity	watt/meter Kelvin (W/m K)	W/m K
51	Heat capacity	joule/Kelvin (J/K)	J/K

Value	Quantity	Unit name	Symbol
52	Concentration	parts per million	ppm
53	Rotational speed	rotations per second (1/s)	s^{-1}
54	Angular velocity	radian per second (rad/s)	$rads^{-1}$
61	Apparent power	volt ampere (VA)	VA
62	Real power	watts (I^2R)	Watts
63	Reactive power	volt ampere reactive (VISinØ)	VAr
64	Phase angle	degrees	Phi
65	Power factor	(dimensionless)	Cos (Phi)
66	Volt seconds	volt seconds (Ws/A)	Vs
67	Volts squared	volt square (W^2/A^2)	V^2
68	Amp seconds	amp second (As)	As
69	Amps squared	amp square (A^2)	A^2
70	Amps squared time	amp square second (A^2s)	A^2t
71	Apparent energy	volt ampere hours	VAh
72	Real energy	watt hours	Wh
73	Reactive energy	volt ampere reactive hours	VArh
74	Magnetic flux	volts per hertz	V/Hz

The **multiplier** enumeration lists a scale symbol for values listed in Table 13.

Table 13. Multiplier Symbols

Value	Quantity	Unit name	Symbol
-24	10^{-24}	Yocto	y
-21	10^{-21}	Zepto	z
-18	10^{-18}	Atto	a
-15	10^{-15}	Femto	f
-12	10^{-12}	Pico	p
-9	10^{-9}	Nano	n
-6	10^{-6}	Micro	µ
-3	10^{-3}	Milli	m
-2	10^{-2}	Centi	c
-1	10^{-1}	Deci	d
0	1		
1	10^{1}	Deca	da
2	10^{2}	Hecto	h
3	10^{3}	Kilo	k
6	10^{6}	Mega	M
9	10^{9}	Giga	G
12	10^{12}	Tera	T
15	10^{15}	Peta	P
18	10^{18}	Exa	E
21	10^{21}	Zetta	Z
24	10^{24}	Yotta	Y

The **deadband** settings represent the deadband values used to determine when the measurement logic nodes “mag” and “cVal” values update. The deadband value is based on a deadband calculation from the instMag as shown in Figure 44. The value of mag is updated to the current value of instMag when the value has changed according to the configuration parameter db.

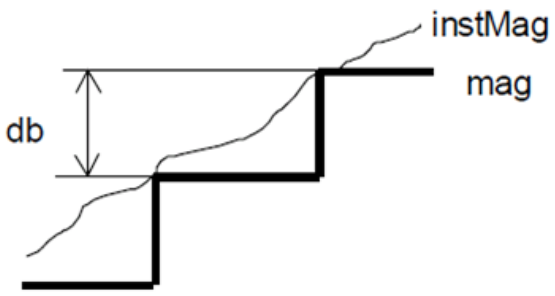


Figure 44. Deadband Calculation

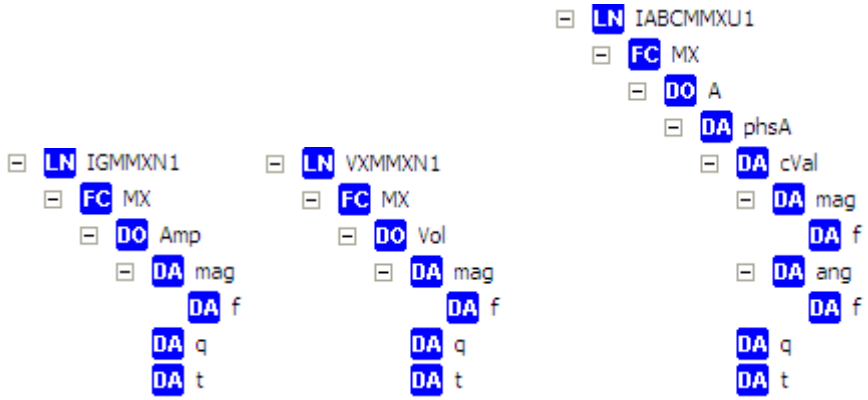


Figure 45. IGMMXN, VXMMXN, and IABCMMXU Measurement Node Mag Data Attributes

The deadband “value represents the percentage of difference between max and min in units of 0.001%”. The range of deadband in the BE1-11 is 1 to 100,000 (0.001% to 100.000%). The default deadband (db) settings for BE1-11 measurement logic nodes are 1.0% or value +1000.

The deadband value can be changed by an IEC 61850 client or by modifying the CID file.

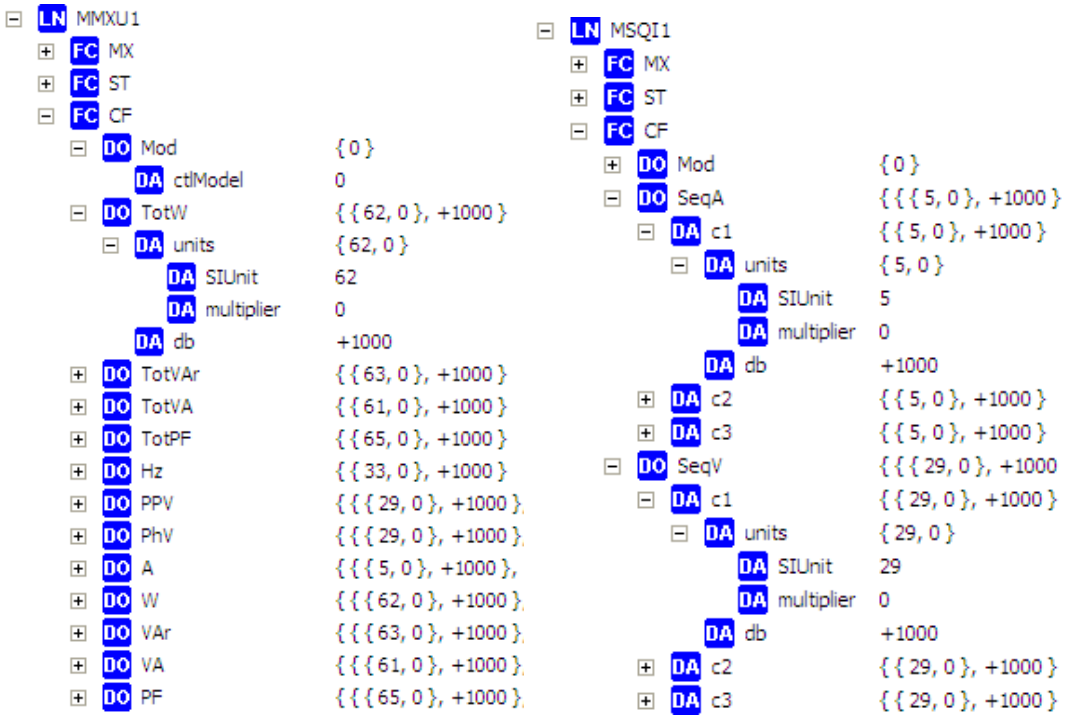


Figure 46. MMXUN and MSQI Measurement Node Default Deadband Values

Table 14. Summary of BE1-11 IEC 61850 Parameter Limits

Parameter	Limit	Description
Maximum number of DataSets	16	Max number of different named DataSets
Maximum number of bytes for single Goose Message	1400	Max number of bytes allowed in one Goose Message from selected DataSets
Maximum number of Published Goose Messages	4	Max number of sent Goose Control Blocks messages
Maximum number of Subscribed Goose Messages	20	Max number of received Goose Messages mapped to Single Point Control SPCSO# inputs
Maximum number of Report Control Blocks supported	8	Max number of configured reports a single client can request
Maximum number of Clients per RCB (Report Enabled Max)	4	Max number of different clients that can request Report Control Blocks

File Transfer

The BE1-11 can transmit the files listed in Table 15 when requested by a supported IEC 61850 client.

Table 15. Files Transmitted by the BE1-11

Description	File Naming Conventions
Fault Record	RO-xxx_SUM.txt
Load Profile	LP-xx.cfg LP-xx.dat
Oscillographic Records	RO-xxx.cfg RO-xxx.dat RO-xxx.hdr
Sequence of Events Report	RO-xxx_SEQ.txt

Data Tags

The description of the DataSets and the list of data object members or FCDAs (Functionally Constrained Data Attributes) is included in the SCL file in the IED section in the Logical Device subsection. FCDAs are also referred to as Data Tags. As specified in IEC 61850–7–2 clause 9, the DataSets are part of a Logical Node. They are included in the LLN0. See Table 16.

Table 16. Data Tags

Data Tags
CTLGGIO1.CF.Mod.ctlModel
CTLGGIO1.CF.SPCSO1.ctlModel
CTLGGIO1.CF.SPCSO10.ctlModel
CTLGGIO1.CF.SPCSO11.ctlModel
CTLGGIO1.CF.SPCSO12.ctlModel
CTLGGIO1.CF.SPCSO13.ctlModel
CTLGGIO1.CF.SPCSO14.ctlModel
CTLGGIO1.CF.SPCSO15.ctlModel
CTLGGIO1.CF.SPCSO16.ctlModel
CTLGGIO1.CF.SPCSO2.ctlModel
CTLGGIO1.CF.SPCSO3.ctlModel
CTLGGIO1.CF.SPCSO4.ctlModel
CTLGGIO1.CF.SPCSO5.ctlModel
CTLGGIO1.CF.SPCSO6.ctlModel
CTLGGIO1.CF.SPCSO7.ctlModel
CTLGGIO1.CF.SPCSO8.ctlModel
CTLGGIO1.CF.SPCSO9.ctlModel
CTLGGIO1.CO.SPCSO1.Oper.ctlVal
CTLGGIO1.CO.SPCSO10.Oper.ctlVal
CTLGGIO1.CO.SPCSO11.Oper.ctlVal
CTLGGIO1.CO.SPCSO12.Oper.ctlVal
CTLGGIO1.CO.SPCSO13.Oper.ctlVal
CTLGGIO1.CO.SPCSO14.Oper.ctlVal
CTLGGIO1.CO.SPCSO15.Oper.ctlVal
CTLGGIO1.CO.SPCSO16.Oper.ctlVal
CTLGGIO1.CO.SPCSO2.Oper.ctlVal
CTLGGIO1.CO.SPCSO3.Oper.ctlVal
CTLGGIO1.CO.SPCSO4.Oper.ctlVal
CTLGGIO1.CO.SPCSO5.Oper.ctlVal
CTLGGIO1.CO.SPCSO6.Oper.ctlVal
CTLGGIO1.CO.SPCSO7.Oper.ctlVal
CTLGGIO1.CO.SPCSO8.Oper.ctlVal
CTLGGIO1.CO.SPCSO9.Oper.ctlVal
CTLGGIO1.DC.NamPlt.d
CTLGGIO1.DC.SPCSO1.d
CTLGGIO1.DC.SPCSO10.d
CTLGGIO1.DC.SPCSO11.d
CTLGGIO1.DC.SPCSO12.d
CTLGGIO1.DC.SPCSO13.d

Data Tags
CTLGGIO1.DC.SPCSO14.d
CTLGGIO1.DC.SPCSO15.d
CTLGGIO1.DC.SPCSO16.d
CTLGGIO1.DC.SPCSO2.d
CTLGGIO1.DC.SPCSO3.d
CTLGGIO1.DC.SPCSO4.d
CTLGGIO1.DC.SPCSO5.d
CTLGGIO1.DC.SPCSO6.d
CTLGGIO1.DC.SPCSO7.d
CTLGGIO1.DC.SPCSO8.d
CTLGGIO1.DC.SPCSO9.d
CTLGGIO1.ST.Beh.q
CTLGGIO1.ST.Beh.stVal
CTLGGIO1.ST.Beh.t
CTLGGIO1.ST.Health.q
CTLGGIO1.ST.Health.stVal
CTLGGIO1.ST.Health.t
CTLGGIO1.ST.Mod.q
CTLGGIO1.ST.Mod.stVal
CTLGGIO1.ST.Mod.t
CTLGGIO1.ST.SPCSO1.q
CTLGGIO1.ST.SPCSO1.stVal
CTLGGIO1.ST.SPCSO1.t
CTLGGIO1.ST.SPCSO10.q
CTLGGIO1.ST.SPCSO10.stVal
CTLGGIO1.ST.SPCSO10.t
CTLGGIO1.ST.SPCSO11.q
CTLGGIO1.ST.SPCSO11.stVal
CTLGGIO1.ST.SPCSO11.t
CTLGGIO1.ST.SPCSO12.q
CTLGGIO1.ST.SPCSO12.stVal
CTLGGIO1.ST.SPCSO12.t
CTLGGIO1.ST.SPCSO13.q
CTLGGIO1.ST.SPCSO13.stVal
CTLGGIO1.ST.SPCSO13.t
CTLGGIO1.ST.SPCSO14.q
CTLGGIO1.ST.SPCSO14.stVal
CTLGGIO1.ST.SPCSO14.t
CTLGGIO1.ST.SPCSO15.q

Data Tags
CTLGGIO1.ST.SPCSO15.stVal
CTLGGIO1.ST.SPCSO15.t
CTLGGIO1.ST.SPCSO16.q
CTLGGIO1.ST.SPCSO16.stVal
CTLGGIO1.ST.SPCSO16.t
CTLGGIO1.ST.SPCSO2.q
CTLGGIO1.ST.SPCSO2.stVal
CTLGGIO1.ST.SPCSO2.t
CTLGGIO1.ST.SPCSO3.q
CTLGGIO1.ST.SPCSO3.stVal
CTLGGIO1.ST.SPCSO3.t
CTLGGIO1.ST.SPCSO4.q
CTLGGIO1.ST.SPCSO4.stVal
CTLGGIO1.ST.SPCSO4.t
CTLGGIO1.ST.SPCSO5.q
CTLGGIO1.ST.SPCSO5.stVal
CTLGGIO1.ST.SPCSO5.t
CTLGGIO1.ST.SPCSO6.q
CTLGGIO1.ST.SPCSO6.stVal
CTLGGIO1.ST.SPCSO6.t
CTLGGIO1.ST.SPCSO7.q
CTLGGIO1.ST.SPCSO7.stVal
CTLGGIO1.ST.SPCSO7.t
CTLGGIO1.ST.SPCSO8.q
CTLGGIO1.ST.SPCSO8.stVal
CTLGGIO1.ST.SPCSO8.t
CTLGGIO1.ST.SPCSO9.q
CTLGGIO1.ST.SPCSO9.stVal
CTLGGIO1.ST.SPCSO9.t
CTLGGIO2.CF.Mod.ctlModel
CTLGGIO2.CF.SPCSO1.ctlModel
CTLGGIO2.CF.SPCSO10.ctlModel
CTLGGIO2.CF.SPCSO11.ctlModel
CTLGGIO2.CF.SPCSO12.ctlModel
CTLGGIO2.CF.SPCSO13.ctlModel
CTLGGIO2.CF.SPCSO14.ctlModel
CTLGGIO2.CF.SPCSO15.ctlModel
CTLGGIO2.CF.SPCSO16.ctlModel
CTLGGIO2.CF.SPCSO2.ctlModel
CTLGGIO2.CF.SPCSO3.ctlModel
CTLGGIO2.CF.SPCSO4.ctlModel
CTLGGIO2.CF.SPCSO5.ctlModel
CTLGGIO2.CF.SPCSO6.ctlModel
CTLGGIO2.CF.SPCSO7.ctlModel
CTLGGIO2.CF.SPCSO8.ctlModel
CTLGGIO2.CF.SPCSO9.ctlModel
CTLGGIO2.CO.SPCSO1.Oper.ctlVal

Data Tags
CTLGGIO2.CO.SPCSO10.Oper.ctlVal
CTLGGIO2.CO.SPCSO11.Oper.ctlVal
CTLGGIO2.CO.SPCSO12.Oper.ctlVal
CTLGGIO2.CO.SPCSO13.Oper.ctlVal
CTLGGIO2.CO.SPCSO14.Oper.ctlVal
CTLGGIO2.CO.SPCSO15.Oper.ctlVal
CTLGGIO2.CO.SPCSO16.Oper.ctlVal
CTLGGIO2.CO.SPCSO2.Oper.ctlVal
CTLGGIO2.CO.SPCSO3.Oper.ctlVal
CTLGGIO2.CO.SPCSO4.Oper.ctlVal
CTLGGIO2.CO.SPCSO5.Oper.ctlVal
CTLGGIO2.CO.SPCSO6.Oper.ctlVal
CTLGGIO2.CO.SPCSO7.Oper.ctlVal
CTLGGIO2.CO.SPCSO8.Oper.ctlVal
CTLGGIO2.CO.SPCSO9.Oper.ctlVal
CTLGGIO2.DC.NamPlt.d
CTLGGIO2.DC.SPCSO1.d
CTLGGIO2.DC.SPCSO10.d
CTLGGIO2.DC.SPCSO11.d
CTLGGIO2.DC.SPCSO12.d
CTLGGIO2.DC.SPCSO13.d
CTLGGIO2.DC.SPCSO14.d
CTLGGIO2.DC.SPCSO15.d
CTLGGIO2.DC.SPCSO16.d
CTLGGIO2.DC.SPCSO2.d
CTLGGIO2.DC.SPCSO3.d
CTLGGIO2.DC.SPCSO4.d
CTLGGIO2.DC.SPCSO5.d
CTLGGIO2.DC.SPCSO6.d
CTLGGIO2.DC.SPCSO7.d
CTLGGIO2.DC.SPCSO8.d
CTLGGIO2.DC.SPCSO9.d
CTLGGIO2.ST.Beh.q
CTLGGIO2.ST.Beh.stVal
CTLGGIO2.ST.Beh.t
CTLGGIO2.ST.Health.q
CTLGGIO2.ST.Health.stVal
CTLGGIO2.ST.Health.t
CTLGGIO2.ST.Mod.q
CTLGGIO2.ST.Mod.stVal
CTLGGIO2.ST.Mod.t
CTLGGIO2.ST.SPCSO1.q
CTLGGIO2.ST.SPCSO1.stVal
CTLGGIO2.ST.SPCSO1.t
CTLGGIO2.ST.SPCSO10.q
CTLGGIO2.ST.SPCSO10.stVal
CTLGGIO2.ST.SPCSO10.t

Data Tags
CTLGGIO2.ST.SPCSO11.q
CTLGGIO2.ST.SPCSO11.stVal
CTLGGIO2.ST.SPCSO11.t
CTLGGIO2.ST.SPCSO12.q
CTLGGIO2.ST.SPCSO12.stVal
CTLGGIO2.ST.SPCSO12.t
CTLGGIO2.ST.SPCSO13.q
CTLGGIO2.ST.SPCSO13.stVal
CTLGGIO2.ST.SPCSO13.t
CTLGGIO2.ST.SPCSO14.q
CTLGGIO2.ST.SPCSO14.stVal
CTLGGIO2.ST.SPCSO14.t
CTLGGIO2.ST.SPCSO15.q
CTLGGIO2.ST.SPCSO15.stVal
CTLGGIO2.ST.SPCSO15.t
CTLGGIO2.ST.SPCSO16.q
CTLGGIO2.ST.SPCSO16.stVal
CTLGGIO2.ST.SPCSO16.t
CTLGGIO2.ST.SPCSO2.q
CTLGGIO2.ST.SPCSO2.stVal
CTLGGIO2.ST.SPCSO2.t
CTLGGIO2.ST.SPCSO3.q
CTLGGIO2.ST.SPCSO3.stVal
CTLGGIO2.ST.SPCSO3.t
CTLGGIO2.ST.SPCSO4.q
CTLGGIO2.ST.SPCSO4.stVal
CTLGGIO2.ST.SPCSO4.t
CTLGGIO2.ST.SPCSO5.q
CTLGGIO2.ST.SPCSO5.stVal
CTLGGIO2.ST.SPCSO5.t
CTLGGIO2.ST.SPCSO6.q
CTLGGIO2.ST.SPCSO6.stVal
CTLGGIO2.ST.SPCSO6.t
CTLGGIO2.ST.SPCSO7.q
CTLGGIO2.ST.SPCSO7.stVal
CTLGGIO2.ST.SPCSO7.t
CTLGGIO2.ST.SPCSO8.q
CTLGGIO2.ST.SPCSO8.stVal
CTLGGIO2.ST.SPCSO8.t
CTLGGIO2.ST.SPCSO9.q
CTLGGIO2.ST.SPCSO9.stVal
CTLGGIO2.ST.SPCSO9.t
CTLGGIO3.CF.Mod.ctlModel
CTLGGIO3.CF.SPCSO1.ctlModel
CTLGGIO3.CF.SPCSO10.ctlModel
CTLGGIO3.CF.SPCSO11.ctlModel
CTLGGIO3.CF.SPCSO12.ctlModel

Data Tags
CTLGGIO3.CF.SPCSO13.ctlModel
CTLGGIO3.CF.SPCSO14.ctlModel
CTLGGIO3.CF.SPCSO15.ctlModel
CTLGGIO3.CF.SPCSO16.ctlModel
CTLGGIO3.CF.SPCSO2.ctlModel
CTLGGIO3.CF.SPCSO3.ctlModel
CTLGGIO3.CF.SPCSO4.ctlModel
CTLGGIO3.CF.SPCSO5.ctlModel
CTLGGIO3.CF.SPCSO6.ctlModel
CTLGGIO3.CF.SPCSO7.ctlModel
CTLGGIO3.CF.SPCSO8.ctlModel
CTLGGIO3.CF.SPCSO9.ctlModel
CTLGGIO3.CO.SPCSO1.Oper.ctlVal
CTLGGIO3.CO.SPCSO10.Oper.ctlVal
CTLGGIO3.CO.SPCSO11.Oper.ctlVal
CTLGGIO3.CO.SPCSO12.Oper.ctlVal
CTLGGIO3.CO.SPCSO13.Oper.ctlVal
CTLGGIO3.CO.SPCSO14.Oper.ctlVal
CTLGGIO3.CO.SPCSO15.Oper.ctlVal
CTLGGIO3.CO.SPCSO16.Oper.ctlVal
CTLGGIO3.CO.SPCSO2.Oper.ctlVal
CTLGGIO3.CO.SPCSO3.Oper.ctlVal
CTLGGIO3.CO.SPCSO4.Oper.ctlVal
CTLGGIO3.CO.SPCSO5.Oper.ctlVal
CTLGGIO3.CO.SPCSO6.Oper.ctlVal
CTLGGIO3.CO.SPCSO7.Oper.ctlVal
CTLGGIO3.CO.SPCSO8.Oper.ctlVal
CTLGGIO3.CO.SPCSO9.Oper.ctlVal
CTLGGIO3.DC.NamPlt.d
CTLGGIO3.DC.SPCSO1.d
CTLGGIO3.DC.SPCSO10.d
CTLGGIO3.DC.SPCSO11.d
CTLGGIO3.DC.SPCSO12.d
CTLGGIO3.DC.SPCSO13.d
CTLGGIO3.DC.SPCSO14.d
CTLGGIO3.DC.SPCSO15.d
CTLGGIO3.DC.SPCSO16.d
CTLGGIO3.DC.SPCSO2.d
CTLGGIO3.DC.SPCSO3.d
CTLGGIO3.DC.SPCSO4.d
CTLGGIO3.DC.SPCSO5.d
CTLGGIO3.DC.SPCSO6.d
CTLGGIO3.DC.SPCSO7.d
CTLGGIO3.DC.SPCSO8.d
CTLGGIO3.DC.SPCSO9.d
CTLGGIO3.ST.Beh.q
CTLGGIO3.ST.Beh.stVal

Data Tags
CTLGGIO3.ST.Beh.t
CTLGGIO3.ST.Health.q
CTLGGIO3.ST.Health.stVal
CTLGGIO3.ST.Health.t
CTLGGIO3.ST.Mod.q
CTLGGIO3.ST.Mod.stVal
CTLGGIO3.ST.Mod.t
CTLGGIO3.ST.SPCSO1.q
CTLGGIO3.ST.SPCSO1.stVal
CTLGGIO3.ST.SPCSO1.t
CTLGGIO3.ST.SPCSO10.q
CTLGGIO3.ST.SPCSO10.stVal
CTLGGIO3.ST.SPCSO10.t
CTLGGIO3.ST.SPCSO11.q
CTLGGIO3.ST.SPCSO11.stVal
CTLGGIO3.ST.SPCSO11.t
CTLGGIO3.ST.SPCSO12.q
CTLGGIO3.ST.SPCSO12.stVal
CTLGGIO3.ST.SPCSO12.t
CTLGGIO3.ST.SPCSO13.q
CTLGGIO3.ST.SPCSO13.stVal
CTLGGIO3.ST.SPCSO13.t
CTLGGIO3.ST.SPCSO14.q
CTLGGIO3.ST.SPCSO14.stVal
CTLGGIO3.ST.SPCSO14.t
CTLGGIO3.ST.SPCSO15.q
CTLGGIO3.ST.SPCSO15.stVal
CTLGGIO3.ST.SPCSO15.t
CTLGGIO3.ST.SPCSO16.q
CTLGGIO3.ST.SPCSO16.stVal
CTLGGIO3.ST.SPCSO16.t
CTLGGIO3.ST.SPCSO2.q
CTLGGIO3.ST.SPCSO2.stVal
CTLGGIO3.ST.SPCSO2.t
CTLGGIO3.ST.SPCSO3.q
CTLGGIO3.ST.SPCSO3.stVal
CTLGGIO3.ST.SPCSO3.t
CTLGGIO3.ST.SPCSO4.q
CTLGGIO3.ST.SPCSO4.stVal
CTLGGIO3.ST.SPCSO4.t
CTLGGIO3.ST.SPCSO5.q
CTLGGIO3.ST.SPCSO5.stVal
CTLGGIO3.ST.SPCSO5.t
CTLGGIO3.ST.SPCSO6.q
CTLGGIO3.ST.SPCSO6.stVal
CTLGGIO3.ST.SPCSO6.t
CTLGGIO3.ST.SPCSO7.q

Data Tags
CTLGGIO3.ST.SPCSO7.stVal
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CTLGGIO3.ST.SPCSO8.q
CTLGGIO3.ST.SPCSO8.stVal
CTLGGIO3.ST.SPCSO8.t
CTLGGIO3.ST.SPCSO9.q
CTLGGIO3.ST.SPCSO9.stVal
CTLGGIO3.ST.SPCSO9.t
CTLGGIO4.CF.Mod.ctlModel
CTLGGIO4.CF.SPCSO1.ctlModel
CTLGGIO4.CF.SPCSO10.ctlModel
CTLGGIO4.CF.SPCSO11.ctlModel
CTLGGIO4.CF.SPCSO12.ctlModel
CTLGGIO4.CF.SPCSO13.ctlModel
CTLGGIO4.CF.SPCSO14.ctlModel
CTLGGIO4.CF.SPCSO15.ctlModel
CTLGGIO4.CF.SPCSO16.ctlModel
CTLGGIO4.CF.SPCSO2.ctlModel
CTLGGIO4.CF.SPCSO3.ctlModel
CTLGGIO4.CF.SPCSO4.ctlModel
CTLGGIO4.CF.SPCSO5.ctlModel
CTLGGIO4.CF.SPCSO6.ctlModel
CTLGGIO4.CF.SPCSO7.ctlModel
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CTLGGIO4.CF.SPCSO9.ctlModel
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CTLGGIO4.CO.SPCSO11.Oper.ctlVal
CTLGGIO4.CO.SPCSO12.Oper.ctlVal
CTLGGIO4.CO.SPCSO13.Oper.ctlVal
CTLGGIO4.CO.SPCSO14.Oper.ctlVal
CTLGGIO4.CO.SPCSO15.Oper.ctlVal
CTLGGIO4.CO.SPCSO16.Oper.ctlVal
CTLGGIO4.CO.SPCSO2.Oper.ctlVal
CTLGGIO4.CO.SPCSO3.Oper.ctlVal
CTLGGIO4.CO.SPCSO4.Oper.ctlVal
CTLGGIO4.CO.SPCSO5.Oper.ctlVal
CTLGGIO4.CO.SPCSO6.Oper.ctlVal
CTLGGIO4.CO.SPCSO7.Oper.ctlVal
CTLGGIO4.CO.SPCSO8.Oper.ctlVal
CTLGGIO4.CO.SPCSO9.Oper.ctlVal
CTLGGIO4.DC.NamPlt.d
CTLGGIO4.DC.SPCSO1.d
CTLGGIO4.DC.SPCSO10.d
CTLGGIO4.DC.SPCSO11.d
CTLGGIO4.DC.SPCSO12.d
CTLGGIO4.DC.SPCSO13.d

Data Tags
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CTLGGIO4.DC.SPCSO16.d
CTLGGIO4.DC.SPCSO2.d
CTLGGIO4.DC.SPCSO3.d
CTLGGIO4.DC.SPCSO4.d
CTLGGIO4.DC.SPCSO5.d
CTLGGIO4.DC.SPCSO6.d
CTLGGIO4.DC.SPCSO7.d
CTLGGIO4.DC.SPCSO8.d
CTLGGIO4.DC.SPCSO9.d
CTLGGIO4.ST.Beh.q
CTLGGIO4.ST.Beh.stVal
CTLGGIO4.ST.Beh.t
CTLGGIO4.ST.Health.q
CTLGGIO4.ST.Health.stVal
CTLGGIO4.ST.Health.t
CTLGGIO4.ST.Mod.q
CTLGGIO4.ST.Mod.stVal
CTLGGIO4.ST.Mod.t
CTLGGIO4.ST.SPCSO1.q
CTLGGIO4.ST.SPCSO1.stVal
CTLGGIO4.ST.SPCSO1.t
CTLGGIO4.ST.SPCSO10.q
CTLGGIO4.ST.SPCSO10.stVal
CTLGGIO4.ST.SPCSO10.t
CTLGGIO4.ST.SPCSO11.q
CTLGGIO4.ST.SPCSO11.stVal
CTLGGIO4.ST.SPCSO11.t
CTLGGIO4.ST.SPCSO12.q
CTLGGIO4.ST.SPCSO12.stVal
CTLGGIO4.ST.SPCSO12.t
CTLGGIO4.ST.SPCSO13.q
CTLGGIO4.ST.SPCSO13.stVal
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CTLGGIO4.ST.SPCSO14.q
CTLGGIO4.ST.SPCSO14.stVal
CTLGGIO4.ST.SPCSO14.t
CTLGGIO4.ST.SPCSO15.q
CTLGGIO4.ST.SPCSO15.stVal
CTLGGIO4.ST.SPCSO15.t
CTLGGIO4.ST.SPCSO16.q
CTLGGIO4.ST.SPCSO16.stVal
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CTLGGIO4.ST.SPCSO2.q
CTLGGIO4.ST.SPCSO2.stVal
CTLGGIO4.ST.SPCSO2.t

Data Tags
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CTLGGIO4.ST.SPCSO3.t
CTLGGIO4.ST.SPCSO4.q
CTLGGIO4.ST.SPCSO4.stVal
CTLGGIO4.ST.SPCSO4.t
CTLGGIO4.ST.SPCSO5.q
CTLGGIO4.ST.SPCSO5.stVal
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CTLGGIO4.ST.SPCSO6.q
CTLGGIO4.ST.SPCSO6.stVal
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CTLGGIO4.ST.SPCSO8.stVal
CTLGGIO4.ST.SPCSO8.t
CTLGGIO4.ST.SPCSO9.q
CTLGGIO4.ST.SPCSO9.stVal
CTLGGIO4.ST.SPCSO9.t
IABCMMXU1.CF.A.phsA.db
IABCMMXU1.CF.A.phsA.units.multiplier
IABCMMXU1.CF.A.phsA.units.SIUnit
IABCMMXU1.CF.A.phsB.db
IABCMMXU1.CF.A.phsB.units.multiplier
IABCMMXU1.CF.A.phsB.units.SIUnit
IABCMMXU1.CF.A.phsC.db
IABCMMXU1.CF.A.phsC.units.multiplier
IABCMMXU1.CF.A.phsC.units.SIUnit
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IABCMMXU1.MX.A.phsA.cVal.mag.f
IABCMMXU1.MX.A.phsA.q
IABCMMXU1.MX.A.phsA.t
IABCMMXU1.MX.A.phsB.cVal.ang.f
IABCMMXU1.MX.A.phsB.cVal.mag.f
IABCMMXU1.MX.A.phsB.q
IABCMMXU1.MX.A.phsB.t
IABCMMXU1.MX.A.phsC.cVal.ang.f
IABCMMXU1.MX.A.phsC.cVal.mag.f
IABCMMXU1.MX.A.phsC.q
IABCMMXU1.MX.A.phsC.t
IABCMMXU1.ST.Beh.q
IABCMMXU1.ST.Beh.stVal
IABCMMXU1.ST.Beh.t

Data Tags
IABCMMXU1.ST.Health.q
IABCMMXU1.ST.Health.stVal
IABCMMXU1.ST.Health.t
IABCMMXU1.ST.Mod.q
IABCMMXU1.ST.Mod.stVal
IABCMMXU1.ST.Mod.t
IABCMMXU2.CF.A.phsA.db
IABCMMXU2.CF.A.phsA.units.multiplier
IABCMMXU2.CF.A.phsA.units.SIUnit
IABCMMXU2.CF.A.phsB.db
IABCMMXU2.CF.A.phsB.units.multiplier
IABCMMXU2.CF.A.phsB.units.SIUnit
IABCMMXU2.CF.A.phsC.db
IABCMMXU2.CF.A.phsC.units.multiplier
IABCMMXU2.CF.A.phsC.units.SIUnit
IABCMMXU2.CF.Mod.ctlModel
IABCMMXU2.DC.NamPlt.d
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IABCMMXU2.MX.A.phsA.cVal.mag.f
IABCMMXU2.MX.A.phsA.q
IABCMMXU2.MX.A.phsA.t
IABCMMXU2.MX.A.phsB.cVal.ang.f
IABCMMXU2.MX.A.phsB.cVal.mag.f
IABCMMXU2.MX.A.phsB.q
IABCMMXU2.MX.A.phsB.t
IABCMMXU2.MX.A.phsC.cVal.ang.f
IABCMMXU2.MX.A.phsC.cVal.mag.f
IABCMMXU2.MX.A.phsC.q
IABCMMXU2.MX.A.phsC.t
IABCMMXU2.ST.Beh.q
IABCMMXU2.ST.Beh.stVal
IABCMMXU2.ST.Beh.t
IABCMMXU2.ST.Health.q
IABCMMXU2.ST.Health.stVal
IABCMMXU2.ST.Health.t
IABCMMXU2.ST.Mod.q
IABCMMXU2.ST.Mod.stVal
IABCMMXU2.ST.Mod.t
IGMMXN1.CF.Amp.db
IGMMXN1.CF.Amp.units.multiplier
IGMMXN1.CF.Amp.units.SIUnit
IGMMXN1.CF.Mod.ctlModel
IGMMXN1.DC.NamPlt.d
IGMMXN1.MX.Amp.mag.f
IGMMXN1.MX.Amp.q
IGMMXN1.MX.Amp.t
IGMMXN1.ST.Beh.q

Data Tags
IGMMXN1.ST.Beh.stVal
IGMMXN1.ST.Beh.t
IGMMXN1.ST.Health.q
IGMMXN1.ST.Health.stVal
IGMMXN1.ST.Health.t
IGMMXN1.ST.Mod.q
IGMMXN1.ST.Mod.stVal
IGMMXN1.ST.Mod.t
IGMMXN2.CF.Amp.db
IGMMXN2.CF.Amp.units.multiplier
IGMMXN2.CF.Amp.units.SIUnit
IGMMXN2.CF.Mod.ctlModel
IGMMXN2.DC.NamPlt.d
IGMMXN2.MX.Amp.mag.f
IGMMXN2.MX.Amp.q
IGMMXN2.MX.Amp.t
IGMMXN2.ST.Beh.q
IGMMXN2.ST.Beh.stVal
IGMMXN2.ST.Beh.t
IGMMXN2.ST.Health.q
IGMMXN2.ST.Health.stVal
IGMMXN2.ST.Health.t
IGMMXN2.ST.Mod.q
IGMMXN2.ST.Mod.stVal
IGMMXN2.ST.Mod.t
INDGGIO1.CF.Mod.ctlModel
INDGGIO1.DC.Ind01.d
INDGGIO1.DC.Ind02.d
INDGGIO1.DC.Ind03.d
INDGGIO1.DC.Ind04.d
INDGGIO1.DC.Ind05.d
INDGGIO1.DC.Ind06.d
INDGGIO1.DC.Ind07.d
INDGGIO1.DC.Ind08.d
INDGGIO1.DC.Ind09.d
INDGGIO1.DC.Ind10.d
INDGGIO1.DC.Ind11.d
INDGGIO1.DC.Ind12.d
INDGGIO1.DC.Ind13.d
INDGGIO1.DC.Ind14.d
INDGGIO1.DC.Ind15.d
INDGGIO1.DC.Ind16.d
INDGGIO1.DC.NamPlt.d
INDGGIO1.ST.Beh.q
INDGGIO1.ST.Beh.stVal
INDGGIO1.ST.Beh.t
INDGGIO1.ST.Health.q

Data Tags
INDGGIO1.ST.Health.stVal
INDGGIO1.ST.Health.t
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INDGGIO1.ST.Ind01.stVal
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INDGGIO1.ST.Ind02.q
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INDGGIO1.ST.Ind03.stVal
INDGGIO1.ST.Ind03.t
INDGGIO1.ST.Ind04.q
INDGGIO1.ST.Ind04.stVal
INDGGIO1.ST.Ind04.t
INDGGIO1.ST.Ind05.q
INDGGIO1.ST.Ind05.stVal
INDGGIO1.ST.Ind05.t
INDGGIO1.ST.Ind06.q
INDGGIO1.ST.Ind06.stVal
INDGGIO1.ST.Ind06.t
INDGGIO1.ST.Ind07.q
INDGGIO1.ST.Ind07.stVal
INDGGIO1.ST.Ind07.t
INDGGIO1.ST.Ind08.q
INDGGIO1.ST.Ind08.stVal
INDGGIO1.ST.Ind08.t
INDGGIO1.ST.Ind09.q
INDGGIO1.ST.Ind09.stVal
INDGGIO1.ST.Ind09.t
INDGGIO1.ST.Ind10.q
INDGGIO1.ST.Ind10.stVal
INDGGIO1.ST.Ind10.t
INDGGIO1.ST.Ind11.q
INDGGIO1.ST.Ind11.stVal
INDGGIO1.ST.Ind11.t
INDGGIO1.ST.Ind12.q
INDGGIO1.ST.Ind12.stVal
INDGGIO1.ST.Ind12.t
INDGGIO1.ST.Ind13.q
INDGGIO1.ST.Ind13.stVal
INDGGIO1.ST.Ind13.t
INDGGIO1.ST.Ind14.q
INDGGIO1.ST.Ind14.stVal
INDGGIO1.ST.Ind14.t
INDGGIO1.ST.Ind15.q
INDGGIO1.ST.Ind15.stVal
INDGGIO1.ST.Ind15.t

Data Tags
INDGGIO1.ST.Ind16.q
INDGGIO1.ST.Ind16.stVal
INDGGIO1.ST.Ind16.t
INDGGIO1.ST.Mod.q
INDGGIO1.ST.Mod.stVal
INDGGIO1.ST.Mod.t
INDGGIO2.CF.Mod.ctlModel
INDGGIO2.DC.Ind01.d
INDGGIO2.DC.Ind02.d
INDGGIO2.DC.Ind03.d
INDGGIO2.DC.Ind04.d
INDGGIO2.DC.Ind05.d
INDGGIO2.DC.Ind06.d
INDGGIO2.DC.Ind07.d
INDGGIO2.DC.Ind08.d
INDGGIO2.DC.Ind09.d
INDGGIO2.DC.Ind10.d
INDGGIO2.DC.Ind11.d
INDGGIO2.DC.Ind12.d
INDGGIO2.DC.Ind13.d
INDGGIO2.DC.Ind14.d
INDGGIO2.DC.Ind15.d
INDGGIO2.DC.Ind16.d
INDGGIO2.DC.NamPlt.d
INDGGIO2.ST.Beh.q
INDGGIO2.ST.Beh.stVal
INDGGIO2.ST.Beh.t
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INDGGIO2.ST.Ind04.stVal
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INDGGIO2.ST.Ind06.stVal

Data Tags
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INDGGIO2.ST.Ind16.stVal
INDGGIO2.ST.Ind16.t
INDGGIO2.ST.Mod.q
INDGGIO2.ST.Mod.stVal
INDGGIO2.ST.Mod.t
INDGGIO3.CF.Mod.ctlModel
INDGGIO3.DC.Ind01.d
INDGGIO3.DC.Ind02.d
INDGGIO3.DC.Ind03.d
INDGGIO3.DC.Ind04.d
INDGGIO3.DC.Ind05.d
INDGGIO3.DC.Ind06.d
INDGGIO3.DC.Ind07.d
INDGGIO3.DC.Ind08.d
INDGGIO3.DC.Ind09.d
INDGGIO3.DC.Ind10.d
INDGGIO3.DC.Ind11.d
INDGGIO3.DC.Ind12.d

Data Tags
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INDGGIO3.DC.Ind14.d
INDGGIO3.DC.Ind15.d
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INDGGIO3.DC.NamPlt.d
INDGGIO3.ST.Beh.q
INDGGIO3.ST.Beh.stVal
INDGGIO3.ST.Beh.t
INDGGIO3.ST.Health.q
INDGGIO3.ST.Health.stVal
INDGGIO3.ST.Health.t
INDGGIO3.ST.Ind01.q
INDGGIO3.ST.Ind01.stVal
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INDGGIO3.ST.Ind06.q
INDGGIO3.ST.Ind06.stVal
INDGGIO3.ST.Ind06.t
INDGGIO3.ST.Ind07.q
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INDGGIO3.ST.Ind12.stVal
INDGGIO3.ST.Ind12.t

Data Tags
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INDGGIO3.ST.Ind16.t
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INDGGIO3.ST.Mod.stVal
INDGGIO3.ST.Mod.t
INDGGIO4.CF.Mod.ctlModel
INDGGIO4.DC.Ind01.d
INDGGIO4.DC.Ind02.d
INDGGIO4.DC.Ind03.d
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INDGGIO4.DC.Ind06.d
INDGGIO4.DC.Ind07.d
INDGGIO4.DC.Ind08.d
INDGGIO4.DC.Ind09.d
INDGGIO4.DC.Ind10.d
INDGGIO4.DC.Ind11.d
INDGGIO4.DC.Ind12.d
INDGGIO4.DC.Ind13.d
INDGGIO4.DC.Ind14.d
INDGGIO4.DC.Ind15.d
INDGGIO4.DC.Ind16.d
INDGGIO4.DC.NamPlt.d
INDGGIO4.ST.Beh.q
INDGGIO4.ST.Beh.stVal
INDGGIO4.ST.Beh.t
INDGGIO4.ST.Health.q
INDGGIO4.ST.Health.stVal
INDGGIO4.ST.Health.t
INDGGIO4.ST.Ind01.q
INDGGIO4.ST.Ind01.stVal
INDGGIO4.ST.Ind01.t
INDGGIO4.ST.Ind02.q
INDGGIO4.ST.Ind02.stVal
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INDGGIO4.ST.Ind03.q
INDGGIO4.ST.Ind03.stVal

Data Tags
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INDGGIO4.ST.Ind05.stVal
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INDGGIO4.ST.Ind06.q
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INDGGIO4.ST.Ind13.stVal
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INDGGIO4.ST.Ind14.q
INDGGIO4.ST.Ind14.stVal
INDGGIO4.ST.Ind14.t
INDGGIO4.ST.Ind15.q
INDGGIO4.ST.Ind15.stVal
INDGGIO4.ST.Ind15.t
INDGGIO4.ST.Ind16.q
INDGGIO4.ST.Ind16.stVal
INDGGIO4.ST.Ind16.t
INDGGIO4.ST.Mod.q
INDGGIO4.ST.Mod.stVal
INDGGIO4.ST.Mod.t
LLN0.CF.Mod.ctlModel
LLN0.DC.NamPlt.d
LLN0.SP.SGCB.ActSG
LLN0.SP.SGCB.CnfEdit

Data Tags
LLN0.SP.SGCB.EditSG
LLN0.SP.SGCB.LActTm
LLN0.SP.SGCB.NumOfSG
LLN0.ST.Beh.q
LLN0.ST.Beh.stVal
LLN0.ST.Beh.t
LLN0.ST.Health.q
LLN0.ST.Health.stVal
LLN0.ST.Health.t
LLN0.ST.Mod.q
LLN0.ST.Mod.stVal
LLN0.ST.Mod.t
LPHD1.ST.PhyHealth.q
LPHD1.ST.PhyHealth.stVal
LPHD1.ST.PhyHealth.t
LPHD1.ST.Proxy.q
LPHD1.ST.Proxy.stVal
LPHD1.ST.Proxy.t
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MMDC1CFVol$units$multiplier
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MMDC1CFWatt$db
MMDC1CFWatt$units$multiplier
MMDC1CFWatt$units$SIUnit
MMDC1DCNamPlt$d
MMDC1MXAmpmagf
MMDC1MXAmp$q
MMDC1MXAmp$t
MMDC1MXVolmagf
MMDC1MXVol$q
MMDC1MXVol$t
MMDC1MXWattmagf
MMDC1MXWatt$q
MMDC1MXWatt$t
MMDC1STBeh$q
MMDC1STBeh$stVal
MMDC1STBeh$t
MMDC1STHealth$q
MMDC1STHealth$stVal
MMDC1STHealth$t
MMDC1STMod$q
MMDC1STMod$stVal
MMDC1STMod$t

Data Tags
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MMDC2CFVol$units$multiplier
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MMDC2DCNamPlt$d
MMDC2MXVolmagf
MMDC2MXVol$q
MMDC2MXVol$t
MMDC2STBeh$q
MMDC2STBeh$stVal
MMDC2STBeh$t
MMDC2STHealth$q
MMDC2STHealth$stVal
MMDC2STHealth$t
MMDC2STMod$q
MMDC2STMod$stVal
MMDC2STMod$t
MMDC3CFMod$ctlModel
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MMDC3CFVol$units$multiplier
MMDC3CFVol$units$SIUnit
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MMDC3MXVolmagf
MMDC3MXVol$q
MMDC3MXVol$t
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MMDC3STBeh$stVal
MMDC3STBeh$t
MMDC3STHealth$q
MMDC3STHealth$stVal
MMDC3STHealth$t
MMDC3STMod$q
MMDC3STMod$stVal
MMDC3STMod$t
MMXU1.CF.A.neut.db
MMXU1.CF.A.neut.units.multiplier
MMXU1.CF.A.neut.units.SIUnit
MMXU1.CF.A.phsA.db
MMXU1.CF.A.phsA.units.multiplier
MMXU1.CF.A.phsA.units.SIUnit
MMXU1.CF.A.phsB.db
MMXU1.CF.A.phsB.units.multiplier
MMXU1.CF.A.phsB.units.SIUnit
MMXU1.CF.A.phsC.db
MMXU1.CF.A.phsC.units.multiplier
MMXU1.CF.A.phsC.units.SIUnit
MMXU1.CF.Hz.db

Data Tags
MMXU1.CF.Hz.units.multiplier
MMXU1.CF.Hz.units.SIUnit
MMXU1.CF.Mod.ctlModel
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MMXU1.CF.PF.phsA.units.multiplier
MMXU1.CF.PF.phsA.units.SIUnit
MMXU1.CF.PF.phsB.db
MMXU1.CF.PF.phsB.units.multiplier
MMXU1.CF.PF.phsB.units.SIUnit
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MMXU1.CF.PF.phsC.units.multiplier
MMXU1.CF.PF.phsC.units.SIUnit
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MMXU1.CF.PhV.phsA.units.multiplier
MMXU1.CF.PhV.phsA.units.SIUnit
MMXU1.CF.PhV.phsB.db
MMXU1.CF.PhV.phsB.units.multiplier
MMXU1.CF.PhV.phsB.units.SIUnit
MMXU1.CF.PhV.phsC.db
MMXU1.CF.PhV.phsC.units.multiplier
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MMXU1.CF.TotPF.db
MMXU1.CF.TotPF.units.multiplier
MMXU1.CF.TotPF.units.SIUnit
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MMXU1.CF.TotVAr.units.SIUnit
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MMXU1.CF.VA.phsB.db
MMXU1.CF.VA.phsB.units.multiplier

Data Tags
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MMXU1.CF.VA.phsC.db
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MMXU1.CF.VAr.phsA.db
MMXU1.CF.VAr.phsA.units.multiplier
MMXU1.CF.VAr.phsA.units.SIUnit
MMXU1.CF.VAr.phsB.db
MMXU1.CF.VAr.phsB.units.multiplier
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MMXU1.CF.VAr.phsC.units.multiplier
MMXU1.CF.VAr.phsC.units.SIUnit
MMXU1.CF.W.phsA.db
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MMXU1.CF.W.phsC.db
MMXU1.CF.W.phsC.units.multiplier
MMXU1.CF.W.phsC.units.SIUnit
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MMXU1.MX.A.neut.cVal.ang.f
MMXU1.MX.A.neut.cVal.mag.f
MMXU1.MX.A.neut.q
MMXU1.MX.A.neut.t
MMXU1.MX.A.phsA.cVal.ang.f
MMXU1.MX.A.phsA.cVal.mag.f
MMXU1.MX.A.phsA.q
MMXU1.MX.A.phsA.t
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MMXU1.MX.A.phsB.q
MMXU1.MX.A.phsB.t
MMXU1.MX.A.phsC.cVal.ang.f
MMXU1.MX.A.phsC.cVal.mag.f
MMXU1.MX.A.phsC.q
MMXU1.MX.A.phsC.t
MMXU1.MX.Hz.mag.f
MMXU1.MX.Hz.q
MMXU1.MX.Hz.t
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MMXU1.MX.PF.phsA.q
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MMXU1.MX.PF.phsB.cVal.mag.f
MMXU1.MX.PF.phsB.q

Data Tags
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MMXU1.MX.PF.phsC.q
MMXU1.MX.PF.phsC.t
MMXU1.MX.PhV.phsA.cVal.ang.f
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MMXU1.MX.PPV.phsBC.t
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MMXU1.MX.VA.phsA.t
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MMXU1.MX.VA.phsB.t
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Data Tags
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MMXU1.MX.VAr.phsB.cVal.mag.f
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MMXU1.MX.VAr.phsB.t
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MMXU1.MX.VAr.phsC.t
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MMXU1.MX.W.phsB.t
MMXU1.MX.W.phsC.cVal.mag.f
MMXU1.MX.W.phsC.q
MMXU1.MX.W.phsC.t
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MSQI1.CF.SeqA.c2.units.SIUnit
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MSQI1.CF.SeqV.c1.units.multiplier
MSQI1.CF.SeqV.c1.units.SIUnit
MSQI1.CF.SeqV.c2.db
MSQI1.CF.SeqV.c2.units.multiplier
MSQI1.CF.SeqV.c2.units.SIUnit
MSQI1.CF.SeqV.c3.db
MSQI1.CF.SeqV.c3.units.multiplier

Data Tags
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MSQI1.MX.SeqA.c1.cVal.ang.f
MSQI1.MX.SeqA.c1.cVal.mag.f
MSQI1.MX.SeqA.c1.q
MSQI1.MX.SeqA.c1.t
MSQI1.MX.SeqA.c2.cVal.ang.f
MSQI1.MX.SeqA.c2.cVal.mag.f
MSQI1.MX.SeqA.c2.q
MSQI1.MX.SeqA.c2.t
MSQI1.MX.SeqA.c3.cVal.ang.f
MSQI1.MX.SeqA.c3.cVal.mag.f
MSQI1.MX.SeqA.c3.q
MSQI1.MX.SeqA.c3.t
MSQI1.MX.SeqA.seqT
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MSQI1.MX.SeqV.c1.q
MSQI1.MX.SeqV.c1.t
MSQI1.MX.SeqV.c2.cVal.ang.f
MSQI1.MX.SeqV.c2.cVal.mag.f
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MSQI1.MX.SeqV.c2.t
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MSQI1.MX.SeqV.c3.q
MSQI1.MX.SeqV.c3.t
MSQI1.MX.SeqV.seqT
MSQI1.ST.Beh.q
MSQI1.ST.Beh.stVal
MSQI1.ST.Beh.t
MSQI1.ST.Health.q
MSQI1.ST.Health.stVal
MSQI1.ST.Health.t
MSQI1.ST.Mod.q
MSQI1.ST.Mod.stVal
MSQI1.ST.Mod.t
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MSQI2.CF.SeqA.c1.units.SIUnit
MSQI2.CF.SeqA.c2.db
MSQI2.CF.SeqA.c2.units.multiplier
MSQI2.CF.SeqA.c2.units.SIUnit
MSQI2.CF.SeqA.c3.db
MSQI2.CF.SeqA.c3.units.multiplier
MSQI2.CF.SeqA.c3.units.SIUnit

Data Tags
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MSQI2.MX.SeqA.c1.t
MSQI2.MX.SeqA.c2.cVal.ang.f
MSQI2.MX.SeqA.c2.cVal.mag.f
MSQI2.MX.SeqA.c2.q
MSQI2.MX.SeqA.c2.t
MSQI2.MX.SeqA.c3.cVal.ang.f
MSQI2.MX.SeqA.c3.cVal.mag.f
MSQI2.MX.SeqA.c3.q
MSQI2.MX.SeqA.c3.t
MSQI2.MX.SeqA.seqT
MSQI2.ST.Beh.q
MSQI2.ST.Beh.stVal
MSQI2.ST.Beh.t
MSQI2.ST.Health.q
MSQI2.ST.Health.stVal
MSQI2.ST.Health.t
MSQI2.ST.Mod.q
MSQI2.ST.Mod.stVal
MSQI2.ST.Mod.t
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P25ARSYN1.ST.Beh.stVal
P25ARSYN1.ST.Beh.t
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P25ARSYN1.ST.Health.stVal
P25ARSYN1.ST.Health.t
P25ARSYN1.ST.HzInd.q
P25ARSYN1.ST.HzInd.stVal
P25ARSYN1.ST.HzInd.t
P25ARSYN1.ST.LHz.q
P25ARSYN1.ST.LHz.stVal
P25ARSYN1.ST.LHz.t
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P25ARSYN1.ST.LV.stVal
P25ARSYN1.ST.LV.t
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P25ARSYN1.ST.Mod.stVal
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P25ARSYN1.ST.Rel.q

Data Tags
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P25ARSYN1.ST.RV.t
P25ARSYN1.ST.SynPrg.q
P25ARSYN1.ST.SynPrg.stVal
P25ARSYN1.ST.SynPrg.t
P25ARSYN1.ST.VInd.q
P25ARSYN1.ST.VInd.stVal
P25ARSYN1.ST.VInd.t
P40QPDUP1.DC.NamPlt.d
P40QPDUP1.ST.Beh.q
P40QPDUP1.ST.Beh.stVal
P40QPDUP1.ST.Beh.t
P40QPDUP1.ST.Health.q
P40QPDUP1.ST.Health.stVal
P40QPDUP1.ST.Health.t
P40QPDUP1.ST.Mod.q
P40QPDUP1.ST.Mod.stVal
P40QPDUP1.ST.Mod.t
P40QPDUP1.ST.Op.general
P40QPDUP1.ST.Op.q
P40QPDUP1.ST.Op.t
P40QPDUP1.ST.Str.dirGeneral
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P40ZPDUP1.CF.Mod.ctlModel
P40ZPDUP1.DC.NamPlt.d
P40ZPDUP1.ST.Beh.q
P40ZPDUP1.ST.Beh.stVal
P40ZPDUP1.ST.Beh.t
P40ZPDUP1.ST.Health.q
P40ZPDUP1.ST.Health.stVal
P40ZPDUP1.ST.Health.t
P40ZPDUP1.ST.Mod.q
P40ZPDUP1.ST.Mod.stVal
P40ZPDUP1.ST.Mod.t
P40ZPDUP1.ST.Op.general
P40ZPDUP1.ST.Op.q
P40ZPDUP1.ST.Op.t
P40ZPDUP1.ST.Str.dirGeneral

Data Tags
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P40ZPDUP1.ST.Str.t
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P49RTDPTTR1.ST.Beh.t
P49RTDPTTR1.ST.Health.q
P49RTDPTTR1.ST.Health.stVal
P49RTDPTTR1.ST.Health.t
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P49RTDPTTR1.ST.Op.q
P49RTDPTTR1.ST.Op.t
P49RTDPTTR1.ST.Str.dirGeneral
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P49RTDPTTR10.ST.Health.q
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P49RTDPTTR10.ST.Op.general
P49RTDPTTR10.ST.Op.q
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P49RTDPTTR10.ST.Str.dirGeneral
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P49RTDPTTR11.ST.Beh.stVal
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P49RTDPTTR11.ST.Health.stVal
P49RTDPTTR11.ST.Health.t

Data Tags
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P49RTDPTTR11.ST.Mod.t
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P49RTDPTTR11.ST.Op.t
P49RTDPTTR11.ST.Str.dirGeneral
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P49RTDPTTR12.ST.Op.general
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P49RTDPTTR12.ST.Op.t
P49RTDPTTR12.ST.Str.dirGeneral
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P49RTDPTTR13.ST.Health.t
P49RTDPTTR13.ST.Mod.q
P49RTDPTTR13.ST.Mod.stVal
P49RTDPTTR13.ST.Mod.t
P49RTDPTTR13.ST.Op.general
P49RTDPTTR13.ST.Op.q
P49RTDPTTR13.ST.Op.t
P49RTDPTTR13.ST.Str.dirGeneral
P49RTDPTTR13.ST.Str.general
P49RTDPTTR13.ST.Str.q
P49RTDPTTR13.ST.Str.t
P49RTDPTTR14.CF.Mod.ctlModel

Data Tags
P49RTDPTTR14.DC.NamPlt.d
P49RTDPTTR14.ST.Beh.q
P49RTDPTTR14.ST.Beh.stVal
P49RTDPTTR14.ST.Beh.t
P49RTDPTTR14.ST.Health.q
P49RTDPTTR14.ST.Health.stVal
P49RTDPTTR14.ST.Health.t
P49RTDPTTR14.ST.Mod.q
P49RTDPTTR14.ST.Mod.stVal
P49RTDPTTR14.ST.Mod.t
P49RTDPTTR14.ST.Op.general
P49RTDPTTR14.ST.Op.q
P49RTDPTTR14.ST.Op.t
P49RTDPTTR14.ST.Str.dirGeneral
P49RTDPTTR14.ST.Str.general
P49RTDPTTR14.ST.Str.q
P49RTDPTTR14.ST.Str.t
P49RTDPTTR2.CF.Mod.ctlModel
P49RTDPTTR2.DC.NamPlt.d
P49RTDPTTR2.ST.Beh.q
P49RTDPTTR2.ST.Beh.stVal
P49RTDPTTR2.ST.Beh.t
P49RTDPTTR2.ST.Health.q
P49RTDPTTR2.ST.Health.stVal
P49RTDPTTR2.ST.Health.t
P49RTDPTTR2.ST.Mod.q
P49RTDPTTR2.ST.Mod.stVal
P49RTDPTTR2.ST.Mod.t
P49RTDPTTR2.ST.Op.general
P49RTDPTTR2.ST.Op.q
P49RTDPTTR2.ST.Op.t
P49RTDPTTR2.ST.Str.dirGeneral
P49RTDPTTR2.ST.Str.general
P49RTDPTTR2.ST.Str.q
P49RTDPTTR2.ST.Str.t
P49RTDPTTR3.CF.Mod.ctlModel
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P49RTDPTTR3.ST.Beh.q
P49RTDPTTR3.ST.Beh.stVal
P49RTDPTTR3.ST.Beh.t
P49RTDPTTR3.ST.Health.q
P49RTDPTTR3.ST.Health.stVal
P49RTDPTTR3.ST.Health.t
P49RTDPTTR3.ST.Mod.q
P49RTDPTTR3.ST.Mod.stVal
P49RTDPTTR3.ST.Mod.t
P49RTDPTTR3.ST.Op.general

Data Tags
P49RTDPTTR3.ST.Op.q
P49RTDPTTR3.ST.Op.t
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P49RTDPTTR3.ST.Str.general
P49RTDPTTR3.ST.Str.q
P49RTDPTTR3.ST.Str.t
P49RTDPTTR4.CF.Mod.ctlModel
P49RTDPTTR4.DC.NamPlt.d
P49RTDPTTR4.ST.Beh.q
P49RTDPTTR4.ST.Beh.stVal
P49RTDPTTR4.ST.Beh.t
P49RTDPTTR4.ST.Health.q
P49RTDPTTR4.ST.Health.stVal
P49RTDPTTR4.ST.Health.t
P49RTDPTTR4.ST.Mod.q
P49RTDPTTR4.ST.Mod.stVal
P49RTDPTTR4.ST.Mod.t
P49RTDPTTR4.ST.Op.general
P49RTDPTTR4.ST.Op.q
P49RTDPTTR4.ST.Op.t
P49RTDPTTR4.ST.Str.dirGeneral
P49RTDPTTR4.ST.Str.general
P49RTDPTTR4.ST.Str.q
P49RTDPTTR4.ST.Str.t
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P49RTDPTTR5.ST.Beh.stVal
P49RTDPTTR5.ST.Beh.t
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P49RTDPTTR5.ST.Health.stVal
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P49RTDPTTR5.ST.Str.t
P49RTDPTTR6.CF.Mod.ctlModel
P49RTDPTTR6.DC.NamPlt.d
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P49RTDPTTR6.ST.Beh.stVal
P49RTDPTTR6.ST.Beh.t

Data Tags
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P49RTDPTTR6.ST.Op.q
P49RTDPTTR6.ST.Op.t
P49RTDPTTR6.ST.Str.dirGeneral
P49RTDPTTR6.ST.Str.general
P49RTDPTTR6.ST.Str.q
P49RTDPTTR6.ST.Str.t
P49RTDPTTR7.CF.Mod.ctlModel
P49RTDPTTR7.DC.NamPlt.d
P49RTDPTTR7.ST.Beh.q
P49RTDPTTR7.ST.Beh.stVal
P49RTDPTTR7.ST.Beh.t
P49RTDPTTR7.ST.Health.q
P49RTDPTTR7.ST.Health.stVal
P49RTDPTTR7.ST.Health.t
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P49RTDPTTR7.ST.Mod.t
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P49RTDPTTR7.ST.Op.t
P49RTDPTTR7.ST.Str.dirGeneral
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P49RTDPTTR8.CF.Mod.ctlModel
P49RTDPTTR8.DC.NamPlt.d
P49RTDPTTR8.ST.Beh.q
P49RTDPTTR8.ST.Beh.stVal
P49RTDPTTR8.ST.Beh.t
P49RTDPTTR8.ST.Health.q
P49RTDPTTR8.ST.Health.stVal
P49RTDPTTR8.ST.Health.t
P49RTDPTTR8.ST.Mod.q
P49RTDPTTR8.ST.Mod.stVal
P49RTDPTTR8.ST.Mod.t
P49RTDPTTR8.ST.Op.general
P49RTDPTTR8.ST.Op.q
P49RTDPTTR8.ST.Op.t
P49RTDPTTR8.ST.Str.dirGeneral
P49RTDPTTR8.ST.Str.general

Data Tags
P49RTDPTTR8.ST.Str.q
P49RTDPTTR8.ST.Str.t
P49RTDPTTR9.CF.Mod.ctlModel
P49RTDPTTR9.DC.NamPlt.d
P49RTDPTTR9.ST.Beh.q
P49RTDPTTR9.ST.Beh.stVal
P49RTDPTTR9.ST.Beh.t
P49RTDPTTR9.ST.Health.q
P49RTDPTTR9.ST.Health.stVal
P49RTDPTTR9.ST.Health.t
P49RTDPTTR9.ST.Mod.q
P49RTDPTTR9.ST.Mod.stVal
P49RTDPTTR9.ST.Mod.t
P49RTDPTTR9.ST.Op.general
P49RTDPTTR9.ST.Op.q
P49RTDPTTR9.ST.Op.t
P49RTDPTTR9.ST.Str.dirGeneral
P49RTDPTTR9.ST.Str.general
P49RTDPTTR9.ST.Str.q
P49RTDPTTR9.ST.Str.t
P49TCPTTR1.CF.Mod.ctlModel
P49TCPTTR1.DC.NamPlt.d
P49TCPTTR1.ST.AlmThm.general
P49TCPTTR1.ST.AlmThm.q
P49TCPTTR1.ST.AlmThm.t
P49TCPTTR1.ST.Beh.q
P49TCPTTR1.ST.Beh.stVal
P49TCPTTR1.ST.Beh.t
P49TCPTTR1.ST.Health.q
P49TCPTTR1.ST.Health.stVal
P49TCPTTR1.ST.Health.t
P49TCPTTR1.ST.Mod.q
P49TCPTTR1.ST.Mod.stVal
P49TCPTTR1.ST.Mod.t
P49TCPTTR1.ST.Op.general
P49TCPTTR1.ST.Op.q
P49TCPTTR1.ST.Op.t
P51TFPTOC1.CF.Mod.ctlModel
P51TFPTOC1.CF.OpCntRs.ctlModel
P51TFPTOC1.DC.NamPlt.d
P51TFPTOC1.ST.Beh.q
P51TFPTOC1.ST.Beh.stVal
P51TFPTOC1.ST.Beh.t
P51TFPTOC1.ST.Health.q
P51TFPTOC1.ST.Health.stVal
P51TFPTOC1.ST.Health.t
P51TFPTOC1.ST.Mod.q

Data Tags
P51TFPTOC1.ST.Mod.stVal
P51TFPTOC1.ST.Mod.t
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P51TFPTOC1.ST.Op.q
P51TFPTOC1.ST.Op.t
P51TFPTOC1.ST.OpCntRs.q
P51TFPTOC1.ST.OpCntRs.stVal
P51TFPTOC1.ST.OpCntRs.t
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P51TFPTOC1.ST.Str.general
P51TFPTOC1.ST.Str.q
P51TFPTOC1.ST.Str.t
P78PPAM1.CF.Mod.ctlModel
P78PPAM1.DC.NamPlt.d
P78PPAM1.ST.Beh.q
P78PPAM1.ST.Beh.stVal
P78PPAM1.ST.Beh.t
P78PPAM1.ST.Health.q
P78PPAM1.ST.Health.stVal
P78PPAM1.ST.Health.t
P78PPAM1.ST.Mod.q
P78PPAM1.ST.Mod.stVal
P78PPAM1.ST.Mod.t
P78PPAM1.ST.Op.general
P78PPAM1.ST.Op.q
P78PPAM1.ST.Op.t
P78PPAM1.ST.Str.dirGeneral
P78PPAM1.ST.Str.general
P78PPAM1.ST.Str.q
P78PPAM1.ST.Str.t
P78VPPAM1.CF.Mod.ctlModel
P78VPPAM1.DC.NamPlt.d
P78VPPAM1.ST.Beh.q
P78VPPAM1.ST.Beh.stVal
P78VPPAM1.ST.Beh.t
P78VPPAM1.ST.Health.q
P78VPPAM1.ST.Health.stVal
P78VPPAM1.ST.Health.t
P78VPPAM1.ST.Mod.q
P78VPPAM1.ST.Mod.stVal
P78VPPAM1.ST.Mod.t
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P78VPPAM1.ST.Op.q
P78VPPAM1.ST.Op.t
P78VPPAM1.ST.Str.dirGeneral
P78VPPAM1.ST.Str.general
P78VPPAM1.ST.Str.q

Data Tags
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P87NPDIF1.CF.Mod.ctlModel
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P87NPDIF1.ST.Beh.q
P87NPDIF1.ST.Beh.stVal
P87NPDIF1.ST.Beh.t
P87NPDIF1.ST.Health.q
P87NPDIF1.ST.Health.stVal
P87NPDIF1.ST.Health.t
P87NPDIF1.ST.Mod.q
P87NPDIF1.ST.Mod.stVal
P87NPDIF1.ST.Mod.t
P87NPDIF1.ST.Op.general
P87NPDIF1.ST.Op.q
P87NPDIF1.ST.Op.t
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P87NPDIF1.ST.Str.general
P87NPDIF1.ST.Str.q
P87NPDIF1.ST.Str.t
P87NPDIF2.CF.Mod.ctlModel
P87NPDIF2.DC.NamPlt.d
P87NPDIF2.ST.Beh.q
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P87PDIF1.CF.Mod.ctlModel
P87PDIF1.DC.NamPlt.d
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P87PDIF1.ST.Beh.stVal
P87PDIF1.ST.Beh.t
P87PDIF1.ST.Health.q
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P87PDIF1.ST.Health.t
P87PDIF1.ST.Mod.q
P87PDIF1.ST.Mod.stVal

Data Tags
P87PDIF1.ST.Mod.t
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P87PDIF1.ST.Op.q
P87PDIF1.ST.Op.t
P87PDIF1.ST.Str.dirGeneral
P87PDIF1.ST.Str.general
P87PDIF1.ST.Str.q
P87PDIF1.ST.Str.t
PDIS1.CF.Mod.ctlModel
PDIS1.DC.NamPlt.d
PDIS1.ST.Beh.q
PDIS1.ST.Beh.stVal
PDIS1.ST.Beh.t
PDIS1.ST.Health.q
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PDIS1.ST.Health.t
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PDIS1.ST.Str.t
PDIS2.CF.Mod.ctlModel
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PDOP1.CF.Mod.ctlModel
PDOP1.DC.NamPlt.d
PDOP1.ST.Beh.q

Data Tags
PDOP1.ST.Beh.stVal
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PDOP1.ST.Health.t
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PDOP1.ST.Mod.stVal
PDOP1.ST.Mod.t
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PDOP1.ST.Op.q
PDOP1.ST.Op.t
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PDOP1.ST.Str.general
PDOP1.ST.Str.q
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PDUP1.ST.Health.t
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PDUP1.ST.Str.q
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PDUP2.ST.Op.q
PDUP2.ST.Op.t

Data Tags
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PFRC1.ST.Mod.t
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PFRC1.ST.Op.q
PFRC1.ST.Op.t
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PFRC1.ST.Str.general
PFRC1.ST.Str.q
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PFRC2.ST.Mod.t
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PFRC2.ST.Op.q
PFRC2.ST.Op.t
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PFRC2.ST.Str.q
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PIOC1.CF.Mod.ctlModel
PIOC1.DC.NamPlt.d
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PIOC1.ST.Beh.t
PIOC1.ST.Health.q
PIOC1.ST.Health.stVal

Data Tags
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PIOC1.ST.Op.t
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PIOC1.ST.Str.q
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PIOC2.CF.Mod.ctlModel
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PIOC3.ST.Health.stVal
PIOC3.ST.Health.t
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PIOC3.ST.Mod.stVal
PIOC3.ST.Mod.t
PIOC3.ST.Op.general
PIOC3.ST.Op.q
PIOC3.ST.Op.t
PIOC3.ST.Str.dirGeneral
PIOC3.ST.Str.general
PIOC3.ST.Str.q
PIOC3.ST.Str.t

Data Tags
PIOC4.CF.Mod.ctlModel
PIOC4.DC.NamPlt.d
PIOC4.ST.Beh.q
PIOC4.ST.Beh.stVal
PIOC4.ST.Beh.t
PIOC4.ST.Health.q
PIOC4.ST.Health.stVal
PIOC4.ST.Health.t
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PIOC4.ST.Op.q
PIOC4.ST.Op.t
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PIOC4.ST.Str.q
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PIOC5.DC.NamPlt.d
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PIOC5.ST.Op.q
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PIOC6.ST.Health.t
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PIOC6.ST.Mod.stVal
PIOC6.ST.Mod.t

Data Tags
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PIOC6.ST.Str.general
PIOC6.ST.Str.q
PIOC6.ST.Str.t
PIOC7.CF.Mod.ctlModel
PIOC7.DC.NamPlt.d
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PIOC7.ST.Beh.stVal
PIOC7.ST.Beh.t
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PIOC7.ST.Health.stVal
PIOC7.ST.Health.t
PIOC7.ST.Mod.q
PIOC7.ST.Mod.stVal
PIOC7.ST.Mod.t
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PIOC7.ST.Op.q
PIOC7.ST.Op.t
PIOC7.ST.Str.dirGeneral
PIOC7.ST.Str.general
PIOC7.ST.Str.q
PIOC7.ST.Str.t
PIOC8.CF.Mod.ctlModel
PIOC8.DC.NamPlt.d
PIOC8.ST.Beh.q
PIOC8.ST.Beh.stVal
PIOC8.ST.Beh.t
PIOC8.ST.Health.q
PIOC8.ST.Health.stVal
PIOC8.ST.Health.t
PIOC8.ST.Mod.q
PIOC8.ST.Mod.stVal
PIOC8.ST.Mod.t
PIOC8.ST.Op.general
PIOC8.ST.Op.q
PIOC8.ST.Op.t
PIOC8.ST.Str.dirGeneral
PIOC8.ST.Str.general
PIOC8.ST.Str.q
PIOC8.ST.Str.t
PIOC9.CF.Mod.ctlModel
PIOC9.DC.NamPlt.d
PIOC9.ST.Beh.q
PIOC9.ST.Beh.stVal

Data Tags
PIOC9.ST.Beh.t
PIOC9.ST.Health.q
PIOC9.ST.Health.stVal
PIOC9.ST.Health.t
PIOC9.ST.Mod.q
PIOC9.ST.Mod.stVal
PIOC9.ST.Mod.t
PIOC9.ST.Op.general
PIOC9.ST.Op.q
PIOC9.ST.Op.t
PIOC9.ST.Str.dirGeneral
PIOC9.ST.Str.general
PIOC9.ST.Str.q
PIOC9.ST.Str.t
PMRI1.CF.Mod.ctlModel
PMRI1.DC.NamPlt.d
PMRI1.ST.Beh.q
PMRI1.ST.Beh.stVal
PMRI1.ST.Beh.t
PMRI1.ST.Health.q
PMRI1.ST.Health.stVal
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PMRI1.ST.Mod.stVal
PMRI1.ST.Mod.t
PMRI1.ST.StrInh.q
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PVOC1.DC.NamPlt.d
PVOC1.ST.Beh.q
PVOC1.ST.Beh.stVal
PVOC1.ST.Beh.t
PVOC1.ST.Health.q
PVOC1.ST.Health.stVal
PVOC1.ST.Health.t
PVOC1.ST.Mod.q
PVOC1.ST.Mod.stVal
PVOC1.ST.Mod.t
PVOC1.ST.Op.general
PVOC1.ST.Op.q
PVOC1.ST.Op.t
PVOC1.ST.Str.dirGeneral
PVOC1.ST.Str.general
PVOC1.ST.Str.q
PVOC1.ST.Str.t
PVOC2.CF.Mod.ctlModel
PVOC2.DC.NamPlt.d
PVOC2.ST.Beh.q
PVOC2.ST.Beh.stVal
PVOC2.ST.Beh.t
PVOC2.ST.Health.q
PVOC2.ST.Health.stVal
PVOC2.ST.Health.t
PVOC2.ST.Mod.q
PVOC2.ST.Mod.stVal
PVOC2.ST.Mod.t
PVOC2.ST.Op.general
PVOC2.ST.Op.q
PVOC2.ST.Op.t
PVOC2.ST.Str.dirGeneral
PVOC2.ST.Str.general
PVOC2.ST.Str.q
PVOC2.ST.Str.t
PVPH1.CF.Mod.ctlModel
PVPH1.DC.NamPlt.d
PVPH1.ST.Beh.q

Data Tags
PVPH1.ST.Beh.stVal
PVPH1.ST.Beh.t
PVPH1.ST.Health.q
PVPH1.ST.Health.stVal
PVPH1.ST.Health.t
PVPH1.ST.Mod.q
PVPH1.ST.Mod.stVal
PVPH1.ST.Mod.t
PVPH1.ST.Op.general
PVPH1.ST.Op.q
PVPH1.ST.Op.t
PVPH1.ST.Str.dirGeneral
PVPH1.ST.Str.general
PVPH1.ST.Str.q
PVPH1.ST.Str.t
RBRF1.CF.Mod.ctlModel
RBRF1.DC.NamPlt.d
RBRF1.ST.Beh.q
RBRF1.ST.Beh.stVal
RBRF1.ST.Beh.t
RBRF1.ST.Health.q
RBRF1.ST.Health.stVal
RBRF1.ST.Health.t
RBRF1.ST.Mod.q
RBRF1.ST.Mod.stVal
RBRF1.ST.Mod.t
RBRF1.ST.OpEx.general
RBRF1.ST.OpEx.q
RBRF1.ST.OpEx.t
RBRF1.ST.OpIn.general
RBRF1.ST.OpIn.q
RBRF1.ST.OpIn.t
RDRE1.CF.Mod.ctlModel
RDRE1.DC.NamPlt.d
RDRE1.ST.Beh.q
RDRE1.ST.Beh.stVal
RDRE1.ST.Beh.t
RDRE1.ST.FltNum.q
RDRE1.ST.FltNum.stVal
RDRE1.ST.FltNum.t
RDRE1.ST.Health.q
RDRE1.ST.Health.stVal
RDRE1.ST.Health.t
RDRE1.ST.Mod.q
RDRE1.ST.Mod.stVal
RDRE1.ST.Mod.t
RDRE1.ST.RcdMade.q

Data Tags
RDRE1.ST.RcdMade.stVal
RDRE1.ST.RcdMade.t
RFLO1.CF.FltZ.units.multiplier
RFLO1.CF.FltZ.units.SIUnit
RFLO1.CF.Mod.ctlModel
RFLO1.DC.NamPlt.d
RFLO1.MX.FltDiskm.mag.f
RFLO1.MX.FltDiskm.q
RFLO1.MX.FltDiskm.t
RFLO1.MX.FltZ.cVal.ang.f
RFLO1.MX.FltZ.cVal.mag.f
RFLO1.MX.FltZ.q
RFLO1.MX.FltZ.t
RFLO1.ST.Beh.q
RFLO1.ST.Beh.stVal
RFLO1.ST.Beh.t
RFLO1.ST.FltLoop.q
RFLO1.ST.FltLoop.stVal
RFLO1.ST.FltLoop.t
RFLO1.ST.Health.q
RFLO1.ST.Health.stVal
RFLO1.ST.Health.t
RFLO1.ST.Mod.q
RFLO1.ST.Mod.stVal
RFLO1.ST.Mod.t
RREC1.CF.Mod.ctlModel
RREC1.DC.NamPlt.d
RREC1.ST.AutoRecSt.q
RREC1.ST.AutoRecSt.stVal
RREC1.ST.AutoRecSt.t
RREC1.ST.Beh.q
RREC1.ST.Beh.stVal
RREC1.ST.Beh.t
RREC1.ST.Health.q
RREC1.ST.Health.stVal
RREC1.ST.Health.t
RREC1.ST.Mod.q
RREC1.ST.Mod.stVal
RREC1.ST.Mod.t
RREC1.ST.Op.general
RREC1.ST.Op.q
RREC1.ST.Op.t
RSYN1.CF.Mod.ctlModel
RSYN1.DC.NamPlt.d
RSYN1.ST.AngInd.q
RSYN1.ST.AngInd.stVal
RSYN1.ST.AngInd.t

Data Tags
RSYN1.ST.Beh.q
RSYN1.ST.Beh.stVal
RSYN1.ST.Beh.t
RSYN1.ST.Health.q
RSYN1.ST.Health.stVal
RSYN1.ST.Health.t
RSYN1.ST.HzInd.q
RSYN1.ST.HzInd.stVal
RSYN1.ST.HzInd.t
RSYN1.ST.Mod.q
RSYN1.ST.Mod.stVal
RSYN1.ST.Mod.t
RSYN1.ST.Rel.q
RSYN1.ST.Rel.stVal
RSYN1.ST.Rel.t
RSYN1.ST.VInd.q
RSYN1.ST.VInd.stVal
RSYN1.ST.VInd.t
VXMMXN1.CF.Mod.ctlModel
VXMMXN1.CF.Vol.db
VXMMXN1.CF.Vol.units.multiplier
VXMMXN1.CF.Vol.units.SIUnit
VXMMXN1.DC.NamPlt.d
VXMMXN1.MX.Vol.mag.f
VXMMXN1.MX.Vol.q
VXMMXN1.MX.Vol.t
VXMMXN1.ST.Beh.q
VXMMXN1.ST.Beh.stVal
VXMMXN1.ST.Beh.t
VXMMXN1.ST.Health.q
VXMMXN1.ST.Health.stVal
VXMMXN1.ST.Health.t
VXMMXN1.ST.Mod.q
VXMMXN1.ST.Mod.stVal
VXMMXN1.ST.Mod.t
XCBR1.CF.BlkClsCtl.ctlModel
XCBR1.CF.BlkOpnCtl.ctlModel
XCBR1.CF.Mod.ctlModel
XCBR1.CF.PosCtl.ctlModel
XCBR1.CO.BlkCls.Oper.ctlVal
XCBR1.CO.Pos.Oper.ctlVal
XCBR1.DC.NamPlt.d
XCBR1.DC.NamPlt.swRev
XCBR1.DC.NamPlt.vendor
XCBR1.ST.Beh.q
XCBR1.ST.Beh.stVal
XCBR1.ST.Beh.t

Data Tags
XCBR1.ST.BlkCls.q
XCBR1.ST.BlkCls.stVal
XCBR1.ST.BlkCls.t
XCBR1.ST.BlkOpn.q
XCBR1.ST.BlkOpn.stVal
XCBR1.ST.BlkOpn.t
XCBR1.ST.CBOpCap.q
XCBR1.ST.CBOpCap.stVal
XCBR1.ST.CBOpCap.t
XCBR1.ST.Health.q
XCBR1.ST.Health.stVal
XCBR1.ST.Health.t
XCBR1.ST.Loc.q
XCBR1.ST.Loc.stVal
XCBR1.ST.Loc.t
XCBR1.ST.Mod.q
XCBR1.ST.Mod.stVal
XCBR1.ST.Mod.t
XCBR1.ST.OpCnt.q
XCBR1.ST.OpCnt.stVal
XCBR1.ST.OpCnt.t
XCBR1.ST.Pos.q
XCBR1.ST.Pos.stVal
XCBR1.ST.Pos.t
ZMOT1.CF.DExt.ctlModel
ZMOT1.CF.Mod.ctlModel
ZMOT1.CO.DExt.Oper.ctlVal
ZMOT1.DC.NamPlt.d
ZMOT1.ST.Beh.q
ZMOT1.ST.Beh.stVal
ZMOT1.ST.Beh.t
ZMOT1.ST.DExt.q
ZMOT1.ST.DExt.stVal
ZMOT1.ST.DExt.t
ZMOT1.ST.Health.q
ZMOT1.ST.Health.stVal
ZMOT1.ST.Health.t
ZMOT1.ST.Mod.q
ZMOT1.ST.Mod.stVal
ZMOT1.ST.Mod.t

Conformance Statements

The following conformance statements described in this chapter are applicable for a BE1-11 Protection System:

- MICS (Model Implementation Conformance Statement)
- PICS (Protocol Implementation Conformance Statement)
- PIXIT (Protocol Implementation eXtra Information for Testing)
- TICS (TISSUES Implementation Conformance Statement)

MICS

This MICS document specifies the modeling extensions compared to IEC 61850 Edition 1. For the exact details on the standardized model, please compare the ICD substation configuration file in BEST61850: “BE1_11.icd”, version 2.2.1.

Table 17 contains the list of logical nodes implemented in the device.

Table 17. Logical Nodes

	BE1-11*f*	**BE1-11*i***	**BE1-11*g***	**BE1-11*t***	**BE1-11*m***	**BE1-11*d***
L: System						
Logical node zero: LLN0	LLN0	LLN0	LLN0	LLN0	LLN0	LLN0
Physical device information: LPHD1	PHD	PHD	PHD	PHD	PHD	PHD
P: Protection functions						
Distance: PDIS1, PDIS2	21-1, 21-2 optional		21-1, 21-2	21-1, 21-2 optional		
Volts Per Hz: PVPH1	24 optional	24	24	24		
Undervoltage: PTUV1, PTUV2, PTUV3, PTUV4, PTUV5	27P-1 to 5	27P-1 to 5	27P-1 to 5	27P-1 to 5	27P-1 to 4	
Undervoltage: PTUV6, PTUV7, PTUV8, PTUV9	27X-1 to 4	27X-1 to 4	27X-1 to 4	27X-1 to 4		
Directional Over Power: PDOP1	32-1 optional	32-1	32-1			
Directional Under Power: PDUP1	32-2 optional	32-2	32-2			
Directional Under Power: PDUP2					32-1	
Time Undercurrent: PTUC1					37	
Loss of Excitation Reverse Var Based: P40QPDUP1			40Q		40Q	
Loss of Excitation Impedance Based: P40ZPDUP1			40Z			
Incomplete Sequence: PMSS1					48	
Thermal Overload: P49TCPTTR1					49TC	
Thermal Overload: P49RTDPTTR1, P49RTDPTTR2, P49RTDPTTR3, P49RTDPTTR4, P49RTDPTTR5, P49RTDPTTR6, P49RTDPTTR7, P49RTDPTTR8, P49RTDPTTR9, P49RTDPTTR10, P49RTDPTTR11, P49RTDPTTR12, P49RTDPTTR13, P49RTDPTTR14	49RTD-1 to 49RTD-14	49RTD-1 to 49RTD-14	49RTD-1 to 49RTD-14	49RTD-1 to 49RTD-14	49RTD-1 to 49RTD-14	
Instantaneous Overcurrent: PIOC1, PIOC2, PIOC3, PIOC4, PIOC5, PIOC6, PIOC7, PIOC8, PIOC9	50-1 to 50-6	50-1 to 50-6	50-1 to 50-6	50-1 to 50-9	50-1 to 50-6	

	BE1-11*f*	BE1-11*i*	BE1-11*g*	BE1-11*t*	BE1-11*m*	BE1-11*d*
Time Overcurrent: PTOC1, PTOC2, PTOC3, PTOC4, PTOC5, PTOC6, PTOC7, PTOC8, PTOC9	51-1 to 51-5	51-1 to 51-5	51-1 to 51-5	51-1 to 51-9	51-1 to 51-5	
Voltage Control Overcurrent: PVOC1, PVOC2	51-6, 51-7	51-6, 51-7	51-6, 51-7			
Transformer Time Overcurrent: P51TFPTOC1				51TF		
Under Power Factor: PUPF1					55	
Overvoltage: PTOV1, PTOV2, PTOV3, PTOV4	59P-1 to 4	59P-1 to 4	59P-1 to 4	59P-1 to 4	59P-1 to 2	
Overvoltage: PTOV5, PTOV6, PTOV7, PTOV8	59X-1 to 4	59X-1 to 4	59X-1 to 4	59X-1 to 4	59X-1 to 2	
Motor Restart Inhibition: PMRI1					66	
Phase Angle Measuring: P78VPPAM1		78V	78V			
Phase Angle Measuring:P78OOSPPAM1			78OOS			
Under Frequency: PTUF1, PTUF2, PTUF3, PTUF4	81-1 to 81-4	81-1 to 81-4	81-1 to 81-4	81-1 to 81-4	81-1, 81-2	
Over Frequency: PTOF1, PTOF2	81-5, 81-6	81-5, 81-6	81-5, 81-6	81-5, 81-6		
Over Frequency: PTOF3, PTOF4					81-3 , 81-4	
Rate Of Change Frequency: PFRC1, PFRC2	81-7, 81-8	81-7, 81-8	81-7, 81-8	81-7, 81-8		
Differential protection: P87NPDIF1			87N optional	87N-1, 87N-2		
Differential protection: P87PDIF1			87 optional	87	87 optional	
Protection Trip Conditioning: PTRC1	Logic Points	Logic Points	Logic Points	Logic Points	Logic Points	Logic Points
R: Protection related functions						
Sync-check: RSYN1	25	25	25 optional	25 optional		
Auto synchronizer: P25ARSYN1			25A optional			
Breaker failure: RBRF1	50BF	50BF	50BF	50BF	50BF	
Automatic reclosing : RREC1	79	79		79 optional		
Fault locator: RFLO1	FLT	FLT	FLT	FLT	FLT	FLT
Disturbance Recorder Function: RDRE	FLT	FLT	FLT	FLT	FLT	FLT
G: Generic References						
Generic Process Control Inputs: CTLGGIO1, CTLGGIO2, CTLGGIO3, CTLGGIO4	Input Logic Points	Input Logic Points	Input Logic Points	Input Logic Points	Input Logic Points	Input Logic Points
Generic Process Indicator Outputs: INDGGIO1, INDGGIO2, INDGGIO3, INDGGIO4	Output Logic Points	Output Logic Points	Output Logic Points	Output Logic Points	Output Logic Points	Output Logic Points
M: Metering and Measurement						
Multi-Phase Measurement: MMXU1 CT Circuit 1	Amps, Volts, Power, Freq	Amps, Volts, Power, Freq	Amps, Volts, Power, Freq	Amps, Volts, Power, Freq	Amps, Volts, Power, Freq	
Multi-Phase Measurement: IABCMMXU1 CT Circuit 1	Amps	Amps	Amps	Amps	Amps	
Multi-Phase Measurement: IABCMMXU2 CT Circuit 2	Amps optional	Amps optional	Amps optional	Amps	Amps	
Single Phase Measurement: VXMMXN1	VX	VX	VX	VX	VX	

	BE1-11*f*	BE1-11*i*	BE1-11*g*	BE1-11*t*	BE1-11*m*	BE1-11*d*
Single Phase Measurement: IGMMXN1 CT Circuit 1	IG or IG1	IG or IG1	IG or IG1	IG or IG1	IG or IG1	
Single Phase Measurement: IGMMXN2 CT Circuit 2	IG2 optional	IG2 optional	IG2 optional	IG2	IG2	
Sequence Components: MSQI1 CT Circuit 1	I0, I1, I2, V0, V1, V2	I0, I1, I2, V0, V1, V2	I0, I1, I2, V0, V1, V2	I0, I1, I2, V0, V1, V2	I0, I1, I2, V0, V1, V2	
Sequence Components: MSQI2 CT Circuit 2	I0, I1, I2	I0, I1, I2,	I0, I1, I2	I0, I1, I2	I0, I1, I2	
Watts, DC Current, DC Voltage 1: MMDC1						Watts, I1, V1
DC Voltage 2: MMDC2						V2
DC Voltage 3: MMDC3						V3
X: Switchgear						
Circuit breaker: XCBR1	52a, 52b Trip & Close Coil	52a, 52b Trip & Close Coil	52a, 52b Trip & Close Coil	52a, 52b Trip & Close Coil	52a, 52b Trip & Close Coil	52a, 52b Trip & Close Coil
Z: Other						
Motor: ZMOT					Output Logic Point	

PICS

The following ACSI conformance statements are used to provide an overview and details about the BE1-11 Protection System.

- ASCI basic conformance statement (Table 19)
- ACSI models conformance statement (Table 20)
- ACSI service conformance statement (Table 21)

The statements specify the communication features mapped to IEC 61850-8-1.

Table 18. Conformance Statement Key and Notes

Table Entry	Description
Yes	Supported with MMS services and objects necessary for implementing this capability.
No	Not supported.
	Not applicable.

Table 19. ACSI Basic Conformance Statement

		Client/subscriber	Server/publisher	Value/comments
CLIENT-SERVER ROLES				
B11	Server side (of two-party application-association)		c1	Yes
B12	Client side (of two-party application-association)	c1		No
SCSMS SUPPORTED				
B21	SCSM: IEC 61850-8-1 used			Yes
B22	SCSM: IEC 61850-9-1 used			No
B23	SCSM: IEC 61850-9-2 used			No
B24	SCSM: other			No

GENERIC SUBSTATION EVENT MODEL (GSE)				
B31	Publisher side		O	Yes
B32	Subscriber side	O		Yes
TRANSMISSION OF SAMPLED VALUE MODEL (SVC)				
B41	Publisher side		O	No
B42	Subscriber side	O		No
Notes: c1 - shall be 'M' if support for LOGICAL-DEVICE model has been declared. O - Optional M - Mandatory				

Table 20. ACSI Models Conformance Statement

		Client/subscriber	Server/publisher	Value/comments
IF SERVER SIDE (B11) SUPPORTED				
M1	Logical device	c2	c2	Yes
M2	Logical node	c3	c3	Yes
M3	Data	c4	c4	Yes
M4	Data set	c5	c5	Yes
M5	Substitution	O	O	No
M6	Setting group control	O	O	Yes
REPORTING				
M7	Buffered report control	O	O	Yes
M7-1	sequence-number			Yes
M7-2	report-time-stamp			Yes
M7-3	reason-for-inclusion			Yes
M7-4	data-set-name			Yes
M7-5	data-reference			Yes
M7-6	buffer-overflow			Yes
M7-7	entryID			Yes
M7-8	BufTm			Yes
M7-9	IntgPd			Yes
M7-10	GI			Yes
M8	Unbuffered report control	O	O	Yes
M8-1	sequence-number			Yes
M8-2	report-time-stamp			Yes
M8-3	reason-for-inclusion			Yes
M8-4	data-set-name			Yes
M8-5	data-reference			Yes
M8-6	BufTm			Yes
M8-7	IntgPd			Yes
M8-8	GI			Yes
Logging				

		Client/subscriber	Server/publisher	Value/comments
M9	Log control	O	O	No
M9-1	IntgPd			No
M10	Log	O	O	No
M11	Control	M	M	Yes
IF GSE (B31/32) IS SUPPORTED				
GOOSE		O	O	Yes
M12-1	entryID			No
M12-2	DataRefInc			No
M13	GSSE	O	O	No
IF SVC (B41/B42) IS SUPPORTED				
M14	Multicast SVC	O	O	No
M15	Unicast SVC	O	O	No
M16	Time	M	M	Yes
M17	File transfer	O	O	Yes

Notes:
c2 - shall be 'M' if support for LOGICAL-NODE model has been declared.
c3 - shall be 'M' if support for DATA model has been declared.
c4 - shall be 'M' if support for DATA-SET/Substitution/Report/Log Control/or Time model has been declared.
c5 - shall be 'M' if support for Report/GSE/or SV models has been declared.
O - Optional
M - Mandatory

Table 21. ACSI Service Conformance Statement

SERVICES		AA: TP/MC	Client/ subscriber	Server/ publisher	Value/ comments
SERVER					
S1	ServerDirectory	TP		M	Yes
APPLICATION ASSOCIATION					
S2	Associate		M	M	Yes
S3	Abort		M	M	Yes
S4	Release		M	M	Yes
LOGICAL DEVICE					
S5	LogicalDeviceDirectory	TP	M	M	Yes
LOGICAL NODE					
S6	LogicalNodeDirectory	TP	M	M	Yes
S7	GetAllDataValues	TP	O	M	Yes
DATA					
S8	GetDataValues	TP	M	M	Yes
S9	SetDataValues	TP	O	O	Yes
S10	GetDataDirectory	TP	O	M	Yes
S11	GetDataDefinition	TP	O	M	Yes

SERVICES		AA: TP/MC	Client/ subscriber	Server/ publisher	Value/ comments
DATA SET					
S12	GetDataSetValues	TP	O	M	Yes
S13	SetDataSetValues	TP	O	O	No
S14	CreateDataSet	TP	O	O	No
S15	DeleteDataSet	TP	O	O	No
S16	GetDataSetDirectory	TP	O	O	Yes
SUBSTITUTION					
S17	SetDataValues	TP	M	M	No
SETTING GROUP CONTROL					
S18	SelectActiveSG	TP	O	O	Yes
S19	SelectEditSG	TP	O	O	No
S20	SetSGValues	TP	O	O	No
S21	ConfirmEditSGValues	TP	O	O	No
S22	GetSGValues	TP	O	O	No
S23	GetSGCBValues	TP	O	O	No
REPORTING					
BUFFERED REPORT CONTROL BLOCK (BRCB)					
S24	Report	TP	c6	c6	Yes
S24-1	data-change (dchg)				Yes
S24-2	qchg-change (qchg)				Yes
S24-3	data-update (dupd)				Yes
S25	GetBRCBValues	TP	c6	c6	Yes
S26	SetBRCBValues	TP	c6	c6	Yes
UNBUFFERED REPORT CONTROL BLOCK (URCB)					
S27	Report	TP	c6	c6	Yes
S27-1	data-change (dchg)				Yes
S27-2	qchg-change (qchg)				Yes
S27-3	data-update (dupd)				Yes
S28	GetURCBValues	TP	c6	c6	Yes
S29	SetURCBValues	TP	c6	c6	Yes
LOGGING					
LOG CONTROL BLOCK					
S30	GetLCBValues	TP	M	M	No
S31	SetLCBValues	TP	M	M	No
LOG					
S32	QueryLogByTime	TP	c7	M	No
S33	QueryLogByEntry	TP	c7	M	No
S34	GetLogStatusValues	TP	M	M	No

SERVICES		AA: TP/MC	Client/ subscriber	Server/ publisher	Value/ comments
GENERIC SUBSTATION EVENT MODEL (GSE)					
GOOSE-CONTROL-BLOCK					
S35	SendGOOSEMessage	MC	c8	c8	Yes
S36	GetReference	TP	O	c9	No
S37	GetGOOSEElementNumber	TP	c9	c9	No
S38	GetGoCBValues	TP	O	O	Yes
S39	SetGoCBValues	TP	O	O	Yes
GSSE-CONTROL-BLOCK					
S40	SendGSSEMessage	MC	c8	c8	No
S41	GetReference	TP	O	c9	No
S42	GetGSSEElementNumber	TP	O	c9	No
S43	GetGsCBValues	TP	O	O	No
S44	SetGsCBValues	TP	O	O	No
TRANSMISSION OF SAMPLE VALUE MODEL (SVC)					
MULTICAST SVC					
S45	SendMSVMessage	MC	c10	c10	No
S46	GetMSVCBValues	TP	O	O	No
S47	SetMSVCBValues	TP	O	O	No
UNICAST SVC					
S48	SendUSVMessage	MC	c10	c10	No
S49	GetUSVCBValues	TP	O	O	No
S50	SetUSVCBValues	TP	O	O	No
CONTROL					
S51	Select	O	M	O	No
S52	SelectWithValue	TP	M	O	No
S53	Cancel	TP	O	O	No
S54	Operate	TP	M	M	Yes
S55	Command-Termination	TP	M	O	No
S56	TimeActivated-Operate	TP	O	O	No
FILE TRANSFER					
S57	GetFile	TP	O	M	Yes
S58	SetFile	TP	O	O	No
S59	DeleteFile	TP	O	O	No
S60	GetFileAttributeValues	TP	O	M	Yes
TIME					
T1	Time resolution of internal clock				T1
T2	Time accuracy of internal clock				T1 T2 T3 T4

SERVICES		AA: TP/MC	Client/ subscriber	Server/ publisher	Value/ comments
T3	Supported TimeStamp resolution				T1

Notes:
c6 - shall declare support for at least one (BRCB or URCB).
c7 - shall declare support for at least one (QueryLogByTime or QueryLogAfter).
c8 - shall declare support for at least one (SendGOOSEMessage or SendGSSEMessage).
c9 - shall declare support if TP association is available.
c10 - shall declare support for at least one (SendMSVMessage or SendUSVMessage).
TP - Two Party
MC - Multicast
O - Optional
M - Mandatory

PIXIT

This document specifies the protocol implementation extra information for testing (PIXIT) of the IEC 61850 interface in BE1-11 Feeder Protection System.

Together with the PICS and the MICS, the PIXIT forms the basis for a conformance test according to IEC 61850-10.

Each table specifies the PIXIT for each applicable ACSI service model as structured in IEC 61850-10.

Table 22. PIXIT for Association Model

Description	Value / Clarification
Maximum number of clients that can set-up an association simultaneously	4
TCP_KEEPALIVE value	16 seconds
Lost connection detection time	16 seconds
Is authentication supported?	N
What association parameters are necessary for successful association?	Transport selector Y Session selector Y Presentation selector Y AP Title N AE Qualifier N

Description	Value / Clarification
If association parameters are necessary for association, describe the correct values e.g.	Transport selector 0001 Session selector 0001 Presentation selector 00000001 AP Title na AE Qualifier na
What is the maximum and minimum MMS PDU size?	Max MMS PDU size Negotiated up to 120,000 bytes (typical 32,768) Min MMS PDU size na
What is the maximum startup time after a power supply interrupt?	17 seconds

Table 23. PIXIT for Server Model

Description	Value / Clarification
Which analogue value (MX) quality bits are supported (can be set by server)?	Validity: Y Good, Y Invalid, N Reserved, Y Questionable N Overflow Y OutofRange N BadReference N Oscillatory N Failure N OldData N Inconsistent N Inaccurate Source: Y Process N Substituted N Test N OperatorBlocked

Description	Value / Clarification
Which status value (ST) quality bits are supported (can be set by server)?	Validity: Y Good, Y Invalid, N Reserved, Y Questionable N BadReference N Oscillatory N Failure N OldData N Inconsistent N Inaccurate Source: Y Process N Substituted N Test N OperatorBlocked
What is the maximum number of data values in one GetDataValues request?	Depends on the max MMS PDU size
What is the maximum number of data values in one SetDataValues request?	Depends on the max MMS PDU size

Table 24. PIXIT for Data Set Model

Description	Value / Clarification
What is the maximum number of data elements in one data set (compare ICD setting)?	Not limited by an internal configuration parameter. It depends on the available memory.
How many persistent data sets can be created by one or more clients?	There are up to 16 pre-defined (configured) data sets for each LD. Persistent data sets are not supported.
How many non-persistent data sets can be created by one or more clients?	Not supported

Table 25 . PIXIT for Setting Group Control Model

Description	Value / Clarification
What is the number of supported setting groups for each logical device (compare NumSG in the SGCB)?	4 (Selection of group only, Editing not supported)
What is the effect of when and how the non-volatile storage is updated? (compare IEC 61850-8-1 $16.2.4)	n/a
Can multiple clients edit the same setting group?	n/a
What happens if the association is lost while editing a setting group?	n/a
Is EditSG value 0 allowed?	n/a

Table 26. PIXIT for Reporting Model

Description	Value / Clarification
The supported trigger conditions are (compare PICS)	integrity Y data change Y quality change Y data update Y general interrogation Y
The supported optional fields are	sequence-number Y report-time-stamp Y reason-for-inclusion Y data-set-name Y data-reference Y buffer-overflow Y entryID Y conf-rev Y segmentation Y
Can the server send segmented reports?	Y
Mechanism on second internal data change notification of the same analogue data value within buffer period (Compare IEC 61850-7-2 $14.2.2.9)	Send report immediately
Multi-client URCB approach (compare IEC 61850-7-2 $14.2.1)	All client can access all URCB's
What is the format of EntryID?	Octet string 8
What is the buffer size for each BRCB or how many reports can be buffered?	1,000,000 bytes for all report control blocks. More than 200 rcb blocks
Pre-configured RCB attributes that cannot be changed online when RptEna = FALSE (see also the ICD report settings)	<configuration revision>
May the reported data set contain: - structured data objects? - data attributes? - timestamp data attributes?	 Y Y Y
What is the scan cycle for binary events? Is this fixed, configurable?	4 msec Fixed

Table 27. PIXIT for Generic Substation Events Model

Description	Value / Clarification
What elements of a subscribed GOOSE header are checked to decide the message is valid and the allData values are accepted? If yes, describe the conditions. Note: the VLAN tag may be removed by a Ethernet switch and should not be checked	N source MAC address Y destination MAC address Y Ethertype = 0x88B8 Y gocbRef N timeAllowedtoLive Y datSet N goID N t N stNum N sqNum N test Y confRev Y ndsCom Y numDatSetEntries N AppID
Can the test flag in the published GOOSE be turned on / off?	N
What is the behavior when the GOOSE publish configuration is incorrect?	DUT keeps GoEna=F
When is a subscribed GOOSE marked as lost? (TAL = time allowed to live value from the last received GOOSE message)	n/a
What is the behavior when one or more subscribed GOOSE messages aren't received or syntactically incorrect (missing GOOSE)?	use last received Goose until timeout occurs, then device will switch to the default value input from logic for each GGIO
What is the behavior when a subscribed GOOSE message is out-of-order?	use last received Goose until timeout occurs, then device will switch to the default value input from logic for each GGIO
What is the behavior when a subscribed GOOSE message is duplicated?	use last received Goose
Does the device subscribe to GOOSE messages with/without the VLAN tag?	Y with the VLAN tag Y without the VLAN tag
May the GOOSE data set contain: - structured data objects? - data attributes? - timestamp data attributes?	Subscribed / Published N / Y Y / Y N / Y
What is the slow retransmission time? Is it fixed or configurable?	30,000 msec with TAL = 60,000 Configurable
What is the fast retransmission scheme? Is it fixed or configurable?	1) 4 msec with TAL = 8 msec 2) 8 msec with TAL = 16 msec 3) 16 msec with TAL = 32 msec 4) 32 msec with TAL = 64 msec 5) 64 msec with TAL = 128 msec 6) 128 msec with TAL = 256 msec Fixed
Can the Goose publish be turned on / off by using SetGoCBValues (GoEna)	Y

TAL = Time Allowed to Live

Table 28. PIXIT for Control Model

Description	Value / Clarification
What control modes are supported? (compare PICS)	Y status-only (XCBR) Y direct-with-normal-security (CTLGGIO) N sbo-with-normal-security N direct-with-enhanced-security N sbo-with-enhanced-security
Is the control model fixed, configurable and/or online changeable?	Fixed
Is Time activated operate (operTm) supported?	N
Is “operate-many” supported?	N
What is the behavior of the DUT when the test attribute is set in the SelectWithValue and/or Operate request?	DUT ignores the test value and executes the command as usual
What are the conditions for the time (T) attribute in the SelectWithValue and/or Operate request?	DUT ignores the time value and executes the command as usual
Is pulse configuration supported?	N
What is the behavior of the DUT when the check conditions are set? Is this behavior fixed, configurable, online changeable?	N synchrocheck N interlock-check DUT ignores the check value and always perform the action Fixed
What additional cause diagnoses are supported?	N Blocked-by-switching-hierarchy N Select-failed N Invalid-position N Position-reached N Parameter-change-in-execution N Step-limit N Blocked-by-Mode N Blocked-by-process N Blocked-by-interlocking N Blocked-by-synchrocheck N Command-already-in-execution N Blocked-by-health N 1-of-n-control N Abortion-by-cancel N Time-limit-over N Abortion-by-trip
How to force a “test-not-ok” respond with SelectWithValue request?	n/a
How to force a “test-not-ok” respond with Select request?	n/a
How to force a “test-not-ok” respond with Operate request?	DOns: Operate is always possible SBOns: not supported DOes: not supported SBOes: not supported

Description	Value / Clarification
Which origin categories are supported?	DOns: All SBOns: not supported DOes: not supported SBOes: not supported
What happens if the orCat is not supported?	no action
Does the IED accept a selectwithvalue/operate with the same ctlVal as the current status value?	DOns: Yes SBOns: not supported DOes: not supported SBOes: not supported
Does the IED accept a select/operate on the same control object from 2 different clients at the same time?	DOns: Yes SBOns: not supported DOes: not supported SBOes: not supported
Does the IED accept a select/selectwithvalue from the same client when the control object is already selected (tissue 334)	n/a
Is for SBOes the internal validation performed during the SelectWithValue and/or Operate step?	n/a
Can a control operation be blocked by Mod=Off or Blocked?	N
Does the IED support local / remote operation?	N

Table 29. PIXIT for Time and Time Synchronization Model

Description	Value / Clarification
What quality bits are supported?	N LeapSecondsKnown N ClockFailure Y ClockNotSynchronized
Describe the behavior when the time synchronization signal/messages are lost	continues to use internal clock
When is the time quality bit "Clock not synchronized” set?	when SNTP is not configured or SNTP lost sync
Is the timestamp of a binary event adjusted to the configured scan cycle?	N
Does the device support time zone and daylight saving?	Y

Description	Value / Clarification
Which attributes of the SNTP response packet are validated?	N Leap indicator not equal to 3? Y Mode is equal to SERVER N OriginateTimestamp is equal to value sent by the SNTP client as Transmit Timestamp N RX/TX timestamp fields are checked for reasonableness Y SNTP version 4 N other (describe)

Table 30. PIXIT for File Transfer Model

Description	Value / Clarification
What is structure of files and directories?	comtrade files (*.hdr *.cfg *.dat) LD/<device name>/COMTRADE/<filename>.ext
Is the IETF FTP protocol also implemented?	N
Directory names are separated from the file name by	/ (forward slash)
The maximum file name size including path (recommended 64 chars)	up to 64 chars
Are directory/file name case sensitive?	case sensitive
Maximum file size	Maximum file size is not defined. Free space varies and size depends completely on configuration.
Is the requested file path included in the file name of the MMS fileDirectory respond?	Y
Is the wild char supported MMS fileDirectory request?	N
Is it allowed that 2 client get a file at the same time?	N

TICS

This section provides a template for the tissues conformance statement. According to the UCA IUG QAP, the tissue conformance statement is required to perform a conformance test and is referenced on the certificate.

Mandatory Intop Tissues

During the October 2006 meeting, IEC TC57 working group 10 decided that:

- green Tissues with the category “IntOp” are mandatory for IEC 61850 edition 1
- Tissues with the category “Ed.2” Tissues should not be implemented.

Table 31 gives an overview of the implemented IntOp Tissues.

Table 31. Implemented IntOp Tissues

Part	Tissue Description Nr		Implemented Y/n/a
8-1	**116**	GetNameList with empty response?	Y
	165	Improper Error Response for GetDataSetValues	n/a
	83	GetNameList error handling	Y

Part	Tissue Description Nr		Implemented Y/n/a
7-4	None		
7-3	**28**	Definition of APC	n/a
	54	Point def xVal, not cVal	n/a
	55	Ineut = Ires ?	n/a
	60	Services missing in tables	n/a
	63	mag in CDC CMV	n/a
	65	Deadband calculation of a Vector and trigger option	n/a
	219	operTm in ACT	n/a
	270	WYE and DEL rms values	n/a
7-2	**30**	control parameter T	Y
	31	Typo	n/a
	32	Typo in syntax	n/a
	35	Typo Syntax Control time	n/a
	36	Syntax parameter DSet-Ref missing	Y
	37	Syntax GOOSE "T" type	Y
	39	Add DstAddr to GoCB	Y
	40	GOOSE Message “AppID” to “GoID”	Y
	41	GsCB “AppID” to “GsID”	Y/
	42	SV timestamp: “EntryTime” to “TimeStamp"	n/a
	43	Control "T" semantic	Y
	44	AddCause - Object not sel	n/a
	45	Missing AddCauses (neg range)	n/a
	46	Synchro check cancel	n/a
	47	"." in LD Name?	Y
	49	BRCB TimeOfEntry (part of #453)	-
	50	LNName start with number?	Y
	51	ARRAY [0..num] missing	Y
	52	Ambiguity GOOSE SqNum	N
	53	Add DstAddr to GsCB, SV	N
	151	Name constraint for control blocks etc.	Y
	166	DataRef attribute in Log	n/a
	185	Logging - Integrity periode	n/a
	189	SV Format	n/a
	190	BRCB: EntryId and TimeOfEntry (part of #453)	-
	191	BRCB: Integrity and buffering reports (part of #453)	-
	234	New type CtxInt (Enums are mapped to 8 bit integer)	n/a
	275	Confusing statement on GI usage (part of #453)	-
	278	EntryId not valid for a server (part of #453)	-
Part 6	**1**	Syntax	n/a
	5	tExtensionAttributeNameEnum is restricted	Y
	8	SIUnit enumeration for W	Y
	10	Base type for bitstring usage	Y
	17	DAI/SDI elements syntax	Y
	169	Ordering of enum differs from 7-3	n/a

Notes:

Tissue 49, 190, 191, 275 and 278 are part of the optional tissue #453, all other technical tissues in the table are mandatory if applicable.

Editorial tissues are marked as “n/a”.

Final proposal on tissue 45 is not defined yet.

Optional IntOp Tissues

After the approval of the server conformance test procedures version 2.2 the following IntOp tissues in Table 32 were added or changed. It is optional to implement these tissues.

Table 32. Optional IntOp Tissues

Part	Tissue Nr	Description	Implemented Y/N/n/a
8-1	246	Control negative response (SBOns) with LastApplError	n/a
8-1	545	Skip file directories with no files	Y
7-2	333	Enabling of an incomplete GoCB	N
7-2	453	Combination of all reporting and logging tissues	N
6	245	Attribute RptId in SCL	Y
6	529	Replace sev - Unknown by unknown	Y

Revision History

Table 33 provides a historical summary of the changes made to the BEST61850™ software. The corresponding revisions made to this instruction manual are summarized in Table 34. Revisions are listed in chronological order.

Table 33. BEST61850™ Software Revision History

Software Version and Date	Change
—, Nov-10	• Initial release
1.00.03, Jul-11	• BEST61850 software is now automatically activated • Improved renaming and validation of cid files • Changed order of tabs • Moved the FC field in column headers for Dataset and GOOSE details and on the Edit Dataset screen • Changed IED Name field to only accept alphanumeric characters and underscores • Minor bug fixes
1.00.04, Dec-11	• Improved GOOSE subscriptions and publishing • Improved Datasets • Improved IED renaming • Improved workspaces
2.00.00, Sep-12	• Added support for BE1-11*m* and BE1-11*t*
2.00.01, Nov-12	• Added Windows® 8 compatibility
2.00.04, Jul-13	• Improved overall functionality
2.01.01, Dec-13	• Added support for 49RTD elements 7 through 14
2.02.00, May-13	• Added support for 40Q element for BE1-11*m*
2.03.00, Nov-15	• Added ability to compare CID files • Added ability to modify deadband values • Improved Dataset creation • Improved error reporting • Improved Dataset LN order • Corrected CID file open errors • Corrected access timeouts after uploading a CID file • Added the ability to log in to a BE1-11 utilizing complex usernames and passwords
2.04.00, Sep-16	• Added support for 21 and 24 elements in the BE1-11*f* and 21, 25, and 79 elements in the BE1-11*t*
2.06.00, May-17	• Added authentication and encrypted communication
2.06.01, Jul-17	• Updated USB driver installer for improved Windows 10 compatibility
2.06.02, May-18	• Corrected an issue preventing BEST61850 from connecting via USB to a BE1-11 holding firmware prior to version 2.07.00
2.06.03, Aug-18	• Improved USB driver installation and communication
2.07.00, Feb-19	• Added support for BE1-11*d*

Table 34. Instruction Manual Revision History

Manual Revision and Date	Change
—, Oct-10	• Initial release
A, Jul-11	• Revised to support BEST61850 version 1.00.03. (See BEST61850 version history.)
B, Feb-12	• Replaced Figures 4-3, 4-12, and 4-16, and updated Tables 4-2, 4-7, and 4-9 to reflect BEST61850 version 1.00.04

Manual Revision and Date	Change
C, Sep-12	• Revised to support BEST61850 version 2.00.00. (See BEST61850 version history.) • Converted manual to new style
D, Dec-13	• Added *File Transfer, Data Tags,* and *Conformance Statements* chapters • Added descriptions of Functional Constraints, Data Object, and Data Attribute in the *BEST61850* chapter • Improved description of Report Controls and added Figure 22 in the *BEST61850* chapter • Moved revision history to the back of the manual
E, Apr-14	• Updated processor and RAM recommendations in Table 2 • Added 40Q for BE1-11*m* in Table 13 • Updated Device Info Tab screenshot (Figure 17)
F, Sep-14	• Added *Measurement Logic Node Configuration* at the end of the *BEST61850* chapter
G, Dec-15	• Added description for comparing CID files in the *BEST61850* chapter • Added description for the Deadbands screen in the *BEST61850* chapter • Replaced several screenshots to show new Deadbands tab
H, Sep-16	• Added logical nodes for 21 and 24 (BE1-11*f*) and 21, 25, and 79 (BE1-11*t*) in the *Conformance Statements* chapter
I	• This revision letter not used
J, Feb-17	• Added caution statement about nonvolatile memory
K, May-17	• Added section on *Authenticity and Encryption*
L, Jul-17	• Revised to support BEST61850 version 2.06.01. (See BEST61850 version history.)
M, Aug-18	• Added revision history for BEST61850 versions 2.06.02 and 2.06.03
M1, Nov-18	• Added Prop 65 warning on back of cover page
N, Feb-19	• Added support for BE1-11*d* • Minor edits throughout manual

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