



# GE Multilin Technical Description for Interoperability

GE Publication number: GET-8529A

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The Brick communicates according to the IEC 61850 international standard communication networks and systems in substations, first edition 2004-4. The particular implementation is as described in this document, in the following sections:

- MICS - Model Implementation Conformance Statement.
- PICS - Protocol Implementation Conformance Statement.
- PIXIT - Protocol Implementation Extra Information for Testing.
- TICS - IEC 61850 Tissue Implementation List.
- ICD - IED Configuration Description.



NOTE

Users of systems employing UR-series devices to communicate with the Bricks need no knowledge of the material in this document. It is included for compliance with the requirements of the standard, and for those wishing to communicate with a Brick using a device other than a UR-series device.

The content of this documentation has been independently verified as per the following test summary.



### TEST SUMMARY

Product	GE Multilin Brick Merging Unit Firmware version 5.601
Manufacturer	GE Multilin, Canada
Test facility	KEMA Consulting Europe Protocol Competence & Test Center Utrechtseweg 310, Arnhem, The Netherlands
Test session	July 2008
Requirements	IEC 61850-8-1: GOOSE subscribe IEC 61850-9-2: Sampled Measured Values (SMV) publish
Test procedures	See annex A
Test comments	The Brick uses a GOOSE message to sample the measured values The Brick sends two different datasets in one SMV message The Brick expects a fixed length GOOSE message
Summary and conclusion	Based on the test results described in the test report, test facility declares the tested IEC 61850 implementation in the product has been <b>shown to be interoperable</b> with KEMA's simulator as specified in the PICS, MICS, PIXIT and ICD specifications

The test have been carried out on one single specimen of the products as referred above and submitted to KEMA by GE Multilin. The manufacturer's production process has not been assessed. This test summary does not imply that KEMA has tested or approved any product other than the specimen tested. The electronic version of this document has been issued for information purposes only, and the original paper copy of the KEMA report: No. 30810021-Consulting 08-1446 will prevail.

Arnhem, July 9, 2008

W. Strabbing  
Manager Intelligent Network Control and Protection

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# MICS - Model Implementation Conformance Statement

This section describes the Model Implementation Conformance Statement (MICS) for the IEC 61850 interface in Brick device.

## GE Multilin Process Bus 2007 namespace

A new logical node IBRK has been defined. The data attributes of this logical node have been added according to the namespace "GE Multilin Process Bus 2007" which contains extensions to the IEC 61850-7-4 2003 namespace.

IBRK/NamPlt/InNs = "GE Multilin Process Bus 2007"



NOTE

See the "semantics" tables at the end of this document for descriptions of the various attributes.

## Logical Nodes

### Logical node IBRK (Brick)

LN: Brick

Name: IBRK

An instance of this logical node in the Brick is used to interface all Brick data that can be communicated via IEC 61850 sampled values and GOOSE.

**Table 1: IBRK class**

Attribute		Explanation	T	M/O
Name	Type			
LNNName		Shall be inherited from Logical-Node class (see IEC 61850-7-2)		
<b>Data</b>				
<b>Common logical node information</b>				
		LN shall inherit all mandatory data from common Logical Node class (see IEC 61850-7-2)		M
<b>Measured values, controls and status information</b>				
U	BRICK	Contains all interface data for the Brick		M

An instance of this logical node in the UR is used for interfacing Brick data for up to 8 Bricks

Table 2: IBRK class instance+.0

Attribute		Explanation	T	M/O
Name	Type			
LNName		Shall be inherited from Logical-Node class (see IEC 61850-7-2)		
<b>Data</b>				
<b>Common logical node information</b>				
		LN shall inherit all mandatory data from common Logical Node class (see IEC 61850-7-2)		M
<b>Measured values, controls and status information</b>				
U1	BRICK	Contains all interface for Brick on port 1		M
U2	BRICK	Contains all interface for Brick on port 2		M
U3	BRICK	Contains all interface for Brick on port 3		M
U4	BRICK	Contains all interface for Brick on port 4		M
U5	BRICK	Contains all interface for Brick on port 5		M
U6	BRICK	Contains all interface for Brick on port 6		M
U7	BRICK	Contains all interface for Brick on port 7		M
U8	BRICK	Contains all interface for Brick on port 8		M

## Common data classes

### Common data class BRICK (Brick interface)

This BRICK class is a collection of attributes containing all data exchanged with a single Brick device.

Table 3: BRICK class

Attribute		FC	TrgOP	Value / value range	M/O/C
Name	Type				
<b>Control and status</b>					
SmpNum	INT32U	ST			M
model	VISIBLE STRING35	CF			M
serNum	VISIBLE STRING13	CF			M
outputs	Outputs	CO			M
analogs	Analogs	MX			M
contactInputs	ContactInputs	ST			M
sharedInputs	SharedInputs	ST			M
outputMonitors	OutputMonitors	ST			M
diagnostics	Diagnostics	ST			M

## Common data attribute types

### Outputs common data attribute type

This composite component is a collection of all the contact output, latching output and shared output commands for a Brick in a packed list.

**Table 4: Output type definition**

Attribute		Value / value range	M/O/C
Name	Type		
Packed list (encoded as specified in IEC 61850-8-1 clause 8.1.3.5)			
0	contactOutput1	CODED ENUM	off   on
1	contactOutput2	CODED ENUM	off   on
2	contactOutput3	CODED ENUM	off   on
3	contactOutput4	CODED ENUM	off   on
4	contactOutput5	CODED ENUM	off   on
5	contactOutput6	CODED ENUM	off   on
6	latchingOutputOpen	CODED ENUM	off   on
7	latchingOutputClose	CODED ENUM	off   on
8	sharedOutput1	CODED ENUM	off   on
9	sharedOutput2	CODED ENUM	off   on
10	sharedOutput3	CODED ENUM	off   on
11	sharedOutput4	CODED ENUM	off   on
12	sharedOutput5	CODED ENUM	off   on
13	sharedOutput6	CODED ENUM	off   on
14	sharedOutput7	CODED ENUM	off   on
15	sharedOutput8	CODED ENUM	off   on
16	sharedOutput9	CODED ENUM	off   on
17	sharedOutput10	CODED ENUM	off   on
18	sharedOutput11	CODED ENUM	off   on
19	sharedOutput12	CODED ENUM	off   on
20	sharedOutput13	CODED ENUM	off   on
21	sharedOutput14	CODED ENUM	off   on
22	sharedOutput15	CODED ENUM	off   on
23	Reserved	CODED ENUM	off   on
24	Reserved	CODED ENUM	off   on
25	Reserved	CODED ENUM	off   on
26	Reserved	CODED ENUM	off   on
27	Reserved	CODED ENUM	off   on
28	Reserved	CODED ENUM	off   on
29	Reserved	CODED ENUM	off   on
30	Reserved	CODED ENUM	off   on
31	Reserved	CODED ENUM	off   on

### Analogs common data attribute type

This composite component is a collection of all the AC and DC analogs of the Brick in a packed list.

**Table 5: Analogs type definition**

Attribute name	Attribute type	Value / value range	M/O/C
ac1	INT32		M
ac2	INT32		M
ac3	INT32		M
ac4	INT32		M
ac5	INT32		M
ac6	INT32		M
ac7	INT32		M
ac8	INT32		M
dc1	INT32		M
dc2	INT32		M
dc3	INT32		M

### ContactInputs common data attribute type

This composite component is a collection of all the contact inputs of the Brick in a packed list.

**Table 6: ContactInputs type definition**

Attribute		Value / value range	M/O/C
Name	Type		
Packed list (encoded as specified in IEC 61850-8-1 clause 8.1.3.5)			
0	ci1	BOOLEAN	M
1	ci2	BOOLEAN	M
2	ci3	BOOLEAN	M
3	ci4	BOOLEAN	M
4	ci5	BOOLEAN	M
5	ci6	BOOLEAN	M
6	ci7	BOOLEAN	M
7	ci8	BOOLEAN	M
8	ci9	BOOLEAN	M
9	ci10	BOOLEAN	M
10	ci11	BOOLEAN	M
11	ci12	BOOLEAN	M
12	ci13	BOOLEAN	M
13	ci14	BOOLEAN	M
14	ci15	BOOLEAN	M
15	ci16	BOOLEAN	M
16	ci17	BOOLEAN	M
17	ci18	BOOLEAN	M
18	Reserved	BOOLEAN	M
19	Reserved	BOOLEAN	M
20	Reserved	BOOLEAN	M
21	Reserved	BOOLEAN	M
22	Reserved	BOOLEAN	M
23	Reserved	BOOLEAN	M
24	Reserved	BOOLEAN	M
25	Reserved	BOOLEAN	M
26	Reserved	BOOLEAN	M
27	Reserved	BOOLEAN	M
28	Reserved	BOOLEAN	M
29	Reserved	BOOLEAN	M
30	Reserved	BOOLEAN	M
31	Reserved	BOOLEAN	M

### SharedInputs common data attribute type

This composite component is a collection of all the shared inputs and their test status of the Brick in a packed list.

**Table 7: SharedInputs type definition**

Attribute		Value / value range	M/O/C	
Name	Type			
Packed list (encoded as specified in IEC 61850-8-1 clause 8.1.3.5)				
0	si1	CODED ENUM	off   on	M
1	si1test	CODED ENUM	off   on	M
2	si2	CODED ENUM	off   on	M
3	si2test	CODED ENUM	off   on	M
4	si3	CODED ENUM	off   on	M
5	si3test	CODED ENUM	off   on	M
6	si4	CODED ENUM	off   on	M
7	si4test	CODED ENUM	off   on	M
8	si5	CODED ENUM	off   on	M
9	si5test	CODED ENUM	off   on	M
10	si6	CODED ENUM	off   on	M
11	si6test	CODED ENUM	off   on	M
12	si7	CODED ENUM	off   on	M
13	si7test	CODED ENUM	off   on	M
14	si8	CODED ENUM	off   on	M
15	si8test	CODED ENUM	off   on	M
16	si9	CODED ENUM	off   on	M
17	si9test	CODED ENUM	off   on	M
18	si10	CODED ENUM	off   on	M
19	si10test	CODED ENUM	off   on	M
20	si11	CODED ENUM	off   on	M
21	si11test	CODED ENUM	off   on	M
22	si12	CODED ENUM	off   on	M
23	si12test	CODED ENUM	off   on	M
24	si13	CODED ENUM	off   on	M
25	si13test	CODED ENUM	off   on	M
26	si14	CODED ENUM	off   on	M
27	si14test	CODED ENUM	off   on	M
28	si15	CODED ENUM	off   on	M
29	si15test	CODED ENUM	off   on	M
30	reserved	CODED ENUM	off   on	M
31	reserved	CODED ENUM	off   on	M



## OutputMonitors common data attribute type

This composite component is a collection of all the contact output monitoring of the Brick in a packed list.

**Table 8: OutputMonitors type definition**

Attribute		Type	Value / value range	M/O/C
Name				
Packed list (encoded as specified in IEC 61850-8-1 clause 8.1.3.5)				
0	co1drv	CODED ENUM	output driver off   on status	M
1	co1vlt	CODED ENUM	output voltage monitor off   on	M
2	co1cur	CODED ENUM	output current monitor off   on	M
3	co2drv	CODED ENUM	off   on	M
4	co2vlt	CODED ENUM	off   on	M
5	co2cur	CODED ENUM	off   on	M
6	co3drv	CODED ENUM	off   on	M
7	co3vlt	CODED ENUM	off   on	M
8	co3cur	CODED ENUM	off   on	M
9	co4drv	CODED ENUM	off   on	M
10	co4vlt	CODED ENUM	off   on	M
11	co4cur	CODED ENUM	off   on	M
12	co5drv	CODED ENUM	off   on	M
13	co6drv	CODED ENUM	off   on	M
14	loOpenDrv	CODED ENUM	off   on	M
15	loCloseDrv	CODED ENUM	off   on	M
16	loAuxStatus	CODED ENUM	off   on	M
17	Reserved	CODED ENUM	off   on	M
18	Reserved	CODED ENUM	off   on	M
19	Reserved	CODED ENUM	off   on	M
20	Reserved	CODED ENUM	off   on	M
21	Reserved	CODED ENUM	off   on	M
22	Reserved	CODED ENUM	off   on	M
23	Reserved	CODED ENUM	off   on	M
24	Reserved	CODED ENUM	off   on	M
25	Reserved	CODED ENUM	off   on	M
2	Reserved	CODED ENUM	off   on	M
27	Reserved	CODED ENUM	off   on	M
28	Reserved	CODED ENUM	off   on	M
29	Reserved	CODED ENUM	off   on	M
30	Reserved	CODED ENUM	off   on	M
31	Reserved	CODED ENUM	off   on	M

## Diagnostics common data attribute type

This composite component is a collection of all the self diagnostics of the Brick.

**Table 9: Diagnostics type definition**

Attribute		Value / value range	M/O/C	
Name	Type			
diagnosticFlags packed list (encoded as specified in IEC 61850-8-1 clause 8.1.3.5)				
0	diagRunning	CODED ENUM	normal   alarm	M
1	syncError	CODED ENUM	normal   alarm	M
2	fw_hw_Incompatible	CODED ENUM	normal   alarm	M
3	lossOfSupply	CODED ENUM	normal   alarm	M
4	mircoRestarted	CODED ENUM	normal   alarm	M
5	pldFail	CODED ENUM	normal   alarm	M
6	pldCommsError	CODED ENUM	normal   alarm	M
7	clockDiscrepancy	CODED ENUM	normal   alarm	M
8	wettingFail	CODED ENUM	normal   alarm	M
9	dc1AnalogMode	CODED ENUM	RTD   nonRTD	M
10	dc2AnalogMode	CODED ENUM	RTD   nonRTD	M
11	dc3AnalogMode	CODED ENUM	RTD   nonRTD	M
12	hi_lo_RangeDiscrepancy	CODED ENUM	normal   alarm	M
13	adcPowerTrouble	CODED ENUM	normal   alarm	M
14	adcBusyError	CODED ENUM	normal   alarm	M
15	adcTempTrouble	CODED ENUM	normal   alarm	M
16	transceiverDiagFail	CODED ENUM	normal   alarm	M
17	transceiverTempTrouble	CODED ENUM	normal   alarm	M
18	transceiverVoltsTrouble	CODED ENUM	normal   alarm	M
19	transceiverCurrentTrouble	CODED ENUM	normal   alarm	M
20	transceiverTxPowerTrouble	CODED ENUM	normal   alarm	M
21	transceiverRxPowerTrouble	CODED ENUM	normal   alarm	M
22	outputContactTrouble	CODED ENUM	normal   alarm	M
23	reserved	CODED ENUM	normal   alarm	M
24	reserved	CODED ENUM	normal   alarm	M
25	reserved	CODED ENUM	normal   alarm	M
26	reserved	CODED ENUM	normal   alarm	M
27	reserved	CODED ENUM	normal   alarm	M
28	reserved	CODED ENUM	normal   alarm	M
29	reserved	CODED ENUM	normal   alarm	M
30	reserved	CODED ENUM	normal   alarm	M
31	reserved	CODED ENUM	normal   alarm	M
adcTemp		INT16		M
transceiverTemp		INT16		M
transceiverVolts		INT16U		M
transceiverCurrent		INT16U		M
transceiverTxPower		INT16U		M
transceiverRxPower		INT16U		M

## Data name semantics

Data name	Semantics
U, U1, U2,..., U8	Data object containing all the information that has to be communicated to and from a single Brick.

## Data attribute name semantics

Data name	Semantics
SmpNum	Sample number of the sample. Starts at zero and increments by one each successive sample. Rolls over from $2^{32} - 1$ to 0.
model	String, in comma separated value format, with the first field the physical Brick product name, the second field the Brick order code, and the third field the Brick code version. For example: "GE Multilin Brick,CV-05,v5.601". The field is limited to 35 characters.
serNum	String, equal to the Brick's serial number, appended with the Brick core number: "1", "2", "3" or "4".
outputs	Data attribute, containing as members all Brick output command points, including contact outputs, latching outputs and shared outputs.
analog	Data attribute, containing as members all Brick ac and dc process analog inputs at one sample instant.
contactInputs	Data attribute, containing as members all Brick contact input status points.
sharedInputs	Data attribute, containing as members all shared input status points.
outputMonitors	Data attribute, containing as members output monitoring status points.
diagnostics	Data attribute, containing as members all Brick diagnostics.
diagnosticFlags	Data attribute, containing as members all Brick diagnostic flags.
contactOutput1 to contactOutput6	Commanded state of Brick solid state relay driver outputs (1...4) and from C relay driver outputs (5, 6).
latchingOutputOpen	Commanded state of latching output open driver.
latchingOutputClose	Commanded state of latching output close driver.
sharedOutput1 to sharedOutput15	Commanded state of shared outputs.
ac1 to ac8	Sampled value of ac inputs. Similar to Attribute "i" in IEC 61850-7-3 common data attribute type AnalogValue, with offset = 0 and scaleFactor = 2.980323E-08 instantaneous secondary amps for type BRICK-4-HI-CC11 and BRICK-4-HI-CV10 Bricks, 1.490161E-07 instantaneous secondary amps for type BRICK-4-HI-CC55 and BRICK-4-HI-CV50 Bricks, and 1.862701E-07 instantaneous secondary volts.
dc1 to dc3	Sampled value of dc inputs. Similar to Attribute "i" in IEC 61850-7-3 common data attribute type AnalogValue, with offset = 0 and scaleFactor = 2.328377E-09 instantaneous volts differential on Brick sensing input.
ci1 to ci18	Sampled values of contact inputs.
co1drv to co6drv	Sensed value of contact output relay drivers.
co1vlt to co4vlt	Sensed value of solid state relay output voltage monitoring.
co1cur to co4cur	Sensed value of solid state relay output current monitoring.
loOpenDrv	Sensed value of latched output relay open driver.
loCloseDrv	Sensed value of latched output relay close driver.
loAuxStatus	Sensed state of latched output relay's auxiliary contact.
si1 to si15	State of shared input.
si1test to si15test	State of shared input test bit.
diagRunning	Factory Diagnostics Running (e.g. ADC range forced high or low)*

Data name	Semantics
syncError	The sync error flag is set if any of the last eight received smpNum values is out of numerical sequence, indicating a lost, duplicate or spurious sync function frame. It is also set if any extraneous communications activity occurred (e.g. TFTP traffic), as this activity may have disturbed the sync timing.
fw_hw_Incompatible	Firmware is incompatible with Brick hardware board's version and/or variants
lossOfSupply	Brick power loss of supply - Brick is going down*
mircoRestarted	Brick microcontroller restarted since last transmission - held for two sampled value frames
pldFail	Brick PLD fail - sustained (>10ms) loss of PLD communications in either direction detected by microcontroller
pldCommsError	Brick PLD communications error - single frame CRC error or lost frame*
clockDiscrepancy	Brick microcontroller clock vs. PLD clock frequency discrepancy*
wettingFail	Contact input wetting supply fail*
dc1AnalogMode to dc3AnalogMode	Process analog auto-detected mode is RTD*
hi_lo_RangeDiscrepancy	ADC trouble - hi/lo range discrepancy on one or more channels*
adcPowerTrouble	ADC trouble - weighted sum of various ADC supply voltages out of normal range*
adcBusyError	ADC trouble - busy line error*
adcTempTrouble	ADC trouble - actual temperature is outside of the manufacturer's tolerance limits*
transceiverDiagFail	SPI link from optical transceiver's diagnostics failed - transceiver diagnostic quantities invalid
transceiverTempTrouble	transceiver temperature is outside of the manufacturer's tolerance limits*
transceiverVoltsTrouble	transceiver supply voltage is outside of the manufacturer's tolerance limits*
transceiverCurrentTrouble	transceiver transmitter bias current is outside of the manufacturer's tolerance limits*
transceiverTxPowerTrouble	transceiver transmitted optical power is outside of the manufacturer's tolerance limits*
transceiverRxPowerTrouble	transceiver received optical power is less than the manufacturer's tolerance limits*
outputContactTrouble	monitoring detected trouble with contact output(s)*
adcTemp	ADC temperature value. Similar to Attribute "i" in IEC 61850-7-3 common data attribute type AnalogValue, with offset = 0 and scaleFactor = 1/256 degrees Celsius
transceiverTemp	Transceiver temperature value. Similar to Attribute "i" in IEC 61850-7-3 common data attribute type AnalogValue, with offset = 0 and scaleFactor = 1/256 degrees Celsius
transceiverVolts	Transceiver supply voltage value. Similar to Attribute "i" in IEC 61850-7-3 common data attribute type AnalogValue, with offset = 0 and scaleFactor = 1.000000E-04 volts
transceiverCurrent	Transmitter bias current value. Similar to Attribute "i" in IEC 61850-7-3 common data attribute type AnalogValue, with offset = 0 and scaleFactor = 2.000000E-06 amps
transceiverTxPower	Transmitted optical power value. Similar to Attribute "i" in IEC 61850-7-3 common data attribute type AnalogValue, with offset = 0 and scaleFactor = 1.000000E-07 watts
transceiverRxPower	Received optical power value. Similar to Attribute "i" in IEC 61850-7-3 common data attribute type AnalogValue, with offset = 0 and scaleFactor = 1.000000E-07 watts

## Data sets

### Dataset "C" (commands)

This dataset, also known as the all Brick command dataset, is expected in the received GOOSE messages. The members of this dataset are formally defined in previous sections of this document, the Brick information model.

DSRef: <LDName>/LLN0.C

Member offset	DSMemberRef	Attribute type	Description
1	<LDName>/IBRK.U1.SmpNum	INT32U	Sequence number of sampled data <sup>1</sup>
2	<LDName>/IBRK.U1.serNum	VISIBLE STRING13	Brick 1's serial number <sup>2</sup>
3	<LDName>/IBRK.U1.outputs	Outputs	All Brick 1's commanded states for contact outputs, latching output, and shared outputs.
4	<LDName>/IBRK.U2.serNum	VISIBLE STRING13	
5	<LDName>/IBRK.U2.outputs	Outputs	
6	<LDName>/IBRK.U3.serNum	VISIBLE STRING13	
7	<LDName>/IBRK.U3.outputs	Outputs	
8	<LDName>/IBRK.U4.serNum	VISIBLE STRING13	
9	<LDName>/IBRK.U4.outputs	Outputs	
10	<LDName>/IBRK.U5.serNum	VISIBLE STRING13	
11	<LDName>/IBRK.U5.outputs	Outputs	
12	<LDName>/IBRK.U6.serNum	VISIBLE STRING13	
13	<LDName>/IBRK.U6.outputs	Outputs	
14	<LDName>/IBRK.U7.serNum	VISIBLE STRING13	
15	<LDName>/IBRK.U7.outputs	Outputs	
16	<LDName>/IBRK.U8.serNum	VISIBLE STRING13	
17	<LDName>/IBRK.U8.outputs	Outputs	

#### Table notes:

1. smpNum is a sample sequence number, and will be incremented by the IED each successive sample, wrapping from the maximum code to the minimum code on overflow. The value of smpNum sent here will be attached to the sample data returned to the IED by each Brick, allowing the correlation of samples from different Brick, and detection of missing sample data. All Brick use this value, whether or not their serial numbers match a serNum attribute.
2. Where the serNum attribute of a "Data" object matches a Brick serial number appended with the core number, that core accepts the "outputs" attribute of the same Data as its commands.

**Dataset "F" (fast)**

This dataset, also known as the fast dataset, appears eight times in each sampled value frame. The members and their scaling etc. are formally defined in [MICS - Model Implementation Conformance Statement](#) section on page 3.

DSRef: <LDName>/LLN0.F

Member offset	DSMemberRef	Attribute type	Description
1	<LDName>/IBRK.U.analogs.ac1	INT32	AC1 - Bank 1 Ia
2	<LDName>/IBRK.U.analogs.ac2	INT32	AC2 - Bank 1 Ib
3	<LDName>/IBRK.U.analogs.ac3	INT32	AC3 - Bank 1 Ic
4	<LDName>/IBRK.U.analogs.ac4	INT32	AC4 - Bank 1 Ix
5	<LDName>/IBRK.U.analogs.ac5	INT32	AC5 - Bank 2 Ia/Va
6	<LDName>/IBRK.U.analogs.ac6	INT32	AC6 - Bank 2 Ib/Vb
7	<LDName>/IBRK.U.analogs.ac7	INT32	AC7 - Bank 2 Ic/Vc
8	<LDName>/IBRK.U.analogs.ac8	INT32	AC8 - Bank 2 Ix/Vx
9	<LDName>/IBRK.U.analogs.dc1	INT32	DC1 - first analog process input
10	<LDName>/IBRK.U.analogs.dc2	INT32	DC2
11	<LDName>/IBRK.U.analogs.dc3	INT32	DC3
12	<LDName>/IBRK.U.contactInputs	ContactInputs	
13	<LDName>/IBRK.U.sharedInputs	SharedInputs	
14	<LDName>/IBRK.U.outputMonitors	OutputMonitors	

**Dataset "S" (slow)**

This dataset, also known as the slow dataset, appears once in each sampled value frame. The members are formally defined in [MICS - Model Implementation Conformance Statement](#) section on page 3.

DSRef: <LDName>/LLN0.S

Member offset	DSMemberRef	Attribute type	Description
1	<LDName>/IBRK.U.model	VISIBLE STRING35	Product name, order code, Brick code version <sup>1</sup>
2	<LDName>/IBRK.U.SmpNum	INT32U	sequence number of sampled data <sup>2</sup>
3	<LDName>/IBRK.U.diagnostics	Diagnostics	

**Table notes:**

1. The serial number of the Brick is not included here as it is contained in MsvID field of the sampled value's ASDU.
2. The smpNum value here is the value for the present instance of this dataset, and of the last of the eight F datasets contained in the same frame. Provided there has been no sample sequence error (syncError is not on), the SmpNum of the other F datasets may be determined by noting that they ought to be in chronological order.

# PICS - Protocol Implementation Conformance Statement

This section describes the Protocol Implementation Conformance Statement (PICS) for the IEC 61850 interface in Brick device.

## ACSI conformance statement

The following ACSI conformance statements shall be used to provide an overview and details about a device claiming conformance with ACSI:

- ACSI basic conformance statement.
- ACSI models conformance statement,.
- ACSI service conformance statement,.

These statements are used to specify the communication features mapped to an SCSM.

**Notation** For the following clauses, these definitions apply:

Y: The item is implemented.

N: The item is not implemented.

AA: Application Association.

TP: Two-party (application association).

MC: Multicast (application association).

**Table 10: ACSI basic conformance statement**

	Description	Client/ subscriber	Server/ publisher	Value/ comments
<b>Client-server roles</b>				
B11	Server side (of TWO-PARTY APPLICATION-ASSOCIATION)	---	N	
B12	Client side of (TWO-PARTY APPLICATION-ASSOCIATION)	N	---	
<b>SCSMs supported</b>				
B21	SCSM: IEC 61850-8-1 used	---	Y	GOOSE only
B22	SCSM: IEC 61850-9-1 used	---	N	
B23	SCSM: IEC 61850-9-2 used		Y	
B24	SCSM: other		N	
<b>Generic substation event model (GSE)</b>				
B31	Publisher side	---	N	
B32	Subscriber side	Y	-	GOOSE
<b>Transmission of sampled value model (SVC)</b>				
B41	Publisher side	---	Y	
B42	Subscriber side	N	---	

**Table 11: ACSI models conformance statement**

	Description	Client/ subscriber	Server/ publisher	Value/ comments
<b>If server side (B11) supported</b>				
M1	Logical device	-	N	
M2	Logical node	-	N	
M3	Data	-	N	
M4	Data set	-	N	
M5	Substitution	-	N	

	Description	Client/ subscriber	Server/ publisher	Value/ comments
M6	Setting group control	-	N	
Reporting				
M7	Buffered report control	-	N	
M7-1	sequence-number	-	N	
M7-2	report-time-stamp	-	N	
M7-3	reason-for-inclusion	-	N	
M7-4	data-set-name	-	N	
M7-5	data-reference	-	N	
M7-6	buffer-overflow	-	N	
M7-7	entryID	-	N	
M7-8	BufTm	-	N	
M7-9	IntgPd	-	N	
M7-10	GI	-	N	
M7-11	conf-revision	-	N	
M8	Unbuffered report control	-	N	
M8-1	sequence-number	-	N	
M8-2	report-time-stamp	-	N	
M8-3	reason-for-inclusion	-	N	
M8-4	data-set-name	-	N	
M8-5	data-reference	-	N	
M8-6	BufTm	-	N	
M8-7	IntgPd	-	N	
M8-8	GI	-	N	
M8-9	conf-revision	-	N	
Logging				
M9	Log control	-	N	
M9-1	IntgPd	-	N	
M10	Log	-	N	
M11	Control	-	N	
<b>If GSE (B31/B32) supported</b>				
M12	GOOSE	Y	N	
M13	GSSE	N	N	
<b>If SVC (B41/B42) supported</b>				
M14	Multicast SVC	N	Y	
M15	Unicast SVC	N	N	
<b>If server or client side (B11/B12) supported</b>				
M16	Time	-	N	
M17	File transfer	-	N	

The ACSI service conformance statement shall be defined depending on the statements in previous tables.



Table 12: ACSI service conformance statement

Services		AA: TP / MC	Client/ subscriber	Server/ publisher	Comments
<b>Server (Clause 6)</b>					
S1	ServerDirectory	TP	-	N	
<b>Application association (Clause 7)</b>					
S2	Associate		-	N	
S3	Abort		-	N	
S4	Release		-	N	
<b>Logical device (Clause 8)</b>					
S5	LogicalDeviceDirectory	TP	-	N	
<b>Logical node (Clause 9)</b>					
S6	LogicalNodeDirectory	TP	-	N	
S7	GetDataValues	TP	-	N	
<b>Data (Clause 10)</b>					
S8	GetDataValues	TP	-	N	
S9	SetDataValues	TP	-	N	
S10	GetDataDirectory	TP	-	N	
S11	GetDataDefinition	TP	-	N	
<b>Data set (Clause 11)</b>					
S12	GetDataSetValues	TP	-	N	
S13	SetDataSetValues	TP	-	N	
S14	CreateDataSet	TP	-	N	
S15	DeleteDataSet	TP	-	N	
S16	GetDataSetDirectory	TP	-	N	
<b>Substitution (Clause 12)</b>					
S17	SetDataValues	TP	-	N	
<b>Setting group control (Clause 13)</b>					
S18	SelectActiveSG	TP	-	N	
S19	SelectEditSG	TP	-	N	
S20	SetSGValues	TP	-	N	
S21	ConfirmEditSGValues	TP	-	N	
S22	GetSGValues	TP	-	N	
S23	GetSGCBValues	TP	-	N	
<b>Reporting (Clause 14)</b>					
Buffered report control block (BRCB)					
S24	Report	TP	-	N	
S24-1	data-change (dchg)		-	N	
S24-2	qchg-change (qchg)		-	N	
S24-3	data-update (dupd)		-	N	
S25	GetBRCBValues	TP	-	N	
S26	SetBRCBValues	TP	-	N	
Unbuffered report control block (URCB)					
S27	Report	TP	-	N	
S27-1	data-change (dchg)		-	N	
S27-2	qchg-change (qchg)		-	N	
S27-3	data-update (dupd)		-	N	
S28	GetURCBValues	TP	-	N	

Services		AA: TP / MC	Client/ subscriber	Server/ publisher	Comments
S29	SetURCBValues	TP	-	N	
<b>Logging (Clause 14)</b>					
Log control block					
S30	GetLCBValues	TP	-	N	
S31	SetLCBValues	TP	-	N	
Log					
S32	QueryLogByTime	TP	-	N	
S33	QueryLogAfter	TP	-	N	
S34	GetLogStatusValues	TP	-	N	
<b>Generic substation event model (GSE) (Clause 14.3.5.3.4)</b>					
GOOSE-CONTROL-BLOCK					
S35	SendGOOSEMessage	MC	-	N	
S36	GetGoReference	TP	-	N	
S37	GetGOOSEElementNumber	TP	-	N	
S38	GetGoCBValues	TP	-	N	
S39	SetGoCBValues	TP	-	N	
GSSE-CONTROL-BLOCK					
S40	SendGSSEMessage	MC	-	N	
S41	GetGsReference	TP	-	N	
S42	GetGSSEElementNumber	TP	-	N	
S43	GetGsCBValues	TP	-	N	
S44	SetGsCBValues	TP	-	N	
<b>Transmission of sampled value model (SVC) (Clause 16)</b>					
Multicast SVC					
S45	SendMSVMessage	MC	-	N	
S46	GetMSVCBValues	TP	-	N	
S47	SetMSVCBValues	TP	-	N	
Unicast SVC					
S48	SendUSVMessage	TP	-	N	
S49	GetUSVCBValues	TP	-	N	
S50	SetUSVCBValues	TP	-	N	
<b>Control (Clause 17.5.1)</b>					
S51	Select		-	N	
S52	SelectWithValue	TP	-	N	
S53	Cancel	TP	-	N	
S54	Operate	TP	-	N	
S55	Command- Termination	TP	-	N	
S56	TimeActivated-Operate	TP	-	N	
<b>File transfer (Clause 20)</b>					
S57	GetFile	TP	-	N	
S58	SetFile	TP	-	N	
S59	DeleteFile	TP	-	N	
S60	GetFileAttributeValues	TP	-	N	
<b>Time (Clause 5.5)</b>					
T1	Time resolution of internal clock			N	Nearest negative power of 2 in seconds

Services		AA: TP / MC	Client/ subscriber	Server/ publisher	Comments
T2	Time accuracy of internal clock			N	T0
				N	T1
				N	T2
				N	T3
				N	T4
				N	T5
T3	Supported TimeStamp resolution			N/A	Nearest value of $2^{**n}$ in seconds according to 5.5.3.7.3.3 of Part 7-2

## Protocol implementation extra information for testing (PIXIT)

This section describes the Protocol Implementation Extra Information for Testing (PIXIT) for the IEC 61850 interface in Brick device

### Introduction

This document specifies the protocol implementation extra information for testing (PIXIT) of the IEC 61850 interface in Brick device.

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

### Contents of this document

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

### General information

The typical startup time after a power supply interrupt is 0.07 seconds.

The device implements the functionality of GOOSE subscriber and Sampled Value publisher.

Sampled Value transmission is implemented with fixed Data Sets, which means that the device always transmits the same Data Set format. There are two types of Data Sets in each Sampled Value transmission. Dataset "F" is included 8 times, once for each of 8 sample instants, followed by dataset "S". These datasets are defined in the MICS. All optional fields in SV headers are omitted. Except where otherwise indicated herein, mandatory fields are set to the default specified in the standard.

GOOSE reception is implemented with a fixed Data Set, which means that the device always expects the same Data Set format. The dataset is the "C" data set defined in the MICS. All optional fields in GOOSE headers are expected to be omitted. Each field (including the ASN.1 header and tag) is expected to be of a fixed number of octets as follows:

Field	Length (in octets)
gocbRef	24
timeAllowedtoLive	4
datSet	21
t	10
stNum	6
sqNum	3
test	3
confRev	3
ndsCom	3
numDatSetEntries	3
allData	186 (length portion of triplet is 8200B6)
INT32U	6
VISIBLE STRING13	15
Outputs	7

## Description of sampling

With reference to the [Sampling and time synchronization process \(smpNum = N is assumed a poll frame\)](#) figure on page 21, a compliant relay sends a stream of GOOSE messages to facilitate the sampling process at the Brick. A point in time 360  $\mu$ s prior to the tail end of the Ethernet packet envelope is interpreted by the Brick as a sample and hold signal (S&H) for this IED. The Brick digital core samples its data at this instant. The IED can apply any sampling rate and can sample freely at constant sampling intervals, variable sampling intervals, asynchronously with the absolute time, or in synchronism with the absolute time or any other internal or external process.

For time stamping purposes, the compliant IED is expected to keep track of timing of the tail end of the GOOSE Ethernet packet envelope so that samples can be correlated with the absolute time.

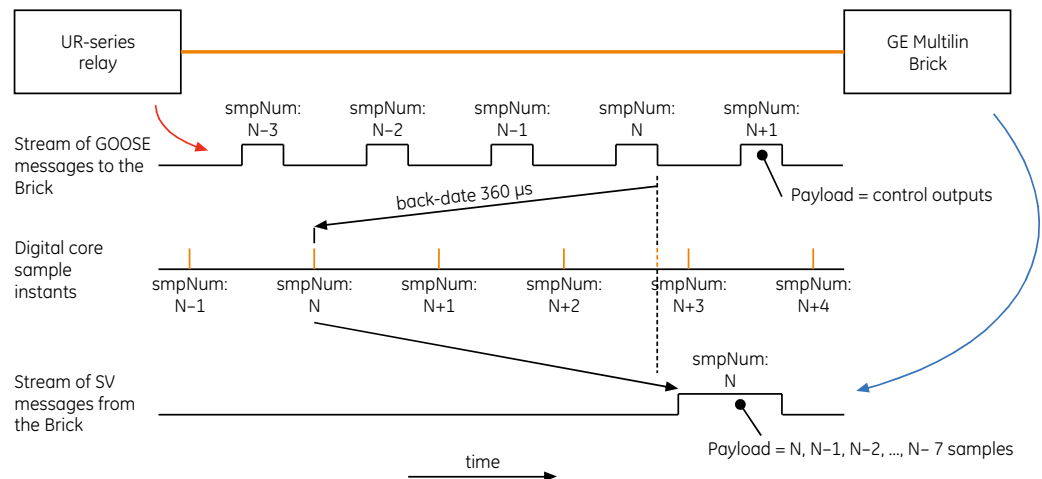
The Brick supports sampling intervals between 10 ms (milliseconds) and 0.1 ms (milliseconds). These intervals can be constant or vary from sample to sample.

All inputs are sampled at the same time. This includes AC currents and voltage, contact inputs, and monitoring points for control outputs.

Each GOOSE message carries a sample number (smpNum). This number is used by the compliant IED to correlate samples with absolute time. GOOSE messages containing a 802.1Q Virtual LAN tag also “poll” for a set of eight samples to be returned to the compliant IED in a sampled value frame.

When the poll frame is received, the Brick responds with the SV payload. The SV data set contains one sample number corresponding to the newest sample in the set of 8. This sample number is equal to the sample number in the initiating GOOSE frame.

**Figure 1: Sampling and time synchronization process (smpNum = N is assumed a poll frame)**



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## PIXIT for Generic substation events model (GOOSE)

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.	Source MAC address	No.
	Destination MAC address	Yes. Should be multicast, broadcast or unicast. If it is unicast it shall be equal to the MAC address of the device.
	LAN ID	Yes. The device accepts GOOSE frames with any VID or no VID at all. However, the presence of VID initiates a sampled value transmission from the device.
	LAN priority	No.
	Ethertype	Yes. Ethertype = 0x88B8.
	APPID	No.
	timeAllowedtoLive	Yes. The device uses this field for clearing all commands included as Data Set payload when the timeAllowedtoLive expires.
	goID	No.
	t	No.
	stNum	No.
	sqNum	No.
	test	Yes. The device uses this field for setting the quality flag "test" of shared I/O included as payload of sampled value frames it is publishing).
	confRev	No.
	ndsCom	No.
NumDatSetEntries	No.	
allData	Yes. The serNum member should match the Brick serial number and core number.	
Can the Goose publish be turned on / off by using SetGoCBValues(GoEna)?	N/A (GOOSE publishing not supported)	
Can the test flag in the published GOOSE be turned on/off?	N/A (GOOSE publishing not supported)	
What is the behavior when the GOOSE publish configuration is incorrect?	N/A (GOOSE publishing not supported)	

Description	Value	Clarification
What is the behavior when one subscribed GOOSE message isn't received or syntactically incorrect (missing GOOSE)?	A single "missing" or syntactically incorrect GOOSE message causes the syncError alarm flag to be raised.	
What is the behavior when one subscribed GOOSE message exceeds the previous time Allowed to Live (TAL)?	All contact and shared outputs are turned off in the affected core.	
What is the behavior when a subscribed GOOSE message is out-of-order?	Sequence number is ignored, the message will be accepted.	
What is the behavior when a subscribed GOOSE message is duplicated?	No. Sequence number is ignored, the message will be accepted.	
May the GOOSE data set contain:	structured data objects?	No. The reception data set is fixed.
	data attributes?	Yes. The reception data set is fixed.
	timestamp data attributes?	No. The reception data set is fixed.
Does the device subscribe to GOOSE messages without the VLAN tag?	Yes.	
What is the slow retransmission time? Is it fixed or configurable?	N/A (GOOSE publishing not supported)	
What is the fast retransmission scheme? Is it fixed or configurable?	N/A (GOOSE publishing not supported)	
<b>Additional Items:</b>		
Maximum number of GOOSE messages which could be received.	4 (the device implements four "digital cores", each core can receive one GOOSE message)	

## PIXIT for sampled value model

Description	Value/clarification
What is the supported sampling interval?	Supported sampling intervals are between 10 ms (milliseconds) and 100 μs (microseconds). These intervals can be constant or vary from sample to sample.
What initiates transmission of SV frame?	The reception of a GOOSE "poll frame" initiates SV transmission from the device. The GOOSE "poll frame" is any GOOSE frame that contains VID field.
Is the data set configurable in transmitted SV frames?	No.
Is the destination MAC address configurable in SV frames?	No. The destination MAC address is fixed to 01:0C:CD:04:00:00
What is the source MAC address in SV frames?	Each Brick device contains 4 "digital cores" (seen as Ethernet ports), every core having its globally unique Ethernet MAC address. Thus SV frames sent from each core will have the source MAC address of that core.

## IEC 61850 Tissue Implementation List (TICS)

This section describes the IEC 61850 Tissue Implementation List (TICS) for the IEC 61850 interface in Brick device.

### Introduction

This document 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.

This document is applicable for Brick devices with firmware version 5.601.

## 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.

The following table gives an overview of the implemented IntOp Tissues.

Part	Tissue Nr	Description	Implemented
8-1	116	GetNameList with empty response?	N/A
	165	Improper Error Response for GetDataSetValues	N/A
	183	GetNameList error handling	N/A
7-4	None		
7-3	28	Definition of APC	N/A
	54	Point def xVal, not cVal	N/A
	55	Input = 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	N/A
	31	Typo	N/A
	32	Typo in syntax	N/A
	35	Typo Syntax Control time	N/A
	36	Syntax parameter DSet-Ref missing	N/A
	37	Syntax GOOSE “T” type	N/A
	38	Syntax “AppID” or “GoID”	N/A
	39	Add DstAddr to GoCB	N/A
	40	GOOSE Message “AppID” to “GoID”	N/A
	41	GsCB “AppID” to “GsID”	N/A
	42	SV timestamp: “EntryTime” to “TimeStamp”	N/A
	43	Control “T” semantic	N/A
	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	LNNName start with number?	Y
	51	ARRAY [0...num] missing	N/A
	52	Ambiguity GOOSE SqNum	Y
	53	Add DstAddr to GsCB, SV	N/A
	151	Name constraint for control blocks etc.	Y
	166	DataRef attribute in Log	N/A
	185	Logging - Integrity period	N/A
	189	SV Format	Y
	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

Part	Tissue Nr	Description	Implemented
7-2	275	Confusing statement on GI usage (part of #453)	-
	278	EntryId not valid for a server (part of #453)	-
6	1	Syntax	Y
	5	tExtensionAttributeNameEnum is restricted	N/A
	8	SIUnit enumeration for W	N/A
	10	Base type for bitstring usage	N/A
	17	DAI/SDI elements syntax	Y/N/A
	169	Ordering of enum differs from 7-3	N/A



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 "na".

### Optional IntOp Tissues

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

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

### Other Implemented Tissues

Part	Tissue Nr	Description
9-2	125	The field SmpRate should be set to optional in order to be in line with IEC 61850-7-2. SmpRate is omitted from SV headers.

## ICD - IEC 61850 IED Configuration Description (ICD)

This section describes the IEC 61850 IED Configuration Description (ICD) for the IEC 61850 interface in Brick device.

```
<?xml version="1.0" encoding="UTF-8" ?>
<!-- Created by GE Multilin Mon Jun 30, 2008 -->
<SCL xmlns="http://www.iec.ch/61850/2003/SCL"
      xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
      xsi:schemaLocation="http://www.iec.ch/61850/2003/SCL SCL.xsd">
<Header id="Brick" version="5.601" revision="1" toolID="ICDGenerator"
        nameStructure="IEDName"/>
<Communication>
  <SubNetwork name="NONE">
    <ConnectedAP iedName="IEDName" apName="P1">
```



```

<Address>
  <P type="IP" xsi:type="tP_IP">192.168.37.199</P>
  <P type="IP-SUBNET" xsi:type="tP_IP-SUBNET">255.255.0.0</P>
  <P type="IP-GATEWAY" xsi:type="tP_IP-GATEWAY">0.0.0.0</P>
  <P type="S-Profile">1</P>
</Address>
<SMV Instance="LDInst" cbName="MSVCB01">
  <Address>
    <P type="MAC-Address" xsi:type="tP_MAC-Address">
      01-0C-CD-04-00-00</P>
    <P type="APPID" xsi:type="tP_APPID">0000</P>
    <P type="VLAN-ID" xsi:type="tP_VLAN-ID">007</P>
    <P type="VLAN-PRIORITY" xsi:type="tP_VLAN-PRIORITY">0</P>
  </Address>
</SMV>
<SMV Instance="LDInst" cbName="MSVCB02">
  <Address>
    <P type="MAC-Address" xsi:type="tP_MAC-Address">
      01-0C-CD-04-00-00</P>
    <P type="APPID" xsi:type="tP_APPID">0000</P>
    <P type="VLAN-ID" xsi:type="tP_VLAN-ID">007</P>
    <P type="VLAN-PRIORITY" xsi:type="tP_VLAN-PRIORITY">0</P>
  </Address>
</SMV>
</ConnectedAP>
</SubNetwork>
</Communication>
<IED type="GE Brick Merging Unit" configVersion="1.0" desc="Brick"
  name="IEDName" manufacturer="GE Multilin">
  <Services>
    <ConfLNs fixPrefix="true" fixInst="true"/>
    <ConfDataSet max="2" maxAttributes="14"/>
    <GOOSE max="0"/>
    <GSESettings cbName="Fix" applD="Dyn"/>
    <SMVSettings cbName="Fix" dataSet="Fix" svID="Fix" optFields="Fix"
      smpRate="Fix">
      <SmpRate>128</SmpRate>
      <SmpRate>16</SmpRate>
    </SMVSettings>
  </Services>
  <AccessPoint name="P1">
    <Server>
      <Authentication none="true"/>
      <LDevice inst="LDInst">
        <LNO InType="IEDName/LDInst/LLNO_0" InClass="LLNO" inst="">
          <DataSet name="F" desc="Fast Data Set of Brick's Sampled Values
            Transmitted via Multicast SV Service">
            <FCDA Instance="LDInst" prefix="" Inst="1" InClass="IBRK"
              fc="MX" doName="U" daName="anal ogs. ac1"/>
            <FCDA Instance="LDInst" prefix="" Inst="1" InClass="IBRK"
              fc="MX" doName="U" daName="anal ogs. ac2"/>
            <FCDA Instance="LDInst" prefix="" Inst="1" InClass="IBRK"
              fc="MX" doName="U" daName="anal ogs. ac3"/>
            <FCDA Instance="LDInst" prefix="" Inst="1" InClass="IBRK"
              fc="MX" doName="U" daName="anal ogs. ac4"/>
            <FCDA Instance="LDInst" prefix="" Inst="1" InClass="IBRK"
              fc="MX" doName="U" daName="anal ogs. ac5"/>
            <FCDA Instance="LDInst" prefix="" Inst="1" InClass="IBRK"
              fc="MX" doName="U" daName="anal ogs. ac6"/>
            <FCDA Instance="LDInst" prefix="" Inst="1" InClass="IBRK"
              fc="MX" doName="U" daName="anal ogs. ac7"/>
            <FCDA Instance="LDInst" prefix="" Inst="1" InClass="IBRK"
              fc="MX" doName="U" daName="anal ogs. ac8"/>
            <FCDA Instance="LDInst" prefix="" Inst="1" InClass="IBRK"
              fc="MX" doName="U" daName="anal ogs. dc1"/>
          </DataSet>
        </LDevice>
      </Server>
    </AccessPoint>
  </IED>

```

```

    <FCDA I dI nst="LDI nst"  p r e f i x=""  I nI nst="1"  I nC l a s s="I B R K"
      f c="M X"  d o N a m e="U"  d a N a m e="a n a l o g s . d c 2"/>
    <FCDA I dI nst="LDI nst"  p r e f i x=""  I nI nst="1"  I nC l a s s="I B R K"
      f c="M X"  d o N a m e="U"  d a N a m e="a n a l o g s . d c 3"/>
    <FCDA I dI nst="LDI nst"  p r e f i x=""  I nI nst="1"  I nC l a s s="I B R K"
      f c="S T"  d o N a m e="U"  d a N a m e="c o n t a c t I n p u t s"/>
    <FCDA I dI nst="LDI nst"  p r e f i x=""  I nI nst="1"  I nC l a s s="I B R K"
      f c="S T"  d o N a m e="U"  d a N a m e="s h a r e d I n p u t s"/>
    <FCDA I dI nst="LDI nst"  p r e f i x=""  I nI nst="1"  I nC l a s s="I B R K"
      f c="S T"  d o N a m e="U"  d a N a m e="o u t p u t M o n i t o r s"/>
  </DataSet>
  <DataSet name="S" desc="S l o w D a t a S e t o f B r i c k ' s S a m p l e d V a l u e s
    T r a n s m i t t e d v i a M u l t i c a s t S V S e r v i c e">
    <FCDA I dI nst="LDI nst"  p r e f i x=""  I nI nst="1"  I nC l a s s="I B R K"
      f c="C F"  d o N a m e="U"  d a N a m e="m o d e l"/>
    <FCDA I dI nst="LDI nst"  p r e f i x=""  I nI nst="1"  I nC l a s s="I B R K"
      f c="S T"  d o N a m e="U"  d a N a m e="s m p N u m"/>
    <FCDA I dI nst="LDI nst"  p r e f i x=""  I nI nst="1"  I nC l a s s="I B R K"
      f c="S T"  d o N a m e="U"  d a N a m e="d i a g n o s t i c s"/>
  </DataSet>
  <S a m p l e d V a l u e C o n t r o l  n a m e="M S V C B 0 1"  s m v I D="0 0 2 2 0 4 0 0 8 0 1 4 1 / F"
    s m p R a t e="1 2 8"  n o f A S D U="8"  c o n f R e v="1"
    d a t S e t="F">
    <S m v O p t s  r e f r e s h T i m e="f a l s e"  s a m p l e S y n c h r o n i z e d="t r u e"
      s a m p l e R a t e="f a l s e"  s e c u r i t y="f a l s e"  d a t a R e f="f a l s e"/>
  </S a m p l e d V a l u e C o n t r o l >
  <S a m p l e d V a l u e C o n t r o l  n a m e="M S V C B 0 2"  s m v I D="0 0 2 2 0 4 0 0 8 0 1 4 1 / S"
    s m p R a t e="1 6"  n o f A S D U="1"  c o n f R e v="1"
    d a t S e t="S">
    <S m v O p t s  r e f r e s h T i m e="f a l s e"  s a m p l e S y n c h r o n i z e d="t r u e"
      s a m p l e R a t e="f a l s e"  s e c u r i t y="f a l s e"  d a t a R e f="f a l s e"/>
  </S a m p l e d V a l u e C o n t r o l >
</LNO>
<LN I n T y p e="I E D N a m e / L D I n s t / L P H D _ 0"  I n C l a s s="L P H D"  I n s t="1"/>
<LN I n T y p e="I E D N a m e / L D I n s t / I B R K _ 0"  I n C l a s s="I B R K"  I n s t="1"
  p r e f i x="" />
</LDevic e>
</Server>
</AccessPoi nt>
</IED>
<DataTypeTempl ates>
  <LNodeType i d="I E D N a m e / L D I n s t / L L N O _ 0"  I n C l a s s="L L N O">
    <DO name="Mod" type="I N C _ 0"/>
    <DO name="Beh" type="I N S _ 0"/>
    <DO name="Heal th" type="I N S _ 1"/>
    <DO name="NamPI t" type="L P L _ 0"/>
  </LNodeType>
  <LNodeType i d="I E D N a m e / L D I n s t / L P H D _ 0"  I n C l a s s="L P H D">
    <DO name="PhyHeal th" type="I N S _ 1" />
    <DO name="Proxy" type="S P S _ 1"/>
    <DO name="PhyNam" type="D P L _ 0"/>
  </LNodeType>
  <LNodeType i d="I E D N a m e / L D I n s t / I B R K _ 0"  I n C l a s s="I B R K">
    <DO name="Mod" type="I N C _ 0"/>
    <DO name="Beh" type="I N S _ 0"/>
    <DO name="Heal th" type="I N S _ 1"/>
    <DO name="NamPI t" type="L P L _ 0"/>
    <DO name="U" type="B R I C K _ 0"/>
  </LNodeType>
  <DOType i d="I N C _ 0"  c d c="I N C">
    <DA name="stVal" f c="S T"  d c h g="t r u e"  b T y p e="E n u m"  t y p e="M o d"/>
    <DA name="q" f c="S T"  q c h g="t r u e"  b T y p e="Q u a l i t y"/>
    <DA name="t" f c="S T"  b T y p e="T i m e s t a m p"/>
    <DA name="ctl Model" f c="C F"  b T y p e="E n u m"  t y p e="c t l M o d e l"/>
  </DOType>

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<D0Type id="INS_0" cdc="INS">
  <DA name="stVal" fc="ST" bType="Enum" type="Beh"/>
  <DA name="q" fc="ST" bType="Quality"/>
  <DA name="t" fc="ST" bType="Timestamp"/>
</D0Type>
<D0Type id="INS_1" cdc="INS">
  <DA name="stVal" fc="ST" bType="Enum" type="Health"/>
  <DA name="q" fc="ST" bType="Quality"/>
  <DA name="t" fc="ST" bType="Timestamp"/>
</D0Type>
<D0Type id="LPL_0" cdc="LPL">
  <DA name="vendor" fc="DC" bType="VisString255"/>
  <DA name="swRev" fc="DC" bType="VisString255"/>
  <DA name="d" fc="DC" bType="VisString255"/>
  <DA name="configRev" fc="DC" bType="VisString255"/>
</D0Type>
<D0Type id="DPL_0" cdc="DPL">
  <DA name="vendor" fc="DC" bType="VisString255">
    <Val>GE Multilin</Val>
  </DA>
  <DA name="swRev" fc="DC" bType="VisString255">
    <Val>5.601</Val>
  </DA>
  <DA name="serNum" fc="DC" bType="VisString255"/>
  <DA name="model" fc="DC" bType="VisString255"/>
  <DA name="location" fc="DC" bType="VisString255"/>
</D0Type>
<D0Type id="SPS_1" cdc="SPS">
  <DA name="stVal" fc="ST" dchg="true" bType="BOOLEAN"/>
  <DA name="q" fc="ST" qchg="true" bType="Quality"/>
  <DA name="t" fc="ST" bType="Timestamp"/>
</D0Type>
<D0Type id="BRICK_0" cdc="BRICK">
  <DA name="smpNum" fc="ST" bType="INT32U" dchg="true"/>
  <DA name="model" fc="CF" bType="VisString35"/>
  <DA name="serNum" fc="CF" bType="VisString13"/>
  <DA name="outputs" fc="CO" bType="BitString32" dchg="true"/>
  <DA name="analog" fc="MX" bType="Struct" type="Analog_0"/>
  <DA name="contactInputs" fc="ST" bType="BitString32" dchg="true"/>
  <DA name="sharedInputs" fc="ST" bType="BitString32" dchg="true"/>
  <DA name="outputMonitors" fc="ST" bType="BitString32" dchg="true"/>
  <DA name="diagnostics" fc="ST" bType="Struct" type="Diagnostics_0"/>
  <DA name="InNs" fc="EX" bType="VisString255"/>
</D0Type>
<DAType id="Analog_0">
  <BDA name="ac1" bType="INT32U"/>
  <BDA name="ac2" bType="INT32U"/>
  <BDA name="ac3" bType="INT32U"/>
  <BDA name="ac4" bType="INT32U"/>
  <BDA name="ac5" bType="INT32U"/>
  <BDA name="ac6" bType="INT32U"/>
  <BDA name="ac7" bType="INT32U"/>
  <BDA name="ac8" bType="INT32U"/>
  <BDA name="dc1" bType="INT32U"/>
  <BDA name="dc2" bType="INT32U"/>
  <BDA name="dc3" bType="INT32U"/>
</DAType>
<DAType id="Diagnostics_0">
  <BDA name="diagnosticFlags" bType="BitString32"/>
  <BDA name="adcTemp" bType="INT16"/>
  <BDA name="transceiverTemp" bType="INT16"/>
  <BDA name="transceiverVolts" bType="INT16"/>
  <BDA name="transceiverCurrent" bType="INT16"/>
  <BDA name="transceiverTxPower" bType="INT16"/>
  <BDA name="transceiverRxPower" bType="INT16"/>

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</DataType>
<EnumType id="Mod">
  <EnumVal ord="1">on</EnumVal >
  <EnumVal ord="2">bl ocked</EnumVal >
  <EnumVal ord="3">test</EnumVal >
  <EnumVal ord="4">test/bl ocked</EnumVal >
  <EnumVal ord="5">off</EnumVal >
</EnumType>
<EnumType id="ctl Model ">
  <EnumVal ord="0">status-onl y</EnumVal >
  <EnumVal ord="1">di rect-wi th-normal -securi ty</EnumVal >
  <EnumVal ord="2">sbo-wi th-normal -securi ty</EnumVal >
  <EnumVal ord="3">di rect-wi th-enhanced-securi ty</EnumVal >
  <EnumVal ord="4">sbo-wi th-enhanced-securi ty</EnumVal >
</EnumType>
<EnumType id="Beh">
  <EnumVal ord="1">on</EnumVal >
  <EnumVal ord="2">bl ocked</EnumVal >
  <EnumVal ord="3">test</EnumVal >
  <EnumVal ord="4">test/bl ocked</EnumVal >
  <EnumVal ord="5">off</EnumVal >
</EnumType>
<EnumType id="Heal th">
  <EnumVal ord="1">Ok</EnumVal >
  <EnumVal ord="2">Warni ng</EnumVal >
  <EnumVal ord="3">Al arm</EnumVal >
</EnumType>
</DataTypeTempl ates>
</SCL>

```