

SIEMENS

SICAM AK 3

PIXIT for IEC 61850 Ed. 2 Server (ET25)

Protocol Implementation extra Information
for Testing (PIXIT) the
IEC 61850 Ed.2 Server Interface in
Siemens SICAM AK 3

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Disclaimer of Liability

Although we have carefully checked the contents of this publication for conformity with the hardware and software described, we cannot guarantee complete conformity since errors cannot be excluded. The information provided in this manual is checked at regular intervals and any corrections that might become necessary are included in the next releases. Any suggestions for improvement are welcome.

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Preface

This document is applicable to the following product(s):

- SICAM AK 3

Purpose of this manual

This manual describes the Protocol Implementation extra Information for Testing (PIXIT) for the IEC 61850 Ed. 2 Server interface in:

- Siemens SICAM AK 3 using firmware "ET25 Rev. 03.04"

Note:

PIXIT "Protocol Implementation extra Information for Testing" contains additional information on how the IEC 61850 is implemented and used.

Target Group

The document you are reading right now is addressed to users, who are in charge of the following engineering tasks:

- Customers
- Sales engineering and technical clarification
- Conceptual activities, as for example design and configuration
- Technical system maintenance

Notes

This document is based on:

- UCA International Users Group
Testing Sub Committee
Template version 1.2
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1 Introduction

This document specifies the protocol implementation extra information for testing (PIXIT) of the IEC 61850 interface in **Siemens SICAM AK 3** with firmware "**ET25 Rev. 03.04**".

Together with the PICS and the MICS the PIXIT forms the basis for a conformance test according to IEC 61850-10. The PIXIT entries contain information which is not available in the PICS, MICS, TICS documents or SCL file.

Each table specifies the PIXIT for applicable ACSI service model as structured in IEC 61850-10. The "Ed" column indicates if the entry is applicable for IEC 61850 Edition 1 and/or Edition 2.

1.1 SICAM AK 3 “Device Under Test” (DUT)

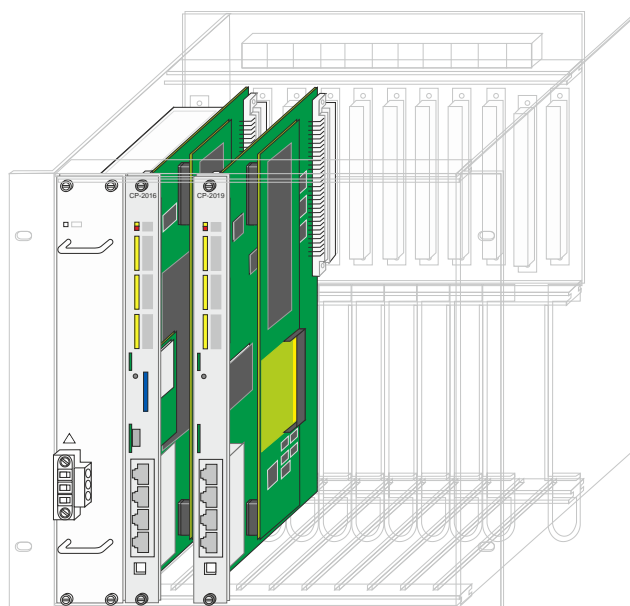
Board	MLFB	Description
PS-2632	6MF11130CG320AA0BB	Power Supply 110-220VDC, 230VAC AK 3
CP-2016	6MF10130CA160AA0BB	Central Processor AK 3
CP-2019 ¹⁾	6MF10132CA100AA0BB	Communication/Processing AK 3

¹⁾ CP-2019 on board Ethernet interface with **ET25 Rev. 03.04 firmware** used on logical SUB module SM-2599.



Notes:

- the red marked interface connector is assigned to IEC61850 Ed. 2 Server with ET25 firmware.
- the red marked interface connector is also used for WEB-Browser interface for IEC61850 Ed. 2 Server.
- the blue marked interface connector is used for SICAM AK 3 engineering software TOOLBOX II.



Note: SM-2599 is a logically SUB module on CP-2019 (system internally)

Firmware Revisions

	System element	HW#	FW#	Rev	TBII-Update	SetRev	P	SSE#	Task	Support of system elements
M	CP-2016/CPCX26	2016	2016	03	03 [03]					Supported
M-Bus0/PBA-0	PE-641X/USIO66	6410	6410	05.03	05.03 [05.03]			0		Supported
C2	CP-2019/PCCX26	2019	2019	03	03 [03]					Supported
C2-PRE/1	SM-2599/ET25	2599	2574	03.04	03.04 [03.04]			129		Supported

Note: IEC61850 Ed.2 functionality is included in firmware ET25 Rev. 03.04

Power Supply / CPU-Boards / Interface Cards

	Designation	Item-Number/MLFB
	PS-2632 Power supply 110-220 VDC, 230 VAC AK 3	GC2-632 6MF11130CG320AA0
	CP-2016 Central module AK 3	BC2-016 6MF10130CA160AA0
	CP-2019 Communication/Processing AK 3	BC2-019 6MF10132CA100AA0

2 PIXIT for 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. The recommended range is 1..20s	17 seconds
As3	1,2	Lost connection detection time	Up to 150 seconds
As4	-	Authentication is not supported yet	
As5	1,2	What association parameters are necessary for successful association	Transport selector N Session selector N Presentation selector N AP Title N AE Qualifier N
As6	1,2	If association parameters are necessary for association, describe the correct values e.g.	Transport selector Session selector Presentation selector AP Title AE Qualifier
As7	1,2	What is the maximum and minimum MMS PDU size	Max MMS PDU size 20000 Min MMS PDU size not checked
As8	1,2	What is the maximum start up time after a power supply interrupt	Up to 300 seconds
		<additional items>	

3 PIXIT for 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 N OutofRange N BadReference N Oscillatory N Failure N OldData N Inconsistent N Inaccurate Source: Y Process N Substituted Y Test N OperatorBlocked

ID	Ed	Description	Value / Clarification
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 N Oscillatory N Failure NOldData N Inconsistent N Inaccurate Source: Y Process N Substituted Y Test N OperatorBlocked
Sr3	-	What is the maximum number of data object references in one GetDataValues request	DEPRECATED
Sr4	-	What is the maximum number of data object references in one SetDataValues request	DEPRECATED
Sr5	1	Which Mode values are supported ¹	On Y [On-]Blocked Y Test Y Test/Blocked N Off Y
		<additional items>	

4 PIXIT for 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)	150
Ds2	1	How many persistent data sets can be created by one or more clients (this number includes predefined datasets)	0
Ds3	1	How many non-persistent data sets can be created by one or more clients	0
		<additional items>	

¹ IEC 61850-6:2009 clause 9.5.6 states that if only a subrange of the enumeration value set is supported, this shall be indicated within an ICD file by an enumeration type, where the unsupported values are missing

5 PIXIT for Setting group control model

ID	Ed	Description	Value / Clarification
Sg1	1	What is the number of supported setting groups for each logical device	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)	n.a. The DUT does not use non-volatile storage for setting groups.
Sg3	1	Can multiple clients edit the same setting group	n.a. The DUT does not support editing of setting groups.
Sg4	1	What happens if the association is lost while editing a setting group	n.a. The DUT does not support editing of setting groups
Sg5	1	Is EditSG value 0 allowed	n.a. The DUT does not support editing of setting groups
Sg6	2	When ResvTms is not present how long is an edit setting group locked	n.a. The DUT does not support editing of setting groups
		<additional items>	

6 PIXIT for Reporting model

ID	Ed	Description	Value / Clarification
Rp1	1	The supported trigger conditions are (compare PICS)	integrity Y data change Y quality change Y data update Y general interrogation Y
Rp2	1	The supported optional fields are	sequence-number Y report-time-stamp Y reason-for-inclusion Y data-set-name Y data-reference Y buffer-overflow Y entryID Y conf-rev Y segmentation Y
Rp3	1,2	Can the server send segmented reports	Y

ID	Ed	Description	Value / Clarification
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 immediately
Rp5	1	Multi client URCB approach (compare IEC 61850-7-2:2003 §14.2.1)	Each URCB is visible 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	n.a.
Rp8	-	Pre-configured RCB attributes that are dynamic, compare SCL report settings	Deprecated
Rp9	1	May the reported data set contain: - structured data objects - data attributes	Y N
Rp10	1,2	What is the scan cycle for binary events Is this fixed, configurable	1 or 10ms depending on the used digital input hardware. During the test the 10ms hardware is used.
Rp11	1	Does the device support to pre-assign a RCB to a specific client in the SCL	N
Rp12	2	After restart of the server is the value of ConfRev restored from the original configuration or retained prior to restart	Restored from original configuration
		<additional items>	

7 PIXIT for Control model

ID	Ed	Description	Value / Clarification
Ct1	-	What control models are supported (compare PICS)	Deprecated
Ct2	1,2	Is the control model fixed, configurable and/or dynamic	Configurable
Ct3	-	Is TimeActivatedOperate supported (compare PICS or SCL)	Deprecated
Ct4	-	Is "operate-many" supported (compare sboClass)	Deprecated
Ct5	1	Will the DUT activate the control output when the test attribute is set in the SelectWithValue and/or Operate request (when N test procedure CtI2 is applicable)	Y
Ct6	-	What are the conditions for the time (T) attribute in the SelectWithValue and/or Operate request	Deprecated
Ct7	-	Is pulse configuration supported (compare pulseConfig)	Deprecated
Ct8	1	What is the behaviour of the DUT when the check conditions are set Is this behaviour fixed, configurable, online changeable	N synchrocheck N interlock-check The Check attribute is not used for interlocking and synchrocheck functionality Fixed

ID	Ed	Description	Value / Clarification
Ct9	1,2	Which additional cause diagnosis are supported	N Unknown N Not-supported N Blocked-by-switching-hierarchy Y Select-failed Y Invalid-position N Position-reached N Step-limit Y Blocked-by-Mode Y Blocked-by-process N Blocked-by-interlocking N Blocked-by-synchrocheck Y Command-already-in-execution N Blocked-by-health Y 1-of-n-control N Abortion-by-cancel Y Time-limit-over N Abortion-by-trip Y Object-not-selected Edition 1 specific values: N Parameter-change-in-execution 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 N Parameter-change-in-execution
Ct10	1,2	How to force a "test-not-ok" respond with SelectWithValue request	orCat >= 9
Ct11	1,2	How to force a "test-not-ok" respond with Select request	orCat >= 9
Ct12	1,2	How to force a "test-not-ok" respond with Operate request	orCat >= 9
Ct13	1,2	Which origin categories are supported / accepted	Y bay-control Y station-control Y remote-control Y automatic-bay Y automatic-station Y automatic-remote Y maintenance Y process
Ct14	1,2	What happens if the orCat value is not supported or invalid	DUT sends a negative response with AddCause "not supported"
Ct15	1,2	Does the IED accept a SelectWithValue / Operate with the same control value as the current status value Is this behaviour configurable	DOns: Y SBOs: n.a. DOes: Y SBOes: Y Configurable N

ID	Ed	Description	Value / Clarification
Ct16	1,2	Does the IED accept a select/operate on the same control object from 2 different clients at the same time	DOns: N SBOs: n.a. DOes: N SBOes: N
Ct17	1	Does the IED accept a Select/SelectWithValue from the same client when the control object is already selected (Tissue #334)	SBOs: n.a. 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 [On-]Blocked (Compare PIXIT-Sr5)	Deprecated
Ct20	1,2	Does the IED support local / remote operation	N
Ct21	1,2	Does the IED send an InformationReport with LastApplError as part of the Operate response- for control with normal security	SBOs: n.a. DOns: N
Ct22	2	How to force a "parameter-change-in-execution"	SBOs: n.a. SBOes: N
		<additional items>	

8 PIXIT for Time synchronisation model

ID	Ed	Description	Value / Clarification
Tm1	1,2	What time quality bits are supported (may be set by the IED)	N LeapSecondsKnown N ClockFailure Y ClockNotSynchronized
Tm2	1,2	Describe the behaviour when the time server(s) ceases to respond What is the time server lost detection time	On one time server: internal diagnosis message. Can be read with SICAM TOOLBOX II. On all time servers: start a timeout, after timeout all new datapoints are marked with clock not synchronized. Default value is 30 minutes, although it is configured during testing to 5 minutes.
Tm3	1,2	How long does it take to take over the new time from time server	Up to 120 seconds
Tm4	1,2	When is the time quality bit "ClockFailure" set	
Tm5	1,2	When is the time quality bit "Clock not Synchronized" set	When connection to all time servers is lost (see PIXIT-Tm2)
Tm6	-	Is the timestamp of a binary event adjusted to the configured scan cycle	Deprecated
Tm7	1	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 N OriginateTimestamp is equal to value sent by the SNTP client as Transmit Timestamp Y RX/TX timestamp fields are checked for reasonableness N SNTP version 3 and/or 4 N other (describe)
Tm9	1,2	Do the COMTRADE files have local time or UTC time and is this configurable	
		<additional items>	

