

SIEMENS

SIPROTEC 5 PIXIT, PICS, TICS IEC 61850

V06.00

Manual

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Preface

Purpose of this manual

In this Manual, you will find the Specification of the applications of the IEC 61850 interface.

Target audience

This manual is intended mainly for all persons who configure, parameterize and operate a SIPROTEC 5 device.

Scope of validity

SIPROTEC 5 Configuration version 6.0 and higher

This manual is valid for SIPROTEC 5 devices changed to Edition 1 and Edition 2 mode of IEC 61850.

Standards

This manual has been created according to the ISO 9001 quality standards.

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1 Applications

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1.1 General

This manual specifies the protocol implementation extra information for testing (PIXIT) of the IEC 61850 interface in SIPROTEC 5.

It is based on the service subset definition given in the protocol implementation conformance statement (PICS), which is specified within the user manual SIPROTEC 5 IEC61850.

The following applicable ACSI service models are specified:

- Association model
- Server model
- Data set model
- Substitution model
- Setting group control model
- Reporting model
- Logging model
- GOOSE publish model
- GOOSE subscribe model
- Control model
- Time and time synchronisation model
- File transfer model
- Tracking
- General items

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

The mapping between the IEC 61850 server data model and the SIPROTEC specific data is specified in DIGSI.

1.2 Association Model

ID	ED	Description	Value / Clarification
As1	1	Maximum number of clients that can set-up an association simultaneously	6
As2	1, 2	TCP_KEEPALIVE value	4 seconds
As3	1, 2	Lost connection detection time range	10 seconds
As4	-	Authentication is not supported	N, it is not supported
As5	1, 2	What association parameters are necessary for successful association?	Y Transport selector Y Session selector Y Presentation selector Y AP Title (ANY) Y AE Qualifier (ANY) Where Y means: as defined within the ICD-File ANY means: any value accepted
As6	1, 2	If association parameters are necessary for association, describe the correct values e.g.	Transport selector 0001 Session selector 0001 Presentation selector 00000001
As7	1, 2	What is the maximum and minimum MMS PDU size?	Max MMS PDU size 65536 Min MMS PDU size 8192
As8	1, 2	What is the maximum startup time after a power supply interrupt?	Typical 100 seconds The value depends on the size of the object directory

1.3 Server Model

ID	ED	Description	Value / Clarification
Sr1	1, 2	Which analogue value (MX) quality bits are supported (can be set by server) ?	Validity: Y Good Y Invalid N Reserved Y Questionable Y Overflow Y OutofRange N BadReference N Oscillatory Y Failure Y OldData N Inconsistent Y Inaccurate Source: Y Process Y Substituted Y Test Y OperatorBlocked
Sr2	1, 2	Which status value (ST) quality bits are supported (can be set by server) ?	Validity: Y Good Y Invalid N Reserved Y Questionable N BadReference Y Oscillatory Y Failure Y OldData N Inconsistent N Inaccurate Source: Y Process Y Substituted Y Test Y OperatorBlocked
Sr3		What is the maximum number of data values in one GetDataValues request ?	Deprecated
Sr4		What is the maximum number of data values in one SetDataValues request ?	Deprecated
Sr5		Which Mode / Behaviour values are supported?	Y On N (On-)Blocked Y Test N Test/Blocked Y Off

ID	ED	Description	Value / Clarification
additional items			
		What is the behaviour of the device by GetAllDataValues?	<p>GetAllDataValues is not supported without functional constraint indication.</p> <p>The functional constraints SG and SP can not be read as functional constraint logical nodes;</p> <p>for those functional constraint only FCD's and FCDA's access are supported: GetDataValues, GetSGValues.</p>

1.4 Data set model

ID	ED	Description	Value / Clarification
Ds1	1	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.
Ds2	1	How many persistent data sets can be created by one or more clients ?	30 data sets for each LD. It depends on the available memory.
Ds3	1	How many non-persistent data sets can be created by one or more clients ?	10 data sets. It depends on the available memory.

1.5 Substitution model

ID	ED	Description	Value / Clarification
Sb1	1	Are substituted values stored in volatile memory?	N
additional items			
		What is the behavior of the substitution model when subEna is true for the object?	As long as subEna is true, further substitution can be performed without having to disable the substitution first.

1.6 Setting group control model

ID	ED	Description	Value / Clarification
Sg1	1	What is the number of supported setting groups for each logical device?	Configurable, see SGCB value
Sg2	1, 2	What is the effect of when and how the non-volatile storage is updated ? (compare IEC 61850-8-1 §16.2.4)	The settings will be available after a restart since they are non-volatile, as long as the setting group editing succeed.
Sg3	1	Can multiple clients edit the same setting group?	Y but not at the same time.
Sg4	1	What happens if the association is lost while editing a setting group?	The setting group edition is cancelled
Sg5	1	Is EditSG value 0 allowed?	Y It cancels the current editing and unreserve the SGCB.
		additional items:	
		What happens if during the editing of a setting group, the EditSG is set again by the client that performs the editing?	The current edit buffer is overwritten with the value contained in the setting group. The edited value that were not confirmed are lost.
		What is the behaviour of the device by GetAllDataValues?	GetAllDataValues is not supported. The functional constraints SG, SP and SE can not be readen as functional constraint logical nodes; the those functional constraint only FCD's and FCDA's access are supported: GetDataValues, GetSG-Values/GetEditSGValue.
		What is the behaviour of the device by GetAllDataValues?	GetAllDataValues is not supported without functional constraint indication. The functional constraints SG, SP and SE can not be readen as functional constraint logical nodes; for those functional constraint only FCD's and FCDA's access are supported: GetDataValues, GetSG-Values/GetEditSGValue.

1.7 Reporting model

ID	ED	Description	Value / Clarification
Rp1	1	The supported trigger conditions are (compare PICS)	Y Integrity Y Data change Y Quality change Y Data update Y General Interrogation
Rp2	1	The supported optional fields are	Y Sequence-number Y Report-time-stamp Y Reason-for-inclusion Y Data-set-name Y Data-reference Y Buffer-overflow - for Buffered report Y EntryID - for Buffered report Y Conf-rev Y Segmentation
Rp3	1, 2	Can the server send segmented reports ?	Y
Rp4	1, 2	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 immediatly
Rp5	1	Multi client URCB approach (Compare IEC 61850-7-2 §14.2.1)	Each URCB is visble to all clients
Rp6	-	What is the format of EntryID?	Deprecated
Rp7	1, 2	What is the buffer size for each BRCB or how many reports can be buffered ?	About 1 MB are available for the buffering. Each BRCB has an extension attribute Memory that display the percentage of those 1 MB that have been reserved/forseen for its own entries. Amount is 1 MB/Number of all BRCB's
Rp8	-	Pre-configured RCB attributes that cannot be changed online when RptEna = FALSE (see also the ICD report settings)	For Buffered and Unbuffered: All pre-configured RCB attributes can be changed online when RptEna = FALSE
Rp9	1	May the reported data set contain: - structured data objects? - data attributes?	Y Y
Rp10	1, 2	What is the scan cycle for binary events? Is this fixed, configurable?	1 msecond Fixed
Rp11	1	Does the device support to pre-assign a RCB to a specific client in SCL?	Y
Rp12	2	After restart of the server is the value of ConfRev restored from the original configuration or retained prior to restart?	Restore from original configuration
additional items			
		Interrupt of general interrogation	Running GI could not be interrupted. If a new GI request occurs during a running GI, the current GI will be finished first before the second GI request will be processed.
		Integrity period	Configurable § 1 second

ID	ED	Description	Value / Clarification
		Optional use of a flow control for transmitting history of a BRCB	<p>As specified in the IEC61850-7-2, transmission of entries may require some time, depending of the amount of entries that have to be transmitted.</p> <p>Therefore, the SIPROTEC has an optional flow control feature to accelerate the transmission of the entries: each BRCB has an extended attribute MaxOutReports that can be set from the associated-client to change the transmission strategy of the entries. Those attributes are located in VMD variables. The number ordered will then be transmitted as long as they exist in the buffer; the server then reset the attribute to 0 and wait for the client to set it again in order to continue the history transmission with MaxOutReports entries. The attribute only influences the flow control of entries while dealing with the history, and not after the history transmission has completed.</p>

1.8 GOOSE publish model

ID	ED	Description	Value / Clarification
Gp1	1, 2	Can the test/simulation flag in the published GOOSE be turned on / off	N
Gp2	1	What is the behavior when the GOOSE publish configuration is incorrect	DUT will send GOOSE with NdsCom = TRUE as long as the minimum required configuration is available (dstAddress)
Gp3	1, 2	Published FCD supported common data classes are	SPS, DPS, INS, ENS, ACT, ACD, BCR, MV, CMV, WYE, DEL, SEQ, SPC, DPC, INC, ENC, APC, BAC, BSC Arrays are not supported
Gp4	1, 2	What is the slow retransmission time? Is it fixed or configurable?	Configured by SCD file
Gp5	1, 2	What is the fast retransmission scheme? Is it fixed or configurable?	Configured by SCD file
Gp6	-	Can the GOOSE publish be turned on / off by using SetGoCBValues(GoEna)?	Deprecated See PICS - SetGoCBValues
Gp7	1, 2	What is the initial GOOSE sqNum after restart?	sqNum = 0
Gp8	1	May the GOOSE data set contain: - structured data objects (FCD)? - Timestamp data attributes?	Y Y
additional items			
		Maximum number of GOOSE messages which could be sent	≤ 16 ; It depends on the available memory
		What is the behavior of the DUT when a user configures a GoCB with a dataset which values will not fit in a single GOOSE message?	Not possible. IED Tool DIGSI informs the users that the DataSet configuration exceeds the maximum size allowed.
		Which TAL (time allowed to live) value is sent by the GOOSE Publishers?	TAL is set to 1,5 * maxTime configured in the SCD file

1.9 GOOSE subscribe model

ID	ED	Description	Value / Clarification
Gs1	1, 2	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 APPIP Y gocbRef N timeAllowedtoLive Y datSet Y goID N t Y stNum Y sqNum Y test/sim Y confRev Y ndsCom Y numDatSetEntries
Gs2	1, 2	When is a subscribed GOOSE marked as lost ? (TAL = time allowed to live value from the last received GOOSE message)	When message does not arrive by $1 \cdot \text{TAL}$
Gs3	1, 2	What is the behavior when one or more subscribed GOOSE message isn't received or syntactically incorrect ? (missing GOOSE)	Last received data as mark as invalid and resend to the application
Gs4	1, 2	What is the behavior when a subscribed GOOSE message is out-of-order ?	When a given state Number n, sequence Number l is received, only the following telegrams will be accepted: n, l + 1; n, l + 2; n + 1, 0; n + 1, 1, 1,0 All other telegrams are ignored.
Gs5	1, 2	What is the behavior when a subscribed GOOSE message is duplicated ?	The repetition will be ignored.
Gs6	1	Does the device subscribe to GOOSE messages with/without the VLAN tag?	Y with the VLAN tag Y without the VLAN tag
Gs7	1	May the GOOSE data set contain: - structured data objects? - timestamp data attributes?	Y Y
Gs8	1, 2	Subscribed FCD supported common data classes are	SPS, DPS, INS, ENS, ACT, ACD, BCR, MV, CMV, WYE, DEL, SEQ, SPC, DPC, INC, ENC, BSC, ISC, APC, BAC Arrays are not supported
additional items			
		Maximum number of GOOSE messages which could be received	≤ 128 ; It depends on the available memory.

ID	ED	Description	Value / Clarification
		Interpretation of GOOSE messages at subscriber side	<p>1. Received GOOSE data objects without assigned quality attribute are interpreted as invalid.</p> <p>2. Received GOOSE data objects which quality attribute are set to questionable are changed to invalid.</p>
		Processing of Quality attribute at subscriber side	Received GOOSE data objects with a quality attribute set to invalid or operator-Block can be internally configured to be substituted with a pre-defined value.
		Processing of time stamp attribute at subscriber side.	Received GOOSE data object are time stamped at reception time. Published attribute time stamp of the GOOSE data object can be used internally if accordingly configured.
		GOOSE subscriber behavior in case of missing GOOSE messages	<p>After a GOOSE multicast application association has been interrupted, the reception of a valid GOOSE telegram is required to validate the state of this GOOSE association again.</p> <p>However, the IED tolerates a missing telegram as long as the next telegram (expected n, received n+1) is received within the time allowed to live time out detection (the time allowed to live timeout detection occurs after $1 \cdot \text{TAL}$).</p>
		What is the behavior when a GOOSE header parameter is mismatching with the expected one? (datSet, goID, confRev, numDatSetEntries, number of allData)	<p>The Rx-mismatch counter available at the diagnostic buffer is incremented.</p> <p>The received telegram with the mismatched attribute will be discarded: it has not been subscribed. In that case only the timeout detection will set the data to invalid.</p>
		What is the behavior when there is an out-of-order entry in the allData?	The confRev attribute in the header guarantees that the allData entries are in the correct order. Therefore, it's necessary to check the confRev attribute. There is no chance to detect a semantic out-of-order if the types are identical.
		What is the behavior when numDatSetEntries and number of allData are inconsistent?	The telegram is discarded since it is corrupt (not well formed). The data objects are declared invalid.

1.10 Control model

ID	ED	Description	Value / Clarification
Ct1	-	What control models are supported? (compare PICS)	Y Status-only Y Direct-with-normal-security Y Sbo-with-normal-security Y Direct-with-enhanced-security Y Sbo-with-enhanced-security
Ct2	1, 2	Is the control model fixed, configurable and/or online changeable?	Configurable
Ct3	-	Is TimeActivatedOperate supported (compare PICS or SCL)	Deprecated
Ct4	-	Is "operate-many" supported (compare sboClass)?	Deprecated
Ct5	1	What is the behavior of the DUT when the test attribute is set in the SelectWithValue and/or Operate request?	Y if own behavior is in test. The request will be proceed if the Beh of the logical node where the controlled object is located is Test. Otherwise, it will be discarded as "Blocked-by-mode".
Ct6	-	What are the conditions for the time (T) attribute in the SelectWithValue and/or Operate request?	Deprecated
Ct7	-	Is pulse configuration supported?	Deprecated
Ct8	1	What is the behavior of the DUT when the check conditions are set Is this behavior fixed, configurable, online changeable?	Y synchrocheck Y interlock-check DUT uses the check value to perform the check according to the control request Configurable

ID	ED	Description	Value / Clarification
Ct9	1, 2	What additional cause diagnosis are supported?	Y Blocked-by-switching-hierarchy Y Select-failed Y Invalid-position Y Position-reached Y Parameter-change-in-execution Y Step-limit Y Blocked-by-Mode Y Blocked-by-process Y Blocked-by-interlocking Y Blocked-by-synchrocheck Y Command-already-in-execution Y Blocked-by-health Y 1-of-n-control Y Abortion-by-cancel Y Time-limit-over N Abortion-by-trip Y Object-not-selected Edition 2 specific values: Y Object-already-selected N No-access-authority N Ended-with-overshoot N Abortion-due-to-deviation N Abortion-by-communication-loss N Blocked-by-command N None Y Inconsistent-parameters Y Locked-by-other-client
Ct10	1, 2	How to force a "test-not-ok" respond with SelectWithValue request?	Test and logical node Beh do not match Wrong or Cat
Ct11	1, 2	How to force a "test-not-ok" respond with Select request?	When the control object has already been selected
Ct12	1, 2	How to force a "test-not-ok" respond with Operate request?	DOns: Test and logical node Beh do not match Wrong or Cat SBOs: Test and logical node Beh do not match Wrong or Cat DOes: Test and logical node Beh do not match Wrong or Cat SBOes: Test and logical node Beh do not match Wrong or Cat
Ct13	1, 2	Which origin categories are supported?	Bay-control, station-control, remote-control, automatic-station, automatic-remote, maintenance, process

ID	ED	Description	Value / Clarification
Ct14	1, 2	What happens if the orCat value is not supported?	DOns: oper.Resp-, not-supported SBOs: oper.Resp-, not-supported DOes: oper.Resp-, not-supported SBOes: SelectWithValue.Resp- Not-supported
Ct15	1, 2	Does the IED accept a selectwithvalue/operate with the same ctIVal as the current status value?	DOns: Y SBOs: Y DOes: Y SBOes: Y Depending if the verify check has been disabled with DIGSI
Ct16	1	Does the IED accept a select/operate on the same control object from 2 different clients at the same time?	DOns: N SBOs: N DOes: N SBOes: N No, if the second request occurred when the object is not in unselected state (SBOs, SBOes), resp. Ready state (DOns, DOes), then it will lead to a negative response
Ct17	1	Does the IED accept a select/selectwithvalue from the same client when the control object is already selected (tissue 334)?	SBOs: N SBOes: N
Ct18	1, 2	Is for SBOes the internal validation performed during the SelectWithValue and/or Operate step?	SelectWithValue and Operate
Ct19	-	Can a control operation be blocked by Mod=Off or Blocked	Y
Ct20	1, 2	Does the IED support local / remote operation?	Y
Ct21	1, 2	Does the IED send an InformationReport with LastApplError as part of the Operate response for control with normal security?	SBOs: Y DOns: Y
Ct22	2	How to force a "parameter-change-in-execution"	SBOs: SBOes: Parameter-change-in-execution is supported in Ed1 only
additional items			
		Inconsistency between Select and (Oper or cancel)	Oper or cancel will be acknowledged with negative response if inconsistencies to the select request are detected. The following attributes will not be checked in this case: T (Time). The controlled object returns then in state "unselected".
		Cancel request could be sent after an operate request.	Y
		Format of the control time stamp attribute ?	Time stamp instead of EntryTime acc. to the 7-2 Errata List
		Negative response for select request could be performed only	If the logical Mod and the Test attribute do not match. If the selection is already done. If the service parameter of Select are not supported (e.g. wrong or Cat)

ID	ED	Description	Value / Clarification
		What is the behavior of the control state machines when the association is lost with the client that issued a successful control?	For SBOes and SBOs: If the current state is "Ready", then the selection ends.

1.11 Time and synchronisation model

ID	ED	Description	Value / Clarification
Tm1	1, 2	What quality bits are supported (may be set by the IED)?	Y LeapSecondsKnown Y ClockFailure Y ClockNotSynchronized
Tm2	1, 2	Describe the behavior when the time synchronization signal/messages are lost	The quality attribute "ClockNotSynchronized" will be set to TRUE after a configured time period.
Tm3	1, 2	How long does it take to take over the new time from time server?	Configurable Default: 10 min
Tm4	1, 2	When is the time quality bit "Clock failure" set?	Clock failure is set when the device internal clock drifts from the external synchronization.
Tm5	1, 2	When is the time quality bit "Clock not synchronised" set?	The "ClockNotSynchronized" attribute is set to TRUE as long as no time synchronization is established.
Tm6	-	Is the timestamp of a binary event adjusted to the configured scan cycle?	Deprecated
Tm7	1, 2	Does the device support time zone and daylight saving?	Y
Tm8	1, 2	Which attributes of the SNTP response packet are validated?	N Leap indicator not equal to 3? Y Mode is equal to SERVER Y OriginateTimestamp is equal to value sent by the SNTP client as Transmit Timestamp Y RX/TX timestamp fields are checked for reasonableness Y SNTP version 3 and/or 4 Y Other (describe): Stratum is not KISS OF DEATH Clock of STNP Server is synchronized Response comes from the server to which the request was sent
Tm9	1, 2	Do the COMTRADE files have local time or UTC time and is this configurable	UTC or local time depending on device type (UTC for 7KE85 devices, local time for other devices) Not configurable

1.12 File transfer model

ID	ED	Description	Value / Clarification
Ft1	1	What is structure of files and directories? Where are the COMTRADE files stored? Are COMTRADE Files zipped and what files are included in each zip file?	Directory name / COMTRADE / *; Directory name / LD / *; Files according to the comtrade standard
Ft2	1, 2	Directory names are separated from the file name by	"/"
Ft3	1	The maximum file name size including path (default 64 chars)	64
Ft4	1, 2	Are directory/file name case sensitive	Case sensitive
Ft5	1, 2	Maximum file size for SetFile	SetFile is not supported
Ft6	1	Is the requested file path included in the file name of the MMS fileDirectory respond?	Y
Ft7	1	Is the wild char supported MMS fileDirectory request?	Y only as *; not as name completion wild card
Ft8	1, 2	Is it allowed that 2 clients get a file at the same time?	N Y only for 7KE85
additional items			
		Maximum number of files that can be accessed simultaneously?	1
		Maximum time the file transfer service is locked for one client	10 min

1.13 Service tracking model

ID	ED	Description	Value / Clarification
Tr1	2	Which ACSI services are tracked by LTRK.GenTrk?	SelectEditSG SetEditSGValue ConfirmEditSGValues depending if several setting groups: SelectActiveSG

1.14 General items

ID	ED	Description	Value / Clarification
additional items:			
		What is the type of the attribute actVal in the BCR (Binary Counter Reading) CDC?	Depending on the edition mode used. The type is integer 32 (INT32) if the software is running in edition 1 mode, otherwise it is integer 64 (INT64).
		What is the behaviour of the Device by GetAllDataValues?	GetAllDataValues is not supported without functional constraint indication.

1.15 TICS - Technical Issues Implementation Conformance Statement

1.15.1 TISSUES Edition 1

The implemented TISSUES are only relevant when the Edition Setting is set to Edition 1, otherwise those TISSUES are not relevant for Edition 2.

TISSUE No	Link	Description	Impact of Interoper.
433	http://tissue.iec61850.com/tissue/433	Order of attributes in specialized CDCs for control service mapping	na
422	http://tissue.iec61850.com/tissue/422	Order of extension data objects and data attributes	na
168	http://tissue.iec61850.com/tissue/168	Order of attributes in MMS components	na
141	http://tissue.iec61850.com/tissue/141	Desc: object reference length extended to 129	Y ¹⁾
120	http://tissue.iec61850.com/tissue/120	Type - Mod.stVal and Mod.ctlVal	na
146	http://tissue.iec61850.com/tissue/146	CtxInt	na
173	http://tissue.iec61850.com/tissue/173	Ctl modelling harmonization	na
234	http://tissue.iec61850.com/tissue/234	New type CtxInt	Y
75	http://tissue.iec61850.com/tissue/75	Desc: Str and Op Data Object in GAPC	na
377	http://tissue.iec61850.com/tissue/377	DeleteDataSet response-	na
276	http://tissue.iec61850.com/tissue/276	File Services Negative Responses	na
183	http://tissue.iec61850.com/tissue/183	GetNameList error handling	Y
165	http://tissue.iec61850.com/tissue/165	Improper Error Response for GetDataSetValues	Y
116	http://tissue.iec61850.com/tissue/116	GetNameList with empty response?	Y
474	http://tissue.iec61850.com/tissue/474	GI for URCB	na
453	http://tissue.iec61850.com/tissue/453	Reporting & Logging model revision	Y
438	http://tissue.iec61850.com/tissue/438	EntryTime base should be GMT	na
349	http://tissue.iec61850.com/tissue/349	BRCB TimeOfEntry has two definitions	Y
348	http://tissue.iec61850.com/tissue/348	URCB class and report	Y
344	http://tissue.iec61850.com/tissue/344	TimeOfEntry misspelled	na
335	http://tissue.iec61850.com/tissue/335	Clearing of Bufovfl	Y
332	http://tissue.iec61850.com/tissue/332	Ambiguity in use of trigger options	Y
329	http://tissue.iec61850.com/tissue/329	Reporting and BufOvl	Y
322	http://tissue.iec61850.com/tissue/322	Write Configuration attribute of BRCBs	na
301	http://tissue.iec61850.com/tissue/301	SqNum in Buffered Reports	na
300	http://tissue.iec61850.com/tissue/300	Attribute Resv in BRCB	Y
298	http://tissue.iec61850.com/tissue/298	Type of SqNum	Y
297	http://tissue.iec61850.com/tissue/297	Sequence number	Y
278	http://tissue.iec61850.com/tissue/278	EntryId not valid for a server	Y
275	http://tissue.iec61850.com/tissue/275	Confusing statement on GI usage	Y
191	http://tissue.iec61850.com/tissue/191	BRCB: Integrity and buffering reports	Y
190	http://tissue.iec61850.com/tissue/190	BRCB: EntryId and TimeOfEntry	Y
177	http://tissue.iec61850.com/tissue/177	Ignoring OptFlds bits for URCB	na
52	http://tissue.iec61850.com/tissue/52	Ambiguity GOOSE SqNum	Y
49	http://tissue.iec61850.com/tissue/49	BRCB TimeOfEntry?	Y
46	http://tissue.iec61850.com/tissue/46	Synchro check cancel	Y
44	http://tissue.iec61850.com/tissue/44	AddCause - Object not sel	Y
30	http://tissue.iec61850.com/tissue/30	control parameter T	Y
520	http://tissue.iec61850.com/tissue/520	Desc: control canceling at connection loss	na

TISSUE No	Link	Description	Impact of Interoper.
593	http://tissue.iec61850.com/tissue/593	Desc: Setting Group Canceling, eding	Y
545	http://tissue.iec61850.com/tissue/545	Files Directories	Y
1) No impact as long as the IED Name and the logical device inst have together a length smaller than 13 char.			

1.15.2 TISSUES Edition 2

Edition 2 TISSUES have already been implemented in the device Object Model and are active within the name space of IEC 61850-7-4:2007.

TISSUE No	Link	Description	Impact of Interoper.
658	http://tissue.iec61850.com/tissue/658	Tracking related features	Y
663	http://tissue.iec61850.com/tissue/663	FCDA element cannot be a "functionally constrained logical node"	Y
668	http://tissue.iec61850.com/tissue/668	Autotransformer modeling	Y
687	http://tissue.iec61850.com/tissue/687	SGCB ResvTms	na
719	http://tissue.iec61850.com/tissue/719	ConfDataSet - maxAttributes definition is confusing	Y
721	http://tissue.iec61850.com/tissue/721	Log element name	na
768	http://tissue.iec61850.com/tissue/768	bType VisString65 is missing	na
779	http://tissue.iec61850.com/tissue/779	object references	Y
788	http://tissue.iec61850.com/tissue/788	SICS S56 from optional to mandatory	na
789	http://tissue.iec61850.com/tissue/789	ConfLdName as services applies to both server and client	Y
804	http://tissue.iec61850.com/tissue/804	valKind and IED versus System configuration	na
806	http://tissue.iec61850.com/tissue/806	Max length of log name inconsistent between -6 and -7-2	na
807	http://tissue.iec61850.com/tissue/807	Need a way to indicate if "Owner" present in RCB	na
822	http://tissue.iec61850.com/tissue/822	Short addresses on structured data attributes	na
823	http://tissue.iec61850.com/tissue/823	ValKind for structured data attributes	Y
824	http://tissue.iec61850.com/tissue/658	Short addresses on structured data attributes	na
825	http://tissue.iec61850.com/tissue/825	Floating point value	na
845	http://tissue.iec61850.com/tissue/845	SGCB ResvTms	na
853	http://tissue.iec61850.com/tissue/853	SBO and ProtNs	Y
855	http://tissue.iec61850.com/tissue/855	Recursive SubFunction	na
856	http://tissue.iec61850.com/tissue/856	VoltageLevel frequency and phases	na
857	http://tissue.iec61850.com/tissue/857	Function/SubFunction for ConductingEquipment	na
886	http://tissue.iec61850.com/tissue/886	Missing 8-1 P-types	na
901	http://tissue.iec61850.com/tissue/901	tServices as AP or as IED element	Y
936	http://tissue.iec61850.com/tissue/936	SupSubscription parameter usage is difficult	na
1168	http://tissue.iec61850.com/tissue/1168	doName and daName of ExtRef; doName may have one dot (DO.SDO)	Y
1175	http://tissue.iec61850.com/tissue/1175	IPv6 address lowercase only	na
828	http://tissue.iec61850.com/tissue/828	Data model namespace revision IEC 61850-7-4:2007[A]	Y
1129	http://tissue.iec61850.com/tissue/1129	Rules for extending nameplate information (new CDC VSD)	na
1151	http://tissue.iec61850.com/tissue/1151	simulated GOOSE disappears after 1st appearance when LPHD.Sim = TRUE	na

TISSUE No	Link	Description	Impact of Interoper.
1196	http://tissue.iec61850.com/tissue/1196	Extensions to standardized LN classes made by third parties	Y
778	http://tissue.iec61850.com/tissue/778	AddCause values – add value not-supported	na
780	http://tissue.iec61850.com/tissue/780	What are unsupported trigger option at a control block?	Y
783	http://tissue.iec61850.com/tissue/783	TimOper Resp- ; add Authorization check	na
786	http://tissue.iec61850.com/tissue/786	AddCause values 26 and 27 are switched	na
820	http://tissue.iec61850.com/tissue/820	Mandatory ACSI services (use for PICS template)	Y
858	http://tissue.iec61850.com/tissue/858	typo in enumeration ServiceType	Y
861	http://tissue.iec61850.com/tissue/861	dchg of ConfRev attribute	Y
876	http://tissue.iec61850.com/tissue/876	GenLogiclNodeClass and SGCB, GoCB, MsvCB, UsvCB	Y
1038	http://tissue.iec61850.com/tissue/1038	Loss of Info Detection After Resynch	Y
1050	http://tissue.iec61850.com/tissue/1050	GTS Phycomaddr definition in SCL	na
1062	http://tissue.iec61850.com/tissue/1062	Entrytime not used in CDC	Y
1071	http://tissue.iec61850.com/tissue/1071	Length of DO name	Y
1091	http://tissue.iec61850.com/tissue/1091	The sentence "The initial value of EditSG shall be 0", has to be stated in part 7.2 not in 8.1	Y
1127	http://tissue.iec61850.com/tissue/1127	Missing owner attribute in BTS and UTS	na
1163	http://tissue.iec61850.com/tissue/1163	Old report in URCB	Y
1202	http://tissue.iec61850.com/tissue/1202	GI not optional	Y
697	http://tissue.iec61850.com/tissue/697	persistent command / PulseConfig	Y
698	http://tissue.iec61850.com/tissue/698	Wrong case is BAC.dB attribute	na
722	http://tissue.iec61850.com/tissue/722	Units for "h" and "min" not in UnitKind enumeration.	Y
919	http://tissue.iec61850.com/tissue/919	Presence Condition for sVC	Y
925	http://tissue.iec61850.com/tissue/925	Presence of i or f attribute - Problem with writing	Y
926	http://tissue.iec61850.com/tissue/926	Presence Conditions within RangeConfig	na
671	http://tissue.iec61850.com/tissue/671	mistake in definition of Mod & Beh	Y
674	http://tissue.iec61850.com/tissue/674	CDC of ZRRC.LocSta is wrong	na
676	http://tissue.iec61850.com/tissue/676	Same data object name used with different CDC	na
677	http://tissue.iec61850.com/tissue/677	MotStr is used with different CDC in PMMS and SOPM LN classes	na
679	http://tissue.iec61850.com/tissue/679	Remove CycTrMod Enum	na
680	http://tissue.iec61850.com/tissue/680	SI unit for MHYD.Cndct	na
681	http://tissue.iec61850.com/tissue/681	Enum PIDAlg	na
682	http://tissue.iec61850.com/tissue/682	ANCR.ParColMod	na
683	http://tissue.iec61850.com/tissue/683	Enum QVVR.IntrDetMth	na
685	http://tissue.iec61850.com/tissue/685	Enum ParTraMod	na
686	http://tissue.iec61850.com/tissue/686	New annex H - enums types in XML	Y
694	http://tissue.iec61850.com/tissue/694	Data object CmdBlk	na
696	http://tissue.iec61850.com/tissue/696	LSVS.St (Status of subscription)	na
712	http://tissue.iec61850.com/tissue/712	interpretation of quality operatorBlocked	na
713	http://tissue.iec61850.com/tissue/713	DO Naming of time constants in FFIL	na
724	http://tissue.iec61850.com/tissue/724	ANCR.Auto	na
725	http://tissue.iec61850.com/tissue/725	Loc in LN A-group	na
734	http://tissue.iec61850.com/tissue/734	LLN0.OpTmh vs. LPHD.OpTmh	na
736	http://tissue.iec61850.com/tissue/736	PFSign	na
742	http://tissue.iec61850.com/tissue/742	GAPC.Str, GAPC.Op and GAPC.StrVal	Y

TISSUE No	Link	Description	Impact of Interoper.
743	http://tissue.iec61850.com/tissue/743	CCGR.PmpCtl and CCGR.FanCtl	na
744	http://tissue.iec61850.com/tissue/744	LN STMP, EEHealth and EEName	Y
773	http://tissue.iec61850.com/tissue/773	Loc, LockKey and LocSta YPSH and YLTC	Y
774	http://tissue.iec61850.com/tissue/774	ITCI.LockKey	na
800	http://tissue.iec61850.com/tissue/800	Misspelling in CSYN	na
802	http://tissue.iec61850.com/tissue/802	CCGR and Harmonized control authority	na
808	http://tissue.iec61850.com/tissue/808	Presence condition of ZMoT.DExt and new DOs	Y
831	http://tissue.iec61850.com/tissue/831	Setting of ConfRevNum in LGOS	na
838	http://tissue.iec61850.com/tissue/838	Testing in Beh=Blocked	na
844	http://tissue.iec61850.com/tissue/844	MFLK.PhPiMax, MFLK.PhPiLoFil, MFLK.PhPiRoot DEL->WYE	na
849	http://tissue.iec61850.com/tissue/849	Presence conditions re-assessing in case of derived statistical calculation	Y
877	http://tissue.iec61850.com/tissue/877	QVUB -settings should be optional	na
909	http://tissue.iec61850.com/tissue/909	Remove ANCR.ColOpR and ColOpL	na
912	http://tissue.iec61850.com/tissue/912	Clarification of PwrRtg/VARtg	na
920	http://tissue.iec61850.com/tissue/920	Resetable Counter is NOT resetable	na
932	http://tissue.iec61850.com/tissue/932	Rename AVCO.SptVol to AVCO.VolSpt	na
939	http://tissue.iec61850.com/tissue/939	Change CDC for ANCR.FixCol	na
991	http://tissue.iec61850.com/tissue/991	LGOS: GoCBBRef (as well as LSVS.SvCBRef) should be mandatory	na
1007	http://tissue.iec61850.com/tissue/1007	PTRC as fault indicator - Update of description required	na
1044	http://tissue.iec61850.com/tissue/1044	TapChg in AVCO	na
1077	http://tissue.iec61850.com/tissue/1077	Rename DOnames within LTIM	Y
784	http://tissue.iec61850.com/tissue/784	Tracking of control (CTS)	na
817	http://tissue.iec61850.com/tissue/817	Fixed-length GOOSE float encoding	na
834	http://tissue.iec61850.com/tissue/834	File dir name length 64	Y
951	http://tissue.iec61850.com/tissue/951	Encoding of Owner attribute	na
1040	http://tissue.iec61850.com/tissue/1040	More associate error codes	na
1178	http://tissue.iec61850.com/tissue/1178	Select Response+ is non-null value	Y

2 IEC 61850 Conformance Statements

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2.2	Definition of the Communication Services Acc. to Standard (PICS)	35
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2.1 Definitions of the ISO/OSI Reference Model

To achieve stable data exchange, all communication is based on the OSI Reference Model (OSI/IEC 7498-1) for a multi-layer communication function.

This section on using the ISO application (application profile) and transport profiles (T profile) describes the various stack profiles. An ISO application profile is a set of specifications and declarations regarding the top 3 layers of the ISO/OSI reference model (i.e. the application, presentation, and session layers). The T profile is a set of specifications and declarations regarding the lower 4 layers (i.e. transport, network, data link, and physical layers).

A and T profiles can be combined in various ways to form different types of services and information items that can be exchanged. The services specified in Part 7-2 of the IEC 61850 standard are mapped onto 4 different combinations of the profiles.

These 4 combinations are used for

- Client/server services
- GOOSE/GSE management services
- GSSE services
- Time synchronization
- Services for measured value sampling.

2.2 Definition of the Communication Services Acc. to Standard (PICS)

The tables in the sections below appear in the same sequence as in standard IEC 61850, Part 8-1, Section 24.

The tables refer to Part 7 of the standard and the corresponding information must be contained in the PICS.

This section describes the conformance statements. The standard groups them together under the term Protocol Implementation Conformance Statement (PICS).

Mandatory services

Please note that a number of services are prescribed and must be implemented to comply with the standard. Only the optional services and protocols are listed here because they constitute freedom of implementation. None of the mandatory services is explicitly explained here. Please refer to the standard IEC 61850, Part 8-1.

The descriptions below refer to implementation in the SIPROTEC 5 device range.

The tables give the names stated in the standard.

2.2.1 Profile Compliance

Basic conformance statement

		Client/ Subscriber	Server/ Publisher	Value/ Comments
Client-Server roles				
B11	Server side (of TWO-PARTY-APPLICATION-ASSOCIATION)	--	Y	
B12	Client side (of TWO-PARTY-APPLICATION-ASSOCIATION)	N	--	
SCSMs supported				
B21	SCSM: IEC 6185-8-1 used	Y	Y	
B22	SCSM: IEC 6185-9-1 used			deprecated
B23	SCSM: IEC 6185-9-2 used			
B24	SCSM: other			
Generic substation event model (GSE)				
B31	Publisher side		Y	
B32	Subscriber side	Y		
Transmission of sample value model (SVC)				
B41	Publisher side	--	N	
B42	Subscriber side	Y	--	depending on HW. PB201 is required for the subscription of SMV.
Y = supported N or empty = not supported				

ACSI models conformance statement

		Client/ Subscriber	Server/ Publisher	Value/ Comments
If Server side (B11) and/or Client side (B12) supported				
M1	Logical device		Y	
M2	Logical node		Y	
M3	Data		Y	
M4	Data set		Y	
M5	Substitution		Y	
M6	Setting group control		Y	
	Reporting			
M7	Buffered report control		Y	
M7-1	sequence-number		Y	
M7-2	report-time-stamp		Y	
M7-3	reason-for-inclusion		Y	
M7-4	data-set-name		Y	
M7-5	data-reference		Y	
M7-6	buffer-overflow		Y	
M7-7	entryID		Y	
M7-8	BufTim		Y	
M7-9	IntgPd		Y	
M7-10	GI		Y	
M7-11	conf-revision		Y	
M8	Unbuffered report control		Y	
M8-1	sequence-number		Y	
M8-2	report-time-stamp		Y	
M8-3	reason-for-inclusion		Y	
M8-4	data-set-name		Y	
M8-5	data-reference		Y	
M8-6	BufTim		Y	
M8-7	IntgPd		Y	
M8-8	GI		Y	
M8-9	conf-revision		Y	
	Logging		N	
M9	Log control		N	
M9-1	IntgPd		N	
M10	Log		N	
M11	Control		Y	
M17	File Transfer	N	Y	
M18	Application association		Y	
M19	GOOSE Control Block		N	
M20	Sampled Value Control Block		N	
If GSE (B31/32) is supported				
M12	GOOSE	Y	Y	
M13	GSE	N	N	

		Client/ Subscriber	Server/ Publisher	Value/ Comments
If SVC (41/42) is supported				
M14	Multicast SVC	N	N	
M15	Unicast SVC	N	N	
For all IEDs				
M16	Time	N	Y	
Y = supported N or empty = not supported				

ACSI service conformance statement

	Services	AA: TP/MC	Client (C)	Server (S)	
Server					
S1	GetServerDirectory (LOGICAL-DEVICE)	TP	N	Y	
Application association					
S2	Associate		N	Y	
S3	Abort		N	Y	
S4	Release		N	Y	
Logical device					
S5	GetLogicalDeviceDirectory	TP	N	Y	
Logical Node					
S6	GetLogicalNodeDirectory	TP	N	Y	
S7	GetAllDataValues	TP	N	Y	
Data					
S8	GetDataValues	TP	N	Y	
S9	S9 SetDataValues	TP	N	Y	
S10	GetDataDirectory	TP	N	Y	
S11	GetDataDefinition	TP	N	Y	
Data set					
S12	GetDataSetValues	TP	N	Y	
S13	SetDataSetValues	TP	N	N	
S14	CreateDataSet	TP	N	Y	
S15	DeleteDataSet	TP	N	Y	
S16	GetDataSetDirectory	TP	N	Y	
Substitution					
S17	SetDataValues	TP	N	Y	

	Services	AA: TP/MC	Client (C)	Server (S)	
Setting group control					
S18	SelectActiveSG	TP	N	Y if there is more than one setting group	
S19	SelectEditSG	TP	N	Y	
S20	SetSGValues/ SetEditSGValue	TP	N	Y	
S21	ConfirmEditSGValues	TP	N	Y	
S22	GetSGValues/ GetEditSGValue	TP	N	Y	
S23	GetSGCBValues	TP	N	Y	
Reporting					
Buffered report control block (BRCB)					
S24	Report	TP	N	Y	
S24-1	data-change (dchg)		N	Y	
S24-2	quality-change (qchg)		N	Y	
S24-3	data-update (dupd)		N	Y	
S25	GetBRCBValues	TP	N	Y	
S26	SetBRCBValues	TP	N	Y	
Unbuffered report control block (URCB)					
S27	Report	TP	N	Y	
S27-1	data-change (dchg)		N	Y	
S27-2	quality-change (qchg)		N	Y	
S27-3	data-update (dupd)		N	Y	
S28	GetURCBValues	TP	N	Y	
S29	SetURCBValues	TP	N	Y	
Logging					
Log control block					
S30	GetLCBValues	TP	N	N	
S31	SetLCBValues	TP	N	N	
Log					
S32	QueryLogByTime	TP	N	N	
S33	QueryLogAfter	TP	N	N	
S34	GetLogStatusValues	TP	N	N	
Generic substation event model (GSE)					
GOOSE					
S35	SendGOOSEMessage	MC	Y	Y	
GOOSE Control Block					
S36	GetGoReference	TP	N	N	
S37	GetGOOSEElementNumber	TP	N	N	
S38	GetGoCBValues	TP	N	Y	
S39	GetGoCBValues	TP	N	Y	

	Services	AA: TP/MC	Client (C)	Server (S)	
GSSE					
S40	SendGSSEMessage	MC	N	N	
GSSE Control Block					
S41	GetGsReference	TP	N	N	
S42	GetGSSEElementNumber	TP	N	N	
S43	GetGsCBValues	TP	N	N	
S44	SetGsCBValues	TP	N	N	
Transmission of sample value model (SVC)					
Multicast Sampled Value Control Block					
S45	SendMSVMessage	MC	N	N	
S46	GetMSVCBValues	TP	N	N	
S47	SetMSVCBValues	TP	N	N	
Unicast Sampled Value Control Block					
S48	SendUSVMessage	TP	N	N	
S49	GetUSVCBValues	TP	N	N	
S50	SetUSVCBValues	TP	N	N	
Control					
S51	Select	TP	N	Y	
S52	SelectWithValue	TP	N	Y	
S53	Cancel	TP	N	Y	
S54	Operate	TP	N	Y	
S55	CommandTermination	TP	N	Y	
S56	TimeActivatedOperate	TP	N	N	
File transfer					
S57	GetFile	TP	N	Y	
S58	SetFile	TP	N	N	
S59	DeleteFile	TP	N	N	
S60	GetFileAttributeValues	TP	N	Y	
Time					
T1	Time resolution of internal clock			10 (1 ms)	nearest negative power of 2 in seconds
T2	Time accuracy of internal clock			Y	T0
				Y	T1
				Not supported	T2
				Not supported	T3
				Not supported	T4
				Not supported	T5
T3	Supported TimeStamp resolution			10 (1 ms)	nearest negative power of 2 in seconds
Y = supported					
N or empty = not supported					

2.3 Model Implementation Conformance Statement (MICS)

Content of the statement

This statement contains the description of all objects that are provided by a device and is especially important if devices are connected to a central system that supplies data to certain applications via the objects provided by the device.

In the case of SIPROTEC 5, this document depends on both the device type and the defined user objects and can therefore not be a permanent part of the manual. It is therefore generated from DIGSI.

Generation in DIGSI 5

Generation is selected in the device processing. Select the device and open via context menu Export ‡ IEC 61850 data formats:MICS the dialog to enter an editable filename under which the MICS document to be generated will be stored (XML file and the corresponding files MICS.css and MICS.xslt). The XML file can be opened, viewed and printed within a web browser.

The document is generated with the correct version and device type data. It shows the model implementation of the SIPROTEC 5 device. The whole document is shown in a hyperlinked table of contents. The MICS is a readable form of the current mapping of a device on IEC 61850.

In addition to the MICS, an ICD file and IID file (XML files) are created which describes the mapping of a device. Those ICD/IID files are used by the System Configurator, or can be imported into the system configurators of other manufacturers, in order to integrate these devices into the communication.