

Electrical network protection

Sepam

IEC 61850

communication

For Sepam series 20/40/60/80

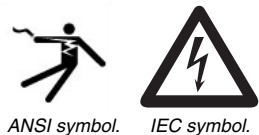
User's manual
01/2013



Safety instructions

Safety symbols and messages

Read these instructions carefully and look at the equipment to become familiar with the device before trying to install, operate, service or maintain it. The following special messages may appear throughout this bulletin or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.



Risk of electric shock

The addition of either symbol to a Danger or Warning safety label indicates that an electrical hazard exists, which will result in personal injury if the instructions are not followed.



Safety alert

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

Safety messages

⚠ DANGER
DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
⚠ WARNING
WARNING indicates a potentially hazardous situation which, if not avoided, can result in death or serious injury.
⚠ CAUTION
CAUTION indicates a potentially hazardous situation which, if not avoided, can result in minor or moderate injury.
NOTICE
NOTICE is used to address practices not related to physical injury.

Important notes

Restricted liability

Electrical equipment should be serviced and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this manual. This document is not intended as an instruction manual for untrained persons.

Device operation

The user is responsible for checking that the rated characteristics of the device are suitable for its application. The user is responsible for reading and following the device's operating and installation instructions before attempting to commission or maintain it. Failure to follow these instructions can affect device operation and constitute a hazard for people and property.

Protective grounding

The user is responsible for compliance with all the existing international and national electrical codes concerning protective grounding of any device.

Presentation	2
Communication implementation steps	4
ECl850 Sepam server	5
Configuration	5
FTP server	13
Diagnostics pages	14
Commissioning and troubleshooting	18
ACE850 Communication interface	20
Configuration	20
FTP server	24
Web server	25
Commissioning and troubleshooting	31
Configuration of IEC 61850 protocol	34
Introduction	34
With SFT2841 setting and operating software	36
With CET850 configuration software	43
Configuration of GOOSE communication	51
GOOSE configuration process	51
Testing GOOSE communication	55
Conformance statements	
(Edition 1.0)	57
ACSI conformance statement	58
MICS - Model implementation conformance statement	61
PICS - Protocol implementation conformance statement	94
PIXIT - Protocol implementation	
extra information for testing	97
TICS - Technical issues conformance statement	104
Conformance statements	
(Edition 2.0)	106
ACSI conformance statement	107
MICS - Model implementation conformance statement	110
PICS - Protocol implementation conformance statement	140
PIXIT - Protocol implementation extra information for testing	143
SICS - SCL Implementation conformance statement	150
TICS - Technical issues conformance statement	152
Notes	154

General

IEC 61850 is a standard for communication networks and systems in substation. Sepam units can be connected to an IEC 61850 station bus by one of the following way:

- the ECI850 Sepam server, for Sepam series 20, Sepam series 40, Sepam series 60, and Sepam series 80,
- the ACE850 communication interface, for Sepam series 40, Sepam series 60, and Sepam series 80 only.

Sepam units with ECI850 and ACE850 are compliant with edition 1 and edition 2 of:

- IEC 61850-6
- IEC 61850-7-1 to 7-4
- IEC 61850-8-1

Application and benefits

Based on the Ethernet protocol, the IEC 61850 communication standard ensures:

- high communication speeds and versatile communication architectures
- interoperability between manufacturers

With ECI850 Sepam server

The ECI850 Sepam server provides a high-performance, cost-effective, and versatile solution for connecting Sepam units to an IEC 61850-compliant system.

This provides:

- compatibility with the whole Sepam range (series 20, 40, 60, and 80) to fit your needs perfectly,
- ability to upgrade existing Sepam units to ensure the durability of your assets,
- ability to connect up to 8 Sepam units to one ECI850, ensuring a cost-effective solution. However, the maximum number of Sepam recommended per ECI850 Sepam server is:

- 5 Sepam series 20
- 3 Sepam series 40
- 2 Sepam series 60 or Sepam series 80

- IEC 61850 logical nodes and configurable data sets to fit the needs of your Scada system,
- high-performance because the ECI850 is not a generic gateway but a data server dedicated to Sepam,
- up to 6 simultaneous IEC 61850 connections.

With ACE850 communication interface

The Sepam series 40, Sepam series 60, and Sepam series 80 fitted with the ACE850 communication interface provide a built-in solution for demanding IEC 61850 applications:

- IEC 61850 logical nodes and configurable data sets to fit the needs of your Scada system,
- Peer-to-peer communication capabilities on Sepam series 60 and Sepam series 80 with GOOSE messages to enhance your protection and control system without additional wiring,
- up to 8 simultaneous IEC 61850 connections.

Implementation

The Sepam IEC 61850 solution can be configured in two ways:

- The SFT2841 setting and operating software ensures straightforward configuration and builds standard IEC 61850 configuration files.
- The CET850 configuration tools adapt the communication profile of the devices to the precise needs of the system.

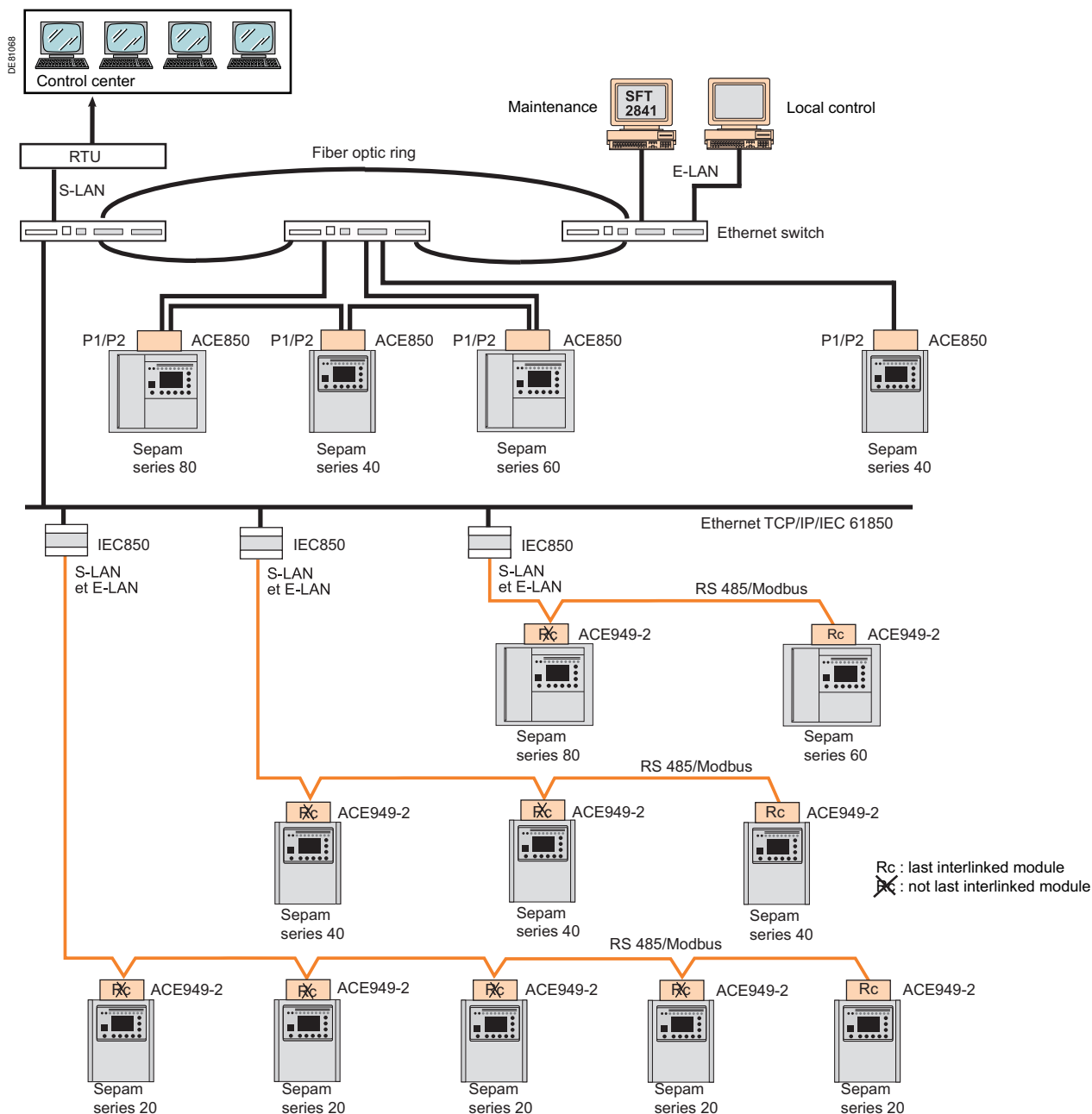
The Sepam E-LAN runs in parallel with the IEC 61850 S-LAN, allowing Ethernet connection of the SFT2841 setting and operating software to Sepam without any extra cost.

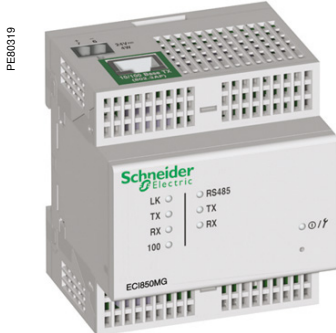
The Sepam series 40, Sepam series 60, and Sepam series 80 fitted with the ACE850 communication interface also support the Modbus TCP-IP communication protocol.

Typical architecture

- The ECI850 Sepam server can be connected to an Ethernet switch using 10/100BASE-T copper wire (radial connection).
 - The Sepam series 40, Sepam series 60, and Sepam series 80 fitted with the ACE850 communication interface can be connected to an Ethernet switch using:
 - 10/100BASE-T copper wire (radial or ring connection)
 - 100BASE-FX multi-mode fiber optic (radial or ring connection)
- To optimize system performance, Schneider Electric recommends the following:
- build a fault-tolerant backbone fiber-optic ring
 - use IEC 61850 compatible managed switches
- If Sepam units are connected in a ring configuration, the managed switches must be compatible with RSTP 802.1d 2004 standard.
- A global approach for building an Ethernet infrastructure can be found in the "Transparent Factory Network Design and Cabling Guide" edited by Schneider Electric.

IEC 61850 architecture example





ECI850: IEC 61850 Sepam server.

IEC 61850 communication with the Sepam relays can be implemented using either the ECI850 Sepam server, or the ACE850 communication interface (Sepam series 40, Sepam series 60, or Sepam series 80 only). Depending on the communication interface used, the following steps must be performed.

ECI850 Sepam server configuration steps

Configuration of Sepam Modbus interface

Communication between the ECI850 server and the Sepam is based on Modbus. The first step deals with the configuration of the Sepam Modbus interface. It consists of installing the Modbus interface in the equipment, wiring it to the RS 485 network and configuring it, using the SFT2841 software.

Two kinds of communication interface can be used on Sepam:

- ACE949-2 for 2-wire RS 485 network
- ACE959 for 4-wire RS 485 network

Refer to the relevant Sepam user's and operation manual for details.

- Sepam series 20 user's manual, reference PCRED301005EN
- Sepam series 40 user's manual, reference PCRED301006EN
- Sepam series 60 user's manual, reference SEPED310017EN
- Sepam series 80 operation manual, reference SEPED303003EN
- Sepam series 80 Modbus manual, reference SEPED303002EN

The physical layer parameters have to be configured, with the authorized values. Remote control must be set in "direct" mode. With Sepam series 60 and Sepam series 80, security features must be disabled.

Parameters	Authorized values
Sepam address	1 to 247
Speed	19200 or 38400 bps
Parity	Even or odd

Configuration of the ECI850 server

The second step deals with the configuration of ECI850 Ethernet and Modbus layers. See page 5.

ACE850 communication interface configuration steps

ACE850 communication interface configuration involves configuring the ACE850 Ethernet layer. See page 20.

ECI850 Sepam server/ACE850 communication interface: common configuration steps

These next 2 steps are common to both the ECI850 Sepam server and the ACE850 communication interface.

Configuration of IEC 61850 protocol

The next step deals with the configuration of the IEC 61850 protocol. It generates a CID file, which contains the configuration of the communication data for all the Sepam connected to an ECI850 Sepam server or an ACE850 communication interface.

- SFT2841 software is used for standard configuration of IEC 61850 (see page 36). All communication data is defined in standard ICD files that are gathered in a CID file depending on the Sepam type.
- CET850 software is used for advanced configuration of IEC 61850 (see page 43). The configuration can be modified to optimize the exchange between devices:
 - Suppress unused communication data
 - Gather relevant communication data
 - ...

Transfer of the CID file to ECI850 or ACE850

The last step consists of loading the CID file, using the SFT2841 software, into either the ECI850 Sepam server or the ACE850 communication interface.

The ECI850 and the ACE850 first perform a validation of the CID file before using it for configuration. See page 50.



ACE850TP communication interface.



ACE850FO communication interface.

Ethernet setup

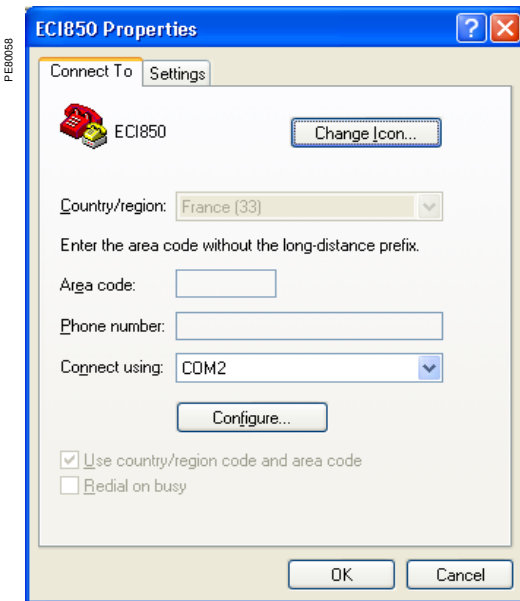
Ethernet setup is required to enable access to the ECI850 over a network. If Ethernet setup has already been done at installation time, proceed directly to the section:

Accessing the ECI850 over a network page 7.

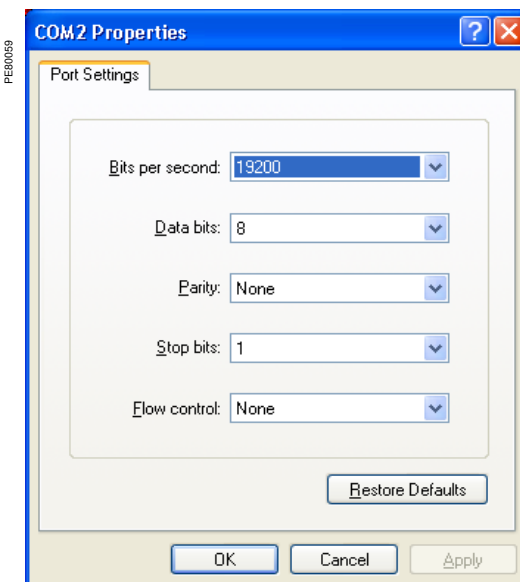
Before configuring the ECI850, obtain a unique static IP address, subnet mask, and default gateway address from the network administrator. Use a web browser or Hyper Terminal to configure the ECI850 with the information obtained from the network administrator, as described in the following sections.

Ethernet setup using Hyper Terminal

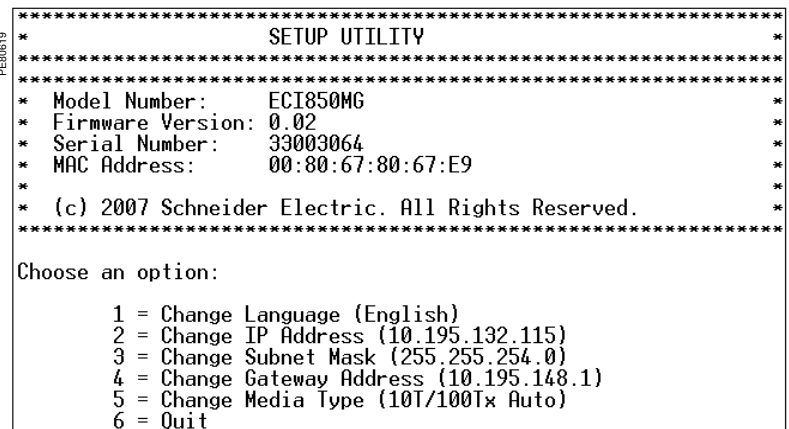
1. Connect to ECI850 RS 232 port using the TCSEAK0100 Configuration kit or any null modem cable.
 2. Start Hyper Terminal (click **Start > Run**, then type `hyperterm`).
 3. In the **Name** text box, type a name for the new connection (for example, `ECI config`), then click **OK**.
 4. In the **Connect using** drop-down list, select the computer COM port you will be using, then click **OK**.
 5. Set the **COM properties** as follows: Bits per second = 19200, Data bits = 8, Parity = None, Stop bits = 1, and Flow control = None. Click **OK**.
 6. Start the ECI850 Setup Utility:
 - Cycle power or press the reset button on the ECI850 below the LED power status.
 - While the green Power/Status LED blinks rapidly, press Enter on the computer keyboard to access the setup utility.
- Note:** the Power/Status LED stops blinking after 5 seconds.
7. The following screen should appear:



Hyper Terminal: choose connection port.



Hyper Terminal: configure serial port.



Hyper Terminal: access ECI850 setup utility.

ECI850 setup options

Option	Description	Setting
1	Used to select the language for the current Hyper Terminal session.	English, French, Spanish Default: English
2	Used to enter the static IP address of the ECI850.	0.0.0.0 to 255.255.255.255 Default: 169.254.0.10
3	Used to enter the subnet mask of the network.	0.0.0.0 to 255.255.255.255 Default: 255.255.0.0
4	Used to enter the default gateway (router) IP address used for wide area network (WAN) communications.	0.0.0.0 to 255.255.255.255 Default: 0.0.0.0
5	Used to define the physical Ethernet connection.	<ul style="list-style-type: none"> ■ 10T/100Tx Auto ■ 10BaseT-HDo 10BaseT-FD ■ 100BaseTx-HD ■ 100BaseTx-FD Default: 10T/100Tx Auto
6	Saves the settings and exits the setup utility.	-

Ethernet setup using a web browser

1. Disconnect your computer from your network.

Nota : after disconnecting from your network, your computer should automatically use the default IP address 169.254.###.### (### = 0 to 255) and the default subnet mask 255.255.0.0. If the IP address is not automatically configured, contact your network administrator to set up a static IP address.

2. Connect an Ethernet crossover cable (available in the kit TCSEAK0100) from the ECI850 to the computer.
3. Start Internet Explorer (version 6.0 or higher).
4. In the Address text box, type 169.254.0.10, then press Enter. Type Administrator for your Username, type ECI850 for your Password, then click **OK**. Usernames and Passwords are case sensitive.
5. Set up parameters as described in the "Ethernet and TCP/IP settings" on page 8.
6. Reconnect your computer to your network. If you assigned a static IP address to your computer in step 1, you must restore your computer's original settings before reconnecting to your network.

Accessing the ECI850 over a network

After setting up the Ethernet parameters, the user can access the ECI850 over an Ethernet LAN using Internet Explorer 6.0 or higher.



ECI850 home page.

Logging into the ECI850

Action	Result
1. Launch Internet Explorer 6.0 or higher.	Opens Internet Explorer.
2. In the Address text box, type the address of your ECI850 (169.254.0.10 is the default), then press Enter.	Opens the Login dialog box.
3. Type your Username (Administrator is the default) and Password (ECI850 is the default) into the text boxes, then click OK .	Enters the Username and Password, then opens the ECI850 home page.
4. Click Setup to access the ECI850 setup page, or click Diagnostics to access the ECI850 diagnostics page.	Opens the Setup or Diagnostics pages.

Logging Out

We recommend logging out whenever you do not need access to the ECI850. To log out of the ECI850 configuration session, click Log Out to end your session.

ECI850 user interface overview

The ECI850 ships with several pre-installed web pages used for ECI850 setup, configuration and diagnostics. See Table below for a description of each web page. Access to pages can be restricted (see Web Pages Access).

ECI850 Web Page	Description	See
Setup		
Ethernet & TCP/IP	Configure Ethernet and TCP/IP communication settings.	page 8
Serial Port	Set up or change serial communication parameters.	page 9
IP Filtering	Set up which IP addresses can access the ECI850.	page 10
SNMP Parameters	Enable and configure the Simple Network Management Protocol (SNMP), which allows the ECI850 to identify itself to network devices requesting SNMP data.	page 11
SNTP Parameters	Enable and configure the Simple Network Time Protocol (SNTP), which allows the ECI850 to be time synchronized.	page 12
User Accounts ⁽¹⁾	Create and edit groups and users.	page 9
Web Page Access ⁽¹⁾	Select web page access rights for each user group.	page 10
Diagnostics		
Communication statistics	Displays diagnostic data used to troubleshoot network problems.	page 14
ECI850 Summary	This page contains information about your specific ECI850, including the serial number, manufacturing date and Media Access Control (MAC) address.	page 16
Read Device Registers	Allows ECI850 administrators to read register data from a serial device connected to the ECI850.	page 17

⁽¹⁾ Accessible by administrators only.

PE60612

Ethernet & TCP/IP

Ethernet

MAC Address - 00:80:67:80:67:E9

Media Type: 10T/100Tx Auto

IP Parameters

IP Address: 10 . 195 . 132 . 115

Subnet Mask: 255 . 255 . 254 . 0

Default Gateway: 10 . 195 . 148 . 1

Allow CID file to override IP settings: ☐

TCP Parameters

TCP Keep Alive: 5 (Seconds)

FTP Session Idle Time: 30 (Seconds)

Apply

ECI850 Ethernet & TCP/IP page.

Communications setup

Ethernet and TCP/IP settings

Procedure

Action	Result
1. From the Setup page, click Ethernet & TCP/IP .	Opens the Ethernet & TCP/IP page.
2. Select your media type. Contact your network administrator if you do not know.	Selects the media type.
3. Enter your IP address, subnet mask, and default gateway address assigned to your ECI850 by your network administrator.	Enters the Ethernet parameters for the ECI850. Note: if you enter an IP address that is used by another device, you will be prompted to select a new IP address. See "Duplicate IP address detection" below.
4. Click Apply .	Updates the ECI850 Ethernet and TCP/IP settings.

Note: after making changes to the Ethernet parameters and clicking Apply, the ECI850 will reboot.

Description of Ethernet and TCP/IP settings

Option	Description	Setting
Media Type	Used to define the physical Ethernet connection or media type.	<ul style="list-style-type: none"> 10T/100Tx Auto 10BaseT-HD 10BaseT-FD 100BaseTX-HD 100BaseTX-FD Default: 10T/100Tx Auto
IP Address	Used to enter the static IP address of the ECI850.	0.0.0.0 to 255.255.255.255 Default: 169.254.0.10
Subnet Mask	Used to enter the Ethernet IP subnet mask address of your network.	0.0.0.0 to 255.255.255.255 Default: 255.255.0.0
Default Gateway	Used to enter the gateway (router) IP address used for wide area network (WAN) communications.	0.0.0.0 to 255.255.255.255 Default: 0.0.0.0
Allow CID file to override IP parameters	Check this box if you want the IP parameters contained in the CID file to replace the above configuration.	Default: not checked
Keepalive	Timeout value used to test for session disconnection.	1 to 60 seconds Default: 30 seconds
FTP session inactivity timeout	Timeout value used to force disconnection of an inactive FTP session	30 to 900 seconds Default: 30 seconds

Duplicate IP address detection

While connected to your network, the ECI850 publishes its IP address. The IP address of the ECI850 must be unique on the network it is connected to. If it is not unique the Power/Status LED repeats a four blink-pause pattern. Assign a new IP address to the ECI850 or to the conflicting device.

ECI850 Serial Port page.

Procedure

Action	Result
1. From the Setup page, click Serial Port .	Opens the Serial Port page.
2. Select your physical interface, baud rate, parity, and response timeout (see Table below).	Selects the serial port options.
3. Click Apply .	Updates the ECI850 Serial Port settings.

Option	Description	Setting
Physical Interface	Used to select how the ECI850 serial port is physically wired.	RS 485 4-wire, RS 485 2-wire Default: RS 485 2-wire
Baud Rate	Used to select the data transmission speed over the serial connection.	19200, 38400 Default: 38400
Parity	Used to select which parity bit is used for checking data.	Even, Odd Default: Even
Response Timeout	Used to select how long the ECI850 will wait to receive a response from a device. Default value should usually be kept.	0.1 to 2 seconds Default: 0.3 second

Note: the settings defined here must match the settings of the connected Sepam devices.

User accounts

ECI850 users are assigned Usernames and Passwords. Each user belongs to a group, and each group has access rights to the ECI850 web pages assigned by the ECI850 administrator.

Note: there are two default user accounts: Administrator (password is ECI850) and Guest (password is Guest).

Procedure

Action	Result
1. From the Setup page, click User Accounts .	Opens the User Accounts page.
2. If you want to change a group name, type a new name in one of the Group text boxes (the Administrator group name cannot be changed).	Enters a new group name.
3. In the Users section, enter a Name (1 to 24 characters) and Password (0 to 12 characters) for a new user.	Enters the name and password for a user.
Note: <i>Usernames and Passwords are case-sensitive and can contain only alphanumeric characters.</i>	
4. Select a group and the default language for the new user.	Selects the group and language for a user.
5. Repeat steps 3 and 4 for each additional user you want to add.	Continues adding users.
6. Click Apply .	Saves all of the user account settings.

ECI850 accounts and passwords description

Account	Default Password
Administrator (default account)	ECI850
Guest (default account)	Guest
User-defined accounts (up to 11 accounts possible)	No default – Password is user-defined

ECI850 User Accounts page.

PE600618

Web Page Access				
	Engineering	Operations	Maintenance	Guest
Communication Statistics	Read-only	Read-only	Read-only	None
ECI850 Summary	Read-only	None	Read-only	None
Read Device Registers	Read-only	Read-only	Full	None
Ethernet & TCP/IP	Read-only	Read-only	Read-only	None
Serial Port	Read-only	Read-only	Read-only	None
TCP/IP Filtering	Read-only	Read-only	Read-only	None
SNMP Parameters	Read-only	Read-only	Read-only	None
SNTP Parameters	Read-only	Read-only	Read-only	None

Apply

ECI850 Web Page Access page.

Web page access

Procedure

Action	Result
1. From the Setup page, click Web Page Access .	Opens the Web Page Access page.
2. In the Communication statistics row, select the access level (None , Read-only , or Full) that each user group will have for the Ethernet & TCP/IP web page.	See Table below for an explanation of access levels for each group.
3. To allow Guest access to the web page, select Read-only under the Guest column. If the Guest group is Read-only, other groups can only be set to Read-only or Full.	Allows the default Guest group to access the web page.
4. Repeat steps 2 and 3 for the other rows.	Selects the access level for each web page.
5. Click Apply .	Saves the page access settings.

Group access

Group	Access
Administrator	Full access to all web pages. We recommend that you change the default administrator password for system security the first time you log in.
Guest	Read-only access to selected web pages.
Three user-defined groups	Choosing from the following options, the administrator assigns web page access for each group. Access levels are as follows: <ul style="list-style-type: none"> None: a group has no access to selected web page Read-only: password grants a group read-only access to the selected web page Full: a group has the same access as the Administrator group to the selected web page

PE600613

TCP/IP Filtering

Enable Filtering: ☒

IP Address	IEC 61850	SFT2841 link
10.195.149.26	<input checked="" type="checkbox"/>	<input type="checkbox"/>
10.195.149.28	<input type="checkbox"/>	<input checked="" type="checkbox"/>
10.111.111.111	<input checked="" type="checkbox"/>	<input type="checkbox"/>
10.195.149.25	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>

Apply

ECI850 TCP/IP Filtering page.

IP address filtering

This function allows the administrator to specify which IEC 61850 clients and SFT2841 have access to the ECI850 services.

Note: if IP addresses filtering is enabled, access is forbidden to any device not in the filtered list.

Procedure

Action	Result
1. From the Setup page, click TCP/IP Filtering .	Opens the TCP/IP Filtering page.
2. Check Enable Filtering .	Activates filtering.
3. In the IP address column, enter the TCP/IP client address	Enters an IP address for a TCP/IP client that will have access to the IEC 61850 server or to the SFT2841 link or both.
4. In the IEC 61850 and SFT2841 link columns, check what applies.	Selects the access level for the corresponding IP address. SFT2841 link, IEC 61850 or both.
5. Repeat steps 3 and 4 to add more IP addresses.	Continues adding IP addresses for filtering.
6. Click Apply .	Saves the IP address filtering list.

PEB0816

SNMP Parameters	
Enable SNMP:	<input checked="" type="checkbox"/>
System Contact:	John Smith
System Name:	Gateway
System Location:	Manufacturing
Read-only Community Name:	public
Read-write Community Name:	private
<input type="button" value="Apply"/>	

ECI850 SNMP Parameters page.

Configuring additional features

SNMP parameters

The ECI850 supports SNMP, allowing a network administrator to remotely access it with an SNMP manager and view the networking status and diagnostics in the MIB2 format.

Procedure

Action	Result
1. From the Setup page, click SNMP Parameters .	Opens the SNMP Parameters page.
2. Check ENABLE SNMP to turn ON the simple network management protocol. <i>Nota : if you uncheck Enable SNMP and click Apply, the ECI850 will reboot and SNMP functionality will be turned OFF.</i>	Activates SNMP.
3. Enter the system contact , system name , system location , read-only community name , and the read-write community name .	Enters the SNMP system information and community access names.
4. Click Apply .	Saves the SNMP settings.

Settings description

Option	Description	Setting
Enable SNMP	Checking the check box enables SNMP and MIB II support	Default: not enabled
System Contact	Name of the administrative contact.	String (< 50 characters) Default: empty string
System Name	Name given to the ECI850 and Sepam subnet.	String (< 50 characters) Default: empty string
System Location	Location of the ECI850.	String (< 50 characters) Default: empty string
Read-only Community Name	SNMP community that has read-only access to the MIB. Acts as a password.	String (< 50 characters) Default: "public"
Read-write Community Name	SNMP community that has read-write access to the MIB. Acts as a password.	String (< 50 characters) Default: "private"

PE80026

SNTP Parameters

Enable SNTP ☒

Time Zone Offset: UTC+01:00

Enable Daylight Saving Time ☒

DST Offset: +60 mn

DST starts: Last Sunday of March at 2:00

DST ends: Last Sunday of October at 3:00

SNTP Servers

Primary Server IP Address: 10 195 132 24

Secondary Server IP Address: 10 195 132 25

Poll Interval: 1 (Minutes)

ECI850 SNTP Parameters page.

SNTP parameters

SNTP is the time synchronization method required by IEC 61850. It is used in mode 3-4 (unicast mode).

The ECI850 supports SNTP to enable synchronization between the ECI850 and Sepam devices.

■ If SNTP is not turned ON, time synchronization must be provided to the Sepam devices by other means (ECI850 time is meaningless in that case).

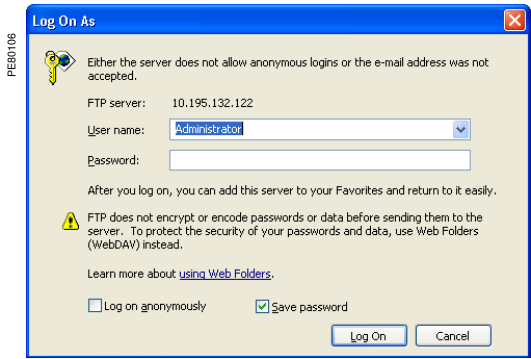
■ If SNTP is turned ON, time synchronization must be set up on Sepam, to the communication channel linked to ECI850 (there are 2 communication channels on Sepam series 80).

Procedure

Action	Result
1. From the Setup page, click SNTP Parameters .	Opens the SNTP Parameters page.
2. Check Enable SNTP to turn ON the simple network time protocol.	Activates SNTP.
3. Enter the time offset from UTC of your location.	Enters the time zone.
4. Check Enable DST to turn ON the Daylight Saving Time (summer Time) feature.	Activates Daylight Saving Time.
5. Enter the time offset for Daylight Saving Time and the start and end time.	Enters DST time offset: start time and end time.
6. Enter the IP address of the primary (or only) SNTP server. If available, enter the IP address of a secondary server to be used if the primary one is not responding.	Enters the address of the SNTP server(s).
7. Enter the poll interval between two requests to the server.	Enters poll interval
8. Click Apply .	Saves the SNTP settings.

Setting descriptions

Option	Description	Setting
Enable SNTP	Enables the time and date of the ECI850 to be set by the Simple Network Time Protocol (SNTP) server.	Default: not enabled
Time Zone Offset	Determines the difference between local time and Coordinated Universal Time UTC (same as GMT).	UTC-12 to UTC+14 Default: UTC
Enable Daylight Saving Time	Enables the use of Daylight Saving Time (Summer time).	Default: not enabled
DST offset	Difference between standard time and Daylight Saving Time.	+ 30 or + 60 minutes Default: + 60 minutes
DST starts	If enabled, DST starts on the selected date.	Default: last sunday of March
DST ends	If enabled, DST ends on the selected date.	Default: last sunday of October
Primary Server IP Address	The IP address of the SNTP server the ECI850 contacts to get the time message.	0.0.0.0 to 255.255.255.255 Default: 0.0.0.0
Secondary Server IP Address	The IP address of another SNTP server the ECI850 contacts in case the primary server is down.	0.0.0.0 to 255.255.255.255 Default: 0.0.0.0
Poll Interval	Controls how often the ECI850 contacts the SNTP server for the correct time.	1 to 300 minutes Default: 60 minutes



Logging into the FTP server.

Name	Size	Type	Modified
bak		File Folder	01/01/1970 00:00
LD		File Folder	01/01/1970 00:00
ecicfg.txt	14,3 KB	Text Document	01/01/1970 00:00
Sepam-s80-pntRef_acm.cid	123 KB	CID File	23/07/2006 00:00

ECI850 directories view.

After you set up the Ethernet parameters, you can access the ECI850 FTP server, using Internet Explorer or another FTP client. The following description is made using Internet Explorer 6.

Note: this server features only a limited implementation of the FTP protocol and is therefore not guaranteed to work with every client.

Logging into the FTP server

Action	Result
1. Launch Internet Explorer, type <code>ftp://</code> and the IP address of the ECI850 in the Address text box (for example, <code>ftp://10.10.10.10</code>), then press Enter .	Opens the Log On As dialog box.
2. Type the Username and the Password in the text boxes, then click Log On .	Opens an FTP session with the ECI850 and displays the root directory of the ECI850.

Note: access to the FTP server is restricted to accounts belonging to the Administrators group.

ECI850 directories

Root directory

The root directory contains:

- the logical devices directory LD
It is structured as described by the IEC 61850 standard. There is one directory for each Sepam Logical Device.
In each of these:
 - a COMTRADE directory contains the COMTRADE ⁽¹⁾ files CFG and DAT.
 - a CTX directory (ECI850 ≥ V2.0) contains the various context files (tripping context, no sync context) in binary (.CTX) or text (.TXT) mode. Please refer to Sepam manuals for a description of their content.These files can only be read. They can also be read using IEC 61850 file transfer. Contrary to other IEC 61850 data, timestamps in these files are expressed in local time.
- the backup directory BAK
It contains the backup IEC 61850 file, if any. This file can only be read. This file is only kept as an archive. It is not used by the ECI850.
- the ECI850 standard configuration file "ecicfg.txt". This file can be read or written. It is checksum protected and must not be modified externally. When written to the ECI850, it updates the device parameters except the Ethernet settings.
- the IEC 61850 configuration file CID (if loaded). This file can be read or written. Its content is protected and can be modified only with the SFT2841 or CET850 tools.

Transferring files from the ECI850 to the computer

Action	Result
1. Right-click the file you want to download from the ECI850, then click Copy .	Copies the selected file.
2. Locate the folder you want to save the copied file, right-click in the folder's window, then click Paste .	Pastes the file into the folder.
3. Repeat steps 1 and 2 if you want to copy other files from the ECI850	Continues to copy files from the ECI850.
4. Click the Close button on the Internet Explorer window.	Closes Internet Explorer and ends the FTP connection to the ECI850.

Transferring files from the computer to the ECI850

Write-able files are transferred to the ECI850 as described above, inverting source and destination folders.
IEC 61850 configuration files can also be transferred with the SFT2841 software (see page 40).

(1) IEEE Std C37.111, Common Format for Transient Data Exchange for Power Systems.

Introduction

Diagnostics pages provide useful information for network monitoring, tuning, and troubleshooting.

There are 3 diagnostics pages:

- Communication statistics page to troubleshoot Ethernet TCP/IP communication
- ECI850 summary page to display information about the ECI850 Sepam server
- Read device registers page to troubleshoot Modbus communication

Communication statistics

Procedure

Action	Result
1. From the Diagnostics page, click Communication Statistics .	Opens the Communication Statistics page.
2. View the data	See "Interpreting Statistics" below.
3. Click Reset .	Resets the ECI850 cumulative diagnostic data to 0.

Interpreting statistics

Statistic	Description
Ethernet	
Link Status	A status string that represents the speed and duplex setting being used to communicate with the linking partner.
Frames Transmitted OK	A counter that increments each time a frame is successfully transmitted.
Collisions	A counter that increments each time a frame is retransmitted due to collision detection.
Excessive Collisions	A counter that increments each time a frame is not able to be sent due to reaching the maximum collision status based on the Truncated Binary Exponential Backoff algorithm.
Frames Received OK	A counter that increments each time a frame is successfully received.
CRC Errors	A counter that increments each time a frame is received that has a checksum/CRC that does not match what is calculated.
Alignment Errors	A counter that increments each time a frame is received that has a checksum/CRC error and does not end on an 8-bit frame boundary.
Frames Too Long	A counter that increments each time a frame is received that is larger than the allowed maximum size defined in the standards (frames larger than 1518 bytes).
Frames Too Short	A counter that increments each time a frame is received that is smaller than the allowed minimum size defined in the standards (frames smaller than 64 bytes).
SFT2841 link	
Frames Sent	A counter that increments each time a frame is sent.
Frames Received	A counter that increments each time a frame is received.
Protocol Errors	A counter that increments each time an ill-formed message is received.
Active Connections	A status value that represents the number of connections that are active at the moment the diagnostics page is refreshed. A maximum of 4 connections are supported. Clicking Active Connections opens a new window with a list of all of the active client connections.
Accumulative Connections	A counter that increments each time a connection is made to the ECI850.
Maximum Connections	A status value that represents the maximum number of connections that were active at any given moment.
Inbound Read Messages	A counter that increments each time a read request message is received.
Inbound Write Messages	A counter that increments each time a write request message is received.
Outbound Reply Messages	A counter that increments each time a reply message is sent.

PE88614

Communication Statistics	
Ethernet	
Link Status:	10BaseT-HD
Frames Transmitted OK:	2093
Collisions:	0
Excessive Collisions:	0
Frames Received OK:	190930
CRC Errors:	0
Alignment Errors:	0
Frames Too Long:	0
Frames Too Short:	0
SFT2841 link	
Frames Sent:	608
Frames Received:	609
Protocol Errors:	0
Active Connections:	1
Accumulative Connections:	1
Maximum Connections:	1
Inbound Read Messages:	0
Inbound Write Messages:	0
Outbound Reply Messages:	608
IEC 61850	
Protocol Errors:	0
Active Connections:	0
Accumulative Connections:	3
Server Indications:	6
Variable Reads:	0
Variable Writes:	0
Information reports:	0
Serial Port	
Frames Sent:	22023
Frames Received:	0
CRC Errors:	0
Protocol Errors:	0
Timeouts:	22022
Outbound Read Messages:	0
Outbound Write Messages:	0
<input type="button" value="Reset"/>	

ECI850 Communication Statistics page.

Interpreting statistics (cont.)

Statistic	Description
IEC 61850	
Protocol Errors	A counter that increments each time a received request is incorrect or cannot be satisfied.
Active Connections	A status value that represents the number of connections that are active at the moment the diagnostics page is refreshed. A maximum of 6 connections are supported. Clicking Active Connections opens a new window with a list of all of the active client connections.
Accumulative Connections	A counter that increments each time a connection is made to the ECI850.
Server indications	A counter that increments each time the server receives a protocol indication.
Variable Reads	A counter that increments each time the server receives a read variable request.
Variable Writes	A counter that increments each time the server receives a write variable request.
Information reports	A counter that increments each time the server sends an information report message.
Serial port	
Frames Sent	A counter that increments each time a frame is sent.
Frames Received	A counter that increments each time a frame is received.
CRC Errors	A counter that increments each time a message is received that has a CRC that does not match what is calculated. Typically the result of wiring issues.
Protocol Errors	A counter that increments each time an ill-formed message is received.
Timeouts	A counter that increments each time a request message is sent without receiving a corresponding response message within the allowed time. Timeouts are typically the result of configuration errors or a non-responsive device.
Outbound Read Messages	A counter that increments each time a read request message is sent.
Outbound Write Messages	A counter that increments each time a write request message is sent.

PE800620

ECI850 Summary					
Device Information					
Firmware Version: 9.96					
System Idle Time: 63%					
MAC Address: 00:80:67:80:67:E9					
Serial Number: 33003064					
Model Number: ECI850MG					
Hardware Version: A2					
Manufacture Date: 2006-Aug-14					
IEC 61850 Device Name: Myle8Acm					
IEC 61850 Configuration files					
File	Name	Edit time	Version	Revision	
Current	Potencia2_acm.cid	2006/05/23 10:38:51	1	3	
Backup	Sepam-v80-prtRef_acm.Cid	2007/03/08 10:38:51	2	2	Restore
IEC 61850 Logical Devices					
Name	Label	Type	Address	Status	
0	Myle8AcmECI	ECI850 - @IP 115	ECI	Online	
1	Myle8AcmMor80		S84	Offline	
2	Myle8AcmMor40_2		S40	Offline	
Date and Time					
Last Successful Time Synchronization (UTC): 2007-04-16 06:40:29.292					
ECI850 Date and Time (UTC): 2007-04-16 06:40:45.753					
ECI850 Date and Time (local): 2007-04-16 08:40:45.754					

ECI850 Summary page.

ECI850 Summary

Procedure

Action	Result
1. From the Diagnostics page, click ECI850 Summary .	Opens the ECI850 Summary page.
2. View the data	See "Interpreting information" below.

Interpreting information

Information	Description
Device Information	
Firmware Version	The firmware version that is installed on the ECI850
System Idle Time	A percentage from 0% to 100% indicating the average processor time that is not being used
MAC Address	The unique Ethernet hardware address of the ECI850
Serial Number	The serial number of the ECI850
Model Number	The ECI850 model number
Hardware Version	The ECI850 hardware version
Manufacture Date	The date the ECI850 was manufactured
IEC 61850 Device Name	The name given to the ECI850 device in the IEC 61850 configuration file
IEC 61850 Configuration files	
File	" Current " is the last loaded CID file " Backup " is the archived CID file
Name	Name of the file as defined at loading
Edit time	Time at which the configuration file has been created
Version	Version of the file as defined in the file header
Revision	Revision of the file as defined in the file header
Restore	This button overwrites the content of the current file with the content of the backup file.
IEC 61850 Logical devices	
Name	Name of the logical device built from the configuration file
Label	Label of the device (Sepam label or ECI850 system name)
Type	Type of the device as declared in the configuration file
Address	Modbus address of the device as declared in the configuration file
Status	<ul style="list-style-type: none"> ■ Offline: the declared device does not respond to ECI850 requests ■ Wrong type: the device at this address is not of the expected type ■ Init: the device database is being initialized ■ Online: the device is operational ■ Bad Conf.: there is an error in the configuration file, the device is ignored
Date and time	
Last Successful Time Synchronization (UTC)	Displays the last time the ECI850 successfully contacted the SNTP server (UTC time).
ECI850 Date and Time (UTC)	Current time and date of the ECI850 (UTC time).
ECI850 Date and Time (local)	Current time and date of the ECI850 (local time).

PEB00615

Read Device Registers

Device ID:
1

Starting Register:
1000

Number Of Registers:
10

Register	Value
1000	0
1001	0
1002	0
1003	0
1004	0
1005	0
1006	0
1007	0
1008	0
1009	0

Read Holding Registers

Read Input Registers

☒ Decimal

☐ Hexadecimal

☐ Binary

☐ ASCII

ECI850 Read Device Registers page.

Read Device Registers

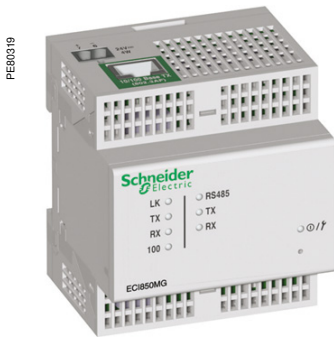
Read Device Registers page can be used to check Modbus communication between the ECI850 and Sepam devices.

Procedure

Action	Result
1. From the Diagnostics page, click Read Device Registers .	Opens the Read Device Registers page.
2. Enter the Device ID , Starting Register number, and the Number of Registers to read.	Enters the values to begin reading registers for the specified device.
3. Click Read Holding Registers or Read Input Registers .	Displays the values for the listed registers.
4. To change how the data is displayed in the Value column, select Decimal , Hexadecimal , Binary , or ASCII .	Selects how the data values are displayed.

ECI850 Read Device Register Settings

Option	Description	Default
Device ID	The address of the device that registers are read.	1
Starting Register	The first register to read.	1000
Number of Registers	The number of registers to read (1 to 10).	10
Register column	Lists the register numbers.	-
Value column	Lists the data stored in a register.	-
Decimal, Hexadecimal, Binary, or ASCII options	Select an option to specify how the Value column data is displayed.	Decimal



ECI850: IEC 61850 Sepam server.

Installation and operating instructions

The ECI850 Sepam server must be installed and connected in accordance with the instructions in the following documents:

- ECI850 installation guide (delivered with each ECI850), reference 63230-216-314,
- Sepam series 20 user's manual, reference PCRED301005EN,
- Sepam series 40 user's manual, reference PCRED301006EN,
- Sepam series 60 user's manual, reference SEPED310017EN,
- Sepam series 80 operation manual, reference SEPED303003EN.

To download these documents, follow the procedure below:

1. Go to www.schneider-electric.com.
2. Type Sepam in the Search field.
3. Click Sepam series xx.
4. Click Download.
5. Click Technical Publications.
6. Click the manual you want to download.

Troubleshooting

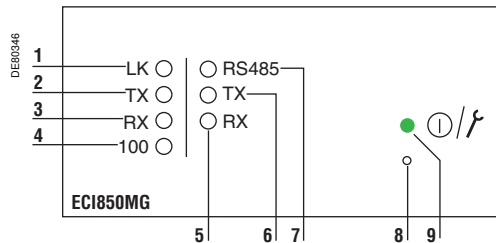
Troubleshooting makes use of:

- ECI850 front panel LED indicators
- ECI850 web diagnostics pages

It should be done in the following order:

1. Check the ECI850 connection to Ethernet.
2. Check the Modbus subnetwork.
3. Check the IEC 61850 configuration.

ECI850 front panel LED indicators



Ethernet status LEDs (green):

- 1 LK LED on: Ethernet link active
- 2 TX LED flashing: transmitting data
- 3 RX LED flashing: receiving data
- 4 100 LED
 - On: 100 Mb link speed
 - Off: 10 Mb link speed

Serial status LEDs (yellow):

- 5 RX LED flashing: receiving data
- 6 TX LED flashing: transmitting data
- 7 RS 485 link mode:
 - On: RS 485 mode
 - Off: RS 232 mode

- 8 Reset button
- 9 Power/status LED

ECI850 and Ethernet troubleshooting

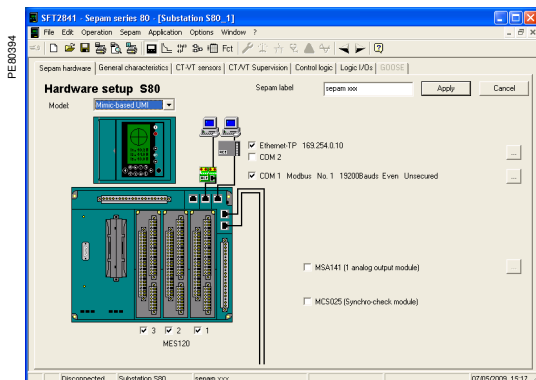
Symptoms	Possible cause	Action/Remedy
Power/Status LED off	Source power is not applied or is not stable. LED is burned out.	Apply power or check source. Check to see if other LEDs operate properly.
Ethernet LK LED off	Proper link is not established.	1. Make sure the proper cable is used and connected. 2. Make sure the proper media type is selected in the ECI850. 3. Check the communications setup configuration.
Power/Status LED repeats a four blink-pause pattern.	The IP address that the ECI850 was assigned is being used by another network device.	Assign a new IP address to the ECI850 or to the conflicting device. Note: when a duplicate IP address is detected, the ECI850 resets its specified IP address to the default IP address. When the ECI850 detects the conflict no longer exists, it will use the specified IP address.
Cannot browse the ECI850.	Incorrect network configuration.	1. Verify all IP parameters are correct. 2. Verify ECI850 receives requests: ping ECI850 by: ■ going to DOS prompt ■ typing ping and the ECI850 IP address, e.g.: ping 169.254.0.10. 3. Verify that all browser internet connections settings are correct.

Modbus subnetwork troubleshooting

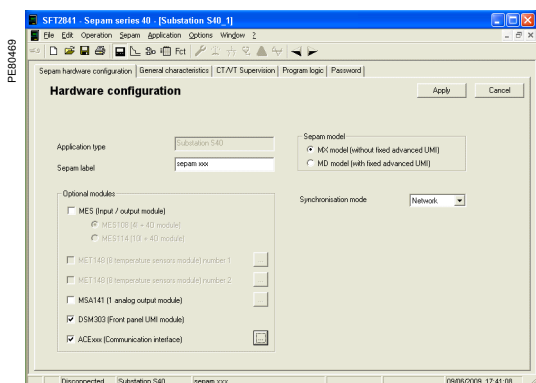
Symptoms	Possible cause	Action/Remedy
RS 485 LED off	ECI850 has not started correctly.	Check to see if there is an Ethernet connection problem.
Serial TX not flashing	The IEC 61850 server is not configured and there is no SFT2841 remote connection active.	This is a normal situation.
	The IEC 61850 server is not configured and there a SFT2841 remote connection active.	The SFT connection can be active on another ECI850. Check IP addresses.
	The IEC 61850 server is configured and there is no SFT2841 remote connection active.	Check the IEC 61850 configuration file.
Serial TX flashing Serial RX not flashing	Setting of ECI850 serial port does not match setting of Sepam devices.	Check and correct settings.
	Modbus addresses configured in the IEC 61850 file or in the SFT2841 do no match Sepam addresses.	Check and correct addresses.
	The RS 485 network is not wired properly.	Check and correct wiring.

IEC 61850 configuration troubleshooting

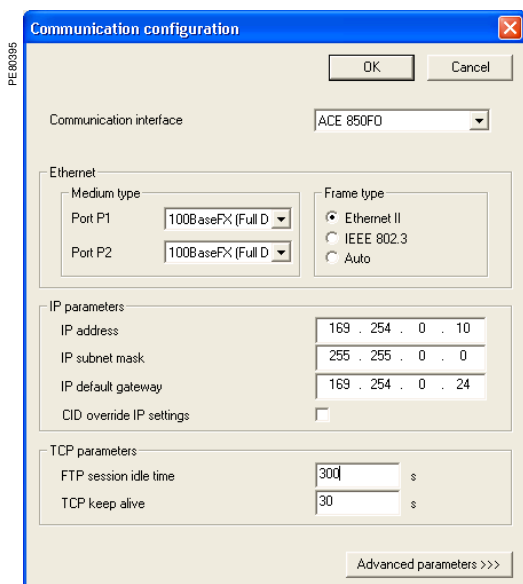
Symptoms	Possible cause	Action/Remedy
IEC 61850 clients can not connect to the ECI850	Ethernet setup is not correct.	See above.
	The maximum number of active connections is reached.	Check the active clients.
IEC 61850 clients connect to the ECI850, but no data is available	The IEC 61850 server is not configured or the configuration file is not valid.	Download a valid configuration file.
The IEC 61850 server is working, but some logical devices do not report data.	The actual Sepam type at a given address is not the type expected in the configuration file.	Check device address, correct the configuration file or replace device.
	The device is not communicating.	Check device, check its communication parameters, check wiring.



SFT2841: Sepam series 80 configuration screen.



SFT2841: Sepam series 40 configuration screen.



SFT2841: Ethernet configuration.

Access to configuration parameters

Configuring an ACE850 involves:

- configuring the standard Ethernet parameters (mandatory)
- configuring one or more of the following sets of advanced optional parameters:
 - SNMP: Ethernet network management
 - SNTP: time synchronization
 - IP filtering: access control
 - RSTP: Ethernet ring management
 - User accounts: access control.

The configuration parameters can be accessed from the Communication configuration window in the SFT2841 software.

To access this window:

- For Sepam series 60 and Sepam series 80:
 - open the **Sepam configuration** window in SFT2841
 - select the Ethernet communication port
 - click on the relevant button : the **Communication configuration** window appears
 - select the type of interface used: ACE850TP or ACE850FO.

- For Sepam series 40:

- open the **Sepam hardware configuration** window in SFT2841
- check the "ACExxx Communication interface" box
- click on the relevant button : the **Communication configuration** window appears
- select the type of interface used: ACE850TP or ACE850FO.

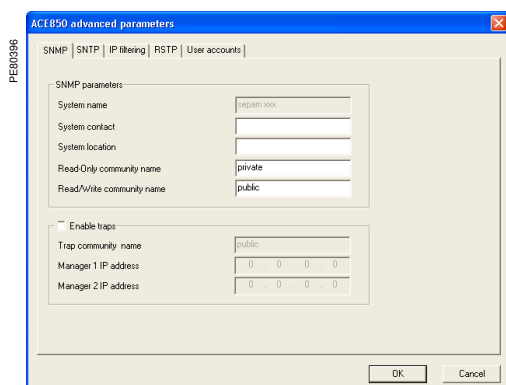
Ethernet and TCP/IP configuration

Before configuring the ACE850, obtain a unique static IP address, subnet mask, and default gateway address from the network administrator. See page 23.

Parameters	Description	Authorized values
Frame format	Used to select the format for data sent over an Ethernet connection.	Ethernet II, 802.3, Auto Default: Ethernet II
Media type	Used to define the physical Ethernet connection.	ACE850TP <ul style="list-style-type: none"> ■ 10T/100Tx Auto ■ 10BaseT-HD ■ 10BaseT-FD ■ 100BaseTX-HD ■ 100BaseTX-FD Default: 10T/100Tx Auto
		ACE850FO <ul style="list-style-type: none"> ■ 100BaseFX-HD ■ 100BaseFX-FD Default: 100BaseFX-FD
IP address	Used to enter the static IP address of the ACE850.	0.0.0.0 to 255.255.255.255 Default: 169.254.0.10
Subnet mask	Used to enter the subnet mask of your network.	0.0.0.0 to 255.255.255.255 Default: 255.255.0.0
Default gateway	Used to enter the default gateway (router) IP address used for wide area network (WAN) communications.	0.0.0.0 to 255.255.255.255 Default: 0.0.0.0
Allow CID file to override IP parameters	This parameter is not used for Modbus only communication.	Default: not checked
Keep alive	Timeout value used to test for session disconnection.	1 to 60 seconds Default: 30 seconds
FTP session inactivity timeout	Timeout value used to force disconnection of an inactive FTP session	30 to 900 seconds Default: 30 seconds

Duplicate IP address detection

The ACE850 IP address must be unique in the network. If it is not unique, the Status LED repeats a four blink-pause pattern and a new IP address must be assigned to the ACE850 or to the conflicting device.



SFT2841: SNMP configuration.

SNMP configuration

The ACE850 supports SNMP V1, allowing a network administrator to remotely access it with an SNMP manager and view the network status and diagnostics in the MIB2 format (only a subset of MIB2 is implemented).

Additionally, the ACE850 may be configured to send SNMP traps in the following cases:

- ACE850 start/restart
- Link up
- Link down
- Authentication failure.

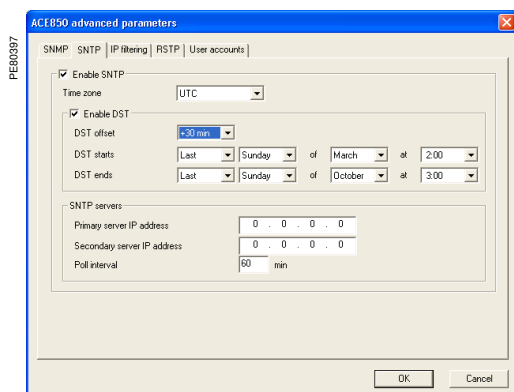
Parameters	Description	Authorized values
System Name	This parameter is the same as the Sepam label.	Not modifiable from this screen.
System Contact	Name of the administrative contact	String (< 16 characters) Default: empty string
System Location	Location of the Sepam/ACE850	String (< 16 characters) Default: empty string
Read-only Community Name	SNMP community that has read-only access to the MIB. Acts as a password	String (< 16 characters) Default: "public"
Read-write Community Name	SNMP community that has read-write access to the MIB. Acts as a password	String (< 16 characters) Default: "private"
Enable traps	Checking this check box enables SNMP to send traps.	Default: "not checked"
Traps Community Name	SNMP community that is used with traps	String (< 16 characters) Default: "public"
Manager 1 IP address	IP address of the SNMP manager to which traps are sent	0.0.0.0 to 255.255.255.255 Default: 0.0.0.0
Manager 2 IP address	IP address of a second SNMP manager to which traps are sent	0.0.0.0 to 255.255.255.255 Default: 0.0.0.0

SNTP configuration

SNTP is a time synchronization protocol that can be used to synchronize the Sepam. SNTP is used in mode 3-4 (unicast mode).

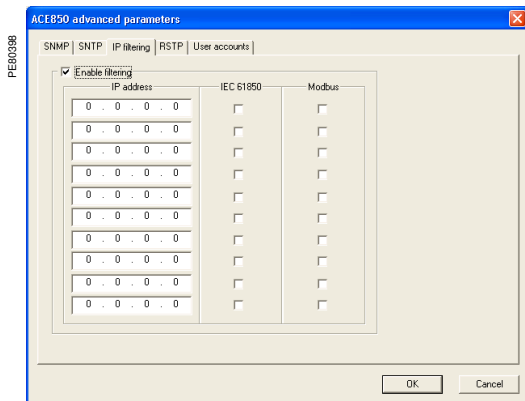
■ If SNTP is used, the synchronization source for Sepam must be defined as Ethernet.

■ If SNTP is not used, the Sepam synchronization must be ensured by other means (Modbus frames, synchronization tops).



SFT2841: SNTP configuration.

Parameters	Description	Authorized values
Enable SNTP	Enables the time and date of the Sepam to be set by the Simple Network Time Protocol (SNTP) server.	Default: not enabled
Time Zone Offset	Determines the difference between local time and Coordinated Universal Time (UTC) (same as GMT).	UTC-12 to UTC+14 Default: UTC
Enable Daylight Saving Time	Enables the use of Daylight Saving Time (Summer time).	Default: not enabled
DST offset	Difference between standard time and Daylight Saving Time.	+ 30 or + 60 minutes Default: + 60 minutes
DST starts	If enabled, DST starts on the selected date.	Default: last Sunday of March
DST ends	If enabled, DST ends on the selected date.	Default: last Sunday of October
Primary Server IP Address	The IP address of the SNTP server the ACE850 contacts to get the time message.	0.0.0.0 to 255.255.255.255 Default: 0.0.0.0
Secondary Server IP Address	The IP address of another SNTP server the ACE850 contacts in case the primary server is down.	0.0.0.0 to 255.255.255.255 Default: 0.0.0.0
Poll Interval	Controls how often the ACE850 contacts the SNTP server for the correct time.	1 to 300 minutes Default: 60 minutes



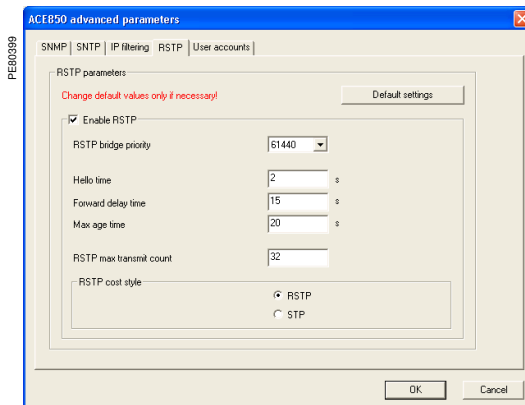
SFT2841: IP filtering configuration.

IP filtering configuration

The IP filtering function allows the administrator to specify which Modbus/TCP clients and which IEC 61850 clients have access to the ACE850 services.

Note: if IP filtering is enabled, access is forbidden to any client not in the filtered list.

Parameters	Description	Authorized values
Enable filtering	Check this box to activate filtering based on IP addresses.	Default: not enabled
IP address	The IP address of a client for which filtering options are defined.	0.0.0.0 to 255.255.255.255 Default: 0.0.0.0
IEC 61850	Check this box to grant IEC 61850 access to the given IP address.	Default: not checked
Modbus	Check this box to grant Modbus/TCP access to the given IP address.	Default: not checked



SFT2841: RSTP configuration.

RSTP configuration

The RSTP protocol enables the use of redundant Ethernet architectures such as rings.

It must be enabled each time the ACE850 is included in a loop. It may be disabled in other cases.

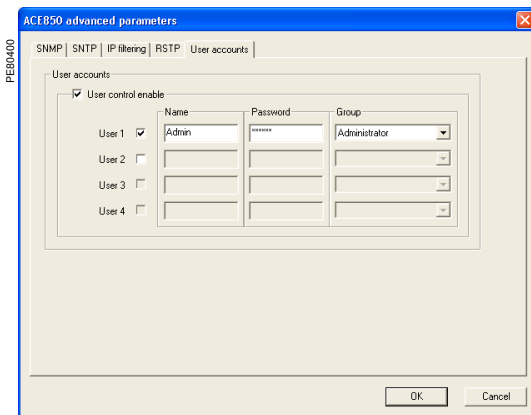
Changing the default settings is normally not required and should be performed with extreme care as it could jeopardize the stability of the Ethernet network.

If in doubt, it is always possible to revert to the default values using the "default settings" button.

Parameters	Description	Authorized values
Enable RSTP	Check this box to activate the use of the RSTP protocol.	Default: enabled
Bridge priority	Priority of the bridge. The bridge with the lowest priority becomes root.	0 - 61440, by steps of 4096 Default: 61440
Hello time	Amount of time between the transmission of configuration messages	1 to 10 seconds Default: 2 seconds
Forward delay time	Time value to control how fast a port changes its spanning state when moving towards the forwarding state	4 to 30 seconds Default: 21 seconds
Max age time	Valid duration of configuration message once sent by the root bridge	6 to 40 seconds Default: 40 seconds
Max transmit count	Maximum BPDUs that can be transmitted by the Port Transmit state machine in any Hello time. This value limits the maximum transmission rate.	3 to 100 Default: 32
Cost style	RSTP (32 bits) or STP (16 bits) cost style selection	Default: RSTP

Note: RSTP parameters must verify the following relationships:

- $2 \times (\text{Forward_delay_time} - 1 \text{ second}) \geq \text{Max_age_time}$
- $\text{Max_age_time} \geq 2 \times (\text{Hello_time} + 1 \text{ second})$



SFT2841: User accounts configuration.

User accounts configuration

ACE850 users are assigned usernames and passwords used to gain access to the FTP or web servers. Each user belongs to a group which determines the user's access rights:

- Administrator: read-write access to the FTP server, access to the web server
- Operator: read-only access to the FTP server, access to the web server
- Guest: no access to the FTP server, access to the web server

Up to 4 user accounts can be defined.

Parameters	Description	Authorized values
User control enable	Check this box to enable the configuration of users account. Currently, the ACE850 will not operate if this box is not checked. Ensure that this box is always checked.	Default: enabled
User n	Check this box to create this user account. Uncheck it to delete the account (only the last account in the list can be deleted).	Default: user 1 enabled Users 2 to 4 disabled
Name	User name	String (1 to 8 characters)
Password	User password	String (4 to 8 characters)
Group	Group to which the user belongs	Administrator, Operator, Guest

The following account is always created by default as user 1:

- Name: Admin
- Password: ACE850
- Group: Administrator

IP address and parameter guidelines

IP addresses

Several configuration parameters are IP addresses. These addresses must follow precise rules which are enforced by SFT2841 and ACE850. These rules are:

- Every IP address is made of 4 fields separated by dots: x . y . z . t
- Each field is a decimal value coded on 8 bits (range [0..255]).
- The first field (x) must be in the range [1..224] but must not be 127.
- Intermediate fields can cover the full range [0..255].
- The last field must not be 0 (range [1..255]).

IP subnet mask

The IP subnet mask is also made of 4 dot separated fields:

- The binary representation of the subnet mask is made of a set of 8 to 30 contiguous ones in the most significant part, followed by a set of contiguous zeroes (255.0.0.0 to 255.255.255.252).
- For a class A IP address ($x \leq 126$), the number of ones in the subnet mask must be at least 8 (255.y.z.t).
- For a class B IP address ($128 \leq x \leq 191$), the number of ones in the subnet mask must be at least 16 (255.255.z.t).
- For a class C IP address ($192 \leq x \leq 223$), the number of ones in the subnet mask must be at least 24 (255.255.255.t).
- The subnet part of the device IP address, obtained when applying the subnet mask, must not be 0.

IP default gateway

- An IP address of 0.0.0.0 means no gateway.
- If a gateway is defined, it must belong to the same subnet as the device.

After you set up the Ethernet parameters, you can access the ACE850 FTP server. It features a limited implementation of the FTP protocol and is therefore compatible mainly with command-line mode FTP clients, although ACE850 ≥ V2.0 also offers limited compatibility with some graphical clients.

Nota : Access to the FTP server is restricted to authorized user accounts.

Using a command-line mode FTP client

The following description is made using the Windows client.

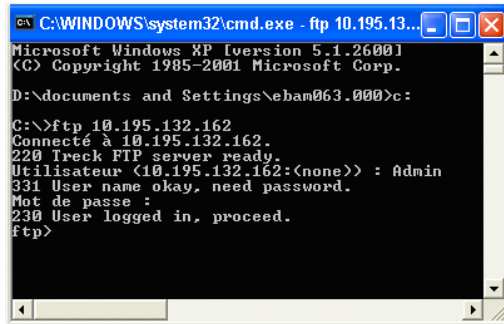
Connecting to the FTP server

- Start the command line interface (start menu, then execute "cmd")
- If required, change to your working directory
- Run ftp on the desired IP address
- Give user name and password when prompted

FTP commands

The main FTP client commands that can be used are:

- cd: to change the current target directory
- put: to load a file into the ACE850
- get: to get a file from the ACE850
- dir: to list the files of the target directory
- bye: to disconnect from the ACE850
- help: to get help on using the ftp client



```
C:\WINDOWS\system32\cmd.exe - ftp 10.195.132.162
Microsoft Windows XP [version 5.1.2600.1]
(C) Copyright 1985-2001 Microsoft Corp.

D:\documents and Settings\ebam063.000>c:
C:\>ftp 10.195.132.162
Connecté à 10.195.132.162.
220 Treck FTP server ready.
Utilisateur (10.195.132.162:(none)) : Admin
331 User name okay, need password.
Mot de passe :
230 User logged in, proceed.
ftp>
```

ACE850 file system structure

The ACE850 file system comprises two volumes named "flash0:" and "ram0:". The ftp server always starts on the flash0 volume. To switch from one volume to the other, use the following commands:

```
cd ram0:\
cd flash0:\
```

Flash0 volume content

This volume contains:

- the IEC 61850 configuration file "CID" (if loaded). This file can be read or written. Its content is protected and can be modified only with the SFT2841 or CET850 tools.
- the backup directory "bak". It contains the backup IEC 61850 file, if any. This file can only be read. This file is only kept as an archive. It is not used by the ACE850.
- the system directories "fw" and "wwwroot". These directories contain firmware and system files and they should never be modified unless instructed to do so.

Ram0 volume content (ACE850 < V2.0)

This volume contains:

- the logical devices directory LD

As described by the IEC 61850 standard, it contains a directory bearing the same name as the Sepam Logical Device, in which a COMTRADE directory gathers the disturbance files CFG and DAT. These files can only be read.

- a system directory "fw" that should never be modified.

Ram0 volume content (ACE850 ≥ V2.0)

This volume contains:

- the logical devices directory LD which itself contains (as described by the IEC 61850 standard) a directory bearing the same name as the Sepam Logical Device, in which are located:
 - a COMTRADE directory gathering the various COMTRADE ⁽¹⁾ files (disturbance records, data log records, motor records). These files (.CFG and .DAT) can only be read. Timestamps in these files are expressed in local time.
 - a CTX directory containing the various context files (tripping context, no sync context). These files in binary (.CTX) or text (.TXT) mode can only be read. Please refer to Sepam manuals for a definition of their content. Timestamps in these files are expressed in local time.
 - a LOGS directory containing a COMFEDE ⁽²⁾ image of the entire IEC 61850 Log file. This file can only be read.
- a system directory "fw" that should never be modified.

Note: The content of the "Ram0:" volume can also be read using IEC 61850 file transfer, except for COMFEDE files.

(1) IEEE Std C37.111, Common Format for Transient Data Exchange for Power Systems.

(2) IEEE Std C37.239, Common Format for Event Data Exchange for Power Systems.

The ACE850 features an embedded web server that enables network and device monitoring, tuning, and troubleshooting.

Accessing the ACE850 over the network

After you have set up the Ethernet parameters, you can access the ACE850 over an Ethernet LAN using a web browser (Internet explorer 6.0 or higher, Mozilla Firefox ...).

Accessing the ACE850 Web server

1. Start your web browser.
2. In the address text box, type the address of the ACE850 (169.254.0.10 is the default), then press Enter.
3. Type your username and password in the login window (default is Admin, ACE850).
4. Choose the language for the current session, using the Home menu (left side).

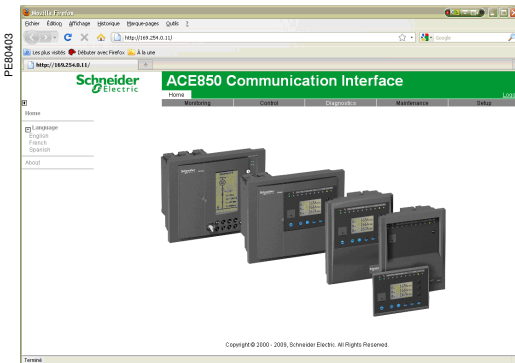
Logging Out

We recommend logging out whenever you do not need access to the ACE850. To log out of the ACE850 session, click Log Out to end your session. This feature is only available with Internet Explorer. With other web browsers, the browser's window must be closed.

Home menu

Click Home, to access the Home menu. With this menu, you can:

- Change the language for the current session
- Display the About page that provides information about Sepam and ACE850



ACE850 home page.

Product & Communication Interface	
Sepam	
Type	T87
Serial Number	00732999
Label	Sepam xxx
Communication Interface	
Type	ACE850TP
Serial Number	111111
Firmware Version	V0.5
Hardware Version	V1

ACE850 About page.

Diagnostics Web pages

Click Diagnostics to access the diagnostics menu.

There are 2 general diagnostics pages dealing with Ethernet operation:

- Ethernet global statistics
- Ethernet port statistics

There is also a set of protocol dedicated diagnostics pages:

- Modbus statistics
- IEC 61850 statistics
- SNMP statistics
- STNP statistics
- RSTP statistics

Diagnostics pages are automatically refreshed every 5 seconds (approximately).

Ethernet statistics

Ethernet and TCP/IP statistics

Item	Description
Mac address	Unique Ethernet hardware address of the ACE850
Frame type	Value of the frame type configured with SFT2841
TCP/IP parameters	Parameter values configured with SFT2841
Frames received	Total number of received Ethernet frames, regardless of port or protocol
Frames transmitted	Total number of transmitted Ethernet frames, regardless of port or protocol
Reset Counters button	Button to reset the Ethernet counters

PE80831

Ethernet TCP/IP Statistics

Ethernet Parameters

Mac Address 00:00:54:81:30:10

Frame Type Ethernet II

Ethernet Statistics

Frames Received 1129

Frames Transmitted 1972

TCP/IP Parameters

IP Address 169.254.0.10

Subnet Mask 255.255.0.0

Default Gateway 169.254.0.24

TCP Keepalive 30

IP Filtering Disabled

Reset Counters

ACE850 Ethernet TCP/IP statistics.

Ethernet port statistics

Item	Description
Port P1/P2 buttons	Selection of the port of which statistics are displayed
Frames transmitted OK	A counter that increments each time a frame is successfully transmitted.
Collisions	A counter that increments each time a frame is retransmitted due to collision detection.
Excessive collisions	A counter that increments each time a frame cannot be sent because it has reached the maximum collision status based on the Truncated Binary Exponential Backoff algorithm.
Carrier sense errors	A counter that increments each time there is a collision because carrier sense is disabled.
Internal MAC Tx errors	A counter that increments for every transmission error that is not caused by late, excessive, or carrier sense collisions.
Link speed	Actual link speed
Frames received OK	A counter that increments each time a frame is successfully received.
Alignment errors	A counter that increments each time a received frame has an FCS error and does not end on an 8-bit frame boundary.
CRC errors	A counter that increments each time a received frame has a CRC or an alignment error.
FCS errors	A counter that increments each time a received frame has a FCS or an alignment error.
Late collisions	A counter that increments each time a collision occurs after the slot time (512 bits starting at the preamble).
Reset counters button	Button to reset the port counters

PE80832

Ethernet Port Statistics

Port ☐ P1 ☒ P2

Transmit Statistics

Frames Transmitted OK 1477

Collisions 0

Excessive Collisions 0

Carrier Sense Errors 0

Internal MAC Tx Errors 0

Link Speed 100

Receive Statistics

Frames Received OK 2219

Alignment Error 0

CRC Errors 0

FCS Errors 0

Collision Statistics

Late Collisions 0

Reset Counters

ACE850 Ethernet port statistics.

Modbus statistics

Modbus/TCP server statistics

PE800633

Modbus/TCP Server Statistics

TCP Connection
 Port Status: Operational

Inbound/Outbound Statistics
 Opened TCP Connections: 1
 Received Messages: 24
 Transmitted Messages: 25

Reset Counters

ACE850 Modbus/TCP server statistics.

Modbus/TCP connections statistics

PE800634

Modbus/TCP Connections Statistics

Index	Remote IP	Remote Port	Local Port	Transmitted Messages	Received Messages	Sent Errors
1	169.254.0.20	4607	502	15001	15002	0
2	169.254.0.20	3213	502	3	3	2

Reset Counters

ACE850 Modbus/TCP connections statistics.

IEC 61850 statistics

IEC 61850 server statistics

PE800641

IEC 61850 Server Statistics

IEC 61850 Server Counters
 Called Connections: 1
 Called Connections OK: 1
 Called Connections Failure: 0
 Server Conclude: 0
 Local Abort: 0
 Remote Abort: 0
 Rejects Sent: 0
 Rejects Received: 0
 Server Indications: 1293
 Server Responses OK: 1293
 Server Responses Errors: 0
 Variables Read OK: 94190
 Variables Read Errors: 0
 Variables Write OK: 2
 Variables Write Errors: 0
 Information Reports: 0
 Unsolicited Status: 0

Reset Counters

ACE850 IEC 61850 server statistics.

Item	Description
Called connections	Number of incoming connection requests
Called connections OK	Number of accepted incoming connection requests
Called connections failure	Number of rejected incoming connection requests
Server conclude	Number of server initiated conclude operation
Local abort	Number of server initiated abort operation
Remote abort	Number of client initiated abort operation
Rejects sent	Number of reject frames sent
Rejects received	Number of reject frames received
Server indication	Number of incoming server requests
Server responses OK	Number of accepted incoming server requests
Variables Read OK	Number of accepted MMS read variable requests
Variables Read errors	Number of rejected MMS read variable requests
Variables Write OK	Number of accepted MMS write variable requests
Variables Write errors	Number of rejected MMS write variable requests
Information reports	Number of Information reports sent
Unsolicited status	Number of Unsolicited status messages sent
Reset counters button	Button to reset the IEC 61850 counters

PEB0642

IEC 61850 Connections Statistics				
IEC 61850 Connections				
Index	Remote IP	Remote Port	Local Port	
1	169.254.0.15	1237	102	
2	169.254.0.20	1507	102	

ACE850 IEC 61850 connections statistics.

PEB0643

IEC 61850 Configuration Status																			
<div>IEC 61850 Device Information</div> <div> Device Name <input type="text"/> Device Type <input type="text"/> Device Status <input type="text"/> </div>																			
<div>IEC 61850 Configuration Files</div> <table border="1"> <thead> <tr> <th>File</th> <th>Name</th> <th>Edit Time</th> <th>Version</th> <th>Revision</th> </tr> </thead> <tbody> <tr> <td>Current</td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Backup</td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table> <div>Restore Backup File</div>					File	Name	Edit Time	Version	Revision	Current					Backup				
File	Name	Edit Time	Version	Revision															
Current																			
Backup																			

ACE850 IEC 61850 Configuration status.

PEB0644

GOOSE Messaging Statistics						
GOOSE Produced						
Index	GOOSE ID Dataset	Destination @ V-Lan ID / Priority	Test	Enabled AppID	Min / Max (ms)	Tx Msgs
1	app00TX 082_LD0LLN080d6A	01:0C:CD:01:00:01 0/4	<input type="checkbox"/>	✓ 289	32 / 29900	132934
2	C81850One 082_LD0LLN080d6A	00:00:00:00:00:00 0/0	<input type="checkbox"/>	0	0 / 29900	0
<div>Undo Apply</div>						
GOOSE Subscribed						
Index	GOOSE ID Dataset	Source @ Destination @	Test	Validity AppID	Quality Status QD / QR	Rx Msgs
1	UNICASIM IEDKLOWLLN080SK	00:18:FE:26:4A:B9 01:0C:CD:01:00:05	<input type="checkbox"/>	✓ 3002	✓ ✓	24256
2	app00TX 082_LD0LLN080d6A	00:00:54:01:30:10 01:0C:CD:01:00:01	<input type="checkbox"/>	✓ 289	✓ ✓	132927
<div>GOOSE Frames Counters</div> <div> Frames Transmitted [32934] Frames Received [89310] </div>						

ACE850 GOOSE messaging statistics.

IEC 61850 connection statistics

Item	Description
Index	Number of the connection
Remote IP	IP address of the IEC 61850 client
Remote port	TCP port number on the client side
Local port	TCP port number on the server side

IEC 61850 configuration status

Item	Description
Device information	
Device name	Name given to the device in the IEC 61850 configuration file
Device type	Type of the Sepam as declared in the configuration file
Device status	<ul style="list-style-type: none"> Wrong type: the actual Sepam is not of the expected type Init: the device database is being initialized Online: the device is operational Bad Conf.: there is an error in the configuration file

IEC 61850 Configuration files

File	"Current" is the last loaded CID file "Backup" is the archived CID file
Name	Name of the file as defined at loading
Edit time	Time at which the configuration file has been created
Version	Version of the file as defined in the file header
Revision	Revision of the file as defined in the file header
Restore backup file button	Overwrite the content of the current file with the content of the backup file

GOOSE messaging statistics

Item	Description
GOOSE produced ⁽¹⁾	
Index	Number of the produced GOOSE message
GOOSE ID Dataset	Value of the appID field in the GOOSE control block Dataset used for this GOOSE message
Destination @ V-Lan ID / Priority	Mac multicast address for this GOOSE message V-Lan identifier and priority for this GOOSE message
Test checkbox	Value of the GOOSE message test mode/simulation flag
Enabled	Enabled status of the GOOSE control block
AppID	Value of the AppID field in the GSE address block
Min/Max	Minimum and maximum retransmission time
Tx Msgs	Number of such GOOSE messages produced
Undo button	Cancel the changes made to the test checkboxes
Apply button	Apply the changes made to the test checkboxes

GOOSE subscribed ⁽¹⁾

Index	Number of the subscribed GOOSE message
GOOSE ID Dataset	Value of the GoID field in the received GOOSE message Dataset used for this GOOSE message
Source @	Mac address of the GOOSE message producer
Destination @	Mac multicast address for this GOOSE message
Test	Value of the test mode/simulation field of the received GOOSE message
Validity	Enabled state of the subscription
AppID	Value of the AppID field in the received GOOSE message
Quality status: QD	Value of the "quality of data" flag for that message
Quality status: QR	Value of the "quality of reception" flag for that message
Rx Msgs	Number of such GOOSE messages received

GOOSE frames counters ⁽¹⁾

Frames transmitted	Total number of GOOSE frames transmitted by the device
Frames received	<ul style="list-style-type: none"> Number of GOOSE frames received with or without subscription (V1.0) Number of GOOSE frames received with subscription (≥ V1.1)

⁽¹⁾ More information can be found on page 100.

PEB08035

SNMP Statistics

Global Diagnostics

SNMP Agent Status	Operational
Bad Community Usages	13
Received Messages	342
Transmitted Messages	342

Reset Counters

ACE850 SNMP statistics.

PEB08036

SNTP Statistics

SNTP Protocol

SNTP Client Status	Enabled
Active SNTP Server IP Address	169.254.0.20
Poll Interval (minutes)	1
Round Trip Delay	0,002
Local Offset	0,003

Date and Time

Daylight Saving Time	Enabled
Last Successful Time Sync (UTC)	2009-04-22 08:58:13:210
Device Date and Time (UTC)	2009-04-22 08:59:07:114
Device Date and Time (local)	2009-04-22 10:29:07:114

ACE850 SNTP statistics.

SNMP statistics

Item	Description
SNMP agent status	Status of the SNMP agent
Bad Community usages	Number of requests with invalid community
Received messages	Total number of SNMP requests
Transmitted messages	Total number of SNMP responses
Reset counters button	Button to reset the messages counters

SNTP statistics

Item	Description
SNTP Client status	Value configured for the parameter in SFT2841
Active SNTP server IP address	Address of the server currently answering SNTP requests (0.0.0.0 if no server answer)
Poll interval	Value configured for the parameter in SFT2841
Round trip delay	Total time for SNTP request and response messages
Local offset	Difference between SNTP time and ACE time
Daylight saving time	Value configured for the parameter in SFT2841
Last Successful Time Synchronization (UTC)	Last time the ACE850 successfully contacted the SNTP server (UTC time)
Device Date and Time (UTC)	Current time and date of the ACE850 (UTC time)
Device Date and Time (local)	Current time and date of the ACE850 (local time)

PE00037

RSTP Bridge Statistics

General

Bridge Status

Enabled

Bridge ID

61440 / 00:00:54:90:60:02

Designated Root ID

8192 / 00:0A:DC:19:AE:40

Designated Root Port

128 / 0

Rootpath Cost

200000

Total Topology Changes

3

Configured vs Learned

Configured Hello Time

2

Learned Hello Time

2

Configured Forward Delay

15

Learned Forward Delay

15

Configured Max Age

20

Learned Max Age

20

ACE850 RSTP bridge statistics.

PE00038

RSTP Port Statistics

Port

☒ P1

☐ P2

Port Status

Status

Forwarding

Role

Root

Priority

128

Port Path Cost

200000

Designated Port ID

128 / 15

Received RSTs

32824

Transmitted RSTs

3

Received Configure

0

Transmitted Configure

0

Received TCNs

0

Transmitted TCNs

0

ACE850 RSTP port statistics.

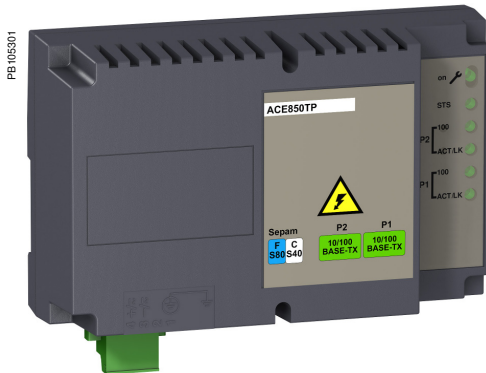
RSTP statistics

RSTP bridge statistics

Item	Description
Bridge status	RSTP status of the bridge
Bridge ID	Bridge vector (Bridge priority/Bridge Mac address)
Designated Root ID	Bridge vector of the RSTP root bridge
Designated Root Port	Identifier of the root port (priority/number)
Rootpath cost	Path cost to the root
Total topology changes	Topology change counter (as defined by 802.1D-2004)
Configured hello time	Value of the configured hello time
Learned hello time	Operational value for hello time
Configured forward delay	Reminder of the configured forward delay
Learned forward delay	Operational value for forward delay
Configured max age	Value of the configured max age
Learned max age	Operational value for max age

RSTP port statistics

Item	Description
Port P1 / P2 buttons	Selection of the port of which statistics are displayed
Status	RSTP status for the selected port
Role	RSTP role for the selected port
Priority	Port priority
Port path cost	Port contribution to root path cost
Designated port ID	Identifier of the link partner port (priority/number)
Received RSTs	Number of RST BPDUs received (RSTP)
Transmitted RSTs	Number of RST BPDUs sent (RSTP)
Received configure	Number of Configuration BPDUs received (STP)
Transmitted configure	Number of Configuration BPDUs sent (STP)
Received TCNs	Number of Topology change BPDUs received (STP)
Transmitted TCNs	Number of Topology change BPDUs sent (STP)



ACE850TP communication interface.

Installation instructions

The ACE850 communication interface must be installed and connected in accordance with the instructions in the following documents:

- ACE850 installation guide (delivered with each ACE850), reference BBV35290,
- Sepam series 40 user's manual, reference PCRED301006EN,
- Sepam series 60 operation manual, reference SEPED310017EN,
- Sepam series 80 operation manual, reference SEPED303003EN.

Preliminary checks

Perform the following actions:

- check the CCA614 cord connection between the ACE850 interface and the Sepam base unit
- check the connection of the ACE850 to the Ethernet network
- check the auxiliary power supply connection
- check the complete configuration of the ACE850.

Checking the operation of the ACE interface

You can use the following to check that an ACE850 interface is operating correctly:

- the indicator LEDs on the front panel of the ACE850
- the information provided by the SFT2841 software connected to Sepam
- the web pages embedded inside the ACE850 (this advanced diagnostics feature is only available when it is possible to establish an Ethernet connection with the ACE850. If not, use the basic diagnostics to help solving the problems).

Basic diagnostics

Diagnosis using indicator LEDs on the ACE850

1 On/fault indicator. This indicator has the following states:

- Off: the module is not powered
- steady red: the ACE850 is initializing or is faulty
- blinking red: the ACE850 is unable to establish communication with the Sepam base unit, or the ACE850 is not properly configured
- steady green: the ACE850 is operating correctly
- fast blinking green: indicates a transient state which occurs at startup when IEC 61850 configuration file is analyzed
- steady green and blinking red: communication with the base unit has been lost. This can indicate a normal situation due to a restart of the Sepam after parameters have been downloaded. The ACE850 automatically resumes normal operation in a few seconds.

This status can also indicate an error condition, in which case, ACE850 restarts automatically within 15 seconds and try to re-establish connection.

2 Status indicator. This indicator has the following states:

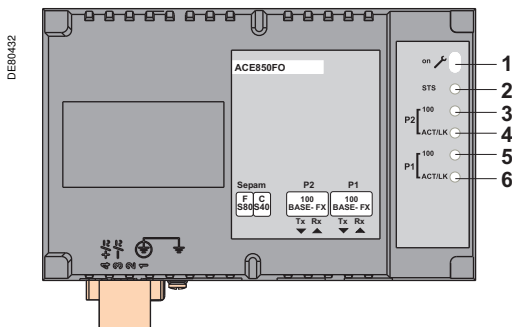
- Off: the Ethernet communication is not started
- steady green: the Ethernet communication is correctly operating
- three blinks pattern: no logical Ethernet link
- four blinks pattern: duplicate IP address
- six blinks pattern: invalid IP configuration.

3 and 5 Speed indicators. These indicators have the following states:

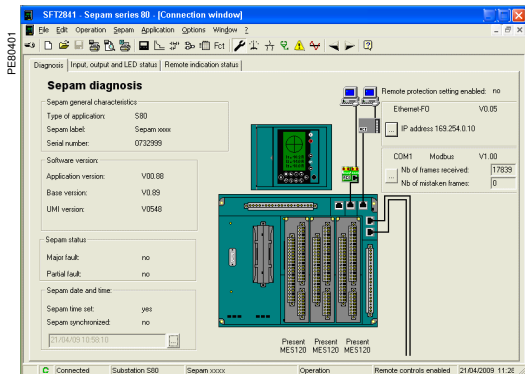
- Off: the corresponding physical link is down or the port speed is 10Mbps
- On: the corresponding port operates at 100Mbps.

5 and 6 Link/Activity indicators. These indicators have the following states:

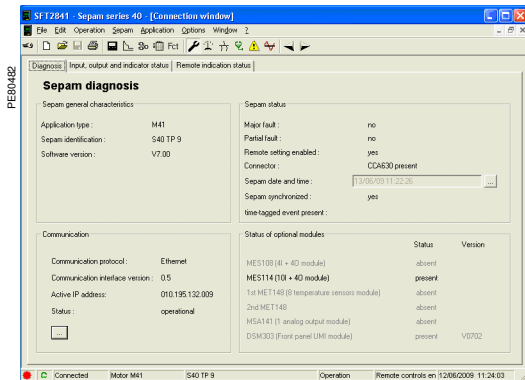
- Off: the corresponding physical link is not established
- On: the corresponding physical link is established
- blinking: the indicator blinks with the activity on the link.



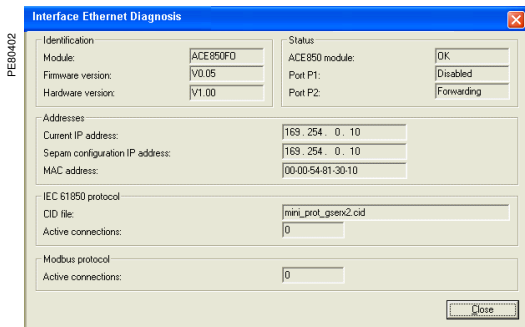
ACE850 communication interface.



SFT2841: Sepam series 80 diagnosis screen.



SFT2841: Sepam series 40 diagnosis screen.

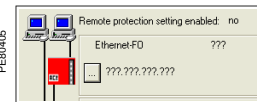


SFT2841: Ethernet diagnosis screen.

Diagnosis using SFT2841 software

When connected to Sepam, the SFT2841 software informs the operator of the general Sepam status and of the Sepam communication status in particular. Sepam status information appears on the Sepam diagnosis screen on which buttons can be used to obtain detailed status information on each communication channel. The Sepam diagnosis screen can be used to check that the Sepam base unit and the ACE850 interface are correctly connected:

Sepam series 60 and Sepam series 80

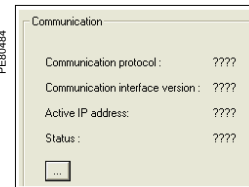


Diagnosis screen detail:
ACE850 not or improperly connected.

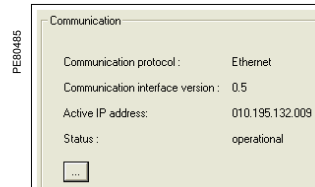


Diagnosis screen detail:
ACE850 connected properly.

Sepam series 40



Diagnosis screen detail:
ACE850 not or improperly connected.



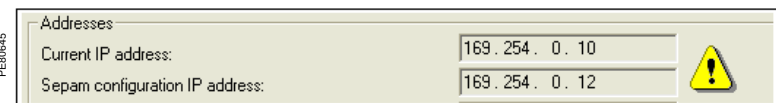
Diagnosis screen detail:
ACE850 connected properly.

Detailed diagnosis

The Ethernet diagnosis screen allows to check:

- the ACE850 has accepted its configuration (status = OK)
- the communication ports status
- the IP address used by the ACE850.

If different from the one configured, it might mean that the configured address is not valid, or that it is overridden by the CID file, if allowed.



Troubleshooting

ACE850 and Ethernet troubleshooting

Symptoms	Possible cause	Action/Remedy
On/Fault LED is not lit.	Source power is not applied or is not stable. LED is burned out.	Apply power or check source. Check to see if other LEDs operate properly.
On/Fault LED is steady red.	The module is in a faulty condition.	Try to power off and on again. If condition persists, replace the module.
On/Fault LED is blinking red.	The link with Sepam base unit is broken.	1. Check that the ACE850 is declared in Sepam configuration. 2. Check the cabling between Sepam and ACE850.
P1/P2 link LED is not lit.	Proper link is not established.	1. Make sure the proper cable is used and connected. 2. Make sure the proper media type is selected in the ACE850 Communication setup configuration.
Status LED repeats a four blink-pause pattern.	The IP address that the ACE850 was assigned is being used by another networked device.	Assign a new IP address to the ACE850 or to the conflicting device. Nota : When a duplicate IP address is detected, the ACE850 resets its specified IP address to the default IP address. When the ACE850 detects the conflict no longer exists, it will use the specified IP address.
Status LED repeats a three blink-pause pattern.	No Ethernet connection can be established. Nota : if RSTP is enabled, this is a normal transient situation for approximately 20/30 seconds after startup.	Check that at least one of the P1 or P2 link is established.
Cannot browse the ACE850.	Incorrect network configuration.	1. Verify all IP parameters are correct. 2. Verify ACE850 receives request by pinging the ACE850: ■ go to DOS prompt ■ type ping and the ACE850 IP address, e.g ping 169.254.0.10 3. Verify all the browser Internet option connection settings are correct.

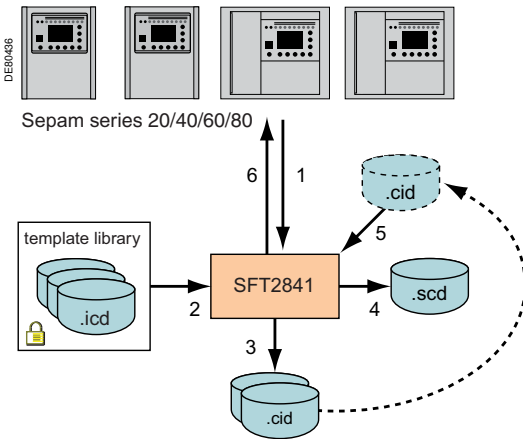
IEC 61850 configuration troubleshooting

Symptoms	Possible cause	Action/Remedy
IEC 61850 clients can not connect to the ECI850.	Ethernet setup is not correct. The maximum number of active connections is reached.	See above. Check the active clients.
IEC 61850 clients connect to the ACE850, but no data is available.	The IEC 61850 server is not configured or the CID configuration file is not valid.	Download a valid configuration file.
The ACE850 seems working, but does not report data.	The actual Sepam type is not the type expected in the configuration file.	Check on the web server that the configured Sepam type matches the actual Sepam type and update the configuration file as necessary.

Configuration files

The IEC 61850 configuration process uses and generates the following types of Substation Configuration Language (SCL) files:

SCL file	Description
ICD IED (Intelligent Electronic Device) Capability Description	An ICD file exists for each type of Sepam device. It describes the functions and communication data available in a Sepam. ICD files are provided in a library with SFT2841 and CET850 configuration tools, and are used as device models in the configuration process.
IID Instantiated IED Description	The IID file describes the project-specific configuration of a single IED in a system. It is used as an exchange file between the CET850 configuration tool and other IEC 61850 system configuration tools to exchange the configuration data for a single IED instantiated specifically for a project.
CID Configured IED Description	For every configured Sepam or ECI850 device there is a CID file which describes the operating IEC 61850 configuration of the device. A CID file is created when a device is configured with the configuration tools. The CID file is then loaded into the device to configure it. In the case of an ECI850, the CID file contains configuration information for all the Sepam devices to which it is connected.
SCD Substation Configuration Description	An IEC 61850 Substation Automation System has an SCD file. An SCD file contains configuration data for the IEC 61850 system and the communication configuration settings for all related IEC 61850 devices.



SCL files with SFT2841.

SFT2841 for standard IEC 61850 configuration

The Sepam setting and operating software, SFT2841, is used to produce a standard IEC 61850 configuration. The standard configuration enables the use of all the communication data of a Sepam without modification, as described in the ICD files.

The SFT2841 is used to:

- 1 Get the information from Sepam and ECI850 connected to the IEC 61850 network. This can be done manually by keying the Sepam description (name, type, address) or automatically by the SFT2841 polling the network to find connected devices.
- 2 Extract ICD files from the library to build a configuration based on the Sepam description.
- 3 Build a CID file as a result of the configuration for each Sepam or ECI850 connected to the IEC 61850 network. For an ECI850, it contains the configuration of all the Sepam connected to the ECI850.
- 4 Generate an SCD file for use by other IEC 61850 configuration tools. It contains the configuration of all Sepam and ECI850 connected to the IEC 61850 network.
- 5 Import a CID file into SFT2841 to modify it: for example to add or remove a Sepam in the IEC 61850 network topology.
- 6 Download a CID file into Sepam or ECI850 with SFT2841.

CET850 for advanced IEC 61850 configuration

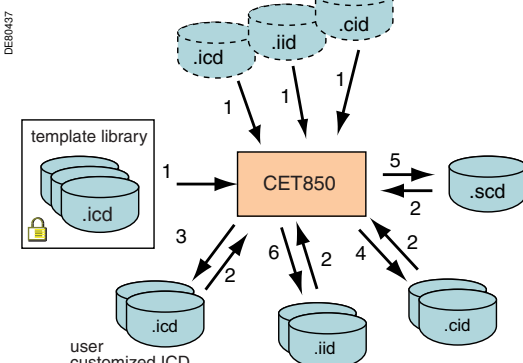
IEC 61850 configuration software CET850 is used to create, display, modify, or optimize an IEC 61850 configuration.

The CET850 can be used to:

- 1 Create an IEC 61850 configuration using an ICD, IID, or CID file as an input.
- 2 Edit an existing CID, SCD, IID, or user-customized ICD file to modify its contents by:
 - adding or removing a Sepam
 - displaying the configuration
 - modifying communication parameter values
 - optimizing configuration by creating or modifying Datasets and Report Control Blocks
 - configuring or optimizing the GOOSE communication by creating or modifying the GOOSE messages production and subscription.
- 3 Generate a user-customized ICD file using a Sepam IED template from the factory ICD library.
- 4 Generate a CID file for storing the configuration of one device which can then be downloaded to the Sepam or ECI850 server using SFT2841 or by FTP with a standard Internet browser software.
- 5 Generate an SCD file for storing the configuration of an IEC 61850 system which can then be used by other IEC 61850 configuration tools.
- 6 Generate an IID file for storing the specific configuration of an instantiated IED which can then be used by other IEC 61850 system configuration tools.

Note:

The CID or SCD file can come from the SFT2841. Sepam ICD Factory library templates can not be modified.



SCL files with CET850.

Introduction

The SFT2841 software provides a quick and easy way to generate all the standard configuration files that describe the IEC 61850 access to Sepam devices according to standard IEC 61850-6. These files are:

- The ECI850 CID file that describes the communication and data interface to all Sepam attached to the server as Logical Devices.
- The CID file for the Sepam series 40, Sepam series 60, and Sepam series 80 fitted with the ACE850 communication interface.
- The SCD file that gives the complete description of the whole IEC 61850 communication system and that can be used as input to configure the SCADA system.

The CET850 configuration software provides all necessary functions for an advanced IEC 61850 configuration. SFT2841 supports only a standard IEC 61850 configuration with predefined device capabilities (predefined Datasets and Report Control Blocks).

To configure an IEC 61850 Sepam communication system using SFT2841, follow these steps:

1. Create a Sepam communication network
2. Add the Sepam and ECI850 devices to the network
3. Generate the CID files, and optionally, the SCD file
4. Load the CID files into the devices

Sepam communication network

SFT2841 can be connected to Sepam either locally in point-to-point mode, or in multipoint mode via a communication network called E-LAN (Engineering Local Area Network).

First the definition of a Sepam communication network is described in a configuration file (NET file) with SFT2841.

Then the Sepam devices can be addressed by SFT2841 via the E-LAN and constitute a Sepam communication network.

In an IEC 61850 system based on Ethernet TCP/IP, the E-LAN uses the same Ethernet TCP/IP communication network. Therefore, this network configuration (defined in a NET file) can be successfully adapted to include the full description of the IEC 61850 Sepam devices profiles, thus creating their CID files.

SFT2841 is able to load into the Sepam devices and ECI850 their CID file via the Ethernet network.

Creating a Sepam communication network

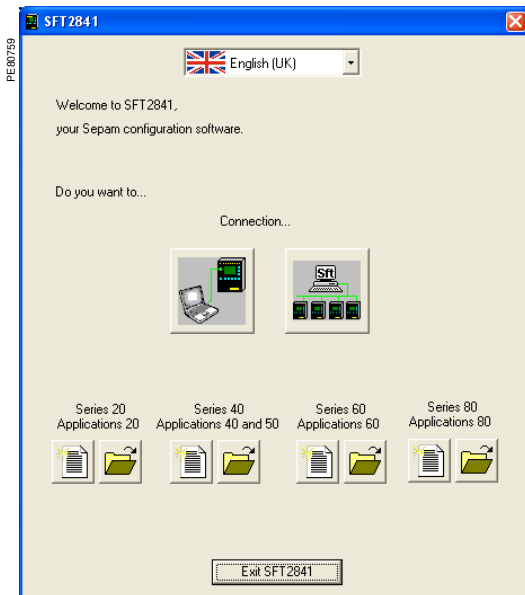
When creating a Sepam communication network (NET file) with SFT2841, 3 types of communication link are possible:

- Serial
- Phone modem
- Ethernet

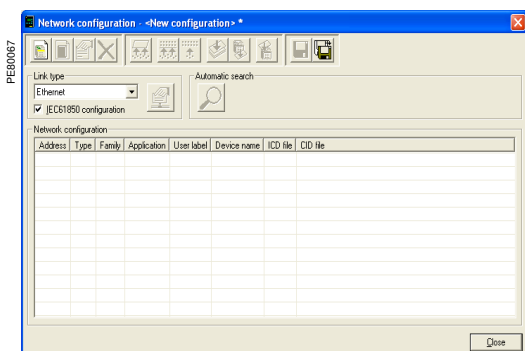
To create an IEC 61850 Sepam network do the following steps:

1. Select **Ethernet** because IEC 61850 is based on Ethernet TCP/IP protocol over Ethernet network.
2. Select the option **IEC 61850 configuration**.

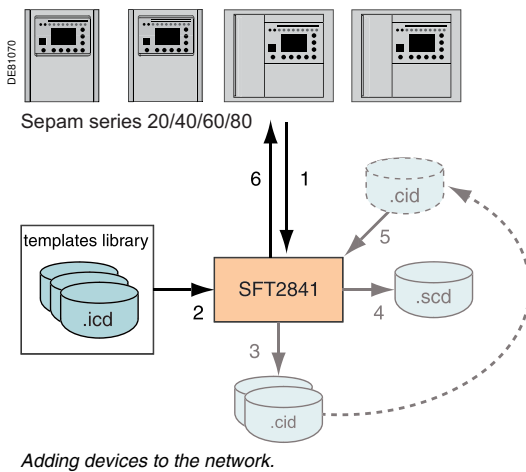
This option enables a set of functions that are used during the IEC 61850 configuration process.



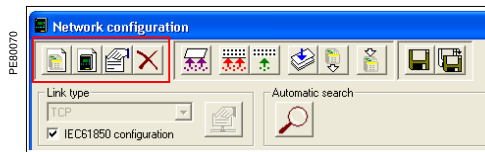
SFT2841 welcome window.



Network configuration.

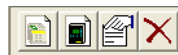


Adding devices



Device editing functions.

Device editing functions




To define the devices to be connected on the network, 4 options are available:

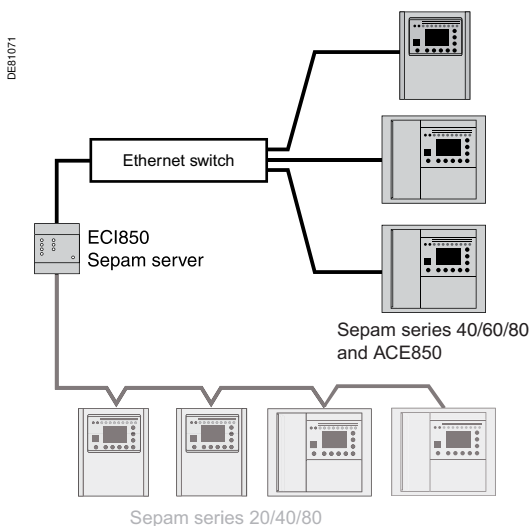
- Add an Ethernet TCP/IP device
- Add a device on an ECI850
- Modify a device
- Remove a device from the configuration

These actions are also available from a contextual menu.

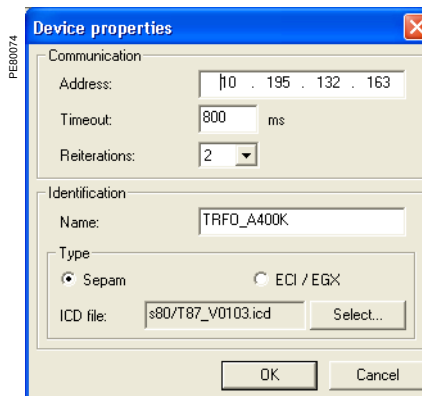
Adding an Ethernet TCP/IP device

To add an Ethernet TCP/IP device (ECI850 or Sepam series 40/80 and ACE850):

1. Click on the button  to display the following Device properties window.



Adding an Ethernet TCP/IP device.



2. Set the fields of the Device properties window according to following description.

Communication settings

■ Address

Assign an IP address to the device.

This address is used by SFT2841 to access the device for loading the CID file. This address must match the IP address assigned locally to the device. It must be unique on the Ethernet TCP/IP network.

■ Timeout and Reiterations

These parameters are related to the communication between SFT2841 and the device when SFT2841 is used in multi-point mode via the E-LAN. They have no impact on the IEC 61850 configuration. Default values should be kept.

Device identification

■ Device name

The device name is the name of the IED in the IEC 61850 system. It must be unique in the IEC 61850 system.

■ ICD file

□ Device type

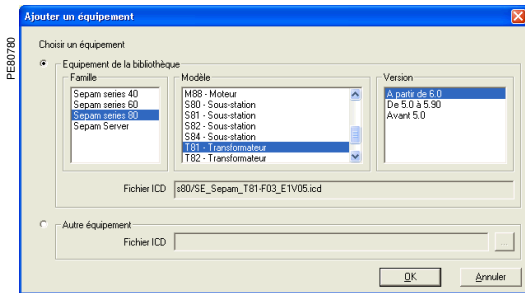
For a Sepam series 40, Sepam series 60, or Sepam series 80 device, set the type to Sepam. For an ECI850, set the type to ECI/EGX.

□ ICD file

Select the ICD file that provides the IEC 61850 description of the device.

SFT2841 software is delivered with a library of ICD files for all types of Sepam devices and all Sepam applications. This library also includes the ICD file for the ECI850.

Configuration of IEC 61850 protocol With SFT2841 setting and operating software



Browsing the library and device selection.

Selecting a device in the library

SFT2841 displays the list of IEC 61850 devices available in the library.

To browse inside the ICD library, use the 3 access keys: Family, Model and Version.

1. Select the Family you wish.

Then the Model defines a device within the Family.

For instance, the Family Sepam series 80 includes the following Models:

- Substation S80, S81, S82, S84
- Transformer T81, T82, T87
- Generator G82, G87, G88
- Motor M81, M87, M88
- Busbar B80, B83
- Capacitor C86

2. Select the Model you wish.

3. For a given Model, select the Version.

The correct ICD file associated with the device is automatically selected.

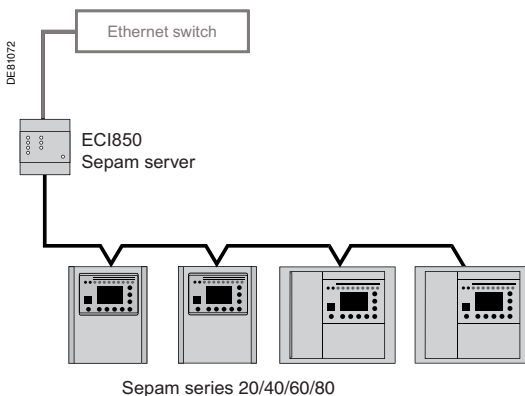
The new device is added to the devices table and all its main characteristics are displayed.

Network configuration							
Address	Type	Family	Model	User label	Device name	ICD file	CID file
10.195.132.160	ECI / EGX	ECI	ECI850		KZ_400K	ECI/ECI850_V0103.icd	C:\Program Files\Schneider\SF1
10.195.132.163	Sepam	Sepam series 80	T87		TRFO_A400K	s80/T87_V0103.icd	C:\Program Files\Schneider\SF1

Ethernet TCP/IP devices added on the devices table.

The ECI850 is represented by the following icon:

A Sepam is represented by the icon:



Adding an Ethernet TCP/IP device.

Adding a Sepam on the ECI850

This option is enabled only if an existing ECI850 is selected in the devices table.

To add a Sepam:

1. Click on the button

2. Set the fields of the device settings window according to following description.

Properties

■ Address

Assigning a Modbus address to the device from 1 to 247.

This address is used by the ECI850 to access the device as a slave device via the Modbus subnetwork. It must be unique on the Modbus subnetwork.

■ Device name

Assigning a name to the device.

Each Sepam attached to the ECI850 will be considered as a Logical Device (LD) according to the IEC 61850 standard. The name of the device will be the name of the LD inside the ECI850. It must be unique inside the server.

■ ICD file

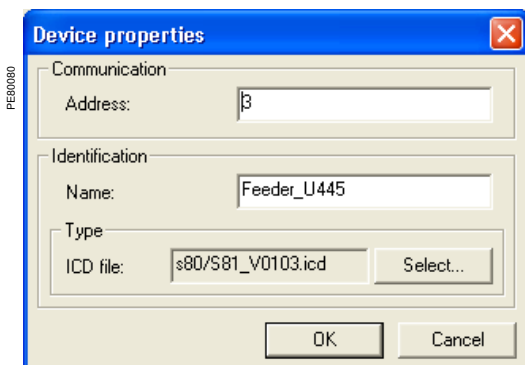
Selecting the ICD file that provides the IEC 61850 description of the device.

Selecting the device in the library

To select the ICD file that provides the IEC 61850 description of the device, follow the same process as described for an Ethernet TCP/IP device, browsing inside the ICD library with the 3 access keys: Family, Model and Version.

The Family depends on the device type so select the Model, then select the Version.

When the action is complete, the new Sepam is added to the devices table and all its main characteristics are displayed.



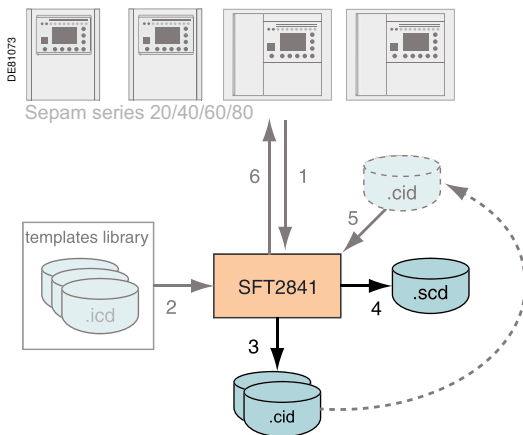
Sepam device settings window.

Network configuration							
Address	Type	Family	Model	User label	Device name	ICD file	CID file
10.195.132.160	ECI / EGX	ECI	ECI850		KZ_400K	ECI/ECI850_V0103.icd	C:\Program Files\Schneider\SF1
1	Sepam	Sepam series 20	B22		Busbar_01	s20/B22_V0103.icd	
2	Sepam	Sepam series 80	G88		Generator_G732	s80/G88_V0103.icd	
3	Sepam	Sepam series 80	S81		Feeder_U445	s80/S81_V0103.icd	
4	Sepam	Sepam series 80	S84		Feeder_E655	s80/S84_V0103.icd	
10.195.132.163	Sepam	Sepam series 80	T87		TRFO_A400K	s80/T87_V0103.icd	C:\Program Files\Schneider\SF1

Sepam devices added on the devices table.

The ECI850 is represented by the following icon:

A slave Sepam connected to an ECI850 is represented by the icon and a link to the ECI850 icon.



Generating CID and SCD files.

Generating the CID files and the SCD file


After the devices have been added to the IEC 61850 communication network, SFT2841 can generate the CID file of a specific device or all the CID files for all IEC 61850 devices defined on the network. SFT2841 can also generate the SCD file that describes the Sepam communication network as an IEC 61850 communication system.

3 functions are available to generate the CID files and the SCD files.

To activate these functions, use the following 3 buttons in the toolbar:




Generating a specific CID file

To generate the CID file of a specific device, select the device in the devices table and click on the button .

Nota : this button is enabled only when an Ethernet TCP/IP device is selected (ECI850, Sepam series 40, Sepam series 60 or Sepam series 80 directly connected to the Ethernet TCP/IP network).


A dialog box requests the location and name of the CID file. By default, the name of the CID file is built from the IED name: <IED-name>.cid.

Generating all CID files

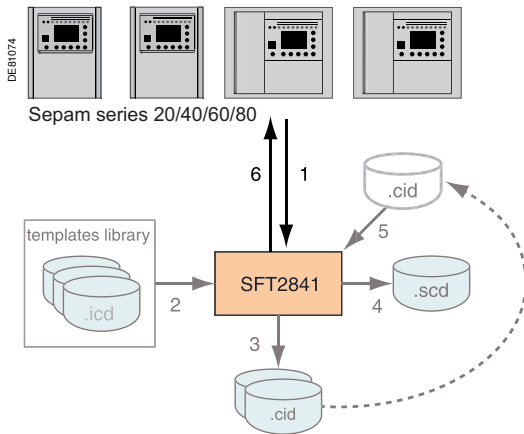
To generate all of the CID files for all IEC 61850 devices defined on the network, click on the button .

A dialog box requests you to provide the location of the CID files. The name of each CID file is built from the IED name: <IED-name>.cid.

Generating the SCD file


To generate the SCD files for all IEC 61850 devices defined on the network, click on the button .

A dialog box requests the location and name of the SCD file. By default, the name of the SCD file is built from the name of the Sepam NET file: <NET file name>.scd.



Loading a CID file into a device.

Loading a CID file into a device

To load a CID file into a device, select the device from the devices table and click on the button .

Nota : this button is enabled only when an Ethernet TCP/IP device is selected (ECI850, Sepam series 40, Sepam series 60 or Sepam series 80 directly connected to the Ethernet TCP/IP network).

1. A dialog box requests to select the CID file to load.
2. The file transfer from SFT2841 to the device is based on FTP protocol. A dialog box requests your Username and Password in order to establish the FTP connection with the device.

The Username and Password should match those defined in the FTP server embedded in the remote device. Ask your IEC 61850 network administrator for the FTP Username and Password.

3. When the load of the CID file is complete, the connection with the remote device is automatically closed and the following result message "CID file downloaded successfully" is displayed.

Special transfer error cases

The transfer of the CID file is aborted by the device in the following cases:

- The content of the CID file is corrupted

To guarantee the integrity of the CID files, SFT2841 and Schneider Electric devices use a check key. If a CID file is modified using an XML editor or any other editor, the CID file will be considered as corrupted and refused by the device.

- Memory overflow


The device refuses the CID file if there is not enough memory to store it on the device.

Importing a device configuration from an existing CID file

This function enables the creation of a Sepam communication network by importing CID files. In this case, descriptions of devices are provided by CID files, instead of ICD files.

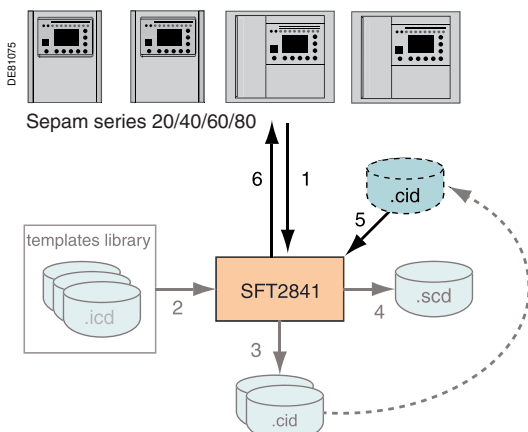
If the CID file represents an ECI850 Sepam server, all associated Sepam devices will be automatically added to the Sepam communication network.

To import a device from a CID file, proceeds as follow:

1. Add an Ethernet TCP/IP device by clicking the button .
2. Enter the IP address. The other parameters are not needed, as they will be taken automatically from the CID file.


Nota : to import a CID file from a remote device, the address must be the IP address of this device.

3. When the device is created and appears in the devices table, select it.
4. Then, associate an existing CID file to the selected device. 2 cases are possible:
 - The CID file is on the PC.
 - The CID file is on the remote device.



Importing a device configuration.

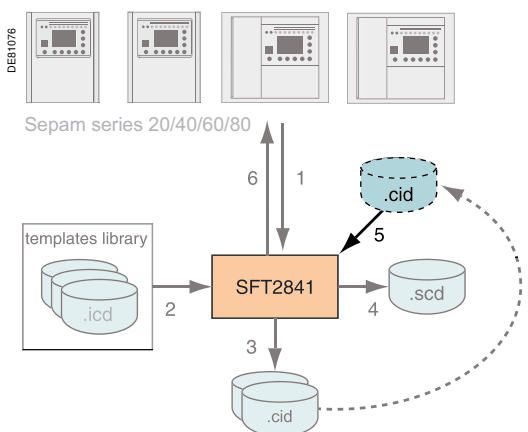
Importing a CID file from the PC

If the CID file is on the PC, click on the button .

Nota : this button is enabled only when an Ethernet TCP/IP device is selected in the devices table.

1. A dialog box asks you to select a CID file on the disk.
2. After the CID file has been selected, the description of the device in the devices table is automatically updated with the data taken from the CID file (device type, Family, application, IED name, ...).

If the CID file represents an ECI850 Sepam server, all associated Sepam devices will be automatically added to the devices table with their own characteristics (device type, Family, application, IED name, ...).




Importing a CID file from the PC.

Address	Type	Family	Model	User label	Device name	ICD file	CID file
10.195.132.160	ECI / EGX	ECI	ECI850		KZ_400K	ECI/ECI850_V0103.icd	C:\Program Files\Schneider\SF1
1	Sepam	Sepam series 20	B22		Busbar_01	s20/B22_V0103.icd	
2	Sepam	Sepam series 80	G88		Generator_G732	s80/G88_V0103.icd	
3	Sepam	Sepam series 80	S81		Feeder_U445	s80/S81_V0103.icd	
4	Sepam	Sepam series 80	S84		Feeder_E655	s80/S84_V0103.icd	
10.195.132.163	Sepam	Sepam series 80	T87		TRFO_A400K	s80/T87_V0103.icd	C:\Program Files\Schneider\SF1

Devices table.

Importing a CID file from a remote device

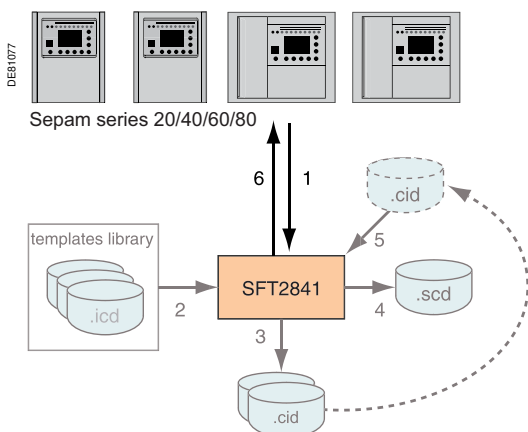
If the CID file is on the remote device, click on the button .

Nota : this button is enabled only when an Ethernet TCP/IP device is selected in the devices table.

This will initialize a file transfer from the device to SFT2841. This transfer is based on FTP protocol. A dialog box requests your Username and Password.

The Username and the Password should match those defined in the FTP server embedded in the remote device.

When the FTP connection with the device is established, and if a CID file is found on the device, select in which folder the CID file is to be stored.

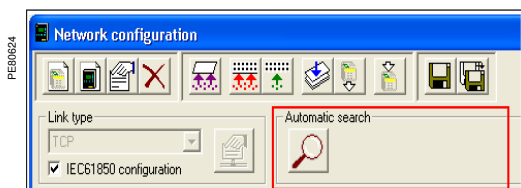


Importing a CID file from a device.


Configuration of IEC 61850 protocol

With SFT2841 setting and operating software

Creating an IEC 61850 standard configuration by automatic search and identification of Sepam devices



SFT2841 is able to display all information about a Sepam series 40, a Sepam series 60, a Sepam series 80 or an ECI850 Sepam server connected to the Ethernet TCP/IP network. SFT2841 is also able to display information about all Sepam connected to an ECI850. Using the parameters returned by each device, SFT2841 automatically retrieves its ICD files from the ICD library. The devices table is then updated and the entire Sepam network configuration is ready to build the CID files.




To activate this function click on the following button: 

Nota : this button is enabled only when an Ethernet TCP/IP device is selected in the devices table.

When the function is activated, SFT2841 asks the selected Ethernet TCP/IP device to provide its identification.



When SFT2841 receives the response, it automatically updates the devices table with the data returned by the device (device type, Family, application ...). Then, using the version of the Sepam firmware, SFT2841 automatically selects the associated ICD file in the ICD library.

In the devices table, the device identified by SFT2841 is displayed with the following different icons depending on the device type:

-  for a Sepam series 40, Sepam series 60 or Sepam series 80
-  for an ECI850 Sepam server
-  for an unknown device

If SFT2841 identifies an ECI850, the function continues and SFT2841 launches the polling of all Sepam devices connected to the server as slave devices. Modbus addresses 1 to 247 are polled. SFT2841 asks each slave device to provide its identification. When SFT2841 receives a response, it automatically updates the devices table with the data returned by the slave device (device type, Family, application ...). Then using the version of the Sepam firmware, SFT2841 automatically selects the associated ICD file in the ICD library.

In the devices table, a slave device identified by SFT2841 is displayed with different icons depending on its type:

-  for a Sepam device
-  for an unknown device

Introduction

CET850 software provides a way to create, edit, and display IEC 61850 configuration files which use the Substation Configuration Language (SCL).

In particular, it is used for creating or editing the following files:

- ICD (IED Capability Description)
- IID (Instantiated IED Description)
- CID (Configured IED Description)
- SCD (Substation Configuration Description)

CET850 enables editing of the CID and SCD files generated by SFT2841 so that the Sepam IEC 61850 configuration can be customized to the needs of the system with more options than SFT2841 provides.

This section presents the main characteristics of the CET850 software. For more information, refer to the CET850 User's manual.

Graphical SCL Editor

CET850 is a graphical tool that enables to browse an SCL file using a tree view that displays the content of the file in a hierarchical format.

Tree view

The following main sections are displayed in the tree view:

- Header and History
- Substation (optional)
- Communication
- List of IEDs
- Data Type templates

Expand each section to obtain more details.

Property view

When an item is selected in the tree view, the property view displays details of the selected item. You can activate editing operations from the toolbar and contextual menu. There are also specific dialog interfaces to help guide you.

General content of an SCL file

Header and History

This section contains the history of the file. CET850 provides a specific function that allows you to add an entry whenever there is a need to track the modifications made to the file.

Substation

This section describes the functional structure of the electrical substation, identifies the primary devices and their electrical connections and defines the system functionality by attaching Logical Nodes to primary equipment. This section deals with the system configuration only; it is optional in an SCD file and not relevant to a CID file.

When present, the section is displayed by CET850 but is not editable. It can be hidden using a specific option in the CET850 User Preferences.

Communication

This section contains the definition of all sub-networks defined in the IEC 61850 system, with the list of the connected IEDs. Both Client/Server and Peer-to-Peer communication access points are displayed.

CET850 provides specific functions to add, delete a subnetwork, add, remove an IED on a subnetwork, and to set, modify the communication addresses.

List of IEDs

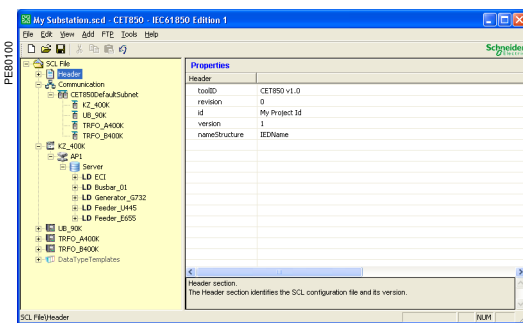
This section contains the definition of all IEDs defined in the IEC 61850 system. Each IED is displayed with all its contents:

- Logical Devices (LD)
- Logical Nodes (LN)
- Datasets (DS)
- Report Control Blocks (RCB)
- GOOSE Control Blocks (GoCB)
- GOOSE Receive
- Log Control Blocks (LCB)

Data Type templates

This section provides the description in detail of all types of data used by the IEDs defined in the configuration: Logical Node Types, Data Object types, Data Attribute types, Enumeration Types.

This section is intended for IEC 61850 experts and is hidden by default, using a specific option in the CET850 User Preferences.



Adding and removing a device in an IEC 61850 system

Adding and removing a device in an IEC 61850 system consists of making the change in the associated SCD file.

CET850 manages 2 types of devices:

- IEC 61850 IEDs: ECI850 Sepam server, Sepam series 40, Sepam series 60 or Sepam series 80.
- Sepam devices as slave devices associated to an ECI850 Sepam server. Such devices are seen as Logical Devices inside the ECI850.

Adding an IED

CET850 enables the addition of an IED to an IEC 61850 system using its ICD description file, or the addition of a device already defined by a CID file.

A specific dialog interface requests a name for the IED and then its description. The description is provided from an ICD file, or from a CID file.

As with SFT2841, CET850 software is delivered with a library of ICD files for all types of Sepam devices and all Sepam applications. This library also includes the ICD file for the ECI850.

You can add a Schneider Electric device identified in this library (as with SFT2841, browsing the ICD library is done using 3 characteristics of the device: Family, Model and Version), or add a third party device using an external ICD file.

When the IED is fully identified, the tree view is updated and the new IED appears in the list of IEDs. The content of the current SCD file is updated with all the description data concerning this device.

Removing an IED

An IED can be removed from an SCD file. This function is available when an IED is selected in the tree view. After you have confirmed that the IED is to be deleted, the tree view and the content of the SCD file are updated.

Adding a Logical Device (LD)

When an ECI850 Sepam server is selected in the tree view, CET850 allows the addition of Sepam devices as Logical Devices.

A specific dialog interface requests a name for the LD and then its description. The description is provided from an ICD file of the ICD library. The ICD file is selected depending on the Family, Model and Version of the Sepam to be added.

After the Sepam device is fully identified, the tree view is automatically updated and the new Sepam appears inside the ECI850 as a new Logical Device.

The content of the current SCD file is updated with all the description data concerning this Sepam.

Removing a Logical Device

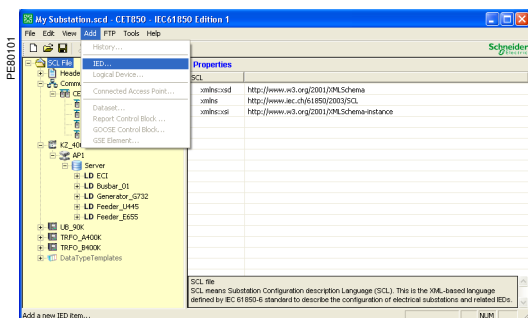
A Logical Device can be removed from an SCD file. This function is available when a LD is selected in the tree view. After you have confirmed the LD is to be deleted, the tree view and the content of the SCD file are updated.

Connecting a device in an IEC 61850 system

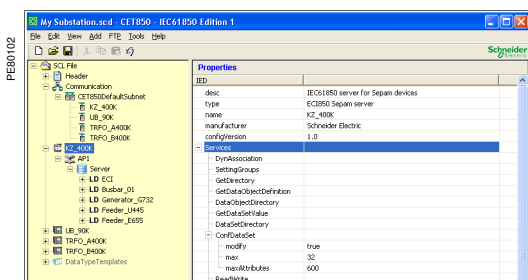
An IEC 61850 IED uses an Access Point (AP) to communicate. This AP should be connected to a subnetwork.

CET850 provides the following set of functions to manage the communication architecture of an IEC 61850 System:

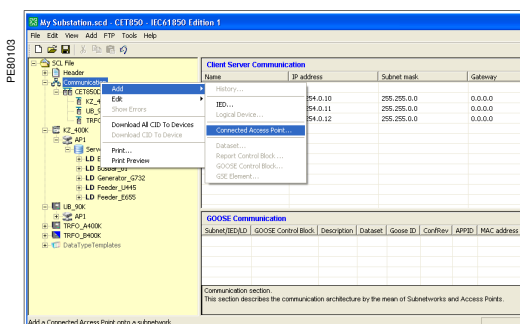
- Adding or removing a Subnet to the system
- Adding or removing an Access Point on a Subnet



Adding an IED.



Removing an IED.



Adding an Access Point.

Editing an IED

The configuration of an IED described in an ICD, CID or SCD file can be modified so that its communication profile and behavior are adjusted to the needs of the system. Using the CET850, the user can:

- Create, modify or delete a Dataset
- Create, modify or delete a Report Control Block
- Adjust a dead band
- Create, modify or delete a GOOSE Control Block
- Subscribe to GOOSE messages and assign Sepam GOOSE Inputs

Create, modify or delete a Dataset

A Dataset is a collection of Data Attributes (DAs) grouped together to increase communication efficiency. In particular, Datasets are used for reports and GOOSE messages.

Any LN instance can contain one or more Datasets depending on the capabilities of the IED.

By default, each Sepam provides 3 Datasets predefined in the ICD file in LLN0:

- StDs: this Dataset includes all status indications provided by all the Protection (or related to protection) Logical Nodes present in Sepam, the Switchgear LN, the Sensor and Monitoring LN, and the Physical Device itself.
- MxDs: this Dataset includes all measurement values provided by all the Measurement Logical Nodes (MMXU) present in Sepam.
- BasicGseDs: this Dataset includes the main indications used for basic GOOSE exchange.

These default Datasets can be modified by the user and new Datasets can be added, depending on the capabilities of the IED.

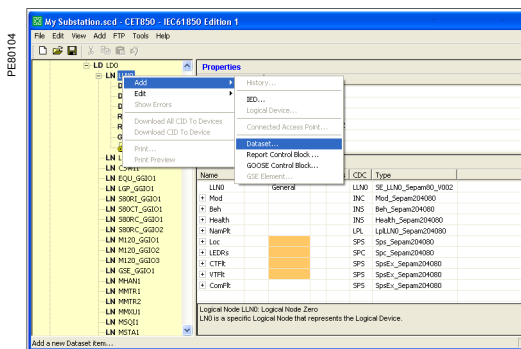
It is not necessary to define the BRCB index number in the versions where auto-indexed BRCBs are supported (Attribut RptEnabled) because the instances are automatically created.

Note: The *BRCB.RptEnabled* attribute is supported from version V1.25 of the *ECI850* and version V1.2 of the *ACE850*.

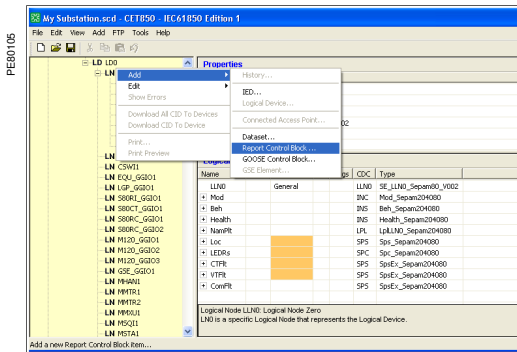
CET850 provides an easy way to create or edit a Dataset inside a Logical Node.

When creating a Dataset, CET850 prompts you for its name and description. A specific dialog interface allows you to select which data is to be added to, or removed from the Dataset. The available data that can be selected is displayed in a hierarchical tree with collapse and expand facilities, from their host Logical Node up to their final attributes. Individual and multiple selections are possible.

After completing the definition of the Dataset in the dialog interface, the changes to the Dataset are reflected in the current SCL file and the CET850 display is updated: a newly created Dataset is displayed in the tree view and a deleted Dataset is removed from the tree view. The content of the Dataset is updated in the property view.



Adding a Dataset.



Adding a Control Block.

Create, modify or delete a Report Control Block (RCB)

A Report Control Block (RCB) defines the way a Dataset is transmitted to a client. An RCB can be created inside any Logical Node.

Sepam provides both buffered and unbuffered RCBs.

A buffered RCB (BRCB) is dedicated to only one client at a time. If the same report is to be used by more than one client, several reports of this type have to be instantiated in the IED. The instances of a BRCB are identified using a numerical index and are called commonly indexed BRCB.

An unbuffered RCB (URCB) may be used by several clients.

By default, each Sepam provides 2 pre-defined buffered RCBs in the LLN0, each RCB defined with 2 instances.

These 2 RCBs, defined in each Sepam ICD file, are:

- brcbST01 and brcbST02 are the 2 indexed BRCB associated with the StDs Dataset for reporting status indications.

- brcbMX01 and brcbMX02 are the 2 indexed BRCB associated with the MxDs Dataset for reporting measurements.

These default RCBs can be modified by the user and new RCBs can be added, depending on the capabilities of the IED.

It is not necessary to define the BRCB index number in the versions where auto-indexed BRCBs are supported (Attribut RptEnabled) because the instances are automatically created.

Note: the *BRCB.RptEnabled* attribute is supported from version V1.25 of the *IEC1850* and version V1.2 of the *ACE850*.

CET850 provides a specific dialog interface for creating or modifying a Report Control Block. When creating an RCB, CET850 prompts you for the name and description of the RCB. A specific dialog interface allows you to select the Dataset to be associated with the RCB and to define all settings concerning the way the report is generated.

The most common trigger options to define an RCB are:

- Data Change: the Report is triggered by changes to the data
- Quality Change: the Report is triggered by quality changes
- Periodic: the Report is triggered periodically, according to an Integrity period you specify.

After completing the definition of the RCB in the dialog interface, the changes to the RCB are reflected in the current SCL file and the CET850 display is updated: a newly created RCB is displayed in the tree view and a deleted RCB is removed from the tree view. The settings of the RCB are updated in the property view.

Adjusting the dead band of measurements

Sepam produces a lot of measurements that are accessible via the IEC 61850 communication interface as Measured Values (MV) and Complex Measured Values (CMV).

To optimize the network bandwidth, it is possible to create a Dataset of measurements and to send it on data changes only, rather than periodically. Sepam and CET850 use the dead band parameter (db) defined by the IEC 61850 standard for the MV and CMV to control the conditions for generating reports. CET850 allows you to set the dead band of each value for MV and CMV data produced by Sepam. If the data is associated with a Dataset and an RCB with the Data change trigger option, a report will be generated only when the value of the data exceeds the dead band. If the data change is less than the dead band, no report will be generated.

Create, modify or delete a GOOSE Control Block (GoCB)

The GOOSE message service is an efficient real-time communication service for peer-to-peer exchanges between IEDs.

A GOOSE Control Block (GoCB) defines the way a Dataset is transmitted in a GOOSE message. A GoCB can only be created inside the Logical Node 0 (LLN0). The capabilities of an IED regarding the configuration of GoCBs are defined in its ICD file. For Sepam devices, only Sepam series 60 and Sepam series 80 IEDs implement the GOOSE communication service.

By default, each Sepam series 60 or Sepam series 80 IED provides 1 GoCB defined in the LLN0. This GoCB is pre-defined in each Sepam series 60 or Sepam series 80 ICD file. It is named gcbBasicGse and is associated with the BasicGseDs Dataset. This default GoCB can be modified by the user and new GoCBs can be added, depending on the capabilities of the IED.

CET850 provides a specific dialog interface to create or modify a GOOSE Control Block. When creating a GoCB, CET850 prompts the user for a name and description. A specific dialog interface allows the user to select the Dataset to be transmitted as a GOOSE message. Then, the user needs to enter the settings for publishing the GOOSE message. This includes:

- multicast address the GOOSE message must be transmitted to
- time for the first reiteration of the GOOSE message
- maximum period of production (heartbeat cycle time)

After completing the definition of the GoCB in the dialog interface, the changes to the GoCB are reflected in the current SCL file and the CET850 display is updated: a newly created GoCB is displayed in the tree view and a deleted GoCB is removed from the tree view. The GoCB settings are displayed in the property view.

Subscribe to GOOSE messages and assign Sepam GOOSE Inputs

The capability of a Sepam IED to receive GOOSE messages is defined in its ICD file. In this case, a GOOSE Receive element is defined at the beginning of the IED section, in the tree view displayed by CET850. For Sepam devices, only Sepam series 60 and Sepam series 80 IEDs implement the GOOSE communication service. Editing the GOOSE Receive element allows the user to:

- select the GOOSE messages and the data to which the IED must subscribe
- assign the subscribed data to Sepam GOOSE inputs.

CET850 provides a specific dialog interface to edit the GOOSE Receive. The dialog is organized in 2 parts:

- GOOSE message and data subscription
- Sepam GOOSE Inputs assignment

GOOSE message and data subscription

This dialog interface displays the list of all GOOSE messages produced on the network and allows you to select the ones the IED must receive. Each GOOSE message can be expanded to see its content: the Dataset conveyed by the GOOSE message is displayed up to the final Data Attributes (DA). The dialog interface allows you to select which DA you want to subscribed to.

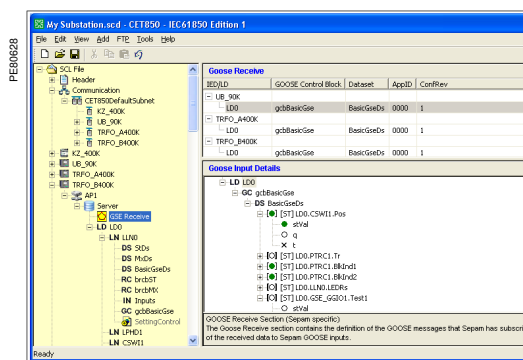
Sepam GOOSE Inputs assignment

This dialog interface allows you to assign the subscribed DAs to the Sepam GOOSE Inputs.

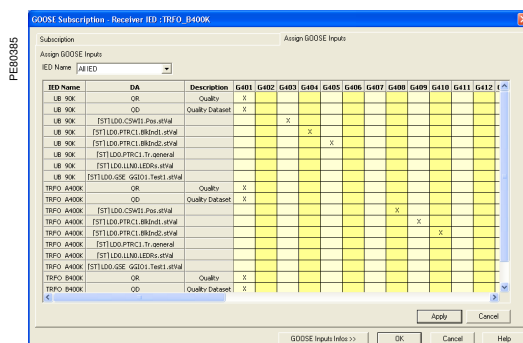
Sepam provides 32 GOOSE inputs that can be used as binary inputs by Sepam control logic functions:

- 31 GOOSE Inputs, named G401 to G416 and G501 to G515, are free for assignment;
- GOOSE Input G516 is reserved for the ACE850 module presence detection.

An assignment table gives in rows the list of all the subscribed DAs and in column the list of the Sepam GOOSE inputs to which the DAs can be assigned/de-assigned. Assignment/de-assignment is done by selecting the appropriate cells in the table. Several DAs can be assigned to the same Sepam GOOSE input. In this case, Sepam applies a wired-OR logic operation to these DAs.



GOOSE Receive element.



Sepam GOOSE Inputs assignment.

Create, modify or delete a Log Control Block (LCB)

A Log Control Block (LCB) defines which data values and when these data values are to be stored in the log.

CET850 provides a specific dialog box to create or edit a LCB depending of the capabilities of the IED.

When creating a LCB, CET850 prompts you for its name and description.

The LCB identification attributes and parameters can be completed according to the description below.

- The associated dataset can be chosen thanks to a list.

- Log Attributes

- ☐ LD inst: the name of the logical device where the log resides. If missing, it refers to the LD in which the LCB is located.

- ☐ Log Name: the name of the log. The log element shall exist and can't be added nor modified.

In edition 1, LD inst and Log Name are set with default values and can't be modified.

In edition 2, LD inst and Log Name are chosen in list box.

- Integrity Period: time to periodically create the log, in ms.

- Trigger conditions: the reasons for storing a log entry into the log. The reasons may be:

- ☐ dchg: report triggers on data change,

- ☐ qchg : report triggers on quality change,

- ☐ dupd : report triggers on data update

- ☐ period: report triggers periodically according to the integrity period defined above.

To set an attribute, click the corresponding attribute value and select true or false in the combo box.

- Optional Attributes:

- ☐ logEna: select true to enable the logging process, false to disable it

- ☐ reasonCode: select true to store the reason code for the event trigger into the log.

After validation, the changes are reflected in the current SCL file and the CET850 display is updated: a newly created LCB is displayed in the tree view and a deleted LCB is removed from the tree view. The content of the LCB is updated in the property view.

Note:

For edition 1, ACE850 allows only one Log file (in Logical Device LD0) and only one Log Control Blocks.

For edition 2, ACE850 allows only one Log file (in Logical node LLN0 and Logical Device LD0) and only one Log Control Blocks.

Logging is not supported by EC1850.

Generating CID files

When an SCD file is open, CET850 generates the CID file of a specific IED or all the CID files for all IEDs defined in the SCD file.

Generating a CID file

This function is available when an IED is selected from the tree view and when this IED is connected to a subnet. A specific dialog interface box asks you to enter the location and the name of the output CID file. By default, the name of the CID file is based on the name of the IED.

Generating all CID files

This function is available when the SCD file includes at least one IED that is connected to a subnet. A specific dialog interface box asks you to enter the location of the output CID files.

The name of each CID file is based on the name of the IED.

Editing a CID file

CET850 allows the editing of an existing CID file.

This CID file is an advanced configuration file generated during a previous use of CET850, or a standard configuration file generated by SFT2841.

When editing the CID file of an ECI850, you can use all of the advanced editing functions described below:

- Add, remove a Logical Device inside the ECI850
- Create, modify or delete a Dataset
- Create, modify or delete a Report Control Block
- Adjust the dead band of the measurements

When editing the CID file of a Sepam series 40, Sepam series 60, or Sepam series 80, you can use all of the advanced editing functions described below:

- Create, modify or delete a Dataset
- Create, modify or delete a Report Control Block
- Adjust the dead band of the measurements
- Create, modify or delete a GOOSE Control Block (for Sepam series 60 or Sepam series 80)

Validating an SCL file

The Validate function includes 2 kinds of verification:

- Verification of the structure and content of the SCL file

The Substation Configuration Language is based on XML. The structure and content of an SCL file is fully specified by the IEC 61850 standard using an XML Schema (XSD files).

CET850 is delivered with the set of XSD files defined by the IEC 61850 standard. Using the Xerces parser, CET850 checks the validity of SCL files against the IEC 61850 XML Schema.

- Verification of the consistency of the GOOSE communication

The Dataset sent via GOOSE messages must meet a specific size constraint.

The data sent by a producer IED must be consistent with the data expected and subscribed by the consumer IED.

CET850 checks the size and the consistency of the data exchanged via GOOSE messages.

CET850 provides 2 ways to validate an SCL file:

- Schema validation
- Validation at file saving

Automatic validation is enabled or disabled using a specific option in the CET850 User Preferences.



Editing a GOOSE Control Block or the Dataset associated to a GoCB may lead to incoherence with the definition of the GOOSE message expected by the consumer IEDs. Therefore it is recommended to deal with GOOSE configuration when editing an SCD file, and not a CID file.

Modifying the GOOSE subscription requires to have the description of the IEDs that publish GOOSE messages. Therefore when editing a CID file, CET850 does not allow modifying the GOOSE Receive element of the IED.

Export to SFT2841

SFT2841 is the setting tool for Sepam devices. It gives access to Sepam devices via Ethernet TCP/IP and may be used to identify the Sepam devices connected to the network and to load the associated CID files.

For that purpose, SFT2841 uses a configuration file named "NET file" which contains:

- the IP address of each Sepam,
- the reference to its CID file,
- the identification of the originating ICD file from the Sepam ICD library.

When an SCD file is open, the Export to SFT2841 function allows you to generate the NET file and the CID files for all the connected IEDs defined in the SCD file. This function is available when the SCD file contains at least one connected IED.

A specific dialog interface prompts you to enter the location of the NET file. The name of the NET file is the same as the name of the SCD file, with the .scd extension changed to .net. The NET file is created in the specified output directory.

A CID sub-directory which contains all the CID files for the IED declared in the NET file is created.

The Export to SFT2841 provides a ready-to-use NET file for SFT2841 that allows addressing Sepam easily for CID transfer (see below).

Transferring a CID file

A CID file contains all the IEC 61850 configuration information needed for a Sepam or an ECI850. The transfer of a CID file is performed on Ethernet TCP/IP and based on FTP protocol. There are 2 ways to transfer a CID file to Sepam or ECI850:

- Transfer with SFT2841: the transfer is done using the function "Load CID file to device".
- Simple copy with a standard Internet browser connected to the IP address of the Sepam or ECI850 Sepam server.

In both cases the user has to log onto the device with an authorized username and password.

The use of the Export to SFT2841 function provided by CET850 makes the transfer process by SFT2841 easier for a complete IEC 61850 installation described by an SCD file and when several CID files are to be loaded in several Sepam devices (see above).

The Export to SFT2841 provides a ready-to-use NET file for SFT2841 that allows addressing Sepam easily for CID transfer. Once the Export to SFT2841 is completed, you can open the NET file using SFT2841. All connected Sepam devices defined in the originating SCD file are displayed in a table along with their IP address and the reference to their CID file. To load a CID file into a device, select the device from the devices table and follow the instructions given on page 40.

The CID file is copied at the root of the file system within the device:

ftp://<ip address>/.

A back-up copy of the previous CID file is automatically created in the directory ftp://<ip address>/bak. You can revert to the previous configuration by copying the back-up file to its previous location.

After the CID file has been correctly transferred, it is automatically taken into account and used by the Sepam or ECI850.



- CET850 software to configure GOOSE communication in the IEC 61850 system
- SFT2841 software to assign GOOSE Inputs to Sepam control and monitoring functions
- As an option, SFT2885 software (Logipam) to design fully customized and extended control logic functions.

Configuring GOOSE communication involves first configuring the publisher that sends the messages and then the subscriber that receives the messages. The GOOSE communication configuration is saved in an SCD file.

1. Create a Dataset. You can use the predefined BasicGseDs Dataset from the Sepam ICD file, adapt it to meet your application needs or create a new one.
2. Create a GOOSE Control Block to define the publishing of the Dataset as a GOOSE message on the communication network.

Any Dataset may be attached to a GOOSE Control Block provided its size is compatible with the size of an Ethernet frame. When creating a Dataset, CET850 calculates the size of the Dataset and informs you if it is GOOSE compatible or not. When creating a GOOSE Control Block, CET850 allows the selection of GOOSE compatible Datasets only.

1. Select from the published GOOSE messages which Data Attributes (DAs) the device shall subscribe to.
2. Assign subscribed DAs to Sepam GOOSE Inputs.

Sepam provides 32 GOOSE inputs that can be used as binary inputs by Sepam control logic functions:

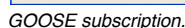
- 31 GOOSE Inputs, named G401 to G416 and G501 to G515, are free for assignment;
- GOOSE Input G516 is reserved for the ACE850 module presence detection.

The subscribed DAs are assigned to Sepam GOOSE inputs in an assignment table. The assignment table gives in rows the list of all the subscribed DAs and in column the list of the Sepam GOOSE inputs to which the DAs can be assigned/de-assigned. Assignment/de-assignment is done by selecting the appropriate cells in the table. Several DAs can be assigned to the same Sepam GOOSE input. In this case, Sepam applies a wired-OR logic operation to these DAs.

2 specific attributes, QR and QD, are available for each GOOSE message. They can be assigned to a GOOSE Input to provide information about the timing and consistency of the message received:

- QR: Quality Reception
If at run time the QR attribute is set to 1, this means that the GOOSE message was not received in the expected time.
- QD: Dataset consistency
If at run time the QD attribute is set to 1, this means that the structure of the GOOSE message is not as expected at subscription time.

When the GOOSE configuration is completed both at publisher and subscriber side, run the Export to SFT2841 function in order to generate from the SCD file, the CID files and the appropriate NET configuration file to be used with SFT2841 (see page 50).

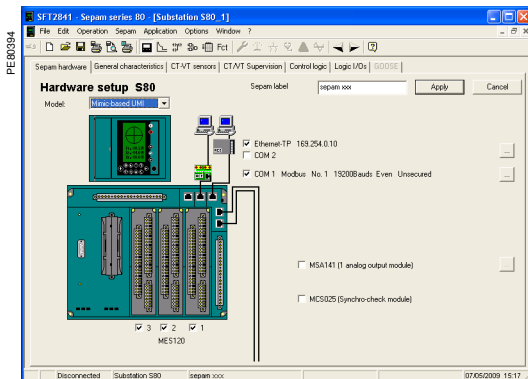


Configuration using SFT2841 software

SFT2841 software is used to configure the ACE850 communication interface and to assign the Sepam GOOSE inputs to control and monitoring functions. Follow the steps described below:

Configuring the ACE850 communication interface

1. Open the Sepam configuration window in SFT2841,
2. Select the Ethernet communication port
3. Configure the ACE850 communication interface (see page 20).



SFT2841: Sepam series 80 hardware configuration.

Assigning the Sepam GOOSE inputs to control and monitoring functions

Once the ACE850 communication interface is configured, the GOOSE tab in the Sepam configuration window becomes available. Select the GOOSE tab to display the GOOSE inputs assignment window.

For each GOOSE input G401 to G416 and G501 to G515, select in the list box a control and monitoring function which the GOOSE input shall be assigned to. The control and monitoring functions available depend on the Sepam application type and are listed in the table below.

A GOOSE input can also be assigned to customized control and monitoring functions designed with SFT2885 software (used to create Logipam programs). In this case, select the **Other use** option in the assignment list box.

GOOSE input G516 is always assigned to the ACE850 module presence detection. This assignment cannot be changed.

The control logic of each GOOSE input can be inverted by clicking the associated Neg cell (Negative).

Available functions for GOOSE Inputs assignment

The following tables list for each Sepam series 60 and Sepam series 80 application, the pre-defined control and monitoring functions that can be assigned to GOOSE inputs.

Assignment with Sepam series 60

Functions	S60	S62	T60	T62	G60	G62	M61	C60	Assignment
Blocking reception 1	■	■	■	■	■	■			Free
Blocking reception 2		■		■		■			Free
External trip 2	■	■	■	■	■	■	■	■	Free
Inhibit closing	■	■	■	■	■	■	■	■	Free
Load shedding request		■	■	■	■	■	■	■	Free
GOOSE reception fault	■	■	■	■	■	■	■	■	Free
GOOSE reception indicator	■	■	■	■	■	■	■	■	Free
Other use	■	■	■	■	■	■	■	■	Free
ACE850 presence	■	■	■	■	■	■	■	■	G516

Assignment with Sepam series 80

Functions	S80	S81	S82	S84	T81	T82 T87	M87	M81 M88	G87	G82 G88	B80	B83	C86	Assignment
Blocking reception 1	■	■	■	■	■	■			■	■	■	■		Free
Blocking reception 2			■	■		■			■	■				Free
External trip 2	■	■	■	■	■	■	■	■	■	■	■	■	■	Free
Inhibit closing	■	■	■	■	■	■	■	■	■	■	■	■	■	Free
Load shedding request							■	■					■	Free
GOOSE reception fault	■	■	■	■	■	■	■	■	■	■	■	■	■	Free
GOOSE reception indicator	■	■	■	■	■	■	■	■	■	■	■	■	■	Free
Other use	■	■	■	■	■	■	■	■	■	■	■	■	■	Free
ACE850 presence	■	■	■	■	■	■	■	■	■	■	■	■	■	G516

Configuration of GOOSE communication

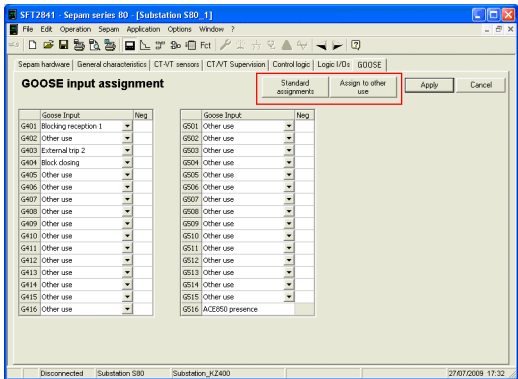
GOOSE configuration process

Standard GOOSE inputs assignment

The following table describes the standard GOOSE inputs assignment obtained with SFT2841 when clicking the **Standard assignments** button.

Functions	Standard assignment	Application
Blocking reception 1	G401	All except M61, C60, M87, M81, M88, C86
Blocking reception 2	G402	S62, T62, S82, S84, T82, T87, G87, G82, G83
External trip 2	G403	All
Inhibit closing	G404	All

All other GOOSE inputs are automatically marked "Not used".



SFT2841: "Standard assignments" and "Assign to other use" buttons.

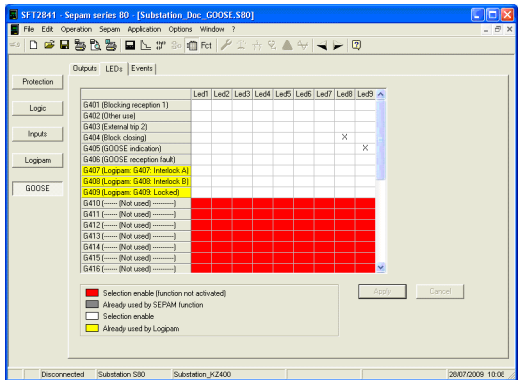
GOOSE inputs assignment to Logipam control and monitoring functions

To assign a GOOSE input to a customized control and monitoring function (Logipam program), select the Other use option in the assignment list box of the GOOSE input. All GOOSE inputs that are not yet assigned to any function (marked "Not used") can be assigned to a Logipam program by clicking the **Assign to other use** button.

Using GOOSE in the control matrix

All Sepam GOOSE inputs, whether assigned to predefined functions or customized Logipam programs, can be used in the control matrix. The Sepam GOOSE inputs, in the same way as wired logic inputs, can be connected to wired logic outputs or a LED on the front of the Sepam or a message on the local Sepam display.

Note: Sepam GOOSE inputs cannot be used in logical equations.



SFT2841: Using GOOSE Inputs in the control matrix.

Using SFT2885 (Sepam series 80 only)

Logipam Inputs

All Sepam GOOSE inputs can be used with SFT2885 software as binary input variables for the Logipam program in ladder language.

Sepam GOOSE inputs G401 to G416 and G501 to G515 are handled in the same way as wired logic inputs I1xx, I2xx and I3xx from the 3 Sepam MES120 modules:

- They are divided between 2 binary input virtual modules: G4xx and G5xx
- They can be used only in the program contact zone.
- They are updated at the start of each program execution cycle.
- They can be given a name and a comment.

For more details about SFT2885, refer to Logipam User's Manual (SEPED303004EN).

The logic inputs used only in Logipam should be assigned as **Other use** in SFT2841. A GOOSE input that is declared **unused** in SFT2841 is always set to 0. If a name has been allocated to the GOOSE input in Logipam, this name appears in the input assignment table in SFT2841 instead of **Other use**.

Logipam Outputs

The Logipam program can set 5 types of output variables:

- Binary outputs to MES physical I/O modules)
- Remote indications (status)
- Outputs to control matrix
- Predefined outputs
- Protection inputs

Only remote indications can be put in a dataset to be sent via a GOOSE message. Most Sepam indications are pre-assigned to protection, control and metering functions. They are available from the Logical Node that implements the functions. For example, the trip indication of the first instance of the time over-current protection comes from A51_PTOC1 Logical Node and is named A51_PTOC1.Op.general. Some Sepam indications are totally free and can be used without restriction by Logipam program. They are specifically named Logipam indications and are defined in the LGP_GGIO1 Logical Node.

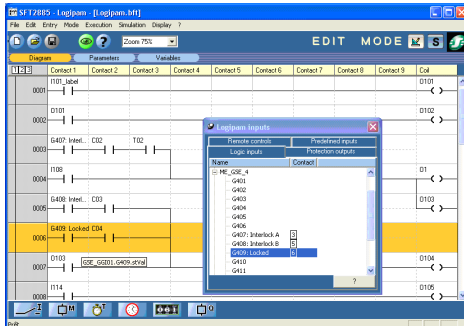
8 Logipam indications are available, named LGP_GGIO1.Ind1 to LGP_GGIO1.Ind8. Pre-assigned Sepam indications can be re-assigned by the Logipam program if necessary to answer the needs of your installation. When an indication is used by a Logipam program, it is no longer assigned to a predefined function and its meaning is determined by the Logipam program.

64 Sepam indications are specifically defined for that purpose. They are available from a generic Logical Node named S80RI_GGIO1. These indications are named S80RI_GGIO1.TS1 to S80RI_GGIO1.TS64.

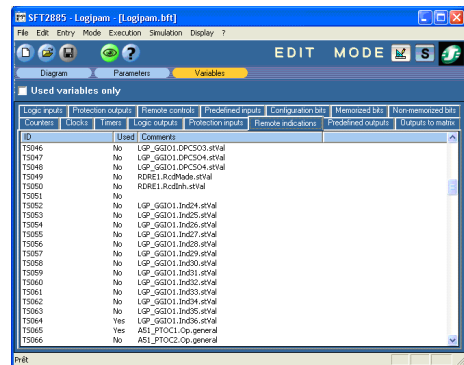
The IEC 61850 name of Sepam indications in SFT2885 software can be obtained in the Variables window (Remote indications tab)

When editing a program in the Diagram window, the IEC 61850 name of Sepam variable is also given:

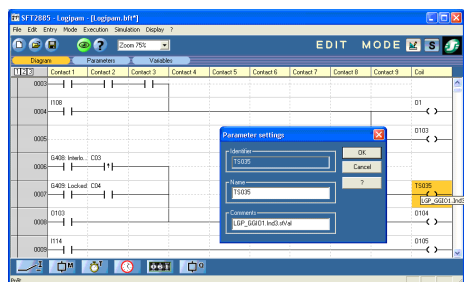
- by a tool tip displayed when you point to the variable with the mouse;
- by a specific dialog box that opens when you double-click on the variable



SFT2885: GOOSE Inputs in Logipam program.



SFT2885: Variables window (Remote indication tab).



SFT2885: IEC 61850 name of a variable in tool tip and parameter setting dialog box.

When using GOOSE communication between devices, it is important to verify that all collaborating devices have a consistent IEC 61850 configuration which ensures that each producer device sends the correct GOOSE message as expected by the receiver devices.

Sepam and SFT2841 software provide an easy way to check the GOOSE communication at installation time and at run time. The GOOSE Test function is available when SFT2841 is connected to Sepam. This function is used to:

- Display the current state of Sepam GOOSE inputs at Sepam subscriber side
- Force the emission of GOOSE messages at Sepam producer side

Displaying the current state of the Sepam GOOSE inputs

Open the **Sepam diagnosis** window and select the **Input, Output and LED status** tab. The window displays the current state (0 or 1) of the 32 Sepam GOOSE Inputs: each GOOSE Input is displayed by a coloured cell with its name G401 to G416 and G501 to G516. State 0 is displayed by a grey colour cell while state 1 is displayed by a yellow colour cell.

Forcing GOOSE message emission

Forcing GOOSE message emission can be done by:

- Forcing specific GOOSE Test Data Objects
- Forcing Sepam status

Forcing specific GOOSE Test Data Objects

Sepam provides 4 specific Single Point Status Data Objects for testing GOOSE communication. These DOs are defined in GSE_GGIO1 Logical Node and are named GSE_GGIO1.Test1 to GSE_GGIO1.Test4.

Each Test DO can be added to a GOOSE Dataset and then used to trigger the emission of the GOOSE message. To check that the GOOSE message is received by the expected Sepam, the GOOSE Test DO can be attached at the Sepam subscriber side to a GOOSE input to switch-on a LED or generate a message on the Sepam front display. The GOOSE input state can be also obtained using another PC running SFT2841 software and displaying the **Input, Output and LED status** window as described above.

By default, each GOOSE Test DO is set to 0. To set manually each Test DO to 1 using SFT2841, follow the procedure below:

1. In the **Input, Output and LED status** window, click the **Testing GOOSE ...** button. The **GOOSE Test** window opens.
2. Select the Test DOs to be forced by checking the corresponding check-boxes located at the top of the window.
3. Select the forcing duration from 50 ms to 999 s in the **Test duration** list box.
4. Click the **Test** button to force the selected Test DOs for the specified forcing duration.

Forcing Sepam status

The **GOOSE Test** window includes a grid that displays the current state of 240 Single Point Status (SPS) generated by Sepam. The current state of the status is given by the cell color:

- grey means state 0
- yellow means state 1

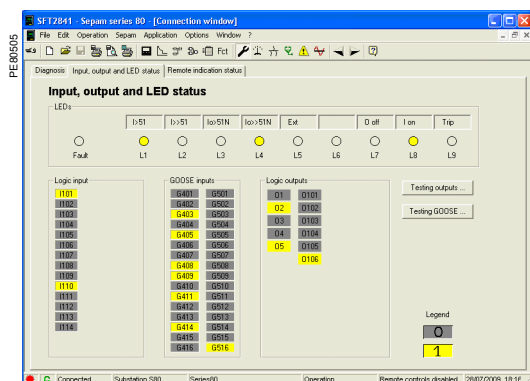
Each cell contains the internal identifier of the Sepam SPS (from 1 to 240).

If the Sepam status corresponds to an IEC 61850 Data Object, a tool tip displays the IEC 61850 name when the mouse pointer is placed over the cell.

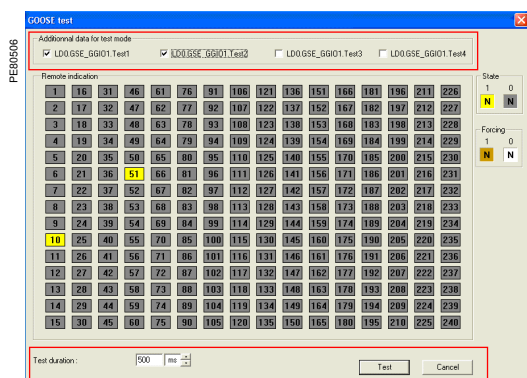
When some SPS are defined as member of a Dataset for GOOSE communication, you can trigger the emission of the GOOSE message by changing the state of the status.

To force the Sepam status, follow the procedure below:

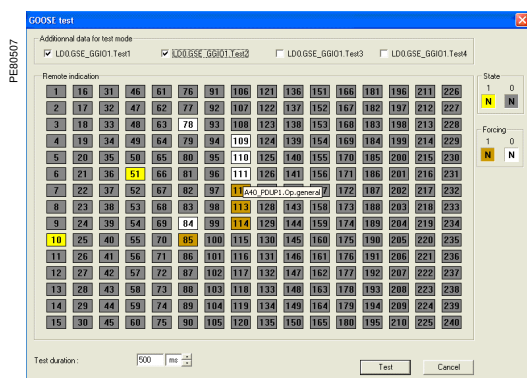
1. Select the state of all the desired SPS in the grid:
 - To select state 1, click the corresponding cell once: the cell blinks orange.
 - To select state 0, click the corresponding cell twice: the cell blinks white.
 - To deselect the cell and keep the current state unchanged, click 3 times: the cell stops blinking and is colored according to the current state of the SPS.
2. Select the forcing duration from 50 ms to 999 s in the **Test duration** list box.
3. Click the **Test** button to force the selected SPS for the specified forcing duration.



SFT2841: Sepam diagnosis Input, Output and LED status.



SFT2841: Forcing GOOSE Test Data Objects.



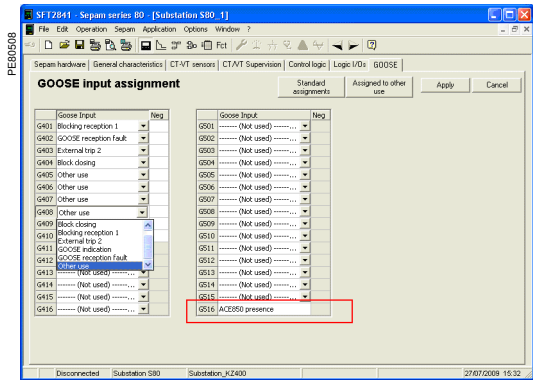
SFT2841: Forcing Sepam status.

Monitoring GOOSE communication at Sepam subscriber side

Several indications are specifically available to check that GOOSE communication is fully operational at run time. All these indications can be used in any monitoring function to generate alarms or to switch-on a LED on Sepam front panel.

Check of ACE850 module presence

This indication is available as GOOSE input G516. It is set to 0 if ACE850 module is off-line or not installed, or not correctly defined in the Sepam series 60 or Sepam series 80 hardware configuration.



SFT2841: ACE850 presence assigned to G516.

Check of GOOSE message reception

For each expected GOOSE message, 2 specific attributes QR and QD are available allowing the receiver Sepam to check that the timing and the consistency of the received GOOSE message are correct.

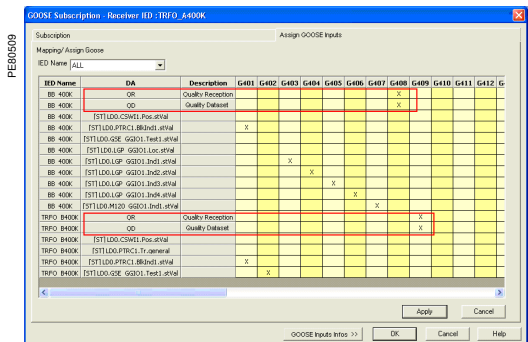
QR and QD attributes can be assigned to any Sepam GOOSE inputs G401-G416 and G501-516.

■ QR: Quality Reception

At run time, the QR attribute is set to 1 to inform that the GOOSE message was not received in the expected time.

■ QD: Dataset consistency

At run time, the QD attribute is set to 1 to inform that the structure of the received GOOSE message is not as expected at subscription time.



CET850: assigning QR and QD attributes.

General

This chapter describes conformity with IEC 61850 Edition 1.0. It does not describe the standard itself, but only the choices that have been made in the Sepam implementation of the standard, in terms of services, modeling, exceptions, extensions and adaptations.

The conformance statement is made up of the following documents:

- ACSI conformance statement: this document describes the abstract communication services interface (which services are implemented). These services are mapped to specific communication services (SCSM) described in the PICS.
- MICS (Model Implementation Conformance Statement): describes how the information model is implemented.
- PICS (Protocol Implementation Conformance Statement): describes choices made in protocol implementation. Many of these choices are implied by the ACSI conformance statement.
- PIXIT (Protocol Implementation eXtra Information for Testing): gives any additional implementation specific information not found in the previous standardized documents. Despite the name, these informations are useful for operation of the devices.
- TICS (Technical Issues Conformance Statement): describes how the device behaves regarding identified technical issues.



ACSI

The **Abstract Communication Services Interface** is defined by part 7-2 of IEC 61850.

It provides:

- the specification of a basic information model,
- the specification of information exchange service models.

These conformance statement tables are as defined by Annex A of IEC 61850-7-2.

ACSI basic conformance statement

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

(1) Sepam series 60 or Sepam series 80, with ACE850 only.

ACSI service conformance statement

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

Nota :

AA: Application Association

TP: Two Party

MC: Multi Cast

■: supported

ACSI service conformance statement (cont.)

Services	AA: TP/MC	Client / subscriber	Server / publisher	Value / comments
Unbuffered Report Control Block (URCB)				
S27 Report	TP		■	(1)
S27-1 data-change (dchg)			■	(1)
S27-2 quality-change (qchg)			■	(1)
S27-3 data-update (dupd)			■	(1)
S28 GetURCBValues	TP		■	(1)
S29 SetURCBValues	TP		■	(1)
Logging (Clause 14)				
Log Control Block				
S30 GetLCBValues	TP		■	(2)
S31 SetLCBValues	TP		■	(2)
Log				
S32 QueryLogByTime	TP		■	(2)
S33 QueryLogAfter	TP		■	(2)
S34 GetLogStatusValues	TP		■	(2)
Generic substation event model (GSE) (Clause 15)				
GOOSE Control Block				
S35 SendGOOSEMessage	MC		■	ACE850 only
S36 GetReference	TP			
S37 GetGOOSEElementNumber	TP			
S38 GetGoCBValues	TP		■	ACE850 only
S39 SetGoCBValues	TP		■	ACE850 only
GSSE Control Block				
S40 SendGSSEMessage	MC			
S41 GetReference	TP			
S42 GetGSSEElementNumber	TP			
S43 GetGsCBValues	TP			
S44 SetGsCBValues	TP			
Transmission of sampled values model (SVC) (Clause 16)				
Multicast SVC				
S45 SendMSVMessage	MC			
S46 GetMSVCBValues	TP			
S47 SetMSVCBValues	TP			
Unicast SVC				
S48 SendUSVMessage	TP			
S49 GetUSVCBValues	TP			
S50 SetUSVCBValues	TP			
Control (Clause 17)				
S51 Select	TP			
S52 SelectWithValue	TP		■	
S53 Cancel	TP		■	
S54 Operate	TP		■	
S55 CommandTermination	TP		■	without parameters
S56 TimeActivatedOperate	TP			
File transfer (Clause 20)				
S57 GetFile	TP		■	
S58 SetFile	TP			
S59 DeleteFile	TP			
S60 GetFileAttributeValues	TP		■	
Time (Clause 18)				
T1 clock resolution of internal clock (nearest value of 2 ⁻ⁿ in seconds)				class T1
T2 Time accuracy of internal clock				
T3 Supported TimeStamp resolution (nearest value of 2 ⁻ⁿ in seconds)				class T1

Nota :
AA: Application Association
TP: Two Party
MC: Multi Cast
■: supported

(1) With IEC1850, supported only from version V1.25.
(2) ACE850: supported from version 2.0, IEC1850: not supported.

Conformance statements (Edition 1.0) ACSI conformance statement

ACSI model conformance statement

		Client / subscriber	Server / publisher	Value / comments
If server side (B11) supported				
M1	Logical device		■	
M2	Logical node		■	
M3	Data		■	
M4	Data set		■	
M5	Substitution			
M6	Setting group control		■	Active SG only
M7	Buffered report control		■	
M7-1	sequence-number		■	
M7-2	report- time-stamp		■	
M7-3	reason-for-inclusion		■	
M7-4	data-set-name		■	
M7-5	data-reference		■	
M7-6	buffer-overflow		■	
M7-7	EntryId		■	
M7-8	BufTm		■	
M7-9	IntgPd		■	
M7-10	GI		■	
M7-11	Conf revision		■	
M8	Unbuffered report control		■	(1)
M8-1	sequence-number		■	(1)
M8-2	report- time-stamp		■	(1)
M8-3	reason-for-inclusion		■	(1)
M8-4	data-set-name		■	(1)
M8-5	data-reference		■	(1)
M8-6	BufTm		■	(1)
M8-7	IntgPd		■	(1)
M8-8	GI		■	(1)
M8-9	Conf revision		■	(1)
M9	Log Control			
M9-1	IntgPd			
M10	Log			
M11	Control		■	
If GSE (B31/B32) supported				
M12	GOOSE	■	■	ACE850 only
M13	GSSE			
If SVC (B41/B42) supported				
M14	Multicast SVC			
M15	Unicast SVC			
Other				
M16	Time		■	
M17	File Transfer		■	

(1) With ECI850, supported only from version V1.25.

Nota :
■: supported



The information model is defined by parts 7-3 and 7-4 of IEC 61850.

It provides:

- the specification of the Logical Nodes used to model substation devices and functions,
- the specification of Common Data Classes and Common Data Attribute Classes used in the Logical Nodes.

Model conformance

The Model conformance of each particular Sepam device is described by its ICD file. The following descriptions are general descriptions that apply to all Sepam devices. Extensions to the IEC 61850 data model belong to the "Sepam series 20/40/60/80" Logical Node name space.

Common data attributes classes

The following tables list which fields is found in each Common Data Attribute Class (CDAC). Fields not found in these tables are optional (O) or conditional (C) fields not supported by Sepam devices. Mandatory fields (M) are always present.

Quality

Attribute name	Attribute type	Value/Value range	M/O/C	Comments
validity	CODED ENUM	good invalid questionable	M	Supported
detailQual	PACKED LIST		M	Supported
overflow	BOOLEAN	DEFAULT : FALSE	M	Defaulted
outOfRange	BOOLEAN	TRUE FALSE	M	Supported
badReference	BOOLEAN	TRUE FALSE	M	Supported
oscillatory	BOOLEAN	DEFAULT : FALSE	M	Defaulted
failure	BOOLEAN	TRUE FALSE	M	Supported
oldData	BOOLEAN	DEFAULT : FALSE	M	Defaulted
inconsistent	BOOLEAN	TRUE FALSE	M	Supported
inaccurate	BOOLEAN	TRUE FALSE	M	Supported
source	CODED ENUM	process substituted DEFAULT : process	M	Defaulted
test	BOOLEAN	DEFAULT : FALSE	M	Defaulted
operatorBlocked	BOOLEAN	DEFAULT : FALSE	M	Defaulted

Analogue value

Attribute name	Attribute type	Value/Value range	M/O/C
f	FLOAT32	floating point value	C

Configuration of analogue value

Common data attribute class not supported.

Range configuration

Common data attribute class not supported.

Step position with transient indication

Common data attribute class not supported.

Pulse configuration

Common data attribute class not supported.

Originator

Attribute name	Attribute type	Value/Value range	M/O/C
orCat	ENUMERATED	See IEC 61850-7-3	M
orIdent	OCTET STRING64		M

Unit definition

Common data attribute class not supported.

CtxInt

Context specific integer. The type depends on the data object. For Mod, Beh, Health, PhyHealth, EEHealth and AutoRecSt data objects, the type is ENUMERATED, otherwise, the type is INT32.

Nota :

M: mandatory field
O: optional field
C: conditional field

Conformance statements (Edition 1.0) MICS - Model implementation conformance statement

Vector definition

Attribute name	Attribute type	Value/Value range	M/O/C
mag	AnalogueValue		M
ang	AnalogueValue		O

Point definition

Common data attribute class not supported.

CtlModels definition

Attribute value	Comment
status-only	not controllable SPC, DPC and INC
direct-with-normal-security	controllable SPC and INC
direct-with-enhanced-security	not supported
sbo-with-normal-security	not supported
sbo-with-enhanced-security	controllable DPC

SboClasses definition

Attribute value	Comment
operate-once	
operate-many	not supported

Common data classes

The following tables list which attributes is found in each Common Data Class (CDC). Attributes not found in these tables are optional (O) or conditional (C) attributes not supported by Sepam devices. Mandatory attributes (M) are always present.

Single point status (SPS)

Attribute name	Attribute type	FC	M/O/C	Comments
stVal	BOOLEAN	ST	M	
q	Quality	ST	M	
t	TimeStamp	ST	M	
dataNs	VISIBLE STRING255	EX	C	for non standard data objects

Double point status (DPS)

Common data class not supported.

Integer status (INS)

Attribute name	Attribute type	FC	M/O/C	Comments
stVal	CtxInt	ST	M	
q	Quality	ST	M	
t	TimeStamp	ST	M	
dataNs	VISIBLE STRING255	EX	C	for non standard data objects

Protection activation information (ACT)

Attribute name	Attribute type	FC	M/O/C	Comments
general	BOOLEAN	ST	M	
q	Quality	ST	M	
t	TimeStamp	ST	M	

Nota :
M: mandatory field
O: optional field
C: conditional field

Conformance statements (Edition 1.0)

MICS - Model implementation conformance statement

Directional protection activation information (ACD)

Attribute name	Attribute type	FC	M/O/C	Comments
general	BOOLEAN	ST	M	
dirGeneral	ENUMERATED	ST	M	
q	Quality	ST	M	
t	TimeStamp	ST	M	

Security violation counting (SEC)

Common data class not supported.

Binary counter reading (BCR)

Attribute name	Attribute type	FC	M/O/C	Comments
actVal	INT128	ST	M	The range of such variables never exceeds 32 bits. They are therefore transmitted as INT32 values (as allowed by ASN.1 rules).
q	Quality	ST	M	
t	TimeStamp	ST	M	
pulsQty	FLOAT32	CF	M	read-only

Measured value (MV)

Attribute name	Attribute type	FC	M/O/C	Comments
mag	AnalogueValue	MX	M	
q	Quality	MX	M	
t	TimeStamp	MX	M	
db	INT32U	CF	O	read-only
dataNs	VISIBLE STRING255	EX	C	for non standard data objects

Complex measured value (CMV)

Attribute name	Attribute type	FC	M/O/C	Comments
cVal	Vector	MX	M	
q	Quality	MX	M	
t	TimeStamp	MX	M	
db	INT32U	CF	O	read-only

Sampled value (SAV)

Common data class not supported.

WYE

Data name	Data class	FC	M/O/C	Comments
phsA	CMV		C	
phsB	CMV		C	
phsC	CMV		C	
neut	CMV		C	for some objects only
res	CMV		C	for some objects only

Delta (DEL)

Data name	Data class	FC	M/O/C	Comments
phsAB	CMV		C	
phsBC	CMV		C	
phsCA	CMV		C	

Nota :

M: mandatory field
O: optional field
C: conditional field

Conformance statements (Edition 1.0) MICS - Model implementation conformance statement

Sequence (SEQ)

Data name	Data class	FC	M/O/C Comments
c1	CMV		M
c2	CMV		M
c2	CMV		M
SeqT	ENUMERATED	MX	M

Harmonic value (HMV)

Common data class not supported.

Harmonic value for WYE (HWYE)

Common data class not supported.

Harmonic value for DEL (HDEL)

Common data class not supported.

Controllable single point (SPC)

Attribute name	Attribute type	FC	M/O/C Comments
ctlVal	BOOLEAN	CO	C
stVal	BOOLEAN	ST	C
q	Quality	ST	C
t	TimeStamp	ST	C
ctlModel	CtlModels	CF	C read-only
dataNs	VISIBLE STRING255	EX	C for non standard data objects

Controllable double point (DPC)

Attribute name	Attribute type	FC	M/O/C Comments
ctlVal	BOOLEAN	CO	C
stVal	CODED ENUM	ST	M
q	Quality	ST	M
t	TimeStamp	ST	M
ctlModel	CtlModels	CF	C read-only
sboTimeout	INT32U	CF	C read-only
sboClass	SboClasses	CF	C read-only

Controllable integer status (INC)

Attribute name	Attribute type	FC	M/O/C Comments
ctlVal	CtxInt	CO	C
stVal	CtxInt	ST	M
q	Quality	ST	M
t	TimeStamp	ST	M
ctlModel	CtlModels	CF	C read-only

Binary controlled step position information (BSC)

Common data class not supported.

Integer controlled step position information (ISC)

Common data class not supported.

Controllable analog set point information (APC)

Common data class not supported.

Single point setting (SPG)

Common data class not supported.

Nota :

M: mandatory field

O: optional field

C: conditional field

Conformance statements (Edition 1.0)

MICS - Model implementation conformance statement

Integer status setting (ING)

Common data class not supported.

Analogue setting (ASG)

Common data class not supported.

Setting curve (CURVE)

Common data class not supported.

Device name plate (DPL)

Attribute name	Attribute type	FC	M/O/C	Comments
vendor	VISIBLE STRING255	DC	M	
model	VISIBLE STRING255	DC	O	Sepam application
location	VISIBLE STRING255	DC	O	Same as SNMP location

Logical node name plate (LPL)

Attribute name	Attribute type	FC	M/O/C	Comments
vendor	VISIBLE STRING255	DC	M	
swRev	VISIBLE STRING255	DC	M	Sepam version
d	VISIBLE STRING255	DC	M	LLN0: Sepam label Other LN: not used
configRev	VISIBLE STRING255	DC	C	LLN0 only
ldNs	VISIBLE STRING255	EX	C	LLN0 only

Curve shape description (CSD)

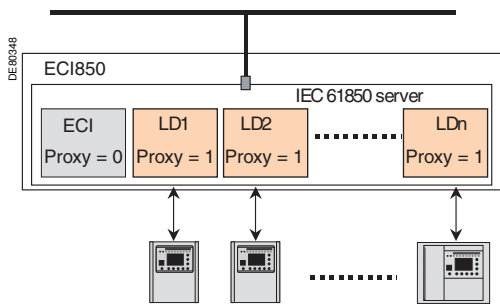
Common data class not supported.

Nota :

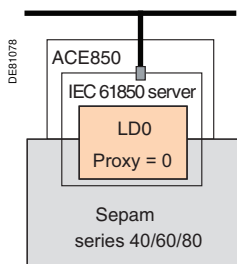
M: mandatory field

O: optional field

C: conditional field



ECI850 logical devices.



ACE850 logical device.

Logical device

ECI850

The IEC 61850 server inside the ECI850 contains the following logical devices:

- A logical device dedicated to the ECI850 unit itself. This logical device contains only LLN0 and LPHD logical nodes.
- A logical device for each Sepam unit connected to the ECI850. The content of this logical device is defined by the Sepam type, as described by its ICD file. The PROXY attribute of the LPHD logical node is set to TRUE for Sepam logical devices.

ECI850 logical devices name

The name of the logical devices is freely assigned at configuration time, using SFT2841 or CET850 tools, except for the ECI850 logical device which has a fixed name of "ECI".

ACE850

ACE850 is a communication accessory. It is not modelled in the IEC 61850 server. A single logical device is used for each Sepam (fixed name LD0).

The content of this logical device is defined by the Sepam type, as described by its ICD file.

Logical nodes

The following tables list possible attributes in Logical Node (LN).

Attributes not found in these tables are optional (O) or conditional (C) attributes not supported by Sepam devices. Mandatory attributes (M) are always present. Sepam devices also use extension attributes (E) for some LNs.

Logical nodes not found in this description are not supported.

System logical nodes: L group

Physical device information (LPHD class)

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	ECI850	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	LPHD1		M	■	■	■	■	■
PhyNam	DPL	Physical device name plate		M	■	■	■	■	■
PhyHealth	INS	Physical device health ⁽¹⁾		M	■	■	■	■	■
Proxy	SPS	Indicates if this LN is a proxy		M	■	■	■	■	■
PwrSupAlm	SPS	Power supply alarm		O				■	■

(1) Sepam partial fault, low battery...

Logical node zero (LLN0 class)

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	ECI850	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	LLN0		M	■	■	■	■	■
Common logical node information									
Mod	INC	Mode		M	■	■	■	■	■
Beh	INS	Behavior		M	■	■	■	■	■
Health	INS	Health		M	■	■	■	■	■
NamPlt	LPL	Name plate		M	■	■	■	■	■
Loc	INC	Local operation		O		■	■	■	■
Controls									
LEDRs	SPC	LED reset (reset Sepam)	■	O		■	■	■	■
ComWac	SPC	Communication monitoring		E		■ (≥ V09xx)	■ (≥ V7.0)		
PhRot	SPC	Set phase rotation direction (on: 123, off: 132)		E				■ (≥ V8.0)	■ (≥ V8.0)
Status information									
CTFlt	SPS	CTs fault		E			■	■	■
VTFlt	SPS	VTs fault		E			■	■	■
ComFlt	SPS	Communication fault (TS240)		E				■	■ (≥ V6.0)
ActSGA	SPS	Setting group A active		E		■	■	■	■
ActSGB	SPS	Setting group B active		E		■	■	■	■
PhRotFlt	SPS	Phase rotation command fault (TS239)		E				■ (≥ V8.0)	■ (≥ V8.0)

Nota :

M: mandatory data

O: optional data

C: conditional data

E: extension data

T: transient data (applies only to BOOLEAN attributes with FC=ST).

No event is generated for reporting when changing from TRUE to FALSE.

Starting with version V1.4, the Sepam ICD files library is provided with this attribute always set to FALSE.

□: compulsory data but unavailable in the device (provided with an invalid quality status).

Logical nodes for protection functions: P group

Differential protections (PDIF class)

87T - Transformer differential								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	A87T_PDIF1		M				■
Common logical node information								
Mod	INC	Mode		M				■
Beh	INS	Behavior		M				■
Health	INS	Health		M				■
NamPlt	LPL	Name plate		M				■
Status information								
Op	ACT	Operate	■	M				■
Measured values								
DifAClc	WYE	Differential Current		O				■
RstA	WYE	Restraint Current		O				■

87M - Machine differential								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	A87M_PDIF1		M				■
Common logical node information								
Mod	INC	Mode		M				■
Beh	INS	Behavior		M				■
Health	INS	Health		M				■
NamPlt	LPL	Name plate		M				■
Status information								
Op	ACT	Operate	■	M				■
Measured values								
DifAClc	WYE	Differential Current		O				■
RstA	WYE	Restraint Current		O				■

64REF - Restricted earth fault differential								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	A64RF_PDIF1, A64RF_PDIF2		M			■	■
Common logical node information								
Mod	INC	Mode		M			■	■
Beh	INS	Behavior		M			■	■
Health	INS	Health		M			■	■
NamPlt	LPL	Name plate		M			■	■
Status information								
Op	ACT	Operate	■	M			■	■

Nota :

M: mandatory data

O: optional data

C: conditional data

E: extension data

T: transient data (applies only to BOOLEAN attributes with FC=ST).

No event is generated for reporting when changing from TRUE to FALSE.

Starting with version V1.4, the Sepam ICD files library is provided with this attribute always set to FALSE.

□: compulsory data but unavailable in the device (provided with an invalid quality status).

Logical nodes for protection functions: P group (cont.)

Distance protections (PDIS class)

21B - Underimpedance

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	A21B_PDIS1		M			■	■
Common logical node information								
Mod	INC	Mode		M			■	■
Beh	INS	Behavior		M			■	■
Health	INS	Health		M			■	■
NamPlt	LPL	Name plate		M			■	■
Status information								
Str	ACD	Start		M			□	□
Op	ACT	Operate	■	M			■	■

Directional overpower (PDOP class)

32P - Directional active overpower

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	A32P_PDOP1		M		■		
		A32P_PDOP1, A32P_PDOP2		M			■	■
Common logical node information								
Mod	INC	Mode		M		■	■	■
Beh	INS	Behavior		M		■	■	■
Health	INS	Health		M		■	■	■
NamPlt	LPL	Name plate		M		■	■	■
Status information								
Str	ACD	Start		M		□	□	□
Op	ACT	Operate	■	M		■	■	■

32Q - Directional reactive overpower

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	A32Q_PDOP1		M		■	■	■
Common logical node information								
Mod	INC	Mode		M		■	■	■
Beh	INS	Behavior		M		■	■	■
Health	INS	Health		M		■	■	■
NamPlt	LPL	Name plate		M		■	■	■
Status information								
Str	ACD	Start		M		□	□	□
Op	ACT	Operate	■	M		■	■	■

Nota :

M: mandatory data

O: optional data

C: conditional data

E: extension data

T: transient data (applies only to BOOLEAN attributes with FC=ST).

No event is generated for reporting when changing from TRUE to FALSE.

Starting with version V1.4, the Sepam ICD files library is provided with this attribute always set to FALSE.

□: compulsory data but unavailable in the device (provided with an invalid quality status).

Logical nodes for protection functions: P group (cont.)

Directional underpower (PDUP class)

37P - Directional active underpower								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	A37P_PDUP1, A37P_PDUP2		M			■	■
Common logical node information								
Mod	INC	Mode		M			■	■
Beh	INS	Behavior		M			■	■
Health	INS	Health		M			■	■
NamPlt	LPL	Name plate		M			■	■
Status information								
Str	ACD	Start		M			□	□
Op	ACT	Operate	■	M			■	■

40 - Field loss								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	A40_PDUP1		M			■	■
Common logical node information								
Mod	INC	Mode		M			■	■
Beh	INS	Behavior		M			■	■
Health	INS	Health		M			■	■
NamPlt	LPL	Name plate		M			■	■
Status information								
Str	ACD	Start		M			□	□
Op	ACT	Operate	■	M			■	■

Rate of change of frequency (PFRC class)

81R - Rate of change of frequency								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	A81R_PFC1		M	■			
		A81R_PFC1, A81R_PFC2		M			■	■
Common logical node information								
Mod	INC	Mode		M	■		■	■
Beh	INS	Behavior		M	■		■	■
Health	INS	Health		M	■		■	■
NamPlt	LPL	Name plate		M	■		■	■
Status information								
Str	ACD	Start		M	□		□	□
Op	ACT	Operate	■	M	■		■	■

Ground detector (PHIZ class)

27TN/64G2 - Third harmonic undervoltage								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	A64G2_PHIZ1, A64G2_PHIZ2		M				■
Common logical node information								
Mod	INC	Mode		M				■
Beh	INS	Behavior		M				■
Health	INS	Health		M				■
NamPlt	LPL	Name plate		M				■
Status information								
Str	ACD	Start		M				■
Op	ACT	Operate	■	M				■

Nota :

M: mandatory data

O: optional data

C: conditional data

E: extension data

T: transient data (applies only to BOOLEAN attributes with FC=ST).

No event is generated for reporting when changing from TRUE to FALSE.

Starting with version V1.4, the Sepam ICD files library is provided with this attribute always set to FALSE.

□: compulsory data but unavailable in the device (provided with an invalid quality status).

Logical nodes for protection functions: P group (cont.)

Instantaneous overcurrent (PIOC class)

50/27 - Inadvertent energizing

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	A5027_PIOC1		M				■
Common logical node information								
Mod	INC	Mode		M				■
Beh	INS	Behavior		M				■
Health	INS	Health		M				■
NamPlt	LPL	Name plate		M				■
Status information								
Op	ACT	Operate	■	M				■

Motor restart inhibition (PMRI class)

66 - Starts per hour

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	A66_PMRI1		M	■	■	■	■
Common logical node information								
Mod	INC	Mode		M	■	■	■	■
Beh	INS	Behavior		M	■	■	■	■
Health	INS	Health		M	■	■	■	■
NamPlt	LPL	Name plate		M	■	■	■	■
Status information								
StrInh	SPS	Restart inhibited		O	■	■	■	■
StrInhTmm	INS	Restart inhibition time		O	■	■	■	■
NumStr	INS	Number of starts before inhibition		E	■	■	■	■

Motor starting time supervision (PMSS class)

48/51LR - Excessive starting time, locked rotor

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	A51LR_PMSS1		M	■	■	■	■
Common logical node information								
Mod	INC	Mode		M	■	■	■	■
Beh	INS	Behavior		M	■	■	■	■
Health	INS	Health		M	■	■	■	■
NamPlt	LPL	Name plate		M	■	■	■	■
Measured Values								
StrAmp	MV	Starting current		E	■	■	■	■
Status information								
Op	ACT	Operate	■	O	■	■	■	■
StrTmms	INS	Starting time		E	■	■	■	■

Phase angle measuring (PPAM class)

78PS - Pole slip

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	A78PS_PPAM1		M				■
Common logical node information								
Mod	INC	Mode		M				■
Beh	INS	Behavior		M				■
Health	INS	Health		M				■
NamPlt	LPL	Name plate		M				■
Status information								
Str	ACD	Start		M				■
Op	ACT	Operate	■	M				■

Nota :

M: mandatory data

O: optional data

C: conditional data

E: extension data

T: transient data (applies only to BOOLEAN attributes with FC=ST).

No event is generated for reporting when changing from TRUE to FALSE.

Starting with version V1.4, the Sepam ICD files library is provided with this attribute always set to FALSE.

□: compulsory data but unavailable in the device (provided with an invalid quality status).

Logical nodes for protection functions: P group (cont.)

Time overcurrent (PTOC class)

50/51 - Phase overcurrent								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	A51_PTOC1 to A51_PTOC4		M	■	■		
		A51_PTOC1 to A51_PTOC8		M			■	■
Common logical node information								
Mod	INC	Mode		M	■	■	■	■
Beh	INS	Behavior		M	■	■	■	■
Health	INS	Health		M	■	■	■	■
NamPlt	LPL	Name plate		M	■	■	■	■
Status information								
Str	ACD	Start		M	□	□	□	□
Op	ACT	Operate	■	M	■	■	■	■

50N/51N, 50G/51G - Earth fault								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	A51N_PTOC1 to A51N_PTOC4		M	■	■		
		A51N_PTOC1 to A51N_PTOC8		M			■	■
Common logical node information								
Mod	INC	Mode		M	■	■	■	■
Beh	INS	Behavior		M	■	■	■	■
Health	INS	Health		M	■	■	■	■
NamPlt	LPL	Name plate		M	■	■	■	■
Status information								
Str	ACD	Start		M	□	□	□	□
Op	ACT	Operate	■	M	■	■	■	■

46 - Negative sequence/unbalance								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	A46_PTOC1		M	■	■		
		A46_PTOC1, A46_PTOC2		M			■	■
Common logical node information								
Mod	INC	Mode		M	■	■	■	■
Beh	INS	Behavior		M	■	■	■	■
Health	INS	Health		M	■	■	■	■
NamPlt	LPL	Name plate		M	■	■	■	■
Status information								
Str	ACD	Start		M	□	□	□	□
Op	ACT	Operate	■	M	■	■	■	■

Nota :

M: mandatory data

O: optional data

C: conditional data

E: extension data

T: transient data (applies only to BOOLEAN attributes with FC=ST).

No event is generated for reporting when changing from TRUE to FALSE.

Starting with version V1.4, the Sepam ICD files library is provided with this attribute always set to FALSE.

□: compulsory data but unavailable in the device (provided with an invalid quality status).

Logical nodes for protection functions: P group (cont.)

Time overcurrent (PTOC class) (cont.)

46BC - Broken conductor								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	46BC_PTOC1		M		■		
Common logical node information								
Mod	INC	Mode		M		■		
Beh	INS	Behavior		M		■		
Health	INS	Health		M		■		
NamPlt	LPL	Name plate		M		■		
Status information								
Str	ACD	Start		M		□		
Op	ACT	Operate	■	M		■		
Measured values								
MaxImbNgA	MV	Maximum value of negative sequence/ positive sequence current ratio		E		■		

51C - Capacitor bank unbalance								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	A51C_PTOC1 to A51C_PTOC8		M				■
Common logical node information								
Mod	INC	Mode		M				■
Beh	INS	Behavior		M				■
Health	INS	Health		M				■
NamPlt	LPL	Name plate		M				■
Status information								
Str	ACD	Start		M				□
Op	ACT	Operate	■	M				■

67 - Directional phase overcurrent								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	A67_PTOC1, A67_PTOC2		M		■	■	■
Common logical node information								
Mod	INC	Mode		M		■	■	■
Beh	INS	Behavior		M		■	■	■
Health	INS	Health		M		■	■	■
NamPlt	LPL	Name plate		M		■	■	■
Status information								
Str	ACD	Start		M		□	□	□
Op	ACT	Operate	■	M		■	■	■

67N/67NC - Directional earth fault								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	A67N_PTOC1, A67N_PTOC2		M		■	■	■
Common logical node information								
Mod	INC	Mode		M		■	■	■
Beh	INS	Behavior		M		■	■	■
Health	INS	Health		M		■	■	■
NamPlt	LPL	Name plate		M		■	■	■
Status information								
Str	ACD	Start		M		□	□	□
Op	ACT	Operate	■	M		■	■	■

Nota :

M: mandatory data

O: optional data

C: conditional data

E: extension data

T: transient data (applies only to BOOLEAN attributes with FC=ST).

No event is generated for reporting when changing from TRUE to FALSE.

Starting with version V1.4, the Sepam ICD files library is provided with this attribute always set to FALSE.

□: compulsory data but unavailable in the device (provided with an invalid quality status).

Logical nodes for protection functions: P group (cont.)

Overfrequency (PTOF class)

81H - Overfrequency								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	A81H_PTOF1		M	■			
		A81H_PTOF1, A81H_PTOF2		M		■	■	■
Common logical node information								
Mod	INC	Mode		M	■	■	■	■
Beh	INS	Behavior		M	■	■	■	■
Health	INS	Health		M	■	■	■	■
NamPlt	LPL	Name plate		M	■	■	■	■
Status information								
Str	ACD	Start		M	□	□	□	□
Op	ACT	Operate	■	M	■	■	■	■

Overvoltage (PTOV class)

59 - Overvoltage (L-L or L-N)								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	A59_PTOV1, A59_PTOV2		M	■	■		
		A59_PTOV1 to A59_PTOV4		M			■	■
Common logical node information								
Mod	INC	Mode		M	■	■	■	■
Beh	INS	Behavior		M	■	■	■	■
Health	INS	Health		M	■	■	■	■
NamPlt	LPL	Name plate		M	■	■	■	■
Status information								
Str	ACD	Start		M	□	□	□	□
Op	ACT	Operate	■	M	■	■	■	■

59N - Neutral voltage displacement

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	A59N_PTOV1, A59N_PTOV2		M	■	■	■	■
Common logical node information								
Mod	INC	Mode		M	■	■	■	■
Beh	INS	Behavior		M	■	■	■	■
Health	INS	Health		M	■	■	■	■
NamPlt	LPL	Name plate		M	■	■	■	■
Status information								
Str	ACD	Start		M	□	□	□	□
Op	ACT	Operate	■	M	■	■	■	■

47 - Negative sequence overvoltage

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	A47_PTOV1		M		■		
		A47_PTOV1, A47_PTOV2		M			■	■
Common logical node information								
Mod	INC	Mode		M		■	■	■
Beh	INS	Behavior		M		■	■	■
Health	INS	Health		M		■	■	■
NamPlt	LPL	Name plate		M		■	■	■
Status information								
Str	ACD	Start		M		□	□	□
Op	ACT	Operate	■	M		■	■	■

Nota :

M: mandatory data

O: optional data

C: conditional data

E: extension data

T: transient data (applies only to BOOLEAN attributes with FC=ST).

No event is generated for reporting when changing from TRUE to FALSE.

Starting with version V1.4, the Sepam ICD files library is provided with this attribute always set to FALSE.

□: compulsory data but unavailable in the device (provided with an invalid quality status).

Logical nodes for protection functions: P group (cont.)

Protection trip conditioning (PTRC class)

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	PTRC1		M	■	■	■	■
Common logical node information								
Mod	INC	Mode		M	■	■	■	■
Beh	INS	Behavior		M	■	■	■	■
Health	INS	Health		M	■	■	■	■
NamPlt	LPL	Name plate		M	■	■	■	■
Status information								
Tr	ACT	Trip		C	■	■	■	■
ExTr1	SPS	External Trip 1		E		■	■	■
ExTr2	SPS	External Trip 2		E		■	■	■
ExTr3	SPS	External Trip 3		E		■	■	■
BlkInd1	SPS	Block indication 1 sent (Logic discrimination)		E	■	■	■	■
BlkInd2	SPS	Block indication 2 sent (Logic discrimination)		E		■	■	■

Thermal overload (PTTR class)

49RMS - Thermal overload								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	A49_PTTR1		M	■	■	■	■
Common logical node information								
Mod	INC	Mode		M	■	■	■	■
Beh	INS	Behavior		M	■	■	■	■
Health	INS	Health		M	■	■	■	■
NamPlt	LPL	Name plate		M	■	■	■	■
Loc	SPS	Local operation		O	■	■	■	■
Measured Values								
ThmRte	MV	Thermal capacity used		E	■	■	■	■
Controls								
InhThmPro	SPC	Inhibit thermal protection		E	■	■	■	■
Status information								
Op	ACT	Operate	■	M	■	■	■	■
AlmThm	ACT	Thermal alarm		O	■	■	■	■
TmResTr	INS	Operating time before tripping		E	■	■	■	■
WaitTm	INS	Waiting time after tripping		E	■	■	■	■

38/49T - Thermal monitoring								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	A49T_PTTR1 to A49TPTTR8		M	■			
		A49T_PTTR1 to A49TPTTR16		M		■	■	■
Common logical node information								
Mod	INC	Mode		M	■	■	■	■
Beh	INS	Behavior		M	■	■	■	■
Health	INS	Health ⁽¹⁾		M	■	■	■	■
NamPlt	LPL	Name plate		M	■	■	■	■
Measured Values								
Tmp	MV	Temperature for thermal load		O	■	■	■	■
Status information								
Op	ACT	Operate	■	M	■	■	■	■
AlmThm	ACT	Thermal alarm		O	■	■	■	■

(1) MET148 module status

Nota :

M: mandatory data

O: optional data

C: conditional data

E: extension data

T: transient data (applies only to BOOLEAN attributes with FC=ST).

No event is generated for reporting when changing from TRUE to FALSE.

Starting with version V1.4, the Sepam ICD files library is provided with this attribute always set to FALSE.

□: compulsory data but unavailable in the device (provided with an invalid quality status).

Logical nodes for protection functions: P group (cont.)

Undercurrent (PTUC class)

37 - Phase undercurrent								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	A37_PTUC1		M	■	■	■	■
Common logical node information								
Mod	INC	Mode		M	■	■	■	■
Beh	INS	Behavior		M	■	■	■	■
Health	INS	Health		M	■	■	■	■
NamPlt	LPL	Name plate		M	■	■	■	■
Loc	SPS	Local operation		O		■	■	■
Controls								
ProRs	SPC	Protection reset		E		■	■	■
Status information								
Str	ACD	Start		M	□	□	□	□
Op	ACT	Operate	■	M	■	■	■	■

Underfrequency (PTUF class)

81L - Underfrequency								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	A81L_PTUF1, A81L_PTUF2		M	■			
		A81L_PTUF1 to A81L_PTUF4		M		■	■	■
Common logical node information								
Mod	INC	Mode		M	■	■	■	■
Beh	INS	Behavior		M	■	■	■	■
Health	INS	Health		M	■	■	■	■
NamPlt	LPL	Name plate		M	■	■	■	■
Status information								
Str	ACD	Start		M	□	□	□	□
Op	ACT	Operate	■	M	■	■	■	■

Nota :

M: mandatory data

O: optional data

C: conditional data

E: extension data

T: transient data (applies only to BOOLEAN attributes with FC=ST).

No event is generated for reporting when changing from TRUE to FALSE.

Starting with version V1.4, the Sepam ICD files library is provided with this attribute always set to FALSE.

□: compulsory data but unavailable in the device (provided with an invalid quality status).

Logical nodes for protection functions: P group (cont.)

Undervoltage (PTUV class)

27- Undervoltage (L-L or L-N)

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	A27_PTUV1, A27_PTUV2 A27_PTUV1 to A27_PTUV4		M	■	■		■
Common logical node information								
Mod	INC	Mode		M	■	■	■	■
Beh	INS	Behavior		M	■	■	■	■
Health	INS	Health		M	■	■	■	■
NamPlt	LPL	Name plate		M	■	■	■	■
Status information								
Str	ACD	Start		M	□	□	□	□
Op	ACT	Operate	■	M	■	■	■	■

27D - Positive sequence undervoltage

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	A27D_PTUV1, A27D_PTUV2		M	■	■	■	■
Common logical node information								
Mod	INC	Mode		M	■	■	■	■
Beh	INS	Behavior		M	■	■	■	■
Health	INS	Health		M	■	■	■	■
NamPlt	LPL	Name plate		M	■	■	■	■
Status information								
Str	ACD	Start			□	□	□	□
Op	ACT	Operate	■	M	■	■	■	■

27R - Remanent undervoltage

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	A27R_PTUV1 A27R_PTUV1, A27R_PTUV2		M	■	■	■	■
Common logical node information								
Mod	INC	Mode		M	■	■	■	■
Beh	INS	Behavior		M	■	■	■	■
Health	INS	Health		M	■	■	■	■
NamPlt	LPL	Name plate		M	■	■	■	■
Status information								
Str	ACD	Start		M	□	□	□	□
Op	ACT	Operate	■	M	■	■	■	■

27S - Phase to neutral undervoltage

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	A27S_PTUV1		M	■			
Common logical node information								
Mod	INC	Mode		M	■			
Beh	INS	Behavior		M	■			
Health	INS	Health		M	■			
NamPlt	LPL	Name plate		M	■			
Status information								
Str	ACD	Start		M	□			
Op1	ACT	Operate on phase A	■	M	■			
Op2	ACT	Operate on phase B	■	M	■			
Op3	ACT	Operate on phase C	■	M	■			

Nota :

M: mandatory data

O: optional data

C: conditional data

E: extension data

T: transient data (applies only to BOOLEAN attributes with FC=ST).

No event is generated for reporting when changing from TRUE to FALSE.

Starting with version V1.4, the Sepam ICD files library is provided with this attribute always set to FALSE.

□: compulsory data but unavailable in the device (provided with an invalid quality status).

Logical nodes for protection functions: P group (cont.)

Voltage controlled time overcurrent (PVOC class)

50V/51V - Voltage restrained overcurrent								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	A51V_PVOC1		M		■	■	
		A51V_PVOC1, A51V_PVOC2		M				■
Common logical node information								
Mod	INC	Mode		M		■	■	■
Beh	INS	Behavior		M		■	■	■
Health	INS	Health		M		■	■	■
NamPlt	LPL	Name plate		M		■	■	■
Status information								
Str	ACD	Start		M		□	□	□
Op	ACT	Operate	■	M		■	■	■

Volts per Hertz (PVPH class)

24 - Overfluxing								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	A24_PVPH1, A24_PVPH2		M				■
Common logical node information								
Mod	INC	Mode		M				■
Beh	INS	Behavior		M				■
Health	INS	Health		M				■
NamPlt	LPL	Name plate		M				■
Status information								
Str	ACD	Start						□
Op	ACT	Operate	■	M				■

Nota :

M: mandatory data

O: optional data

C: conditional data

E: extension data

T: transient data (applies only to BOOLEAN attributes with FC=ST).

No event is generated for reporting when changing from TRUE to FALSE.

Starting with version V1.4, the Sepam ICD files library is provided with this attribute always set to FALSE.

□: compulsory data but unavailable in the device (provided with an invalid quality status).

Logical nodes for protection functions:
P group (cont.)

Zero speed or underspeed (PZSU class)

14 - Underspeed

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	A14_PZSU1, A14_PZSU2		M			■	■
Common logical node information								
Mod	INC	Mode		M			■	■
Beh	INS	Behavior		M			■	■
Health	INS	Health		M			■	■
NamPlt	LPL	Name plate		M			■	■
Measured values								
RotSpd	MV	Rotation speed		E			■	■
Status information								
Str	ACD	Start		M			□	□
Op	ACT	Operate	■	M			■	■

12 - Overspeed

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	A12_PZSU1, A12_PZSU2		M			■	■
Common logical node information								
Mod	INC	Mode		M			■	■
Beh	INS	Behavior		M			■	■
Health	INS	Health		M			■	■
NamPlt	LPL	Name plate		M			■	■
Measured values								
RotSpd	MV	Rotation speed		E			■	■
Status information								
Str	ACD	Start		M			□	□
Op	ACT	Operate	■	M			■	■

Nota :

M: mandatory data

O: optional data

C: conditional data

E: extension data

T: transient data (applies only to BOOLEAN attributes with FC=ST).

No event is generated for reporting when changing from TRUE to FALSE.

Starting with version V1.4, the Sepam ICD files library is provided with this attribute always set to FALSE.

□: compulsory data but unavailable in the device (provided with an invalid quality status).

Logical nodes for protection related functions: R group

Breaker failure (RBRF class)

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	RBRF1		M	■	■	■	■
Common logical node information								
Mod	INC	Mode		M	■	■	■	■
Beh	INS	Behavior		M	■	■	■	■
Health	INS	Health		M	■	■	■	■
NamPlt	LPL	Name plate		M	■	■	■	■
Status information								
OpEx	ACT	Breaker failure trip	■	C	■	■	■	■

Disturbance recorder function (RDRE class)

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	RDRE1		M	■	■	■	■
Common logical node information								
Mod	INC	Mode		M	■	■	■	■
Beh	INS	Behavior		M	■	■	■	■
Health	INS	Health		M	■	■	■	■
NamPlt	LPL	Name plate		M	■	■	■	■
Loc	SPS	Local operation		O	■	■	■	■
Controls								
RcdTrg	SPC	Trig recorder		O	■	■	■	■
RcdInh	SPC	Inhibit recorder		E	■	■	■	■
Status information								
RcdMade	SPS	Recording made ⁽²⁾		M	■	■	■	■
FitNum	INS	Fault number (not supported, always 0)		M	■	■	■	■

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	CTX_RDRE2 ⁽¹⁾		M			■	■
Common logical node information								
Mod	INC	Mode		M			■	■
Beh	INS	Behavior		M			■	■
Health	INS	Health		M			■	■
NamPlt	INS	Name plate		M			■	■
Status information								
RcdMade	SPS	Recording made ⁽²⁾		M			■	■
FitNum	INS	Fault number (not supported, always 0)		M			■	■

(1) Requires ACE850 or ECI850 ≥ V2.0.

(2) RcdMade if false when no record is available and true when at least one record is present. It then goes false for a short period of time for every new record. This allows performing new record detection through reporting of RcdMade.stVal.

The timestamp attribute of RcdMade (RcdMade.t) is meaningless and should be ignored.

Nota :

M: mandatory data

O: optional data

C: conditional data

E: extension data

T: transient data (applies only to BOOLEAN attributes with FC=ST).

No event is generated for reporting when changing from TRUE to FALSE.

Starting with version V1.4, the Sepam ICD files library is provided with this attribute always set to FALSE.

□: compulsory data but unavailable in the device (provided with an invalid quality status).

Logical nodes for protection related functions: R group

Data log recorder								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	DLG_RDRE3 ⁽¹⁾		M			≥ V8.0	≥ V8.0
Common logical node information								
Mod	INC	Mode		M			■	■
Beh	ENS	Behavior		M			■	■
Health	INS	Health		M			■	■
NamPlt	INS	Name plate		M			■	■
Loc	SPS	Local operation		O			■	■
Controls								
RcdTrg	SPC	Start/Stop recorder		O			■	■
Status information								
RcdMade	SPS	Recording made ⁽²⁾		M			■	■
FltNum	INS	Fault number (not supported, always 0)		M			■	■
RcdStr	SPS	Recording started		O			■	■

(1) Requires ACE850 or ECI850 ≥ V2.0.

(2) RcdMade if false when no record is available and true when at least one record is present. It then goes false for a short period of time for every new record. This allows performing new record detection through reporting of RcdMade.stVal.

The timestamp attribute of RcdMade (RcdMade.t) is meaningless and should be ignored.

Motor start recorder								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	MOT_RDRE4 ⁽¹⁾		M			≥ V8.0	≥ V8.0
Common logical node information								
Mod	INC	Mode		M			■	■
Beh	ENS	Behavior		M			■	■
Health	INS	Health		M			■	■
NamPlt	INS	Name plate		M			■	■
Loc	SPS	Local operation		O			■	■
Controls								
RcdTrg	SPC	Trigger recorder		O			■	■
Status information								
RcdMade	SPS	Recording made ⁽²⁾		M			■	■
FltNum	INS	Fault number (not supported, always 0)		M			■	■
RcdStr	SPS	Recording started		O			■	■

(1) Requires ACE850 or ECI850 ≥ V2.0.

(2) RcdMade if false when no record is available and true when at least one record is present. It then goes false for a short period of time for every new record. This allows performing new record detection through reporting of RcdMade.stVal.

The timestamp attribute of RcdMade (RcdMade.t) is meaningless and should be ignored.

Fault locator (RFLO class)

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	RFLO1		M		■		
Common logical node information								
Mod	INC	Mode		M		■		
Beh	INS	Behavior		M		■		
Health	INS	Health		M		■		
NamPlt	LPL	Name plate		M		■		
Measured values								
FltZ	CMV	Fault impedance		M		■		
FltDiskm	MV	Fault distance		M		■		
FltPh	INS	Fault phase(s) bit 0 = 1: phase A faulty bit 1 = 1: phase B faulty bit 2 = 1: phase C faulty		E		■		

Nota :

M: mandatory data

O: optional data

C: conditional data

E: extension data

T: transient data (applies only to BOOLEAN attributes with FC=ST).

No event is generated for reporting when changing from TRUE to FALSE.

Starting with version V1.4, the Sepam ICD files library is provided with this attribute always set to FALSE.

□: compulsory data but unavailable in the device (provided with an invalid quality status).

Logical nodes for protection related functions: R group (cont.)

Autoreclosing (RREC class)

Attribute name	Attribute type	Explanation/ Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	RREC1		M	■	■	■	■
Common logical node information								
Mod	INC	Mode		M	■	■	■	■
Beh	INS	Behavior		M	■	■	■	■
Health	INS	Health		M	■	■	■	■
NamPlt	LPL	Name plate		M	■	■	■	■
Loc	SPS	Local operation		O	■	■	■	■
Controls								
BlkRec	SPC	Block reclosing		O	■	■	■	■
Status information								
Op	ACT	Operate	■	M	□	□	■	■
AutoRecSt	INS	Autoreclosing status		M	■	■	■	■

Synchronism-check or synchronizing (RSYN class)

Attribute name	Attribute type	Explanation/ Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	RSYN1		M			■	■
Common logical node information								
Mod	INC	Mode		M			■	■
Beh	INS	Behavior		M			■	■
Health	INS	Health		M			■	■
NamPlt	LPL	Name plate		M			■	■
Loc	SPS	Local operation		O			■	■
Measured values								
DifVCIC	MV	Calculated difference in Voltage		O			■	■
DifHzCIC	MV	Calculated difference in Frequency		O			■	■
DifAngCIC	MV	Calculated difference of Phase Angle		O			■	■
Controls								
InhSynChk	SPC	Inhibit synchronism-check		E			■	■
Status information								
Rel	SPS	Release		M			□	□
VInd	SPS	Voltage difference indicator		O			■	■
AngInd	SPS	Angle difference indicator		O			■	■
HzInd	SPS	Frequency difference indicator		O			■	■
SynPrg	SPS	Synchronizing in progress		O			■	■
SynStop	SPS	Synchronizing stop	■	E			■	■
SynFit	SPS	Synchronizing failure	■	E			■	■
Syn	SPS	Synchronizing successful	■	E			■	■

Logical nodes for control: C group

Switch controller (CSWI class)

Attribute name	Attribute type	Explanation/ Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	CSWI1		M	■	■	■	■
Common logical node information								
Mod	INC	Mode		M	■	■	■	■
Beh	INS	Behavior		M	■	■	■	■
Health	INS	Health		M	■	■	■	■
NamPlt	LPL	Name plate		M	■	■	■	■
Loc	SPS	Local operation		O	■	■	■	■
Controls								
Pos	DPC	Switch, general		M	■	■	■	■

Nota :

M: mandatory data

O: optional data

C: conditional data

E: extension data

T: transient data (applies only to BOOLEAN attributes with FC=ST).

No event is generated for reporting when changing from TRUE to FALSE.

Starting with version V1.4, the Sepam ICD files library is provided with this attribute always set to FALSE.

□: compulsory data but unavailable in the device (provided with an invalid quality status).

Logical nodes for generic reference: G group

Generic automatic process control (GAPC class)

Load shedding								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	LS_GAPC1		M			■	■
Common logical node information								
Mod	INC	Mode		M			■	■
Beh	INS	Behavior		M			■	■
Health	INS	Health		M			■	■
NamPlt	LPL	Name plate		M			■	■
Status information								
Str	ACD	Start		M			□	□
Op	ACT	Operate	■	M			■	■
MotStrRe	SPS	Motor restart		E			■	■

Generic process I/O (GGIO class)

MES114 Digital Inputs								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	M114_GGIO1		M	■	■		
Common logical node information								
Mod	INC	Mode		M	■	■		
Beh	INS	Behavior		M	■	■		
Health	INS	Health		M	■	■		
NamPlt	LPL	Name plate		M	■	■		
Status information								
Ind11 to Ind14	SPS	Digital Input I11 to I14		O	■	■		
Ind21 to Ind26	SPS	Digital Input I21 to I26		O	■	■		

MES120 Digital Inputs								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	M120_GGIO1 (n = 1 to 3)		M			■	■
Common logical node information								
Mod	INC	Mode		M			■	■
Beh	INS	Behavior		M			■	■
Health	INS	Health		M			■	■
NamPlt	LPL	Name plate		M			■	■
Status information								
Ind1 to Ind14	SPS	Digital Input In01 to In14 (n = 1 to 3)		O			■	■

Logic equations								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	EQU_GGIO1		M		■	■	■
Common logical node information								
Mod	INC	Mode		M		■	■	■
Beh	INS	Behavior		M		■	■	■
Health	INS	Health		M		■	■	■
NamPlt	LPL	Name plate		M		■	■	■
Status information								
Ind1 to Ind8	SPS	V1 to V8		O		■	■	■
Ind101 to Ind108	SPS	V_MIMIC_IN_1 to V_MIMIC_IN_8		O			■	■

Nota :

M: mandatory data

O: optional data

C: conditional data

E: extension data

T: transient data (applies only to BOOLEAN attributes with FC=ST).

No event is generated for reporting when changing from TRUE to FALSE.

Starting with version V1.4, the Sepam ICD files library is provided with this attribute always set to FALSE.

□: compulsory data but unavailable in the device (provided with an invalid quality status).

Logical nodes for generic reference:
G group (cont.)

Generic process I/O (GGIO class) (cont.)

Logipam								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	LGP_GGIO1		M				■
Common logical node information								
Mod	INC	Mode		M				■
Beh	INS	Behavior		M				■
Health	INS	Health		M				■
NamPlt	LPL	Name plate		M				■
Loc	SPS	Local operation		O				■
Controls								
SPCSO1 to SPCSO8	SPC	Logipam TC49 to TC56		O				■
DPCSO1	DPC	Logipam TC57/58 and TS41/42		O				■
DPCSO2	DPC	Logipam TC59/60 and TS43/44		O				■
Status information								
Ind1 to Ind8	SPS	Logipam TS33 to TS40		O				■
IntIn1 to IntIn8	INS	Logipam counter C1 to C8		O				■

GOOSE monitoring								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	GSE_GGIO1		M			■	■
Common logical node information								
Mod	INC	Mode		M			■	■
Beh	INS	Behavior		M			■	■
Health	INS	Health		M			■	■
NamPlt	LPL	Name plate		M			■	■
Status information								
G401 to G416	SPS	Value of Sepam virtual inputs G401 to G416		E			■	■
G501 to G515	SPS	Value of Sepam virtual inputs G501 to G515		E			■	■
Test1 to Test4	SPS	Value of GOOSE test data Test1 to Test4		E			■	■

Sepam series 80 customized applications/remote indications								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	S80RI_GGIO1		M				■
Common logical node information								
Mod	INC	Mode		M				■
Beh	INS	Behavior		M				■
Health	INS	Health		M				■
NamPlt	LPL	Name plate		M				■
Status information								
TS1 to TS64	SPS	Sepam remote indication TS1 to TS64		E				■

Nota :

M: mandatory data

O: optional data

C: conditional data

E: extension data

T: transient data (applies only to BOOLEAN attributes with FC=ST).

No event is generated for reporting when changing from TRUE to FALSE.

Starting with version V1.4, the Sepam ICD files library is provided with this attribute always set to FALSE.

□: compulsory data but unavailable in the device (provided with an invalid quality status).

Logical nodes for generic reference: G group (cont.)

Generic process I/O (GGIO class) (cont.)

Sepam series 80 customized applications/Logipam counters

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	S80CT_GGIO1		M				■
Common logical node information								
Mod	INC	Mode		M				■
Beh	INS	Behavior		M				■
Health	INS	Health		M				■
NamPlt	LPL	Name plate		M				■
Status information								
C1 to C24	SPS	Logipam counters C1 to C24		E				■

Sepam series 60/80 customized applications/remote controls (first group)

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	S80RC_GGIO1 S60RC_GGIO1		M M			■	■
Common logical node information								
Mod	INC	Mode		M			■	■
Beh	INS	Behavior		M			■	■
Health	INS	Health		M			■	■
NamPlt	LPL	Name plate		M			■	■
Loc	SPS	Local operation		O			■	■
Controls								
TC1 to TC32	SPC	Remote controls TC1 to TC32		E			■	■

Sepam series 60/80 customized applications/remote controls (second group)

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	S80RC_GGIO2 S60RC_GGIO2		M M			■	■
Common logical node information								
Mod	INC	Mode		M			■	■
Beh	INS	Behavior		M			■	■
Health	INS	Health		M			■	■
NamPlt	LPL	Name plate		M			■	■
Loc	SPS	Local operation		O			■	■
Controls								
TC33 to TC64	SPC	Remote controls TC33 to TC64		E			■	■

Nota :

M: mandatory data

O: optional data

C: conditional data

E: extension data

T: transient data (applies only to BOOLEAN attributes with FC=ST).

No event is generated for reporting when changing from TRUE to FALSE.

Starting with version V1.4, the Sepam ICD files library is provided with this attribute always set to FALSE.

□: compulsory data but unavailable in the device (provided with an invalid quality status).

Logical nodes for metering and measurement: M group

Non phase related harmonics (MHAN class)

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	MHAN1		M			■	■
Common logical node information								
Mod	INC	Mode		M			■	■
Beh	INS	Behavior		M			■	■
Health	INS	Health		M			■	■
NamPlt	LPL	Name plate		M			■	■
Measured values								
Hz	MV	Basic frequency		C			■	■
ThdAmp	MV	Current total harmonic distortion		O			■	■
ThdVol	MV	Voltage total harmonic distortion		O			■	■

Metering (MMTR class)

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	MMTR1 (Internal energy counters)		M		■	■	■
		MMTR2 (External energy counters)		M		■	■	■
Common logical node information								
Mod	INC	Mode		M		■	■	■
Beh	INS	Behavior		M		■	■	■
Health	INS	Health		M		■	■	■
NamPlt	LPL	Name plate		M		■	■	■
Measured values								
SupWh	BCR	Real energy supply		O		■	■	■
SupVArh	BCR	Reactive energy supply		O		■	■	■
DmdWh	BCR	Real energy demand		O		■	■	■
DmdVArh	BCR	Reactive energy demand		O		■	■	■

Nota :

M: mandatory data

O: optional data

C: conditional data

E: extension data

T: transient data (applies only to BOOLEAN attributes with FC=ST).

No event is generated for reporting when changing from TRUE to FALSE.

Starting with version V1.4, the Sepam ICD files library is provided with this attribute always set to FALSE.

□: compulsory data but unavailable in the device (provided with an invalid quality status).

Logical nodes for metering and measurement: M group (cont.)

Measurement (MMXU class)

Main channels measurements (for Sepam series 40 and Sepam series 80)

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	MMXU1		M		■	■	■
Common logical node information								
Mod	INC	Mode		M		■	■	■
Beh	INS	Behavior		M		■	■	■
Health	INS	Health		M		■	■	■
NamPlt	LPL	Name plate		M		■	■	■
Measured values								
TotW	MV	Total active power		O		■	■	■
TotVAr	MV	Total reactive power		O		■	■	■
TotVA	MV	Total apparent power		O		■	■	■
TotPF	MV	Average power factor		O		■	■	■
Hz	MV	Frequency		O		■	■	■
PPV	DEL	Phase to phase voltages		O		■	■	■
PhV	WYE	Phase to ground voltages		O		■	■	■
A	WYE	Phase currents		O		■	■	■
W	WYE	Phase active power		O			■	■
VAr	WYE	Phase reactive power		O			■	■
VA	WYE	Phase apparent power		O			■	■

Current channels measurements for Sepam series 20 and Sepam series 80 (additional channels)

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	MMXU2		M	■			■
Common logical node information								
Mod	INC	Mode		M	■			■
Beh	INS	Behavior		M	■			■
Health	INS	Health		M	■			■
NamPlt	LPL	Name plate		M	■			■
Measured values								
A	WYE	Phase currents		O	■			■

Voltage channels measurements for Sepam series 20 (B2x applications) and Sepam series 80 (additional channels)

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	MMXU3		M	■			■
Common logical node information								
Mod	INC	Mode		M	■			■
Beh	INS	Behavior		M	■			■
Health	INS	Health		M	■			■
NamPlt	LPL	Name plate		M	■			■
Measured values								
Hz	MV	Frequency		O	■			■
PPV	DEL	Phase to phase voltages		O	■			■
PhV	WYE	Phase to ground voltages		O	■			■

Nota :

M: mandatory data

O: optional data

C: conditional data

E: extension data

T: transient data (applies only to BOOLEAN attributes with FC=ST).

No event is generated for reporting when changing from TRUE to FALSE.

Starting with version V1.4, the Sepam ICD files library is provided with this attribute always set to FALSE.

□: compulsory data but unavailable in the device (provided with an invalid quality status).

Logical nodes for metering and measurement: M group (cont.)

Sequence and imbalance (MSQI class)

Main channels measurements								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	MSQI1		M	■	■	■	■
Common logical node information								
Mod	INC	Mode		M	■	■	■	■
Beh	INS	Behavior		M	■	■	■	■
Health	INS	Health		M	■	■	■	■
NamPlt	LPL	Name plate		M	■	■	■	■
Measured values								
SeqV	SEQ	Positive, negative and zero sequence voltage		C	■ ⁽¹⁾	■	■	■

(1) negative sequence voltage not available on Sepam series 20

Additional voltage channels measurements								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	MSQI2		M				■
Common logical node information								
Mod	INC	Mode		M				■
Beh	INS	Behavior		M				■
Health	INS	Health		M				■
NamPlt	LPL	Name plate		M				■
Measured values								
SeqV	SEQ	Positive, negative and zero sequence voltage		C				■

Metering statistics (MSTA class)

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	MSTA1		M	■	■	■	■
Common logical node information								
Mod	INC	Mode		M	■	■	■	■
Beh	INS	Behavior		M	■	■	■	■
Health	INS	Health		M	■	■	■	■
NamPlt	LPL	Name plate		M	■	■	■	■
Loc	SPS	Local operation		O	■	■	■	■
Metered values								
Max W	MV	Maximum real power		O		■	■	■
MaxVAr	MV	Maximum reactive power		O		■	■	■
AvAmps1	MV	Average current phase A		O	■	■	■	■
AvAmps2	MV	Average current phase B		O	■	■	■	■
AvAmps3	MV	Average current phase C		O	■	■	■	■
MaxAmps1	MV	Maximum current phase A		O	■	■	■	■
MaxAmps2	MV	Maximum current phase B		O	■	■	■	■
MaxAmps3	MV	Maximum current phase C		O	■	■	■	■
TrAmp1	MV	Last trip current phase A		E	■	■	■	■
TrAmp2	MV	Last trip current phase B		E	■	■	■	■
TrAmp3	MV	Last trip current phase C		E	■	■	■	■
TrAmp4	MV	Last trip current neutral		E	■	■	■	■
Controls								
RsMaxA	SPC	Reset peak demand current		E			■	■
RsMaxPwr	SPC	Reset peak demand power		E			■	■
RsMax	SPC	Reset peak demand values		E	■	■		

Nota :

M: mandatory data

O: optional data

C: conditional data

E: extension data

T: transient data (applies only to BOOLEAN attributes with FC=ST).

No event is generated for reporting when changing from TRUE to FALSE.

Starting with version V1.4, the Sepam ICD files library is provided with this attribute always set to FALSE.

□: compulsory data but unavailable in the device (provided with an invalid quality status).

Logical nodes for sensors and monitoring: S group

Insulation medium supervision (liquid) (SIML class)

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	SIML1		M		■	■	■
Common logical node information								
Mod	INC	Mode		M		■	■	■
Beh	INS	Behavior		M		■	■	■
Health	INS	Health		M		■	■	■
NamPlt	LPL	Name plate		M		■	■	■
Status information								
InsAlm	SPS	Insulation liquid critical (=Buchholz alarm)		M		■	■	■
GasInsTr	SPS	Buchholz trip		O		■	■	■
PresAlm	SPS	Pressure alarm		O		■	■	■
PresTr	SPS	Pressure trip		O		■	■	■
TmpAlm	SPS	Thermostat alarm		O		■	■	■
TmpTr	SPS	Thermostat trip		E		■	■	■
ThmAlm	SPS	Thermistor alarm		E		■	■	■
ThmTr	SPS	Thermistor trip		E		■	■	■

Nota :

M: mandatory data

O: optional data

C: conditional data

E: extension data

T: transient data (applies only to BOOLEAN attributes with FC=ST).

No event is generated for reporting when changing from TRUE to FALSE.

Starting with version V1.4, the Sepam ICD files library is provided with this attribute always set to FALSE.

□: compulsory data but unavailable in the device (provided with an invalid quality status).

Logical nodes for switchgear: X group

Circuit breaker (XCBR class)

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	XCBR1		M	■	■	■	■
Common logical node information								
Mod	INC	Mode		M	■	■	■	■
Beh	INS	Behavior		M	■	■	■	■
Health	INS	Health		M	■	■	■	■
NamPlt	LPL	Name plate		M	■	■	■	■
Loc	SPS	Local operation		M	■	■	■	■
EEHealth	INS	External equipment health ⁽¹⁾		O	■	■	■	■
OpCnt	INS	Operation counter		M	■	■	■	■
Controls								
Pos	DPC	Switch position		M	■	■	■	■
BlkOpn	SPC	Block opening		M	□	□	□	□
BlkCls	SPC	Block closing		M	□	■	□	□
Metered values								
SumSwARs	BCR	Sum of switched amperes		O	■	■	■	■
Status information								
CBOpCap	INS	Circuit breaker operating capability		M	■	■	■	■
OpHrsCnt	INS	Operating hours counter		E	■	■	■	■
OpTmms	INS	Operating time		E	■	■	■	■
ChdTms	INS	Charging time		E	■	■	■	■
PhFitCnt	INS	Phase faults trip counter		E			■	■
EFTrCnt	INS	Earth faults trip counter		E			■	■
SumSwAAIm	SPS	Cumulative breaking current alarm		E			■	■
CBRkdOut	SPS	Circuit breaker racked out		E			■	■
RkdOutCnt	INS	Racking out operations counter		E			■	■
ESwPos	SPS	Earthing switch position		E			■	■

(1) SF6 alarm and Trip circuit supervision.

Logical nodes for further power system equipment: Z group

Capacitor bank (ZCAP class)

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	ZCAP1 to ZCAP4		M				■
Common logical node information								
Mod	INC	Mode		M				■
Beh	INS	Behavior		M				■
Health	INS	Health		M				■
NamPlt	LPL	Name plate		M				■
Loc	SPS	Local operation		O				■
EEHealth	INS	External equipment health		O				■
OpTmh	INS	Operation time		O				■
Controls								
CapDS	SPC	Capacitor bank device status		M				■
Status information								
DschBlk	SPS	Blocked due to discharge		M				□
Auto	SPS	Automatic operation		E				■

Nota :

M: mandatory data

O: optional data

C: conditional data

E: extension data

T: transient data (applies only to BOOLEAN attributes with FC=ST).

No event is generated for reporting when changing from TRUE to FALSE.

Starting with version V1.4, the Sepam ICD files library is provided with this attribute always set to FALSE.

□: compulsory data but unavailable in the device (provided with an invalid quality status).

Logical Nodes per Sepam series 20

Logical Node	S20	S23	S24	T20	T23	T24	M20	B21	B22
System Logical Nodes - L group									
LPHD1	■	■	■	■	■	■	■	■	■
LLN0	■	■	■	■	■	■	■	■	■
Logical Nodes for protection functions - P group									
A81R_PFR1									■
A66_PMRI1							■		
A51LR_PMSS1							■		
A46_PTOC1	■	■	■	■	■	■	■		
A51_PTOC1-4	■	■	■	■	■	■	■		
A51N_PTOC1-4	■	■	■	■	■	■	■		
A81H_PTOF1								■	■
A59_PTOV1-2								■	■
A59N_PTOV1-2								■	■
PTRC1	■	■	■	■	■	■	■	■	■
A49_PTTR1				■	■	■	■		
A49T_PTTR1-8				■	■	■	■		
A37_PTUC1							■		
A81L_PTUF1-2								■	■
A27_PTUV1-2								■	■
A27D_PTUV1-2								■	■
A27R_PTUV1								■	■
A27S_PTUV1								■	■
Logical Nodes for protection related functions - R group									
RDRE1	■	■	■	■	■	■	■	■	■
RBRF1		■	■		■	■			
RREC1	■	■	■						
Logical Nodes for control - C group									
CSWI1	■	■	■	■	■	■	■	■	■
Logical Nodes for generic reference - G group									
M114_GGIO1	■	■	■	■	■	■	■	■	■
Logical Nodes for metering and measurement - M group									
MMXU2	■	■	■	■	■	■	■		
MMXU3								■	■
MSQI1								■	■
MSTA1	■	■	■	■	■	■	■		
Logical Nodes for switchgear- X group									
XCBR1	■	■	■	■	■	■	■	■	■

Logical Nodes per Sepam series 40

Logical Node	S40	S41	S42	S43	S44	S50	S51	S52	S53	S54	T40	T42	T50	T52	M40	M41	G40
System Logical Nodes - L group																	
LPHD1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
LLN0	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Logical Nodes for protection functions - P group																	
A32P_PDOP1		■	■	■			■	■	■							■	■
A32Q_PDOP1																■	■
A66_PMRI1															■	■	
A51LR_PMSS1															■	■	
A46_PTOC1-2	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
A46BC_PTOC1						■	■	■	■	■			■	■			
A51_PTOC1-4	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
A51N_PTOC1-4	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
A67_PTOC1-2			■					■				■		■			
A67N_PTOC1-2		■	■	■			■	■	■			■		■		■	
A81H_PTOF1-2	■	■	■			■	■	■	■		■	■	■	■		■	■
A47_PTOV1	■	■	■		■	■	■	■		■	■	■	■	■		■	■
A59_PTOV1-2	■	■	■		■	■	■	■		■	■	■	■	■	■	■	■
A59N_PTOV1-2	■	■	■			■	■	■			■	■	■	■		■	■
PTRC1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
A49_PTTR1											■	■	■	■	■	■	■
A49T_PTTR1-16											■	■	■	■	■	■	■
A37_PTUC1															■	■	
A81L_PTUF1-4	■	■	■			■	■	■			■	■	■	■		■	■
A27_PTUV1-2	■	■	■		■	■	■	■		■	■	■	■	■	■	■	■
A27D_PTUV1-2															■	■	
A27R_PTUV1															■	■	
A51V_PVOC1																	■
Logical Nodes for protection related functions - R group																	
RDRE1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
RBRF1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
RFLO1						■	■	■	■	■							
RREC1	■	■	■	■	■	■	■	■	■	■							
Logical Nodes for control - C group																	
CSWI1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Logical Nodes for generic reference - G group																	
EQU_GGIO1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
M114_GGIO1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Logical Nodes for metering and measurement - M group																	
MMTR1-2	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
MMXU1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
MSQI1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
MSTA1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Logical Nodes for sensors and monitoring - S group																	
SIML1											■	■	■	■			
Logical Nodes for switchgear- X group																	
XCBR1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

Logical Nodes per Sepam series 60

Logical Node	S60	S62	T60	T62	M61	G60	G62	C60
System Logical Nodes - L group								
LPHD1	■	■	■	■	■	■	■	■
LLN0	■	■	■	■	■	■	■	■
Logical Nodes for protection functions - P group								
A64RF_PDIF1-2			■	■				
A21B_PDIS1						■	■	
A32P_PDOP1-2		■		■	■	■	■	
A32Q_PDOP1					■	■	■	
A37P_PDUP1-2						■	■	
A40_PDUP1					■	■	■	
A81R_PFC1-2	■	■				■	■	
A66_PMR11					■			
A51LR_PMSS1					■			
A46_PTOC1-2	■	■	■	■	■	■	■	■
A51_PTOC1-4	■	■	■	■	■	■	■	■
A51N_PTOC1-4	■	■	■	■	■	■	■	■
A67_PTOC1-2		■		■			■	
A67N_PTOC1-2		■		■	■		■	
A81H_PTOF1-2	■	■	■	■	■	■	■	■
A47_PTOV1-2	■	■	■	■	■	■	■	■
A59_PTOV1-2	■	■	■	■	■	■	■	■
A59N_PTOV1-2	■	■	■	■	■	■	■	■
PTRC1	■	■	■	■	■	■	■	■
A49_PTTR1		■	■	■	■	■	■	■
A49T_PTTR1-16			■	■	■	■	■	■
A37_PTUC1					■			
A81L_PTUF1-4	■	■	■	■	■	■	■	■
A27_PTUV1-2	■	■	■	■	■	■	■	■
A27D_PTUV1-2	■	■	■	■	■	■	■	■
A27R_PTUV1-2	■	■	■	■	■	■	■	■
A51V_PVOC1						■	■	
A12_PZSU1-2					■	■	■	
A14_PZSU1-2					■	■	■	
Logical Nodes for protection related functions - R group								
RBRF1	■	■	■	■	■	■	■	■
RDRE1	■	■	■	■	■	■	■	■
CTX_RDRE2	■	■	■	■	■	■	■	■
DLG_RDRE3	■	■	■	■	■	■	■	■
MOT_RDRE4					■			
RREC1	■	■						
RSYN1	■	■	■	■		■	■	
Logical Nodes for control - C group								
CSWI1	■	■	■	■	■	■	■	■
Logical Nodes for generic reference - G group								
LS_GAPC1					■			
EQU_GGIO1	■	■	■	■	■	■	■	■
GSE_GGIO1	■	■	■	■	■	■	■	■
M120_GGIO1-2	■	■	■	■	■	■	■	■
S60RC_GGIO1-2	■	■	■	■	■	■	■	■
Logical Nodes for metering and measurement - M group								
MHAN1	■	■	■	■	■	■	■	■
MMTR1-2	■	■	■	■	■	■	■	■
MMXU1	■	■	■	■	■	■	■	■
MSQI1	■	■	■	■	■	■	■	■
MSTA1	■	■	■	■	■	■	■	■
Logical Nodes sensors and monitoring - S group								
SIML1			■	■	■	■	■	
Logical Nodes switchgear - X group								
XCBR1	■	■	■	■	■	■	■	■

Logical Nodes per Sepam series 80

Logical Node	S80	S81	S82	S84	T81	T82	T87	M81	M87	M88	G82	G87	G88	B80	B83	C86
System Logical Nodes - L group																
LPHD1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
LLN0	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Logical Nodes for protection functions - P group																
A64RF_PDIF1-2					■	■	■				■		■			
A87M_PDIF1									■			■				
A87T_PDIF1							■			■			■			
A21B_PDIF1											■	■	■			
A32P_PDOP1-2		■	■	■	■	■	■	■	■	■	■	■	■			
A32Q_PDOP1								■	■	■	■	■	■			
A37P_PDUP1-2				■							■					
A40_PDUP1								■	■	■	■	■	■			
A81R_PFR1-2				■												
A64G2_PHIZ1-2											■	■	■			
A5027_PIOC1											■	■	■			
A66_PMRI1								■	■	■						
A51LR_PMSS1								■	■	■						
A78PS_PPAM1								■	■	■	■	■	■			
A46_PTOC1-2	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
A51_PTOC1-8/A51N_PTOC1-8	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
A51C_PTOC1-8																■
A67_PTOC1-2			■	■		■	■				■	■	■			
A67N_PTOC1-2		■	■	■	■	■	■	■	■	■	■	■	■			
A81H_PTOF1-2	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
A47_PTOV1-2	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
A59_PTOV1-4/A59N_PTOV1-2	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
PTRC1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
A49_PTTR1		■	■	■	■	■	■	■	■	■	■	■	■			■
A49T_PTTR1-16					■	■	■	■	■	■	■	■	■			■
A37_PTUC1								■	■	■						
A81L_PTUF1-4	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
A27_PTUV1-4	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
A27D_PTUV1-2/A27R_PTUV1-2	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
A51V_PVOC1-2											■	■	■			
A24_PVPH1-2							■				■	■	■			
A12_PZSU1-2/A14_PZSU1-2								■	■	■	■	■	■			
Logical Nodes for protection related functions - R group																
RBRF1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
RDRE1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
CTX_RDRE2	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
DLG_RDRE3	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
MOT_RDRE4								■	■	■						
RREC1	■	■	■	■												
RSYN1	■	■	■	■	■	■	■				■	■	■	■	■	
Logical Nodes for control - C group																
CSWI1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Logical Nodes for generic reference - G group																
LS_GAPC1								■	■	■						
EQU_GGIO1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
LGP_GGIO1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
M120_GGIO1-3	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
GSE_GGIO1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
S80xx_GGIOOn	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Logical Nodes for metering and measurement - M group																
MHAN1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
MMTR1-2	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
MMXU1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
MMXU2							■		■	■		■	■			
MMXU3																■
MSQI1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
MSQI2																■
MSTA1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Logical Nodes sensors and monitoring - S group																
SIML1					■	■	■	■		■	■		■			
Logical Nodes switchgear - X group																
XCBR1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Logical Nodes for further power equipment - Z group																
ZCAP1-4																■



The **Specific Communication Services Mapping** to MMS (ISO 9506) and to ISO/IEC 8802-3 is defined by part 8-1 of IEC 61850.

It provides:

- the mapping of the objects and services of the ACSI to MMS

- the mapping of time-critical information exchanges to ISO/IEC 8802-3

These conformance tables are taken from chapter 24 of IEC 61850-8-1.

Profile conformance

A-Profile support

Profile	Client	Server	Comments
A1 Client/server		■	
A2 GOOSE/GSE Management	■	■	(1)
A3 GSSE			
A4 Time sync	■		

T-Profile support

Profile	Client	Server	Comments
T1 TCP/IP profile		■	
T2 OSI T profile			
T3 GOOSE/GSE T profile	■	■	(1)
T4 GSSE T profile			
T5 Time Sync T profile	■		

(1) Sepam series 60 or Sepam series 80, with ACE850 only.

MMS conformance

MMS service supported CBB (server)	M/O/C/I	Supported
status	M	■
getNameList	C	■
identify	M	■
rename	O	
read	C	■
write	C	■
getVariableAccessAttributes	C	■
defineNamedVariable	O	
defineScatteredAccess	I	
getScatteredAccessAttributes	I	
deleteVariableAccess	O	
defineNamedVariableList	O	
getNamedVariablesListAttributes	C	■
deleteNamedVariableList	C	
defineNamedType	I	
getNamedTypeAttributes	I	
deleteNamedType	I	
input	I	
output	I	
takeControl	I	
relinquishControl	I	
defineSemaphore	I	
deleteSemaphore	I	
reportPoolSemaphoreStatus	I	
reportSemaphoreStatus	I	
initialDownloadSequence	I	
downloadSegment	I	
terminateDownloadSequence	I	
initiateUploadSequence	I	
uploadSegment	I	
terminateUploadSequence	I	
requestDomainDownload	I	
requestDomainUpload	I	
loadDomainContent	I	
storeDomainContent	I	
deleteDomain	I	
getDomainAttributes	C	■

Nota :

M: mandatory support

O: optional support

C: conditional support

I: out of scope

X: must not be supported (version compatibility)

Conformance statements (Edition 1.0)

PICS - Protocol implementation conformance statement

MMS conformance (cont'd)

MMS service supported CBB (server)	M/O/C/I	Supported
createProgramInvocation	I	
deleteProgramInvocation	I	
start	I	
stop	I	
resume	I	
reset	I	
kill	I	
getProgramInvocationAttributes	I	
obtainFile	C	
defineEventCondition	I	
deleteEventCondition	I	
getEventConditionAttributes	I	
reportEventConditionStatus	I	
alterEventConditionMonitoring	I	
triggerEvent	I	
defineEventAction	I	
deleteEventAction	I	
alterEventEnrollment	I	
reportEventEnrollmentStatus	I	
getEventEnrollmentAttributes	I	
acknowledgeEventNotification	I	
getAlarmSummary	I	
getAlarmEnrollmentSummary	I	
readJournal	C	■ ACE850 only
writeJournal	O	
initializeJournal	C	
reportJournalStatus	I	
createJournal	I	
deleteJournal	I	
fileOpen	C	■
fileRead	C	■
fileClose	C	■
fileRename	I	
fileDelete	C	
fileDirectory	C	■
unsolicitedStatus	I	
informationReport	C	■
eventNotification	I	
attachToEventCondition	I	
attachToSemaphore	I	
conclude	M	■
cancel	M	■
getDataExchangeAttributes	X	
exchangeData	X	
defineAccessControlList	X	
getAccessControlListAttributes	X	
reportAccessControlledObjects	X	
deleteAccessControlList	X	
alterAccessControl	X	
reconfigureProgramInvocation	X	

Nota :

M: mandatory support

O: optional support

C: conditional support

I: out of scope

X: must not be supported (version compatibility)

Conformance statements (Edition 1.0) PICS - Protocol implementation conformance statement

GOOSE services

GOOSE conformance	Subscriber		Publisher	
	M/O/C	Supported	M/O/C	Supported
GOOSE services	C	■ ⁽¹⁾	C	■ ⁽¹⁾
SendGOOSEMessage	M		M	■
GetGoReference	O		C	
GetGOOSEElementNumber	O		C	
GetGoCBValues	O		O	
SetGoCBValues	O		O	
GOOSE Control Block (GoCB)	O		O	■

⁽¹⁾ Sepam series 60 or Sepam series 80, with ACE850 only.

GSSE conformance	Subscriber		Publisher	
	M/O/C	Supported	M/O/C	Supported
GSSE services	C		C	
SendGSSEMessage	M		M	
GetGsReference	O		C	
GetGSSEDataOffset	O		C	
GetGsCBValues	O		O	
SetGsCBValues	O		O	
GSSE Control Block (GsCB)	O		O	

SCL services

SCL conformance				
			M/O/C	Supported
SCL.1	SCL file for implementation available (offline)		M	■
SCL.2	SCL file available from implementation online		O	
SCL.3	SCL implementation reconfiguration supported online		O	

Nota :

M: mandatory support

O: optional support

C: conditional support

I: out of scope

X: must not be supported (version compatibility)

Conformance statements (Edition 1.0) PIXIT - Protocol implementation extra information for testing

Device configuration

The entire device configuration is read-only and can only be modified by the CID file. In particular, data objects with functional constraints of DC and CF can never be written.

ACSI models

Association model

Item	Value/Comments
Maximum simultaneous client associations	ECI850, ACE850 < V2.0: 6 ACE850 ? V2.0: 8
TCP Keepalive	1 to 60 seconds (default 30) ⁽¹⁾
Authentication	Not supported
Association parameters	
TSEL	Required, value defined in the CID file
SSEL	Required, value defined in the CID file
PSEL	Required, value defined in the CID file
AP-Title	Not required, ignored if present
AE-Qualifier	Not required, ignored if present
Maximum MMS PDU size	8000
Typical startup time after a power supply interrupt	ECI850: 20-100 seconds (depends on the CID configuration file). The status LED blinks quickly during startup. ACE850: 5-30 seconds (depends on the CID configuration file). The On/fault LED blinks quickly during startup.

(1) This is the time between two keepalive probes during normal operation. The session time-out, in case of communication failure, is related to this value in a non-linear way and ranges from approximately 50 seconds to approximately 150 seconds. It is about 90 seconds for the default keepalive value.

Note: A 3 second delay between each association is required.

Server model

Item	Value/Comments
Quality bits for analog values (MX)	
Validity	Good, Invalid
OutOfRange	Supported
Failure	Supported
Inconsistent	Supported
Source	Process
Other quality bits and values	Not supported
Quality bits for status values (ST)	
Validity	Good, Invalid
BadReference	Supported
Failure	Supported
Inconsistent	Supported
Inaccurate	Supported
Source	Process
Other quality bits and values	Not supported
Maximum number of data values in Get/SetDataValues requests	Limited only by the MMS PDU size

Dataset model

Item	Value/Comments
Predefined Datasets in the ICD files	■ 1 status Dataset LLN0.StDs ■ 1 measurand Dataset LLN0.MxDs in each Sepam Logical Device
Maximum number of data elements in one Dataset	By configuration: 600
Maximum number of persistent Datasets	By configuration: 32 ⁽¹⁾
Maximum number of non-persistent Datasets	Not supported

(1) The number of Datasets and attributes is only limited by the available memory. The indicated limit here is an imposed limit for the configurator and based on the section <services> content of the ICD file.

Conformance statements (Edition 1.0)

PIXIT - Protocol implementation extra information for testing

Setting group model

Item	Value/Comments
Number of setting groups	2
Note: Setting group is used to globally switch Sepam between A and B parameter sets, so no individual "SG" feature is provided.	

Reporting model

Item	Value/Comments
Predefined BRCBs in the ICD files	<ul style="list-style-type: none"> ■ 2 status RCBs LLN0.brcbST01 and LLN0.brcbST02, based on LLN0.StDs ■ 2 measurands RCBs LLN0.brcbMX01 and LLN0.brcbMX02, based on LLN0.StMx in each Sepam Logical Device
Predefined URCBs in the ICD files	None
Support of trigger conditions	
Integrity	Supported
Data change	Supported
Data update	Supported (can be set, but there is no process data to report for this condition)
Quality change	Supported
General interrogation	Supported
Support of optional fields	
Sequence number	Supported
Report time-stamp	Supported
Reason for inclusion	Supported
Dataset name	Supported
Data reference	Supported
Buffer overflow	Supported
EntryID	Supported
Conf-rev	Supported
Segmentation	Supported, automatic
Sending of segmented reports	Supported
EntryID	Only the first 4 octets are used. Remaining octets must be 0.
Buffer size for each BRCB	30000 octets
URCB management	<p>Non indexed URCB instances are created dynamically from the models, for each client requesting it.</p> <p>The auto-indexation of the URCB with the use of the RptEnabled max = "n" attribute is supported from 2011 versions (See page 46).</p>
BRCB management	The auto-indexation of the BRCB with the use of the RptEnabled max = "n" attribute is supported from 2011 versions (See page 46).
Maximum number of RCB.	16 (48 for ECI850) ⁽¹⁾

(1) The number of RCB is only limited by the available memory. The indicated limit here is an imposed limit for the configurator and based on the section <services> content of the ICD file.

Conformance statements (Edition 1.0) PIXIT - Protocol implementation extra information for testing

Log model

ACE850

ACE850 allows only one Log file (in Logical device LD0) and only one Log Control block.

Log annotations are used to indicate loss of events, due to buffer overflow or clock not synchronized.

Logging is disabled by default in the ICD file. It must be enabled either dynamically or at configuration time. Integrity period logging is not supported, write operations to the corresponding field of the Log Control Block are possible but the value is ignored.

Log data is stored in non-volatile memory. Two 128 Kbytes memory blocks are used, when both are full, the block containing the oldest data is erased. Then the minimum Log depth is 128 Kbytes and the maximum Log depth is 256 Kbytes, that is approximately between 1000 and 2000 single point status changes respectively.

In order to ensure that a valid TimeOfEntry is assigned to Log entries, Logging is automatically disabled if the SNTP synchronization is disabled or not successful, whatever the value of LogEna.

Log annotations are used to indicate loss of events, due to buffer overflow or clock not synchronized.

The Log file is erased each time a new CID is loaded in the device, in order to avoid model inconsistencies.

Note: The content of the whole Log may also be retrieved at any time, as a COMFEDE formatted XML file, using FTP.

ECI850

Logging is not supported by ECI850. If Log or LogControl elements are found in the CID file, they are ignored. This may occur as ICD files are common for ACE850 and ECI850 and contain default elements.

Control model

Item	Value/Comments
Control models supported	
Status only	Supported
Direct with normal security	Supported
Direct with enhanced security	Not supported
SBO with normal security	Not supported
SBO with enhanced security	Supported
Time activated operate (operTm)	Not supported
Test mode	Not supported, ignored
Check conditions	Not supported, must be 0
Operate many	Not supported
Pulse configuration	Not supported
Command Termination timeout	15 seconds
Service error types	<ul style="list-style-type: none"> ■ instance-not-available ■ access-violation ■ parameter-value-inappropriate ■ instance-locked-by-another-client ■ failed-due-to-server-constraint ■ generic-error

SBO controls

ctlNum normally must have the same value in the Select and Operate requests.

To insure interoperability with older clients not complying with this rule, the value plus one is also accepted in the Operate request.

It is possible to select several times the same control object. The select/operate timeout is restarted with each selection. The value contained in the Cancel structure is ignored. Controls with same ctlVal as current status are accepted.

Conformance statements (Edition 1.0)

PIXIT - Protocol implementation extra information for testing

GOOSE model (Sepam series 60 or series 80, with ACE850)

Item	Value/Comments
GOOSE header subscriber identification	
Source Mac Address	Not Supported
Destination Mac Address	Supported
VPID tag (VLAN, priority)	Supported, optional field
Ethertype = 0x88B8	Supported
APPID	Supported
Length	Supported
gocbRef	Supported
timeAllowedtoLive	Supported
datSet	Supported
golD	Supported, optional field
t	Not Supported
stNum	Supported
sqNum	Not Supported
test	Supported
confRev	Supported
ndsCom	Not Supported, must be FALSE
numDatSetEntries	Supported
GOOSE publish can be turned ON/OFF	Supported, using SetGoCBValues(GoEna)
GOOSE publish mode test turned ON/OFF	Supported, using the Diagnostics Web pages
Incorrect GOOSE publish configuration	Not supported, configurator does not validate it.
Missing GOOSE detection	Supported, QR condition is set on timeout.
Syntactically incorrect GOOSE frame	Supported, QD condition is set on bad syntax.
Subscribed GOOSE is out-of-order	Supported, partially for stNum, not for sqNum
Subscribed GOOSE is duplicated	Supported, the frame is ignored.
GOOSE data contents	
Structured data objects	Supported
Data attributes	Supported
timestamp data attributes	Supported
GOOSE VLAN capability	
GOOSE with VLAN tag	Supported
GOOSE without VLAN tag	Supported
Retransmission time profile	Supported, configuration from 4 ms to 30 s TAL min = 200 ms

(1) Sepam series 60 or Sepam series 80, with ACE850 only.

GOOSE Publisher detailed behavior

■ Test mode:

The test mode of a GOOSE can be set or reset using a check-box in the "GOOSE messaging statistics" web page.

■ Transmission profile:

- On any change the GOOSE frame is first transmitted as soon as possible, and then retransmitted according to the time profile, from MinTime to MaxTime.
- Time profile follows the powers of 2 in milliseconds, bounded to 29900 ms.
- MinTime and MaxTime are configurable and truncated to the nearest convenient value of the profile, in the range from 4ms to 29900 ms.
- Each member of a Dataset have to be detailed at least at the level of IEDLD/LN\$FC\$DO...

■ Time-Allowed-to-Live (TAL):

It is the sum of the 2 next retransmission times (with a minimum of 150 ms), plus 50 ms.

■ Maximum number of GOOSE frames in transmission: 4

■ Proprietary attributes completing information of the state of the GOOSE Control Block status:

- MinTime: actual minimum time of the retransmission profile in milliseconds,
- Max Time: actual maximum time of the retransmission profile in milliseconds,
- Test: Test = TRUE means that the GOOSE is currently being emitted in test mode.

Conformance statements (Edition 1.0)

PIXIT - Protocol implementation extra information for testing

GOOSE Subscriber detailed behavior

A received GOOSE frame is considered if it matches the following configured criteria:

- Ethernet protocol:
 - If the Optional VLAN tag exists, it must have the form 0x8100xxxx.
 - The protocol identifier must be GOOSE = 0x88B8.
- GOOSE protocol:
 - Received frame is large enough to contain specified data length.
 - Destination address is the one of the subscribed GOOSE.
 - All the fields are checked for consistency in the following order: APPID, Length, gocbRef, TAL, datSet, optional goID, t, stNum, sqNum, test, confRev, ndsComm, and Data fields. ndsComm must have the value FALSE.
- GOOSE data consistency:
 - The datSet structure matches the expected one versus ASN.1 coding types.
 - If it does not match, the Quality of Data flag (QD) is set.
- GOOSE timeout:
 - If a frame does not match any above criteria, it is rejected as invalid.
 - If no valid frame is received before the Time-Allowed-to-Live timeout, plus 50ms, the Quality of Reception flag (QR) is set.
 - On invalid frame, data is left to last known valid values.
- GOOSE data validity:
 - stNum may take any value except for the previous value minus 1 (in order to avoid possible desynchronization during a network reconfiguration).
 - sqNum is not checked to prevent deadlocks with a desynchronized producer.
 - t field is not checked, devices may be not time-synchronized.
 - Test mode: when the test mode is set in the GOOSE header, the values are not considered, and previous values are frozen as valid until the test mode is reset, however QD and QR conditions are still evaluated.

A valid received GOOSE is decoded for Sepam serie 60 or Sepam series 80 as follows, provided that the test flag is not set (if test flag is set, the message is ignored):

- Each IEC 61850 data is converted in a 1-bit value using rules:
 - Single Point Status: "TRUE" = 1, "FALSE" = 0.
 - Double Point Status: "10" = 1, all other combinations = 0.
 - Quality: "bad" = 1, "good" = 0, with the following rules:
 - If INVALID: mask "I" is applied on detailQual (default 0xF8).
 - If QUESTIONABLE: mask "Q" is applied on detailQual (default 0x77).
 - Mask "M" is applied on the source, test, operatorBlocked bits (default 0x03).
 - If any of these gives 1 or QR condition is present, the quality is set to "bad".
 - Any other data type gives a 0 value.
- Each of resulting 1-bit values may be assigned to zero, one, or more of the 31 dedicated GOOSE inputs of Sepam (GSE_GGIO1 logical node):
 - The 31 virtual GOOSE inputs are G401 to G416, and G501 to G515.
 - G516 input is reserved for the ACE850 module presence detection.
 - A GOOSE input not having any assignment is let to 0.
 - Several 1-bit values may be assigned to one GOOSE input: an OR is assumed.
- Maximum number of GOOSE subscriptions: 40

Conformance statements (Edition 1.0) PIXIT - Protocol implementation extra information for testing

Time and time synchronization model

Item	Value/Comments
Time quality bits	
LeapSecondsKnown	Supported but not used
ClockFailure	Supported
ClockNotSynchronized	Supported
Maximum time to wait for time server responses	5 seconds
Meaning of ClockFailure bit	This bit is set when it is not possible to get time from any time server (or when the SNTP synchronization is not enabled).
Meaning of ClockNotSynchronized bit	This bit is set when the time server sets the alarm condition (clock not synchronized) in the SNTP frame (LI field).

Time stamps

Time stamping is performed in Sepam devices for process status values such as protection tripping, digital inputs changes...
It is performed in the ECI850 or ACE850 for any other data such as deadbanded analog values.
For time stamping consistency, it is necessary that ECI850 or ACE850 are synchronized via SNTP.

ECI850 or ACE850 clock

At power-up, the ECI850 or ACE850 clock is reset to a default date (1970/01/01 or 2007/01/01, according to the version). It is then synchronized to the SNTP servers if the feature is enabled and the servers are running. Sepam units are synchronized from the ECI850 or ACE850 only if the ClockFailure status is not set.

File transfer model

Item	Value/Comments
Separator for files and directories path	'/'
Structure of files and directories	LD/LDName/dirname/filename ⁽¹⁾
Maximum length of names (incl. path)	64
Case sensitivity	Case sensitive

(1) See FTP server for more details.

Impact of Sepam settings

Logical device mode

Provided that the Sepam unit is of the correct type and communicates correctly with the ECI850 or ACE850, the corresponding logical device mode (given by LLN0.Mod) is always ON. The only exception is when a Sepam series 60 or Sepam series 80 device is set in "test mode" in which case it is reported as BLOCKED (the closest IEC 61850 mode).

Protection logical nodes

Protection logical nodes are OFF (**Mod** attribute), if the corresponding protection function is turned OFF in the Sepam unit.

Some Protection Logical Nodes require a mandatory **Str** (Start) attribute. Such an information being unavailable in Sepam devices, it is always provided as an OFF state and invalid quality.

Breaker-related Logical Nodes

Breaker-related logical nodes CSWI1 and XCBR1 rely on the breaker control function being turned ON in the Sepam device.

Setting groups

IEC 61850 setting group 1 corresponds to Sepam setting group A.

IEC 61850 setting group 2 corresponds to Sepam setting group B.

Selection of active setting group is only possible if "Choice (of setting group) by remote control" is selected on the Sepam device.

Controls

In order to be executed, controls must be enabled in the Sepam unit. This is the case if the **Loc** attribute (available in every logical node containing controls) is OFF. In addition, with ECI850, SBO mode must be turned OFF on the Modbus interface.

Analog values

Measurements

Units

Measurements are provided as floating point values with the following units:

Measurement type	Units
Current	1 A
Voltage	1 V
Power	1 kW, 1 kVA, 1 kvar
Energy	1 MWh, 1 Mvarh
Temperature	1 °C
Angle	1 °
Rate	1 %
Rotation speed	1 rpm
Power factor	1

Deadbands

Default deadband values are provided in the CID file. These values can be changed. Unlike specified in IEC 61850-7-3, deadband values are not expressed as % but they are integer values in physical units, which are described in the CID file.

The deadband for the "ang" attribute of items belonging to the "vector" type is fixed at 5°.

Integer statuses

Integer statuses are transmitted with the following units:

Logical Node	Attribute	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
A66_PMRI1	StrInhTmm	1 min	1 min	1 min	1 min
A51LR_PMSS1	StrTmms	100 ms	100 ms	10 ms	10 ms
A49_PTTR1	TmResTr	1 min	1 min	1 min	1 min
A49_PTTR1	WaitTm	1 min	1 min	1 min	1 min
XCBR1	OpHrsCnt	1 hr	1 hr	1 hr	1 hr
XCBR1	OpTmms	1 ms	1 ms	1 ms	1 ms
XCBR1	ChaTms	1 ms	100 ms	1 second	1 second
Miscellaneous	Counters	1	1	1	1

Conformance statements (Edition 1.0) TICS - Technical issues conformance statement

Introduction

Error corrections and improvements have been made to the current edition (edition 1) of the IEC 61850 standard. These items, known as technical issues or "tissues" can be found on: <http://www.tissues.iec61850.com>.

The UCA IUG QAP, acting as the competent body for device certification, requires that the tissue conformance statement of a device is provided.

The following tables reference only the tissues that have been accepted and solved by the editor's group in charge of them, at the time of publication.

The conformance (M/O/-) column indicates:

- M: Mandatory, tissue is included in the UCA Device conformance test procedures and stated as mandatory (interoperability).
- O: Optional, the tissue is a recommendation or it is optional in the IEC 61850 documents or it is not required for compliance to edition 1.

The supported (Sup) column indicates:

- Y: Yes, the tissue is implemented in the device.
- N: No, the tissue is not implemented in the device.
- N/A: Not applicable, the tissue is not applicable for the device.

Optional tissues are listed only if they are supported.

Some tissues are only editorial, or related to the XML schema or to a client. They have no impact on the device conformance and are therefore just listed for sake of clarity.

IEC 61850 part 6 Tissues

Editorial and schema related TISSUES are: 1, 5, 169

Number	Clause/ Subclause	Paragraph Figure/Table	Final change	M/O/-	Sup
3	Annex B		Check the ENUMS and complete the appendix: AutoRecSt, FltLoop, PmpCtl. The ICD/SCD files should include these ENUMS when used.	O	Y
8	Annex B		Use name Watts for code 62 instead of "W".	M	N/A
10	Annex A		Add the bType Check to the schema, to be used for the Check attribute.	M	Y
15			The "bufOvfl" attribute in the "ReportControl/OptFields" section of SCL should be deleted.	O	Y
17			Change restriction of DA/SDI to make it consistent with DA/BDA restrictions. The DA/BDA explicitly allow SUnit as an attribute starting with uppercase. Other exceptions are special CDCs created in 8-1.	M	Y

IEC 61850 part 7-2 Tissues

Editorial and schema related TISSUES are: 31, 32, 36, 45

Number	Clause/ Subclause	Paragraph Figure/Table	Final change	M/O/-	Sup
30	17.5.2.3		Control parameter T	M	Y
35	17.5.2.3	Table 36	Change T attribute type from "EntryTime" to "TimeStamp".	M	Y
37	15.2.3.1		Change T attribute type from "EntryTime" to "TimeStamp".	M	N/A
38	15.2.1 15.2.1.4		Change GoCB attribute name from "AppID" to "GoID".	M	N/A
39	15.2.1		Add Attribute "DstAddress" after the Attribute "NdsCom". "15.2.1.8 DstAddress The attribute DstAddress shall be the SCSM specific addressing information like media access address, priority, and other information."	M	N/A
40	15.2.3.1 15.2.3.3		GOOSE message syntax. Change Attribute name from "AppID" to "GoID".	M	N/A
41	15.3.1 15.3.4.1		GsCB class definition. Change Attribute name from "AppID" to "GsID".	M	N/A
42	16.4		Sampled value format. Change Attribute type from "EntryTime" to "TimeStamp".	M	N/A
43	17.5.2.3		Change "The parameter T shall be the time when the client sends the control requests. Add NOTE: "Control requests can be Select, Operate, or Cancel."	M	Y
44	17.15.2.6		Add new AddCause value: Object-not-selected (18)	M	Y
46	17.3.3	33, 34	Synchro check - Cancelling a command as long as no Oper_resp+ has been received, compare new state diagram.	O	N/A
47	19.2	Figure 40	The LDName is limited to 64 characters. '.' or '\$' or other '=' are not allowed.	M	Y
49	14.2.2.16		BRCB TimeOfEntry	O	Y

IEC 61850 part 7-2 Tissues (cont.)

Editorial and schema related TISSUES are: 31, 32, 36, 45

Number	Clause/ Subclause	Paragraph Figure/Table	Final change	M/O/-	Sup
50	19.2		The LNNName prefix shall start with a letter. Otherwise, mapping to MMS should restrict it, since MMS variable names are not allowed to start with a number.	M	Y
51	5.5.2	Table 2	Definition of "ARRAY [0..num] OF." type	M	N/A
52	15.2.3.6	Table 2	GOOSE StNum: starts from 1 after power-up and sqNum starts from 0	M	N/A
53	15.3.1	Tables 30, 32	Attribute DstAddress (Type: PHYCOMADDR, FC:GS) has been added to the GSSE control block.	M	N/A
151	19.2		Name constraints for control blocks etc...	M	Y
166	14.3.3.2.7		DataRef attribute in Log	M	N/A
185	14.3.3.2.7		Logging integrity period	M	N/A
189	16.4		SV Format	M	N/A
190	14.2.2.1		BRCB EntryId and TimeOfEntry	O	Y
191	14.2.2.5		BRCB: Integrity and buffering reports	M	Y
234	5.5.2		New type CtxInt	M	Y
275	14.2.3.2		Confusing statement on GI usage	M	Y
278	14.2.2.15		EntryId not valid for a server	O	Y
297	14.2.2.10		The BRCB that has report enable set to TRUE shall maintain the parameter SqNum. This number shall be incremented by the BRCB for each report generated and sent on the basis of the BRCB. The increment shall occur once the BRCB has formatted the report for transmission. The first report following the setting of the report enable to TRUE shall contain sequence number 0. The sequence number shall roll over to 0 at its maximal value.		N (see PIXIT)
334	17.3.3		In case the same SBO control object is selected twice from the same/another client, the second operation must return a select response- with AddCause "command-already-in-execution" or "Already-selected".		Y
335	14.2.3.2.2.8		The buffer overflow bit should only be sent on the first report after enable.		N (see PIXIT)

IEC 61850 part 7-3 Tissues

Editorial and schema related TISSUES are: 54, 55, 56, 57, 58, 59, 60, 61, 138

Number	Clause/ Subclause	Paragraph Figure/Table	Final change	M/O/-	Sup
28	7.6.2	Table 38	APC: change the FC of setMag to CO, like for all controllable CDCs (naturally also for origin and operTm). Add the attribute ctlNum with fc=CO like for other controllable CDCs. Add the attribute mag with fc=MX for the back indication from the process.	M	N/A
65	General		Deadband calculation of a vector and trigger option	M	Y
219	7.3.5		operTm in ACT	M	N/A
270	7.4.5/6		WYE and DEL RMS Values	M	Y

IEC 61850 part 7-4 Tissues

There are no mandatory TISSUES for that part.

IEC 61850 part 8-1 Tissues

Number	Clause/ Subclause	Paragraph Figure/Table	Final change	M/O/-	Sup
116			A MMS GetNameList request with a non-existing domain shall be responded by "Confirmed Error-PDU".	M	Y
118	23.1		When the last character of FileName is the file separator it is a directory. E.g. "LD\KEMA" is a file and "LD\KEMA\" is a directory.	O	Y
120	8.1.2.2		CtxInt shall be defined as a generic data type in 7-2: either as an Int32 or as an ENUMERATED depending on the context. The definition of the attributes stVal, ctlVal, subVal in the CDC INS/INC is changed from Int32 to CtxInt. In 7-4, the enumerations lead to set the CtxInt to ENUMERATED. Therefore no change required in 8-1, because ENUMERATED are already mapped. As a result ENUMERATED attributes (as e.g. stVal, ctlVal) are mapped to INT8 (not to INT32).	O	Y
165			GetDataSetValues request with a non-existent DataSet should result in an MMS ErrorResponse of Class= ACCESS and Error Code= OBJECT-NON-EXISTENT.	M	Y
183	9.3	Table 17	MMS getNamelist request with an unknown domain object reference result in an MMS ServiceError of Class= ACCESS and Error Code= OBJECT-NON-EXISTENT. Update table 17	M	Y
235	8.1.3.2		Extension of name length	M	Y

General

This chapter describes conformity with IEC 61850 Edition 2.0. It does not describe the standard itself, but only the choices that have been made in the Sepam implementation of the standard, in terms of services, modeling, exceptions, extensions and adaptations.

The conformance statement is made up of the following documents:

- ACSI conformance statement: this document describes the abstract communication services interface (which services are implemented). These services are mapped to specific communication services (SCSM) described in the PICS.
- MICS (Model Implementation Conformance Statement): describes how the information model is implemented.
- PICS (Protocol Implementation Conformance Statement): describes choices made in protocol implementation. Many of these choices are implied by the ACSI conformance statement.
- PIXIT (Protocol Implementation eXtra Information for Testing): gives any additional implementation specific information not found in the previous standardized documents. Despite the name, these informations are useful for operation of the devices.
- SICS (SCL Implementation Conformance Statement): describes which features are supported by the configuration tools.
- TICS (Technical Issues Conformance Statement): describes how the device behaves regarding identified technical issues.

Support of Edition 2 features requires ACE850 or ECI850 devices with a firmware version of at least 2.x.



ACSI

The **Abstract Communication Services Interface** is defined by part 7-2 of IEC 61850.

It provides:

- the specification of a basic information model,
- the specification of information exchange service models.

These conformance statement tables are as defined by Annex A of IEC 61850-7-2.

ACSI basic conformance statement

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

(1) Sepam series 60 or Sepam series 80, with ACE850 only.

ACSI service conformance statement

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

Nota :

AA: Application Association

TP: Two Party

MC: Multi Cast

■: supported

ACSI service conformance statement (cont.)

Services		AA: TP/MC	Client / subscriber	Server / publisher	Value / comments
Unbuffered Report Control Block (URCB)					
S27	Report	TP		■	
S27-1	data-change (dchg)			■	
S27-2	quality-change (qchg)			■	
S27-3	data-update (dupd)			■	
S28	GetURCBValues	TP		■	
S29	SetURCBValues	TP		■	
Logging (Clause 14)					
Log Control Block					
S30	GetLCBValues	TP		■	ACE850 only
S31	SetLCBValues	TP		■	ACE850 only
Log					
S32	QueryLogByTime	TP		■	ACE850 only
S33	QueryLogAfter	TP		■	ACE850 only
S34	GetLogStatusValues	TP		■	ACE850 only
Generic substation event model (GSE) (Clause 15)					
GOOSE Control Block					
S35	SendGOOSEMessage	MC		■	ACE850 only
S36	GetReference	TP			
S37	GetGOOSEElementNumber	TP			
S38	GetGoCBValues	TP		■	ACE850 only
S39	SetGoCBValues	TP		■	ACE850 only
GSSE Control Block					
S40	SendGSSEMessage	MC			
S41	GetReference	TP			
S42	GetGSSEElementNumber	TP			
S43	GetGsCBValues	TP			
S44	SetGsCBValues	TP			
Transmission of sampled values model (SVC) (Clause 16)					
Multicast SVC					
S45	SendMSVMessage	MC			
S46	GetMSVCBValues	TP			
S47	SetMSVCBValues	TP			
Unicast SVC					
S48	SendUSVMessage	TP			
S49	GetUSVCBValues	TP			
S50	SetUSVCBValues	TP			
Control (Clause 17)					
S51	Select	TP			
S52	SelectWithValue	TP		■	
S53	Cancel	TP		■	
S54	Operate	TP		■	
S55	CommandTermination	TP		■	without parameters
S56	TimeActivatedOperate	TP			
File transfer (Clause 20)					
S57	GetFile	TP		■	
S58	SetFile	TP			
S59	DeleteFile	TP			
S60	GetFileAttributeValues	TP		■	
Time (Clause 18)					
T1	clock resolution of internal clock (nearest value of 2 ⁻ⁿ in seconds)				class T1
T2	Time accuracy of internal clock				
T3	Supported TimeStamp resolution (nearest value of 2 ⁻ⁿ in seconds)				class T1

Nota :
AA: Application Association
TP: Two Party
MC: Multi Cast
■: supported

ACSI model conformance statement

		Client / subscriber	Server / publisher	Value / comments
If server side (B11) supported				
M1	Logical device		■	
M2	Logical node		■	
M3	Data		■	
M4	Data set		■	
M5	Substitution			
M6	Setting group control		■	Active SG only
M7	Buffered report control		■	
M7-1	sequence-number		■	
M7-2	report- time-stamp		■	
M7-3	reason-for-inclusion		■	
M7-4	data-set-name		■	
M7-5	data-reference		■	
M7-6	buffer-overflow		■	
M7-7	EntryId		■	
M7-8	BufTm		■	
M7-9	IntgPd		■	
M7-10	GI		■	
M7-11	Conf revision		■	
M8	Unbuffered report control		■	
M8-1	sequence-number		■	
M8-2	report- time-stamp		■	
M8-3	reason-for-inclusion		■	
M8-4	data-set-name		■	
M8-5	data-reference		■	
M8-6	BufTm		■	
M8-7	IntgPd		■	
M8-8	GI		■	
M8-9	Conf revision		■	
M9	Log Control			
M9-1	IntgPd			
M10	Log			
M11	Control		■	
If GSE (B31/B32) supported				
M12	GOOSE	■	■	ACE850 only
M13	GSSE			
If SVC (B41/B42) supported				
M14	Multicast SVC			
M15	Unicast SVC			
Other				
M16	Time		■	
M17	File Transfer		■	

Nota :
■: supported



The information model is defined by parts 7-3 and 7-4 of IEC 61850.

It provides:

- the specification of the Logical Nodes used to model substation devices and functions,
- the specification of Common Data Classes and Common Data Attribute Classes used in the Logical Nodes.

Model conformance

The Model conformance of each particular Sepam device is described by its ICD file. The following descriptions are general descriptions that apply to all Sepam devices. Extensions to the IEC 61850 data model belong to the "Sepam series 20/40/60/80 Ed.2" Logical Node name space.

Common data attributes classes

The following tables list which fields is found in each Common Data Attribute Class (CDAC). Fields not found in these tables are optional (O) or conditional (C) fields not supported by Sepam devices. Mandatory fields (M) are always present.

Quality

Attribute name	Attribute type	Value/Value range	M/O/C	Comments
validity	CODED ENUM	good invalid questionable	M	Supported
detailQual	PACKED LIST		M	Supported
overflow	BOOLEAN	DEFAULT : FALSE	M	Defaulted
outOfRange	BOOLEAN	TRUE FALSE	M	Supported
badReference	BOOLEAN	TRUE FALSE	M	Supported
oscillatory	BOOLEAN	DEFAULT : FALSE	M	Defaulted
failure	BOOLEAN	TRUE FALSE	M	Supported
oldData	BOOLEAN	DEFAULT : FALSE	M	Defaulted
inconsistent	BOOLEAN	TRUE FALSE	M	Supported
inaccurate	BOOLEAN	TRUE FALSE	M	Supported
source	CODED ENUM	process substituted DEFAULT : process	M	Defaulted
test	BOOLEAN	DEFAULT : FALSE	M	Defaulted
operatorBlocked	BOOLEAN	DEFAULT : FALSE	M	Defaulted

Analogue value

Attribute name	Attribute type	Value/Value range	M/O/C
f	FLOAT32	floating point value	C

Configuration of analogue value

Common data attribute class not supported.

Range configuration

Common data attribute class not supported.

Step position with transient indication

Common data attribute class not supported.

Pulse configuration

Common data attribute class not supported.

Originator

Attribute name	Attribute type	Value/Value range	M/O/C
orCat	ENUMERATED	See IEC 61850-7-3	M
orIdnt	OCTET STRING64		M

Unit definition

Attribute name	Attribute type	Value/Value range	M/O/C
SIUnit	ENUMERATED		M
multiplier	ENUMERATED		O

Nota :

M: mandatory field

O: optional field

C: conditional field

Conformance statements (Edition 2.0) MICS - Model implementation conformance statement

Vector definition

Attribute name	Attribute type	Value/Value range	M/O/C
mag	AnalogueValue		M
ang	AnalogueValue		O

Point definition

Common data attribute class not supported.

CtlModels definition

Attribute value	Comment
status-only	not controllable SPC, DPC and INC
direct-with-normal-security	controllable SPC and INC
direct-with-enhanced-security	not supported
sbo-with-normal-security	not supported
sbo-with-enhanced-security	controllable DPC

SboClasses definition

Attribute value	Comment
operate-once	
operate-many	not supported

Cell definition

Common data attribute class not supported.

Calendar Time

Common data attribute class not supported.

Common data classes

The following tables list which attributes is found in each Common Data Class (CDC). Attributes not found in these tables are optional (O) or conditional (C) attributes not supported by Sepam devices. Mandatory attributes (M) are always present.

Single point status (SPS)

Attribute name	Attribute type	FC	M/O/C	Comments
stVal	BOOLEAN	ST	M	
q	Quality	ST	M	
t	TimeStamp	ST	M	
dataNs	VISIBLE STRING255	EX	C	for non standard data objects

Double point status (DPS)

Common data class not supported.

Integer status (INS)

Attribute name	Attribute type	FC	M/O/C	Comments
stVal	INT32	ST	M	
q	Quality	ST	M	
t	TimeStamp	ST	M	
dataNs	VISIBLE STRING255	EX	C	for non standard data objects

Nota :

M: mandatory field

O: optional field

C: conditional field

Conformance statements (Edition 2.0)

MICS - Model implementation conformance statement

Enumerated status (ENS)

Attribute name	Attribute type	FC	M/O/C	Comments
stVal	ENUMERATED	ST	M	
q	Quality	ST	M	
t	TimeStamp	ST	M	
dataNs	VISIBLE STRING255	EX	C	for non standard data objects

Protection activation information (ACT)

Attribute name	Attribute type	FC	M/O/C	Comments
general	BOOLEAN	ST	M	
phsA	BOOLEAN	ST	O	27S only (S20)
phsB	BOOLEAN	ST	O	27S only (S20)
phsC	BOOLEAN	ST	O	27S only (S20)
q	Quality	ST	M	
t	TimeStamp	ST	M	

Directional protection activation information (ACD)

Attribute name	Attribute type	FC	M/O/C	Comments
general	BOOLEAN	ST	M	
dirGeneral	ENUMERATED	ST	M	
q	Quality	ST	M	
t	TimeStamp	ST	M	

Security violation counting (SEC)

Common data class not supported.

Binary counter reading (BCR)

Attribute name	Attribute type	FC	M/O/C	Comments
actVal	INT64	ST	M	The range of such variables never exceeds 32 bits. They are therefore transmitted as INT32 values (as allowed by ASN.1 rules).
q	Quality	ST	M	
t	TimeStamp	ST	M	
pulsQty	FLOAT32	CF	M	read-only

Histogram (HST)

Common data class not supported.

Visible string status (VSS)

Common data class not supported.

Measured value (MV)

Attribute name	Attribute type	FC	M/O/C	Comments
mag	AnalogueValue	MX	M	
q	Quality	MX	M	
t	TimeStamp	MX	M	
db	INT32U	CF	O	read-only
units	Unit	CF	O	read-only
dataNs	VISIBLE STRING255	EX	C	for non standard data objects

Nota :

M: mandatory field

O: optional field

C: conditional field

Conformance statements (Edition 2.0) MICS - Model implementation conformance statement

Complex measured value (CMV)

Attribute name	Attribute type	FC	M/O/C	Comments
cVal	Vector	MX	M	
q	Quality	MX	M	
t	TimeStamp	MX	M	
db	INT32U	CF	O	read-only
dbAng	INT32U	CF	O	read-only, for some objects only
units	Unit	CF	O	read-only

Sampled value (SAV)

Common data class not supported.

WYE

Data name	Data class	FC	M/O/C	Comments
phsA	CMV		C	
phsB	CMV		C	
phsC	CMV		C	
neut	CMV		C	for some objects only
res	CMV		C	for some objects only

Delta (DEL)

Data name	Data class	FC	M/O/C	Comments
phsAB	CMV		C	
phsBC	CMV		C	
phsCA	CMV		C	

Sequence (SEQ)

Data name	Data class	FC	M/O/C	Comments
c1	CMV		M	
c2	CMV		M	
c2	CMV		M	
SeqT	ENUMERATED	MX	M	

Harmonic value (HMV)

Common data class not supported.

Harmonic value for WYE (HWYE)

Common data class not supported.

Harmonic value for DEL (HDEL)

Common data class not supported.

Controllable single point (SPC) ⁽¹⁾

Attribute name	Attribute type	FC	M/O/C	Comments
stVal	BOOLEAN	ST	C	
q	Quality	ST	C	
t	TimeStamp	ST	C	
ctlModel	CtlModels	CF	C	read-only
dataNs	VISIBLE STRING255	EX	C	for non standard data objects

⁽¹⁾ This is the class definition as given in IEC 61850-7-3.

The mapping defined in IEC 61850-8-1 introduces complementary attributes for the control part.

Nota :

M: mandatory field

O: optional field

C: conditional field

Conformance statements (Edition 2.0) MICS - Model implementation conformance statement

Controllable double point (DPC) ⁽¹⁾

Attribute name	Attribute type	FC	M/O/C Comments
stVal	CODED ENUM	ST	M
q	Quality	ST	M
t	TimeStamp	ST	M
ctlModel	CtlModels	CF	C read-only
sboTimeout	INT32U	CF	C read-only
sboClass	SboClasses	CF	C read-only
operTimeout	INT32U	CF	C read-only

(1) This is the class definition as given in IEC 61850-7-3.

The mapping defined in IEC 61850-8-1 introduces complementary attributes for the control part.

Controllable integer status (INC) ⁽¹⁾

Attribute name	Attribute type	FC	M/O/C Comments
stVal	INT32	ST	M
q	Quality	ST	M
t	TimeStamp	ST	M
ctlModel	CtlModels	CF	C read-only

(1) This is the class definition as given in IEC 61850-7-3.

The mapping defined in IEC 61850-8-1 introduces complementary attributes for the control part.

Controllable enumerated status (ENC) ⁽¹⁾

Attribute name	Attribute type	FC	M/O/C Comments
stVal	ENUMERATED	ST	M
q	Quality	ST	M
t	TimeStamp	ST	M
ctlModel	CtlModels	CF	C read-only

(1) This is the class definition as given in IEC 61850-7-3.

The mapping defined in IEC 61850-8-1 introduces complementary attributes for the control part.

Binary controlled step position information (BSC)

Common data class not supported.

Integer controlled step position information (ISC)

Common data class not supported.

Controllable analog set point information (APC)

Common data class not supported.

Binary controlled analog process value (BAC)

Common data class not supported.

Single point setting (SPG)

Common data class not supported.

Integer status setting (ING)

Common data class not supported.

Enumerated status setting (ENG)

Attribute name	Attribute type	FC	M/O/C Comments
setVal	ENUMERATED	SP	M

Analogue setting (ASG)

Common data class not supported.

Setting curve (CURVE)

Common data class not supported.

Nota :
M: mandatory field
O: optional field
C: conditional field

Conformance statements (Edition 2.0)

MICS - Model implementation conformance statement

Curve shape setting (CSG)

Common data class not supported.

Curve shape description (CSD)

Common data class not supported.

Device name plate (DPL)

Attribute name	Attribute type	FC	M/O/C	Comments
vendor	VISIBLE STRING255	DC	M	
model	VISIBLE STRING255	DC	O	Sepam application
location	VISIBLE STRING255	DC	O	Same as SNMP location

Logical node name plate (LPL)

Attribute name	Attribute type	FC	M/O/C	Comments
vendor	VISIBLE STRING255	DC	M	
swRev	VISIBLE STRING255	DC	M	Sepam version
d	VISIBLE STRING255	DC	O	LLN0: Sepam label Other LN: not used
configRev	VISIBLE STRING255	DC	C	LLN0 only
IdNs	VISIBLE STRING255	EX	C	LLN0 only
InNs	VISIBLE STRING255	EX	C	MSTA only

Object reference setting (ORG)

Common data class not supported.

Time setting group (TSG)

Common data class not supported.

Currency setting group (CUG)

Common data class not supported.

Visible string setting (VSG)

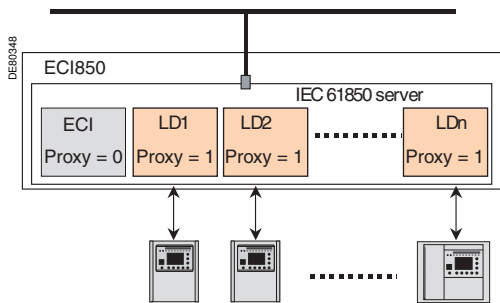
Common data class not supported.

Nota :

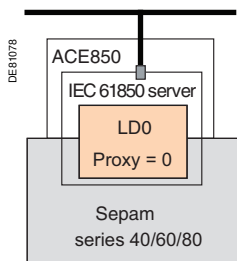
M: mandatory data

O: optional data

C: conditional data



EC1850 logical devices.



ACE850 logical device.

Logical device

EC1850

The IEC 61850 server inside the EC1850 contains the following logical devices:

- A logical device dedicated to the EC1850 unit itself. This logical device contains only LLN0 and LPHD logical nodes.
- A logical device for each Sepam unit connected to the EC1850. The content of this logical device is defined by the Sepam type, as described by its ICD file. The PROXY attribute of the LPHD logical node is set to TRUE for Sepam logical devices.

EC1850 logical devices name

The name of the logical devices is freely assigned at configuration time, using SFT2841 or CET850 tools, except for the EC1850 logical device which has a fixed name of "EC1".

ACE850

ACE850 is a communication accessory. It is not modelled in the IEC 61850 server. A single logical device is used for each Sepam (fixed name LD0).

The content of this logical device is defined by the Sepam type, as described by its ICD file.

Logical nodes

The following tables list possible attributes in Logical Node (LN).

Attributes not found in these tables are optional (O) or conditional (C) attributes not supported by Sepam devices. Mandatory attributes (M) are always present. Sepam devices also use extension attributes (E) for some LNs.

Logical nodes not found in this description are not supported.

System logical nodes: L group

Physical device information (LPHD class)

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	EC1850	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	LPHD1		M	■	■	■	■	■
PhyNam	DPL	Physical device name plate		M	■	■	■	■	■
PhyHealth	ENS	Physical device health ⁽¹⁾		M	■	■	■	■	■
Proxy	SPS	Indicates if this LN is a proxy		M	■	■	■	■	■
PwrSupAlm	SPS	Power supply alarm		O				■	■
Sim	SPC	Receive simulated GOOSE		O				■	■

(1) Sepam partial fault, low battery...

Logical node zero (LLN0 class)

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	EC1850	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	LLN0		M	■	■	■	■	■
Common logical node information									
Mod	INC	Mode		M	■	■	■	■	■
Beh	INS	Behavior		M	■	■	■	■	■
Health	INS	Health		M	■	■	■	■	■
NamPlt	LPL	Name plate		M	■	■	■	■	■
Loc	INC	Local control behavior		O	■	■	■	■	■
Status information									
CTFlt	SPS	CTs fault		E			■	■	■
VTFlt	SPS	VTs fault		E			■	■	■
ComFlt	SPS	Communication fault (TS240)		E				■	■
ActSGA	SPS	Setting group A active		E		■	■	■	■
ActSGB	SPS	Setting group B active		E		■	■	■	■
PhRotFlt	SPS	Phase rotation command fault (TS239)		E				■	■
Controls									
LEDRs	SPC	LED reset (reset Sepam)	■	O		■	■	■	■
ComWac	SPC	Communication monitoring		E		■	■		
PhRot	SPC	Set phase rotation direction (on: 123, off: 132)		E				■	■

Nota :

M: mandatory data

O: optional data

C: conditional data

E: extension data

T: transient data

□: compulsory data but unavailable in the device (provided with an invalid quality status).

Logical nodes for control: C group

Switch controller (CSWI class)

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	CSWI1		M	■	■	■	■
Common logical node information								
Beh	ENS	Behavior		M	■	■	■	■
Controls								
Pos	DPC	Switch, general		M	■	■	■	■

Logical nodes for generic reference: G group

Generic automatic process control (GAPC class)

Load shedding								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	LS_GAPC1		M			■	■
Common logical node information								
Mod	ENC	Mode		O			■	■
Beh	ENS	Behavior		M			■	■
Status information								
Op	ACT	Operate	■	O			■	■
MotStrRe	SPS	Motor restart		E			■	■

Generic process I/O (GGIO class)

MES114 Digital Inputs								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	M114_GGIO1		M	■	■		
Common logical node information								
Beh	ENS	Behavior		M	■	■		
Status information								
Ind11 to Ind14	SPS	Digital Input I11 to I14		O	■	■		
Ind21 to Ind26	SPS	Digital Input I21 to I26		O	■	■		

MES120 Digital Inputs								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	M120_GGIO1 (n = 1 to 3)		M			■	■
Common logical node information								
Beh	ENS	Behavior		M			■	■
Status information								
Ind01 to Ind14	SPS	Digital Input In01 to In14 (n = 1 to 3)		O			■	■

Logic equations								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	EQU_GGIO1		M		■	■	■
Common logical node information								
Beh	ENS	Behavior		M		■	■	■
Status information								
Ind001 to Ind008	SPS	V1 to V8		O		■	■	■
Ind101 to Ind108	SPS	V_MIMIC_IN_1 to V_MIMIC_IN_8		O			■	■

Nota :

M: mandatory data

O: optional data

C: conditional data

E: extension data

T: transient data

□: compulsory data but unavailable in the device (provided with an invalid quality status).

Logical nodes for generic reference: G group (cont.)

Generic process I/O (GGIO class) (cont.)

GOOSE monitoring

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	GSE_GGIO1		M			■	■
Common logical node information								
Beh	ENS	Behavior		M			■	■
Status information								
G401 to G416	SPS	Value of Sepam virtual inputs G401 to G416		E			■	■
G501 to G515	SPS	Value of Sepam virtual inputs G501 to G515		E			■	■
Test1 to Test4	SPS	Value of GOOSE test data Test1 to Test4		E			■	■

Sepam series 80 customized applications/remote indications

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	S80RI_GGIO1		M				■
Common logical node information								
Beh	ENS	Behavior		M				■
Status information								
TS01 to TS64	SPS	Sepam remote indication TS1 to TS64		E				■

Sepam series 80 customized applications/Logipam counters

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	S80CT_GGIO1		M				■
Common logical node information								
Beh	ENS	Behavior		M				■
Status information								
C01 to C24	SPS	Logipam counters C1 to C24		E				■

Sepam series 60/80 customized applications/remote controls (first group)

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	S80RC_GGIO1 S60RC_GGIO1		M M			■	■
Common logical node information								
Beh	ENS	Behavior		M			■	■
Controls								
TC01 to TC32	SPC	Remote controls TC1 to TC32		E			■	■

Sepam series 60/80 customized applications/remote controls (second group)

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	S80RC_GGIO2 S60RC_GGIO2		M M			■	■
Common logical node information								
Beh	ENS	Behavior		M			■	■
Controls								
TC33 to TC64	SPC	Remote controls TC33 to TC64		E			■	■
DPCSO1	DPC	Logipam TC57/58 and TS41/42		O				■
DPCSO2	DPC	Logipam TC59/60 and TS43/44		O				■

Nota :

M: mandatory data

O: optional data

C: conditional data

E: extension data

T: transient data

□: compulsory data but unavailable in the device (provided with an invalid quality status).

Logical nodes for metering and measurement: M group

Non phase related harmonics (MHAN class)

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	MHAN1		M			■	■
Common logical node information								
Beh	ENS	Behavior		M			■	■
Measured values								
Hz	MV	Basic frequency		C			■	■
ThdAmp	MV	Current total harmonic distortion		O			■	■
ThdVol	MV	Voltage total harmonic distortion		O			■	■

Metering (MMTR class)

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	MMTR1 (Internal energy counters)		O		■	■	■
		MMTR2 (External energy counters)		M		■	■	■
Common logical node information								
Beh	ENS	Behavior		M		■	■	■
Measured values								
SupWh	BCR	Real energy supply		O		■	■	■
SupVArh	BCR	Reactive energy supply		O		■	■	■
DmdWh	BCR	Real energy demand		O		■	■	■
DmdVArh	BCR	Reactive energy demand		O		■	■	■

Nota :

M: mandatory data

O: optional data

C: conditional data

E: extension data

T: transient data

□: compulsory data but unavailable in the device (provided with an invalid quality status).

Logical nodes for metering and measurement: M group (cont.)

Measurement (MMXU class)

Main channels measurements (for Sepam series 40 and Sepam series 80)								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	MMXU1		M		■	■	■
Common logical node information								
Beh	ENS	Behavior		M		■	■	■
ClcMth	ENG	Calculation method ⁽¹⁾		M		■	■	■
Measured values								
TotW	MV	Total active power		O		■	■	■
TotVAr	MV	Total reactive power		O		■	■	■
TotVA	MV	Total apparent power		O		■	■	■
TotPF	MV	Average power factor		O		■	■	■
Hz	MV	Frequency		O		■	■	■
PPV	DEL	Phase to phase voltages		O		■	■	■
PhV	WYE	Phase to ground voltages		O		■	■	■
A	WYE	Phase currents		O		■	■	■
W	WYE	Phase active power		O			■	■
VAr	WYE	Phase reactive power		O			■	■
VA	WYE	Phase apparent power		O			■	■

(1) The calculation method is UNSPECIFIED and cannot be changed.

Current channels measurements for Sepam series 20 and Sepam series 80 (additional channels)								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	MMXU2		M	■			■
Common logical node information								
Beh	ENS	Behavior		M	■			■
ClcMth	ENG	Calculation method ⁽¹⁾		M	■			■
Measured values								
A	WYE	Phase currents		O	■			■

(1) The calculation method is UNSPECIFIED and cannot be changed.

Voltage channels measurements for Sepam series 20 (B2x applications) and Sepam series 80 (additional channels)								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	MMXU3		M	■			■
Common logical node information								
Beh	ENS	Behavior		M	■			■
ClcMth	ENG	Calculation method ⁽¹⁾		M	■			■
Measured values								
Hz	MV	Frequency		O	■			■
PPV	DEL	Phase to phase voltages		O	■			■
PhV	WYE	Phase to ground voltages		O	■			■

(1) The calculation method is UNSPECIFIED and cannot be changed.

Nota :

M: mandatory data

O: optional data

C: conditional data

E: extension data

T: transient data

□: compulsory data but unavailable in the device (provided with an invalid quality status).

Logical nodes for metering and measurement: M group (cont.)

Sequence and imbalance (MSQI class)

Main channels measurements								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	MSQI1		M	■	■	■	■
Common logical node information								
Beh	ENS	Behavior		M	■	■	■	■
Measured values								
SeqV	SEQ	Positive, negative and zero sequence voltage		C	■ ⁽¹⁾	■	■	■

(1) Negative sequence voltage not available on Sepam series 20

Additional voltage channels measurements								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	MSQI2		M				■
Common logical node information								
Beh	ENS	Behavior		M				■
Measured values								
SeqV	SEQ	Positive, negative and zero sequence voltage		C				■

Metering statistics (MSTA class) ⁽¹⁾

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	MSTA1		M	■	■	■	■
Common logical node information								
Mod	ENC	Mode		M	■	■	■	■
Beh	ENS	Behavior		M	■	■	■	■
NamPlt	LPL	Name plate		M	■	■	■	■
Metered values								
Max W	MV	Maximum real power		O		■	■	■
MaxVAr	MV	Maximum reactive power		O		■	■	■
AvAmps1	MV	Average current phase A		O	■	■	■	■
AvAmps2	MV	Average current phase B		O	■	■	■	■
AvAmps3	MV	Average current phase C		O	■	■	■	■
MaxAmps1	MV	Maximum current phase A		O	■	■	■	■
MaxAmps2	MV	Maximum current phase B		O	■	■	■	■
MaxAmps3	MV	Maximum current phase C		O	■	■	■	■
TrAmp1	MV	Last trip current phase A		E	■	■	■	■
TrAmp2	MV	Last trip current phase B		E	■	■	■	■
TrAmp3	MV	Last trip current phase C		E	■	■	■	■
TrAmp4	MV	Last trip current neutral		E	■	■	■	■
Controls								
RsMaxA	SPC	Reset peak demand current		E			■	■
RsMaxPwr	SPC	Reset peak demand power		E			■	■
RsMax	SPC	Reset peak demand values		E	■	■		

(1) MSTA is obsolete in edition 2. However, it is kept for backward compatibility with the edition 1 data model.

Nota :

M: mandatory data

O: optional data

C: conditional data

E: extension data

T: transient data

□: compulsory data but unavailable in the device (provided with an invalid quality status).

Logical nodes for protection functions: P group

Differential protections (PDIF class)

87T - Transformer differential

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	A87T_PDIF1		M				■
Common logical node information								
Mod	ENC	Mode		O				■
Beh	ENS	Behavior		M				■
Status information								
Op	ACT	Operate	■	M				■
Measured values								
DifACIc	WYE	Differential Current		O				■
RstA	WYE	Restraint Current		O				■

87M - Machine differential

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	A87M_PDIF1		M				■
Common logical node information								
Mod	ENC	Mode		O				■
Beh	ENS	Behavior		M				■
Status information								
Op	ACT	Operate	■	M				■
Measured values								
DifACIc	WYE	Differential Current		O				■
RstA	WYE	Restraint Current		O				■

64REF - Restricted earth fault differential

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	A64RF_PDIF1, A64RF_PDIF2		M			■	■
Common logical node information								
Mod	ENC	Mode		O			■	■
Beh	ENS	Behavior		M			■	■
Status information								
Op	ACT	Operate	■	M			■	■

Distance protections (PDIS class)

21B - Underimpedance

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	A21B_PDIS1		M			■	■
Common logical node information								
Mod	ENC	Mode		O			■	■
Beh	ENS	Behavior		M			■	■
Status information								
Str	ACD	Start		M			□	□
Op	ACT	Operate	■	M			■	■

Nota :

M: mandatory data

O: optional data

C: conditional data

E: extension data

T: transient data

□: compulsory data but unavailable in the device (provided with an invalid quality status).

Logical nodes for protection functions: P group (cont.)

Directional overpower (PDOP class)

32P - Directional active overpower								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	A32P_PDOP1		M		■		
		A32P_PDOP1, A32P_PDOP2		M			■	■
Common logical node information								
Mod	ENC	Mode		O		■	■	■
Beh	ENS	Behavior		M		■	■	■
Status information								
Str	ACD	Start		M		□	□	□
Op	ACT	Operate	■	M		■	■	■

32Q - Directional reactive overpower								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	A32Q_PDOP1		M		■	■	■
Common logical node information								
Mod	ENC	Mode		O		■	■	■
Beh	ENS	Behavior		M		■	■	■
Status information								
Str	ACD	Start		M		□	□	□
Op	ACT	Operate	■	M		■	■	■

Directional underpower (PDUP class)

37P - Directional active underpower								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	A37P_PDUP1, A37P_PDUP2		M			■	■
Common logical node information								
Mod	ENC	Mode		O			■	■
Beh	ENS	Behavior		M			■	■
Status information								
Str	ACD	Start		M			□	□
Op	ACT	Operate	■	M			■	■

40 - Field loss								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	A40_PDUP1		M			■	■
Common logical node information								
Mod	ENC	Mode		O			■	■
Beh	ENS	Behavior		M			■	■
Status information								
Str	ACD	Start		M			□	□
Op	ACT	Operate	■	M			■	■

Nota :

M: mandatry data

O: optional data

C: conditional data

E: extension data

T: transient data

□: compulsory data but unavailable in the device (provided with an invalid quality status).

Logical nodes for protection functions: P group (cont.)

Rate of change of frequency (PFRC class)

81R - Rate of change of frequency

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	A81R_PFC1		M	■			
		A81R_PFC1, A81R_PFC2		M			■	■
Common logical node information								
Mod	ENC	Mode		O	■		■	■
Beh	ENS	Behavior		M	■		■	■
Status information								
Str	ACD	Start		M	□		□	□
Op	ACT	Operate	■	M	■		■	■

Ground detector (PHIZ class)

27TN/64G2 - Third harmonic undervoltage

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	A64G2_PHIZ1, A64G2_PHIZ2		M				■
Common logical node information								
Mod	ENC	Mode		O				■
Beh	ENS	Behavior		M				■
Status information								
Str	ACD	Start		M				■
Op	ACT	Operate	■	M				■

Instantaneous overcurrent (PIOC class)

50/27 - Inadvertent energizing

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	A5027_PIOC1		M				■
Common logical node information								
Mod	ENC	Mode		O				■
Beh	ENS	Behavior		M				■
Status information								
Op	ACT	Operate	■	M				■

Nota :

M: mandatory data

O: optional data

C: conditional data

E: extension data

T: transient data

□: compulsory data but unavailable in the device (provided with an invalid quality status).

Logical nodes for protection functions: P group (cont.)

Motor restart inhibition (PMRI class)

66 - Starts per hour								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	A66_PMRI1		M	■	■	■	■
Common logical node information								
Mod	ENC	Mode		O	■	■	■	■
Beh	ENS	Behavior		M	■	■	■	■
Status information								
StrInh	SPS	Restart inhibited		O	■	■	■	■
StrInhTmm	INS	Restart inhibition time		O	■	■	■	■
NumStr	INS	Number of starts before inhibition		E	■	■	■	■

Motor starting time supervision (PMSS class)

48/51LR - Excessive starting time, locked rotor								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	A51LR_PMSS1		M	■	■	■	■
Common logical node information								
Mod	ENC	Mode		O	■	■	■	■
Beh	ENS	Behavior		M	■	■	■	■
Status information								
Op	ACT	Operate	■	O	■	■	■	■
StrTmms	INS	Starting time		E	■	■	■	■
Measured Values								
StrAmp	MV	Starting current		E	■	■	■	■

Phase angle measuring (PPAM class)

78PS - Pole slip								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	A78PS_PPAM1		M				■
Common logical node information								
Mod	ENC	Mode		O				■
Beh	ENS	Behavior		M				■
Status information								
Str	ACD	Start		M				■
Op	ACT	Operate	■	M				■

Nota :

M: mandatory data

O: optional data

C: conditional data

E: extension data

T: transient data

□: compulsory data but unavailable in the device (provided with an invalid quality status).

Logical nodes for protection functions: P group (cont.)

Time overcurrent (PTOC class)

50/51 - Phase overcurrent

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	A51_PTOC1 to A51_PTOC4		M	■	■		
		A51_PTOC1 to A51_PTOC8		M			■	■
Common logical node information								
Mod	ENC	Mode		O	■	■	■	■
Beh	ENS	Behavior		M	■	■	■	■
Status information								
Str	ACD	Start		M	□	□	□	□
Op	ACT	Operate	■	M	■	■	■	■

50N/51N, 50G/51G - Earth fault

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	A51N_PTOC1 to A51N_PTOC4		M	■	■		
		A51N_PTOC1 to A51N_PTOC8		M			■	■
Common logical node information								
Mod	ENC	Mode		O	■	■	■	■
Beh	ENS	Behavior		M	■	■	■	■
Status information								
Str	ACD	Start		M	□	□	□	□
Op	ACT	Operate	■	M	■	■	■	■

46 - Negative sequence/unbalance

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	A46_PTOC1		M	■	■		
		A46_PTOC1, A46_PTOC2		M			■	■
Common logical node information								
Mod	ENC	Mode		O	■	■	■	■
Beh	ENS	Behavior		M	■	■	■	■
Status information								
Str	ACD	Start		M	□	□	□	□
Op	ACT	Operate	■	M	■	■	■	■

46BC - Broken conductor

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	46BC_PTOC1		M		■		
Common logical node information								
Mod	ENC	Mode		O		■		
Beh	ENS	Behavior		M		■		
Status information								
Str	ACD	Start		M		□		
Op	ACT	Operate	■	M		■		
Measured values								
MaxImbNgA	MV	Maximum value of negative sequence/positive sequence current ratio		E		■		

Nota :

M: mandatory data

O: optional data

C: conditional data

E: extension data

T: transient data

□: compulsory data but unavailable in the device (provided with an invalid quality status).

Logical nodes for protection functions: P group (cont.)

Time overcurrent (PTOC class) (cont.)

51C - Capacitor bank unbalance								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	A51C_PTOC1 to A51C_PTOC8		M				■
Common logical node information								
Mod	ENC	Mode		O				■
Beh	ENS	Behavior		M				■
Status information								
Str	ACD	Start		M				□
Op	ACT	Operate	■	M				■

67 - Directional phase overcurrent								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	A67_PTOC1, A67_PTOC2		M		■	■	■
Common logical node information								
Mod	ENC	Mode		O		■	■	■
Beh	ENS	Behavior		M		■	■	■
Status information								
Str	ACD	Start		M		□	□	□
Op	ACT	Operate	■	M		■	■	■

67N/67NC - Directional earth fault								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	A67N_PTOC1, A67N_PTOC2		M		■	■	■
Common logical node information								
Mod	ENC	Mode		O		■	■	■
Beh	ENS	Behavior		M		■	■	■
Status information								
Str	ACD	Start		M		□	□	□
Op	ACT	Operate	■	M		■	■	■

Overfrequency (PTOF class)

81H - Overfrequency								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	A81H_PTOF1		M	■			
		A81H_PTOF1, A81H_PTOF2		M		■	■	■
Common logical node information								
Mod	ENC	Mode		O	■	■	■	■
Beh	ENS	Behavior		M	■	■	■	■
Status information								
Str	ACD	Start		M	□	□	□	□
Op	ACT	Operate	■	M	■	■	■	■

Nota :

M: mandatory data

O: optional data

C: conditional data

E: extension data

T: transient data

□: compulsory data but unavailable in the device (provided with an invalid quality status).

Logical nodes for protection functions: P group (cont.)

Overvoltage (PTOV class)

59 - Overvoltage (L-L or L-N)								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	A59_PTOV1, A59_PTOV2 A59_PTOV1 to A59_PTOV4		M	■	■	■	■
Common logical node information								
Mod	ENC	Mode		O	■	■	■	■
Beh	ENS	Behavior		M	■	■	■	■
Status information								
Str	ACD	Start		M	□	□	□	□
Op	ACT	Operate	■	O	■	■	■	■

59N - Neutral voltage displacement								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	A59N_PTOV1, A59N_PTOV2		M	■	■	■	■
Common logical node information								
Mod	ENC	Mode		O	■	■	■	■
Beh	ENS	Behavior		M	■	■	■	■
Status information								
Str	ACD	Start		M	□	□	□	□
Op	ACT	Operate	■	O	■	■	■	■

47 - Negative sequence overvoltage								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	A47_PTOV1 A47_PTOV1, A47_PTOV2		M		■		■
Common logical node information								
Mod	ENC	Mode		O		■	■	■
Beh	ENS	Behavior		M		■	■	■
Status information								
Str	ACD	Start		M		□	□	□
Op	ACT	Operate	■	O		■	■	■

Nota :

M: mandatory data

O: optional data

C: conditional data

E: extension data

T: transient data

□: compulsory data but unavailable in the device (provided with an invalid quality status).

Logical nodes for protection functions: P group (cont.)

Protection trip conditioning (PTRC class)

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	PTRC1		M	■	■	■	■
Common logical node information								
Beh	ENS	Behavior		M	■	■	■	■
Status information								
Tr	ACT	Trip		C	■	■	■	■
ExTr1	SPS	External Trip 1		E		■	■	■
ExTr2	SPS	External Trip 2		E		■	■	■
ExTr3	SPS	External Trip 3		E		■	■	■
BlkInd1	SPS	Block indication 1 sent (Logic discrimination)		E	■	■	■	■
BlkInd2	SPS	Block indication 2 sent (Logic discrimination)		E		■	■	■
PhFltCnt	INS	Phase faults trip counter		E			■	■
EFTrCnt	INS	Earth faults trip counter		E			■	■

Thermal overload (PTTR class)

49RMS - Thermal overload								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	A49_PTTR1		M	■	■	■	■
Common logical node information								
Mod	ENC	Mode		O	■	■	■	■
Beh	ENS	Behavior		M	■	■	■	■
Status information								
Op	ACT	Operate	■	M	■	■	■	■
AlmThm	SPS	Thermal alarm		O	■	■	■	■
TmResTr	INS	Operating time before tripping		E	■	■	■	■
WaitTm	INS	Waiting time after tripping		E	■	■	■	■
Measured Values								
ThmRte	MV	Thermal capacity used		E	■	■	■	■
Controls								
InhThmPro	SPC	Inhibit thermal protection		E	■	■	■	■

Undercurrent (PTUC class)

37 - Phase undercurrent								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	A37_PTUC1		M	■	■	■	■
Common logical node information								
Mod	ENC	Mode		O	■	■	■	■
Beh	ENS	Behavior		M	■	■	■	■
Status information								
Str	ACD	Start		M	□	□	□	□
Op	ACT	Operate	■	M	■	■	■	■
Controls								
ProRs	SPC	Protection reset		E		■	■	■

Nota :

M: mandatory data

O: optional data

C: conditional data

E: extension data

T: transient data

□: compulsory data but unavailable in the device (provided with an invalid quality status).

Logical nodes for protection functions: P group (cont.)

Underfrequency (PTUF class)

81L - Underfrequency								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	A81L_PTUF1, A81L_PTUF2		M	■			
		A81L_PTUF1 to A81L_PTUF4		M		■	■	■
Common logical node information								
Mod	ENC	Mode		O	■	■	■	■
Beh	ENS	Behavior		M	■	■	■	■
Status information								
Str	ACD	Start		M	□	□	□	□
Op	ACT	Operate	■	M	■	■	■	■

Undervoltage (PTUV class)

27- Undervoltage (L-L or L-N)								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	A27_PTUV1, A27_PTUV2		M	■	■		
		A27_PTUV1 to A27_PTUV4		M			■	■
Common logical node information								
Mod	ENC	Mode		O	■	■	■	■
Beh	ENS	Behavior		M	■	■	■	■
Status information								
Str	ACD	Start		M	□	□	□	□
Op	ACT	Operate	■	M	■	■	■	■

27D - Positive sequence undervoltage

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	A27D_PTUV1, A27D_PTUV2		M	■	■	■	■
Common logical node information								
Mod	ENC	Mode		O	■	■	■	■
Beh	ENS	Behavior		M	■	■	■	■
Status information								
Str	ACD	Start			□	□	□	□
Op	ACT	Operate	■	M	■	■	■	■

27R - Remanent undervoltage

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	A27R_PTUV1		M	■	■		
		A27R_PTUV1, A27R_PTUV2		M			■	■
Common logical node information								
Mod	ENC	Mode		O	■	■	■	■
Beh	ENS	Behavior		M	■	■	■	■
Status information								
Str	ACD	Start		M	□	□	□	□
Op	ACT	Operate	■	M	■	■	■	■

Nota :

M: mandatory data

O: optional data

C: conditional data

E: extension data

T: transient data

□: compulsory data but unavailable in the device (provided with an invalid quality status).

Logical nodes for protection functions: P group (cont.)

Undervoltage (PTUV class) (cont.)

27S - Phase to neutral undervoltage								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	A27S_PTUV1		M	■			
Common logical node information								
Mod	ENC	Mode		O	■			
Beh	ENS	Behavior		M	■			
Status information								
Str	ACD	Start		M	□			
Op	ACT	Operate ⁽¹⁾	■	M	■			

(1) Phase A, phase B, and phase C attributes are used.

Voltage controlled time overcurrent (PVOC class)

50V/51V - Voltage restrained overcurrent								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	A51V_PVOC1		M		■	■	
		A51V_PVOC1, A51V_PVOC2		M				■
Common logical node information								
Mod	ENC	Mode		O		■	■	■
Beh	ENS	Behavior		M		■	■	■
Status information								
Str	ACD	Start		M		□	□	□
Op	ACT	Operate	■	M		■	■	■

Volts per Hertz (PVPH class)

24 - Overfluxing								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	A24_PVPH1, A24_PVPH2		M				■
Common logical node information								
Mod	ENC	Mode		O				■
Beh	ENS	Behavior		M				■
Status information								
Str	ACD	Start						□
Op	ACT	Operate	■	M				■

Zero speed or underspeed (PZSU class)

14 - Underspeed								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	A14_PZSU1, A14_PZSU2		M			■	■
Common logical node information								
Mod	ENC	Mode		O			■	■
Beh	ENS	Behavior		M			■	■
Status information								
Str	ACD	Start		M			□	□
Op	ACT	Operate	■	M			■	■

Nota :

M: mandatory data

O: optional data

C: conditional data

E: extension data

T: transient data

□: compulsory data but unavailable in the device (provided with an invalid quality status).

Logical nodes for protection functions: P group (cont.)

Zero speed or underspeed (PZSU class) (cont.)

12 - Overspeed								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	A12_PZSU1, A12_PZSU2		M			■	■
Common logical node information								
Mod	ENC	Mode		O			■	■
Beh	ENS	Behavior		M			■	■
Status information								
Str	ACD	Start		M			□	□
Op	ACT	Operate	■	M			■	■

Logical nodes for protection related functions: R group

Breaker failure (RBRF class)

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	RBRF1		M	■	■	■	■
Common logical node information								
Mod	ENC	Mode		O	■	■	■	■
Beh	ENS	Behavior		M	■	■	■	■
Status information								
OpEx	ACT	Breaker failure trip	■	C	■	■	■	■

Disturbance recorder function (RDRE class)

Disturbance recorder								
Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	RDRE1		M	■	■	■	■
Common logical node information								
Beh	ENS	Behavior		M	■	■	■	■
Status information								
RcdMade	SPS	Recording made ⁽¹⁾		M	■	■	■	■
FltNum	INS	Fault number (not supported, always 0)		M	■	■	■	■
Controls								
RcdTrg	SPC	Trig recorder		O	■	■	■	■
RcdInh	SPC	Inhibit recorder		E	■	■	■	■

Context recorder

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	CTX_RDRE2		M			■	■
Common logical node information								
Beh	ENS	Behavior		M			■	■
Status information								
RcdMade	SPS	Recording made ⁽¹⁾		M			■	■
FltNum	INS	Fault number (not supported, always 0)		M			■	■

⁽¹⁾ RcdMade if false when no record is available and true when at least one record is present. It then goes false for a short period of time for every new record. This allows performing new record detection through reporting of RcdMade.stVal.

The timestamp attribute of RcdMade (RcdMade.t) is meaningless and should be ignored.

Nota :

M: mandatory data

O: optional data

C: conditional data

E: extension data

T: transient data

□: compulsory data but unavailable in the device (provided with an invalid quality status).

Logical nodes for protection related functions: R group (cont.)

Data log recorder

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	DLG_RDRE3		M			≥ V8.0	≥ V8.0
Common logical node information								
Beh	ENS	Behavior		M			■	■
Status information								
RcdMade	SPS	Recording made ⁽¹⁾		M			■	■
FltNum	INS	Fault number (not supported, always 0)		M			■	■
RcdStr	SPS	Recording started		O			■	■
Controls								
RcdTrg	SPC	Start/Stop recorder		O			■	■

(1) RcdMade if false when no record is available and true when at least one record is present. It then goes false for a short period of time for every new record. This allows performing new record detection through reporting of RcdMade.stVal.

The timestamp attribute of RcdMade (RcdMade.t) is meaningless and should be ignored.

Motor start recorder

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	MOT_RDRE4		M			≥ V8.0	≥ V8.0
Common logical node information								
Beh	ENS	Behavior		M			■	■
Status information								
RcdMade	SPS	Recording made ⁽¹⁾		M			■	■
FltNum	INS	Fault number (not supported, always 0)		M			■	■
RcdStr	SPS	Recording started		O			■	■
Controls								
RcdTrg	SPC	Trigger recorder		O			■	■

(1) RcdMade if false when no record is available and true when at least one record is present. It then goes false for a short period of time for every new record. This allows performing new record detection through reporting of RcdMade.stVal.

The timestamp attribute of RcdMade (RcdMade.t) is meaningless and should be ignored.

Fault locator (RFLO class)

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	RFLO1		M		■		
Common logical node information								
Mod	ENC	Mode		O		■		
Beh	ENS	Behavior		M		■		
Measured values								
FltZ	CMV	Fault impedance		M		■		
FltDiskm	MV	Fault distance		O		■		
FltPh	INS	Fault phase(s) bit 0 = 1: phase A faulty bit 1 = 1: phase B faulty bit 2 = 1: phase C faulty		E		■		

Autoreclosing (RREC class)

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNNName	Object Name	RREC1		M	■	■	■	■
Common logical node information								
Mod	ENC	Mode		O	■	■	■	■
Beh	ENS	Behavior		M	■	■	■	■
Status information								
OpCls	ACT	Operate		M	□	□	■	■
AutoRecSt	INS	Autoreclosing status		M	■	■	■	■
Controls								
BlkRec	SPC	Block reclosing		E	■	■	■	■

Nota :

M: mandatory data

O: optional data

C: conditional data

E: extension data

T: transient data

□: compulsory data but unavailable in the device (provided with an invalid quality status).

Logical nodes for sensors and monitoring: R group (cont.)

Synchronism-check or synchronizing (RSYN class)

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	RSYN1		M			■	■
Common logical node information								
Mod	ENC	Mode		O			■	■
Beh	ENS	Behavior		M			■	■
Status information								
Rel	SPS	Release		M			□	□
VInd	SPS	Voltage difference indicator		O			■	■
AngInd	SPS	Angle difference indicator		O			■	■
HInd	SPS	Frequency difference indicator		O			■	■
SynStop	SPS	Synchronizing stop	■	E			■	■
SynFlt	SPS	Synchronizing failure	■	E			■	■
Syn	SPS	Synchronizing successful	■	E			■	■
Measured values								
DifVClc	MV	Calculated difference in Voltage		O			■	■
DifHzClc	MV	Calculated difference in Frequency		O			■	■
DifAngClc	MV	Calculated difference of Phase Angle		O			■	■
Controls								
SynPrg	SPC	Synchronizing in progress		O			■	■
InhSynChk	SPC	Inhibit synchronism-check		E			■	■

Logical nodes for sensors and monitoring: S group

Insulation medium supervision (liquid) (SIML class)

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	SIML1		M		■	■	■
Common logical node information								
Beh	ENS	Behavior		M		■	■	■
Status information								
InsAlm	SPS	Insulation liquid critical (=Buchholz alarm)		M		■	■	■
GasInsTr	SPS	Buchholz trip		O		■	■	■
PresAlm	SPS	Pressure alarm		O		■	■	■
PresTr	SPS	Pressure trip		O		■	■	■
TmpAlm	SPS	Thermostat alarm		O		■	■	■
TmpTr	SPS	Thermostat trip		E		■	■	■
ThmAlm	SPS	Thermistor alarm		E		■	■	■
ThmTr	SPS	Thermistor trip		E		■	■	■

Temperature supervision (STMP class)

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	A49T_STMP1 to A49T_STMP8 A49T_STMP1 to A49T_STMP16		M	■			
Common logical node information								
Mod	ENC	Mode		O	■	■	■	■
Beh	ENS	Behavior		M	■	■	■	■
Health	ENS	Health ⁽¹⁾		O	■	■	■	■
Status information								
Alm	SPS	Temperature alarm		O	■	■	■	■
Trip	SPS	Temperature trip		O	■	■	■	■
Measured Values								
Tmp	MV	Temperature for thermal load		O	■	■	■	■

(1) MET148 module status

Nota :

M: mandatory data

O: optional data

C: conditional data

E: extension data

T: transient data

□: compulsory data but unavailable in the device (provided with an invalid quality status).

Logical nodes for instrument transformers and sensors: T group

Rotation transmitter (TRTN class)

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	TRTN1		M			■	■
Common logical node information								
Beh	ENS	Behavior		M			■	■
Measured values								
RotSpd	MV	Rotation speed (rpm)		E			■	■

Logical nodes for switchgear: X group

Circuit breaker (XCBR class)

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	XCBR1		M	■	■	■	■
Common logical node information								
Beh	INS	Behavior		M	■	■	■	■
Loc	SPS	Local control behavior		M	■	■	■	■
EEHealth	INS	External equipment health ⁽¹⁾		O	■	■	■	■
OpCnt	INS	Operation counter		M	■	■	■	■
Status information								
OpHrsCnt	INS	Operating hours counter		E	■	■	■	■
OpTms	INS	Operating time		E	■	■	■	■
ChaTms	INS	Charging time		E	■	■	■	■
SumSwAAlm	SPS	Cumulative breaking current alarm		E			■	■
CBRkdOut	SPS	Circuit breaker racked out		E			■	■
RkdOutCnt	INS	Racking out operations counter		E			■	■
ESwPos	SPS	Earthing switch position		E			■	■
Metered values								
SumSwARs	BCR	Sum of switched amperes		O	■	■	■	■
Controls								
Pos	DPC	Switch position		M	■	■	■	■
BlkOpn	SPC	Block opening		M	□	□	□	□
BlkCls	SPC	Block closing		M	□	■	□	□

(1) SF6 alarm and Trip circuit supervision.

Logical nodes for further power system equipment: Z group

Capacitor bank (ZCAP class)

Attribute name	Attribute type	Explanation/Value	T	M/O/C/E	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
LNName	Object Name	ZCAP1 to ZCAP4		M				■
Common logical node information								
Beh	ENS	Behavior		M				■
EEHealth	ENS	External equipment health		O				■
OpTmh	INS	Operation time		O				■
Status information								
DschBlk	SPS	Blocked due to discharge		M				□
Auto	SPS	Automatic operation		E				■
Controls								
CapDS	SPC	Capacitor bank device status		M				■

Nota :

M: mandatory data

O: optional data

C: conditional data

E: extension data

T: transient data

□: compulsory data but unavailable in the device (provided with an invalid quality status).

Logical Nodes per Sepam series 20

Logical Node	S20	S23	S24	T20	T23	T24	M20	B21	B22
System Logical Nodes - L group									
LPHD1	■	■	■	■	■	■	■	■	■
LLN0	■	■	■	■	■	■	■	■	■
Logical Nodes for control - C group									
CSWI1	■	■	■	■	■	■	■	■	■
Logical Nodes for generic reference - G group									
M114_GGIO1	■	■	■	■	■	■	■	■	■
Logical Nodes for metering and measurement - M group									
MMXU2	■	■	■	■	■	■	■		
MMXU3								■	■
MSQI1								■	■
MSTA1	■	■	■	■	■	■	■		
Logical Nodes for protection functions - P group									
A81R_PFC1									■
A66_PMRI1							■		
A51LR_PMSS1							■		
A46_PTOC1	■	■	■	■	■	■	■		
A51_PTOC1-4	■	■	■	■	■	■	■		
A51N_PTOC1-4	■	■	■	■	■	■	■		
A81H_PTOF1								■	■
A59_PTOV1-2								■	■
A59N_PTOV1-2								■	■
PTRC1	■	■	■	■	■	■	■	■	■
A49_PTTR1				■	■	■	■		
A37_PTUC1							■		
A81L_PTUF1-2								■	■
A27_PTUV1-2								■	■
A27D_PTUV1-2								■	■
A27R_PTUV1								■	■
A27S_PTUV1								■	■
Logical Nodes for protection related functions - R group									
RDRE1	■	■	■	■	■	■	■	■	■
RBRF1		■	■		■	■			
RREC1	■	■	■						
Logical Nodes for sensors and monitoring - S group									
A49T_STMP1-8				■	■	■	■		
Logical Nodes for switchgear- X group									
XCBR1	■	■	■	■	■	■	■	■	■

Logical Nodes per Sepam series 40

Logical Node	S40	S41	S42	S43	S44	S50	S51	S52	S53	S54	T40	T42	T50	T52	M40	M41	G40
System Logical Nodes - L group																	
LPHD1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
LLN0	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Logical Nodes for control - C group																	
CSWI1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Logical Nodes for generic reference - G group																	
EQU_GGIO1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
M114_GGIO1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Logical Nodes for metering and measurement - M group																	
MMTR1-2	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
MMXU1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
MSQI1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
MSTA1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Logical Nodes for protection functions - P group																	
A32P_PDOP1		■	■	■			■	■	■								■
A32Q_PDOP1																■	■
A66_PMRI1															■	■	
A51LR_PMSS1															■	■	
A46_PTOC1-2	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
A46BC_PTOC1						■	■	■	■	■			■	■			
A51_PTOC1-4	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
A51N_PTOC1-4	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
A67_PTOC1-2			■					■				■		■			
A67N_PTOC1-2		■	■	■			■	■	■			■		■		■	
A81H_PTOF1/1-2	■	■	■			■	■	■			■	■	■	■		■	■
A47_PTOV1	■	■	■		■	■	■	■		■	■	■	■	■		■	■
A59_PTOV1-2	■	■	■		■	■	■	■		■	■	■	■	■	■	■	■
A59N_PTOV1-2	■	■	■		■	■	■	■		■	■	■	■	■		■	■
PTRC1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
A49_PTTR1											■	■	■	■	■	■	■
A37_PTUC1															■	■	
A81L_PTUF1-4	■	■	■			■	■	■			■	■	■	■		■	■
A27_PTUV1-2	■	■	■		■	■	■	■		■	■	■	■	■	■	■	■
A27D_PTUV1-2															■	■	
A27R_PTUV1															■	■	
A51V_PVOC1																	■
Logical Nodes for protection related functions - R group																	
RDRE1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
RBRF1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
RFLO1						■	■	■	■	■							
RREC1	■	■	■	■	■	■	■	■	■	■							
Logical Nodes for sensors and monitoring - S group																	
SIML1											■	■	■	■			
A49T_STMP1-16											■	■	■	■	■	■	■
Logical Nodes for switchgear- X group																	
XCBR1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■

Logical Nodes per Sepam series 60

Logical Node	S60	S62	T60	T62	M61	G60	G62	C60
System Logical Nodes - L group								
LPHD1	■	■	■	■	■	■	■	■
LLN0	■	■	■	■	■	■	■	■
Logical Nodes for control - C group								
CSWI1	■	■	■	■	■	■	■	■
Logical Nodes for generic reference - G group								
LS_GAPC1					■			
EQU_GGIO1	■	■	■	■	■	■	■	■
GSE_GGIO1	■	■	■	■	■	■	■	■
M120_GGIO1-2	■	■	■	■	■	■	■	■
S60RC_GGIO1-2	■	■	■	■	■	■	■	■
Logical Nodes for metering and measurement - M group								
MHAN1	■	■	■	■	■	■	■	■
MMTR1-2	■	■	■	■	■	■	■	■
MMXU1	■	■	■	■	■	■	■	■
MSQI1	■	■	■	■	■	■	■	■
MSTA1	■	■	■	■	■	■	■	■
Logical Nodes for protection functions - P group								
A64RF_PDIF1-2			■	■				
A21B_PDIS1						■	■	
A32P_PDOP1-2		■		■	■	■	■	
A32Q_PDOP1					■	■	■	
A37P_PDUP1-2						■	■	
A40_PDUP1					■	■	■	
A81R_PFC1-2	■	■				■	■	
A66_PMRI1					■			
A51LR_PMSS1					■			
A46_PTOC1-2	■	■	■	■	■	■	■	■
A51_PTOC1-4	■	■	■	■	■	■	■	■
A51N_PTOC1-4	■	■	■	■	■	■	■	■
A67_PTOC1-2		■		■	■		■	
A67N_PTOC1-2		■		■	■		■	
A81H_PTOF1-2	■	■	■	■	■	■	■	■
A47_PTOV1-2	■	■	■	■	■	■	■	■
A59_PTOV1-2	■	■	■	■	■	■	■	■
A59N_PTOV1-2	■	■	■	■	■	■	■	■
PTRC1	■	■	■	■	■	■	■	■
A49_PTTR1		■	■	■	■	■	■	■
A49T_PTTR1-16			■	■	■	■	■	■
A37_PTUC1					■			
A81L_PTUF1-4	■	■	■	■	■	■	■	■
A27_PTUV1-2	■	■	■	■	■	■	■	■
A27D_PTUV1-2	■	■	■	■	■	■	■	■
A27R_PTUV1-2	■	■	■	■	■	■	■	■
A51V_PVOC1-2						■	■	
A12_PZSU1-2					■	■	■	
A14_PZSU1-2					■	■	■	
Logical Nodes for protection related functions - R group								
RBRF1	■	■	■	■	■	■	■	■
RDRE1	■	■	■	■	■	■	■	■
CTX_RDRE2	■	■	■	■	■	■	■	■
DLG_RDRE3	■	■	■	■	■	■	■	■
MOT_RDRE4					■			
RREC1	■	■						
RSYN1	■	■	■	■		■	■	
Logical Nodes for sensors and monitoring - S group								
SIML1			■	■	■	■	■	
A49T_STMP1-16			■	■	■	■	■	■
Logical Nodes for instrument transformers and sensors - T group								
TRTN1					■	■	■	
Logical Nodes switchgear - X group								
XCBR1	■	■	■	■	■	■	■	■

Logical Nodes per Sepam series 80

Logical Node	S80	S81	S82	S84	T81	T82	T87	M81	M87	M88	G82	G87	G88	B80	B83	C86
System Logical Nodes - L group																
LPHD1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
LLN0	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Logical Nodes for control - C group																
CSWI1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Logical Nodes for generic reference - G group																
LS_GAPC1								■	■	■						
EQU_GGIO1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
M120_GGIO1-3	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
GSE_GGIO1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
S80xx_GGIO1n	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Logical Nodes for metering and measurement - M group																
MHAN1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
MMTR1-2	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
MMXU1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
MMXU2							■		■	■		■	■			
MMXU3															■	
MSQ11	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
MSQ12															■	
MSTA1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Logical Nodes for protection functions - P group																
A64RF_PDIF1-2					■	■	■				■		■			
A87M_PDIF1									■			■				
A87T_PDIF1							■			■			■			
A21B_PDIS1											■	■	■			
A32P_PDOP1-2		■	■	■	■	■	■	■	■	■	■	■	■			
A32Q_PDOP1								■	■	■	■	■	■			
A37P_PDUP1-2			■								■					
A40_PDUP1								■	■	■	■	■	■			
A81R_PFC1-2				■												
A64G2_PHIZ1-2											■	■	■			
A5027_PIOC1											■	■	■			
A66_PMRI1								■	■	■						
A51LR_PMSS1								■	■	■						
A78PS_PPAM1								■	■	■	■	■	■			
A46_PTOC1-2	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
A51_PTOC1-8/A51N_PTOC1-8	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
A51C_PTOC1-8																■
A67_PTOC1-2			■	■		■	■				■	■	■			
A67N_PTOC1-2		■	■	■	■	■	■	■	■	■	■	■	■			
A81H_PTOF1-2	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
A47_PTOV1-2	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
A59_PTOV1-4/A59N_PTOV1-2	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
PTRC1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
A49_PTTR1		■	■	■	■	■	■	■	■	■	■	■	■			■
A37_PTUC1								■	■	■						
A81L_PTUF1-4	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
A27_PTUV1-4	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
A27D_PTUV1-2/A27R_PTUV1-2	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
A51V_PVOC1-2											■	■	■			
A24_PVPH1-2							■				■	■	■			
A12_PZSU1-2/A14_PZSU1-2								■	■	■	■	■	■			
Logical Nodes for protection related functions - R group																
RBRF1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
RDRE1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
CTX_RDRE2	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
DLG_RDRE3	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
MOT_RDRE4								■	■	■						
RREC1	■	■	■	■												
RSYN1	■	■	■	■	■	■	■				■	■	■	■	■	
Logical Nodes for sensors and monitoring - S group																
SIML1					■	■	■	■			■		■			
A49TSTMP1-16	■	■	■	■	■	■	■				■	■	■	■	■	■
Logical Nodes for instrument transformers and sensors - T group																
TRTN1								■	■	■	■	■				
Logical Nodes for switchgear - X group																
XCBR1	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Logical Nodes for further power equipment - Z group																
ZCAP1-4																■



The **Specific Communication Services Mapping** to MMS (ISO 9506) and to ISO/IEC 8802-3 is defined by part 8-1 of IEC 61850.

It provides:

■ the mapping of the objects and services of the ACSI to MMS

■ the mapping of time-critical information exchanges to ISO/IEC 8802-3

These conformance tables are taken from chapter 24 of IEC 61850-8-1.

Profile conformance

A-Profile support

Profile	Client	Server	Comments
A1 Client/server		■	
A2 GOOSE/GSE Management	■	■	(1)
A3 GSSE			
A4 Time sync	■		

T-Profile support

Profile	Client	Server	Comments
T1 TCP/IP profile		■	
T2 OSI T profile			
T3 GOOSE/GSE T profile	■	■	(1)
T4 GSSE T profile			
T5 Time Sync T profile	■		

(1) Sepam series 60 or Sepam series 80, with ACE850 only.

MMS conformance

MMS service supported CBB (server)	M/O/C/I	Supported
status	M	■
getNameList	C	■
identify	M	■
rename	O	
read	C	■
write	C	■
getVariableAccessAttributes	C	■
defineNamedVariable	O	
defineScatteredAccess	I	
getScatteredAccessAttributes	I	
deleteVariableAccess	O	
defineNamedVariableList	O	
getNamedVariablesListAttributes	C	■
deleteNamedVariableList	C	
defineNamedType	I	
getNamedTypeAttributes	I	
deleteNamedType	I	
input	I	
output	I	
takeControl	I	
relinquishControl	I	
defineSemaphore	I	
deleteSemaphore	I	
reportPoolSemaphoreStatus	I	
reportSemaphoreStatus	I	
initialDownloadSequence	I	
downloadSegment	I	
terminateDownloadSequence	I	
initiateUploadSequence	I	
uploadSegment	I	
terminateUploadSequence	I	
requestDomainDownload	I	
requestDomainUpload	I	
loadDomainContent	I	
storeDomainContent	I	
deleteDomain	I	
getDomainAttributes	C	■

Nota :

M: mandatory support

O: optional support

C: conditional support

I: out of scope

X: must not be supported (version compatibility)

Conformance statements (Edition 2.0)

PICS - Protocol implementation conformance statement

MMS conformance (cont'd)

MMS service supported CBB (server)	M/O/C/I	Supported
createProgramInvocation	I	
deleteProgramInvocation	I	
start	I	
stop	I	
resume	I	
reset	I	
kill	I	
getProgramInvocationAttributes	I	
obtainFile	C	
defineEventCondition	I	
deleteEventCondition	I	
getEventConditionAttributes	I	
reportEventConditionStatus	I	
alterEventConditionMonitoring	I	
triggerEvent	I	
defineEventAction	I	
deleteEventAction	I	
alterEventEnrollment	I	
reportEventEnrollmentStatus	I	
getEventEnrollmentAttributes	I	
acknowledgeEventNotification	I	
getAlarmSummary	I	
getAlarmEnrollmentSummary	I	
readJournal	C	■ ACE850 only
writeJournal	O	
initializeJournal	C	
reportJournalStatus	I	
createJournal	I	
deleteJournal	I	
fileOpen	C	■
fileRead	C	■
fileClose	C	■
fileRename	I	
fileDelete	C	
fileDirectory	C	■
unsolicitedStatus	I	
informationReport	C	■
eventNotification	I	
attachToEventCondition	I	
attachToSemaphore	I	
conclude	M	■
cancel	M	■
getDataExchangeAttributes	X	
exchangeData	X	
defineAccessControlList	X	
getAccessControlListAttributes	X	
reportAccessControlledObjects	X	
deleteAccessControlList	X	
alterAccessControl	X	
reconfigureProgramInvocation	X	

Nota :

M: mandatory support

O: optional support

C: conditional support

I: out of scope

X: must not be supported (version compatibility)

Conformance statements (Edition 2.0)

PICS - Protocol implementation conformance statement

GOOSE services

GOOSE conformance	Subscriber		Publisher	
	M/O/C	Supported	M/O/C	Supported
GOOSE services	C	■ ⁽¹⁾	C	■ ⁽¹⁾
SendGOOSEMessage	M		M	■
GetGoReference	O		C	
GetGOOSEElementNumber	O		C	
GetGoCBValues	O		O	
SetGoCBValues	O		O	
GOOSE Control Block (GoCB)	O		O	■

⁽¹⁾ Sepam series 60 or Sepam series 80, with ACE850 only.

GSSE conformance	Subscriber		Publisher	
	M/O/C	Supported	M/O/C	Supported
GSSE services	C		C	
SendGSSEMessage	M		M	
GetGsReference	O		C	
GetGSSEDataOffset	O		C	
GetGsCBValues	O		O	
SetGsCBValues	O		O	
GSSE Control Block (GsCB)	O		O	

Nota :

M: mandatory support

O: optional support

C: conditional support

I: out of scope

X: must not be supported (version compatibility)

Device configuration

The entire device configuration is read-only and can only be modified by the CID file. In particular, data objects with functional constraints of DC and CF can never be written.

ACSI models

Association model

Item	Value/Comments
Maximum simultaneous client associations	ECI850: 6 ACE850: 8
TCP Keepalive	1 to 60 seconds (default 30) ⁽¹⁾
Authentication	Not supported
Association parameters	
TSEL	Required, value defined in the CID file
SSEL	Required, value defined in the CID file
PSEL	Required, value defined in the CID file
AP-Title	Not required, ignored if present
AE-Qualifier	Not required, ignored if present
Maximum MMS PDU size	8000
Typical startup time after a power supply interrupt	ECI850: 20-100 seconds (depends on the CID configuration file). The status LED blinks quickly during startup. ACE850: 5-30 seconds (depends on the CID configuration file). The On/fault LED blinks quickly during startup.

(1) This is the time between two keepalive probes during normal operation. The session time-out, in case of communication failure, is related to this value in a non-linear way and ranges from approximately 50 seconds to approximately 150 seconds. It is about 90 seconds for the default keepalive value.

Note: A 3 second delay between each association is required.

Server model

Item	Value/Comments
Quality bits for analog values (MX)	
Validity	Good, Invalid
OutOfRange	Supported
Failure	Supported
Inconsistent	Supported
Source	Process
Other quality bits and values	Not supported
Quality bits for status values (ST)	
Validity	Good, Invalid
BadReference	Supported
Failure	Supported
Inconsistent	Supported
Inaccurate	Supported
Source	Process
Other quality bits and values	Not supported
Maximum number of data values in Get/SetDataValues requests	Limited only by the MMS PDU size

Dataset model

Item	Value/Comments
Predefined Datasets in the ICD files	<ul style="list-style-type: none"> 1 status Dataset LLN0.StDs 1 measurand Dataset LLN0.MxDs in each Sepam Logical Device
Maximum number of data elements in one Dataset	By configuration: 600
Maximum number of persistent Datasets	By configuration: 32 ⁽¹⁾
Maximum number of non-persistent Datasets	Not supported

(1) The number of Datasets is only limited by the available memory. The indicated limit here is an imposed limit for the configurator and based on the section <services> content of the ICD file.

Conformance statements (Edition 2.0) PIXIT - Protocol implementation extra information for testing

Setting group model

Item	Value/Comments
Number of setting groups	2
Note: Setting group is used to globally switch Sepam between A and B parameter sets, so no individual "SG" feature is provided.	

Reporting model

Item	Value/Comments
Predefined BRCBs in the ICD files	<ul style="list-style-type: none"> ■ 2 status RCBs LLN0.brcbST01 and LLN0.brcbST02, based on LLN0.StDs ■ 2 measurands RCBs LLN0.brcbMX01 and LLN0.brcbMX02, based on LLN0.StMx in each Sepam Logical Device
Predefined URCBs in the ICD files	None
Support of trigger conditions	
Integrity	Supported
Data change	Supported
Data update	Supported (can be set, but there is no process data to report for this condition)
Quality change	Supported
General interrogation	Supported
Support of optional fields	
Sequence number	Supported
Report time-stamp	Supported
Reason for inclusion	Supported
Dataset name	Supported
Data reference	Supported
Buffer overflow	Supported
EntryID	Supported
Conf-rev	Supported
Segmentation	Supported, automatic
Sending of segmented reports	Supported
EntryID	Only the first 4 octets are used. Remaining octets must be 0.
Buffer size for each BRCB	30000 octets
URCB management	<p>Non indexed URCB instances are created dynamically from the models, for each client requesting it.</p> <p>The auto-indexation of the URCB with the use of the RptEnabled max = "n" attribute is supported from 2011 versions (See page 46).</p>
BRCB management	The auto-indexation of the BRCB with the use of the RptEnabled max = "n" attribute is supported from 2011 versions (See page 46).
Maximum number of RCB.	40 (48 for ECI850) ⁽¹⁾

(1) The number of RCB is only limited by the available memory. The indicated limit here is an imposed limit for the configurator and based on the section <services> content of the ICD file.

Transient data

Sepam ICD files are provided with this attribute set to FALSE. Both state transitions are reported.

Buffering

Reports buffering starts only when a client context is available for a BRCB. This occurs following the first activation of this BRCB after device startup.

Conformance statements (Edition 2.0) PIXIT - Protocol implementation extra information for testing

Log model

ACE850

ACE850 allows only one Log file (in Logical node LLN0 of logical device LD0) and only one Log Control block.

Log annotations are used to indicate loss of events, due to buffer overflow or clock not synchronized.

Logging is disabled by default in the ICD file. It must be enabled either dynamically or at configuration time. Integrity period logging is not supported, write operations to the corresponding field of the Log Control Block are possible but the value is ignored.

Log data is stored in non-volatile memory. Two 128 Kbytes memory blocks are used, when both are full, the block containing the oldest data is erased. Then the minimum Log depth is 128 Kbytes and the maximum Log depth is 256 Kbytes, that is approximately between 1000 and 2000 single point status changes respectively.

In order to ensure that a valid TimeOfEntry is assigned to Log entries, Logging is automatically disabled if the SNTP synchronization is disabled or not successful, whatever the value of LogEna.

Log annotations are used to indicate loss of events, due to buffer overflow or clock not synchronized.

The Log file is erased each time a new CID is loaded in the device, in order to avoid model inconsistencies.

Note: The content of the whole Log may also be retrieved at any time, as a COMFEDE formatted XML file, using FTP.

ECI850

Logging is not supported by ECI850. If Log or LogControl elements are found in the CID file, they are ignored. This may occur as ICD files are common for ACE850 and ECI850 and contain default elements.

Control model

Item	Value/Comments
Control models supported	
Status only	Supported
Direct with normal security	Supported
Direct with enhanced security	Not supported
SBO with normal security	Not supported
SBO with enhanced security	Supported
Time activated operate (operTm)	Not supported
Test mode	Not supported, ignored
Check conditions	Not supported, must be 0
Operate many	Not supported
Pulse configuration	Not supported
Command Termination timeout	15 seconds
Service error types	<ul style="list-style-type: none"> ■ instance-not-available ■ access-violation ■ parameter-value-inappropriate ■ instance-locked-by-another-client ■ failed-due-to-server-constraint ■ generic-error

SBO controls

ctlNum normally must have the same value in the Select and Operate requests.

To insure interoperability with older clients not complying with this rule, the value plus one is also accepted in the Operate request.

It is possible to select several times the same control object. The select/operate timeout is restarted with each selection. The value contained in the Cancel structure is ignored. Controls with same ctlVal as current status are accepted.

Local/remote modes

Edition 2 has introduced several new objects for managing local/remote controls.

However, only the legacy Loc object is supported by Sepam.

Sepam does not either support multilevel controls.

Conformance statements (Edition 2.0)

PIXIT - Protocol implementation extra information for testing

GOOSE model (Sepam series 60 or series 80, with ACE850)

Item	Value/Comments
GOOSE header subscriber identification	
Source Mac Address	Not Supported
Destination Mac Address	Supported
VPID tag (VLAN, priority)	Supported, optional field
Ethertype = 0x88B8	Supported
APPID	Supported
Length	Supported
gocbRef	Supported
timeAllowedtoLive	Supported
datSet	Supported
golD	Supported, optional field
t	Not Supported
stNum	Supported
sqNum	Not Supported
test	Supported
confRev	Supported
ndsCom	Not Supported, must be FALSE
numDatSetEntries	Supported
GOOSE publish can be turned ON/OFF	Supported, using SetGoCBValues(GoEna)
GOOSE publish mode test turned ON/OFF	Supported, using the Diagnostics Web pages
Incorrect GOOSE publish configuration	Not supported, configurator does not validate it.
Missing GOOSE detection	Supported, QR condition is set on timeout.
Syntactically incorrect GOOSE frame	Supported, QD condition is set on bad syntax.
Subscribed GOOSE is out-of-order	Supported, partially for stNum, not for sqNum
Subscribed GOOSE is duplicated	Supported, the frame is ignored.
GOOSE data contents	
Structured data objects	Supported
Data attributes	Supported
timestamp data attributes	Supported
GOOSE VLAN capability	
GOOSE with VLAN tag	Supported
GOOSE without VLAN tag	Supported
Retransmission time profile	Supported, configuration from 4 ms to 30 s TAL min = 200 ms

(1) Sepam series 60 or Sepam series 80, with ACE850 only.

GOOSE Publisher detailed behavior

■ Test mode:

The test mode of a GOOSE can be set or reset using a check-box in the "GOOSE messaging statistics" web page.

■ Transmission profile:

- On any change the GOOSE frame is first transmitted as soon as possible, and then retransmitted according to the time profile, from MinTime to MaxTime.
- Time profile follows the powers of 2 in milliseconds, bounded to 29900 ms.
- MinTime and MaxTime are configurable and truncated to the nearest convenient value of the profile, in the range from 4ms to 29900 ms.
- Each member of a Dataset have to be detailed at least at the level of IEDLD/LN\$FC\$DO...

■ Time-Allowed-to-Live (TAL):

It is the sum of the 2 next retransmission times (with a minimum of 150 ms), plus 50 ms.

■ Maximum number of GOOSE frames in transmission: 4

■ Proprietary attributes completing information of the state of the GOOSE Control Block status:

- MinTime: actual minimum time of the retransmission profile in milliseconds,
- Max Time: actual maximum time of the retransmission profile in milliseconds,
- Test: Test = TRUE means that the GOOSE is currently being emitted in test mode.

GOOSE Subscriber detailed behavior

A received GOOSE frame is considered if it matches the following configured criteria:

- Ethernet protocol:
 - If the Optional VLAN tag exists, it must have the form 0x8100xxxx.
 - The protocol identifier must be GOOSE = 0x88B8.
- GOOSE protocol:
 - Received frame is large enough to contain specified data length.
 - Destination address is the one of the subscribed GOOSE.
 - All the fields are checked for consistency in the following order: APPID, Length, gocbRef, TAL, datSet, optional goID, t, stNum, sqNum, test, confRev, ndsComm, and Data fields. ndsComm must have the value FALSE.
- GOOSE data consistency:
 - The datSet structure matches the expected one versus ASN.1 coding types.
 - If it does not match, the Quality of Data flag (QD) is set.
- GOOSE timeout:
 - If a frame does not match any above criteria, it is rejected as invalid.
 - If no valid frame is received before the Time-Allowed-to-Live timeout, plus 50ms, the Quality of Reception flag (QR) is set.
 - On invalid frame, data is left to last known valid values.
- GOOSE data validity:
 - stNum may take any value except for the previous value minus 1 (in order to avoid possible desynchronization during a network reconfiguration).
 - sqNum is not checked to prevent deadlocks with a desynchronized producer.
 - t field is not checked, devices may be not time-synchronized.
 - Test mode: when the test mode is set in the GOOSE header, the values are not considered, and previous values are frozen as valid until the test mode is reset, however QD and QR conditions are still evaluated.

A valid received GOOSE is decoded for Sepam serie 60 or Sepam series 80 as follows:

- Each IEC 61850 data is converted in a 1-bit value using rules:
 - Single Point Status: "TRUE" = 1, "FALSE" = 0.
 - Double Point Status: "10" = 1, all other combinations = 0.
 - Quality: "bad" = 1, "good" = 0, with the following rules:
 - If INVALID: mask "I" is applied on detailQual (default 0xF8).
 - If QUESTIONABLE: mask "Q" is applied on detailQual (default 0x77).
 - Mask "M" is applied on the source, test, operatorBlocked bits (default 0x03).
 - If any of these gives 1 or QR condition is present, the quality is set to "bad".
 - Any other data type gives a 0 value.
- Each of resulting 1-bit values may be assigned to zero, one, or more of the 31 dedicated GOOSE inputs of Sepam (GSE_GGIO1 logical node):
 - The 31 virtual GOOSE inputs are G401 to G416, and G501 to G515.
 - G516 input is reserved for the ACE850 module presence detection.
 - A GOOSE input not having any assignment is let to 0.
 - Several 1-bit values may be assigned to one GOOSE input: an OR is assumed.
- Maximum number of GOOSE subscriptions: 40

The acceptance of GOOSE messages with/without the simulation flag set is controlled by the Sim data object in LPHD1, as defined in IEC 61850-7-1.

Conformance statements (Edition 2.0)

PIXIT - Protocol implementation extra information for testing

Time and time synchronization model

Item	Value/Comments
Time quality bits	
LeapSecondsKnown	Supported but not used
ClockFailure	Supported
ClockNotSynchronized	Supported
Maximum time to wait for time server responses	5 seconds
Meaning of ClockFailure bit	This bit is set when it is not possible to get time from any time server (or when the SNTP synchronization is not enabled).
Meaning of ClockNotSynchronized bit	This bit is set when the time server sets the alarm condition (clock not synchronized) in the SNTP frame (LI field).

Time stamps

Time stamping is performed in Sepam devices for process status values such as protection tripping, digital inputs changes...
It is performed in the ECI850 or ACE850 for any other data such as deadbanded analog values.
For time stamping consistency, it is necessary that ECI850 or ACE850 are synchronized via SNTP.

ECI850 or ACE850 clock

At power-up, the ECI850 or ACE850 clock is reset to a default date (1970/01/01). It is then synchronized to the SNTP servers if the feature is enabled and the servers are running. Sepam units are synchronized from the ECI850 or ACE850 only if the ClockFailure status is not set.

File transfer model

Item	Value/Comments
Separator for files and directories path	'/'
Structure of files and directories	LD/LDName/dirname/filename ⁽¹⁾
Maximum length of names (incl. path)	64
Case sensitivity	Case sensitive

(1) See FTP server for more details.

Impact of Sepam settings

Logical device mode

Provided that the Sepam unit is of the correct type and communicates correctly with the ECI850 or ACE850, the corresponding logical device mode (given by LLN0.Mod) is always ON. The only exception is when a Sepam series 60 or Sepam series 80 device is set in "test mode" in which case it is reported as ON-BLOCKED (the closest IEC 61850 mode). However, be aware that Sepam behavior is not exactly the IEC 61850-7-4 behavior (refer to Sepam documentation).

With ECI850, LLN0.Mod is OFF when the communication with the Sepam device attached to the Logical Device is broken.

Protection logical nodes

Protection logical nodes are OFF (**Mod** attribute), if the corresponding protection function is turned OFF in the Sepam unit.

Some Protection Logical Nodes require a mandatory **Str** (Start) attribute. Such an information being unavailable in Sepam devices, it is always provided as an OFF state and invalid quality.

Breaker-related Logical Nodes

Breaker-related logical nodes CSWI1 and XCBR1 rely on the breaker control function being turned ON in the Sepam device.

Setting groups

IEC 61850 setting group 1 corresponds to Sepam setting group A.

IEC 61850 setting group 2 corresponds to Sepam setting group B.

Selection of active setting group is only possible if "Choice (of setting group) by remote control" is selected on the Sepam device.

Controls

In order to be executed, controls must be enabled in the Sepam unit. This is the case if the **Loc** attribute is OFF. In addition, with ECI850, SBO mode must be turned OFF on the Modbus interface.

Analog values

Measurements

Units

Measurements are provided as floating point values. Their units are specified in the data model.

Deadbands

Default deadband values are provided in the CID file. These values can be changed. Unlike specified in IEC 61850-7-3, deadband values are not expressed as % but they are integer values in physical units, which are described in the CID file.

Integer statuses

Integer statuses are transmitted with the following units:

Logical Node	Attribute	Sepam series 20	Sepam series 40	Sepam series 60	Sepam series 80
A66_PMRI1	StrInhTmm	1 min	1 min	1 min	1 min
A51LR_PMSS1	StrTmms	100 ms	100 ms	10 ms	10 ms
A49_PTTR1	TmResTr	1 min	1 min	1 min	1 min
A49_PTTR1	WaitTm	1 min	1 min	1 min	1 min
XCBR1	OpHrsCnt	1 hr	1 hr	1 hr	1 hr
XCBR1	OpTmms	1 ms	1 ms	1 ms	1 ms
XCBR1	ChaTms	1 ms	100 ms	1 second	1 second
Miscellaneous	Counters	1	1	1	1

Conformance statements (Edition 2.0) SICS - SCL Implementation conformance statement

SCL implementation conformance statement

		M/O/C	Value/ Comments
ICD export		M	
I11	Fix ICD file (no adaptable export needed)	GC_1 (1)	Yes
I12	Export of ICD file or IID file according to IED preconfiguration performed by tool	GC_1 (1)	No for ICD Yes for IID
I13	State the data model name space (61850-7-3 subclause 7.2) within ICD file (LLN0.NamPit.IdNs value)	M	Yes
I14	State the data model version (61850-7-3 subclause 7.8.3) and any predefined/fixed configuration values within ICD file (9.5.4.4)	M	Yes
I15	Version 2003 export	GC_1 (2)	No ⁽¹⁾
I16	Version 2007 export	GC_1 (2)	Yes ⁽¹⁾
I17	Predefined data sets	O	Yes
I18	Predefined control blocks	O	Yes
I19	Substation bay template with IED part	O	No
I110	Communication section with default address	O	Yes
I111	Export correct valKind value (Table 46)	O RO, Conf	Yes
I112	Exports internal addresses as InRef or Input section (subclause 9.3.13)	O	Yes (input section only)
I113	Exports internal addresses in Input section with expected serviceType (subclause 9.3.13)	O	No
I114	Exports in UTF-8 coding	M	Yes (only coding supported)
SCD import		M	
I21	Identify IED to be configured in SCD file by IED name	M	Yes
I22	Configure LD name (at least via IdInst, dependent on the IED capabilities) and IED addresses from SCD	M	Yes for IED addresses No for IdInst on ACE850 (fix name) Partial for IdInst on ECI850 IdName is not supported
I23	Determine communication side addresses of IED inputs from SCD	C1	Yes
I24	Determine and use clock communication addresses from SCD	C1	No
I25	Configure values of (existing) control block from SCD (9.3)	C3	Yes
I26	Prepare (new) control block instances according to SCD file	C3	Yes
I27	Prepare/configure data sets according to SCD file	C3	Yes
I28	Modify predefined data sets according to SCD	C3	Yes
I29	Interpret client references in the control blocks of other IEDs to find the control block instances allocated to this IED, and data sent to this IED	C1	For GOOSE only
I210	Set IED configuration values and parameter values as defined in SCD file	O	Yes
I211	Support changed (reduced capability) valKind (e.g. from Set to RO or to Conf) (Table 46)	O	No
I212	Support IdName on other IEDs (9.3.4)	C3	No
I213	Interpret input signal references to source control blocks (9.3.13)	O	No
I214	Imports UTF-8 coding of XML	M Other codings	Yes (only coding supported)

⁽¹⁾ CET850 is not able to convert an SCL file from one edition to the other. However, Sepam ICD libraries are provided for both editions, allowing creating either edition 1 or edition 2 SCD files.

SCL implementation conformance statement (cont.)

		M/O/C	Value/ Comments
IID export after IED engineering		O	
I31	IED version and instance information: LPHD.PhyNam: hwRev, swRev, serNum, LLN0.NamPlt.configRev	O	Yes
I32	Configuration values (fc=CF)	O	Yes
I33	Setting Parameter values (fc=SP, SG)	O	Yes
I34	SCL Header management (9.1)	C2	Yes
I35	Modify IED data model (add LN/Data object/LD, or remove unused LD/LN/Data object)	O	No
Tool functionality		M	
I41	Support MustUnderstand concept (8.2)	M	Yes (at device level)
I42	Incoming 61850 signals to IED internal (input) signals	C1	Yes
I43	Use or create IED Input section for binding incoming (external) signals to internal signals, to document this binding	O	Yes
I44	Create CID file for IED	O	Yes
I45	Support IdName for LD name specification	C3	No
I46	Modify LN prefixes or InInst	O	No

(1) CET850 is not able to convert an SCL file from one edition to the other. However, Sepam ICD libraries are provided for both editions, allowing creating either edition 1 or edition 2 SCD files.

Nota :

C1: mandatory, if the IED can receive data from other IEDs, i.e. be either client or subscriber.

C2: mandatory, if any of the other features in this table section is supported.

C3: mandatory, if the appropriate IED capability is claimed in PIXIT or IED capability section.

GC_1 (n): at least one of the elements of group n shall be available.

O: optional, should match the IED capabilities; i.e., if an IED claims that RCBs can be configured by SCL, then the IED tool shall support it.

M: mandatory

Conformance statements (Edition 2.0) TICS - Technical issues conformance statement

Introduction

Error corrections and improvements have been made to the current edition (edition 1) of the IEC 61850 standard. These items, known as technical issues or "tissues" can be found on: <http://www.tissues.iec61850.com>.

The UCA IUG QAP, acting as the competent body for device certification, requires that the tissue conformance statement of a device is provided.

The following tables reference only the tissues that have been accepted and solved by the editor's group in charge of them, at the time of publication.

The conformance (M/O/-) column indicates:

- M: Mandatory, tissue is included in the UCA Device conformance test procedures and stated as mandatory (interoperability).
- O: Optional, the tissue is a recommendation or it is optional in the IEC 61850 documents or it is not required for compliance to edition 1.

The supported (Sup) column indicates:

- Y: Yes, the tissue is implemented in the device.
- N: No, the tissue is not implemented in the device.
- N/A: Not applicable, the tissue is not applicable for the device.

Optional tissues are listed only if they are supported.

Some tissues are only editorial, or related to the XML schema or to a client. They have no impact on the device conformance and are therefore just listed for sake of clarity.

IEC 61850 part 6 Tissues

Editorial and schema related TISSUES are: 660, 661, 699, 731, 752, 787, 806

Number	Clause/ Subclause	Paragraph Figure/Table	Final change	M/O/-	Sup
658	Annex A		There are some features missing in SCL to support the service tracking as defined in 7-2.		N/A
663	9.3.7	Table 22	FCDA element cannot be a "functionally constrained logical node".		Y
668	9		Allow two terminals additionally to the neutral point at the power transformer winding.		N/A
687	9.3.2		SGCB ResvTms.		N/A
706	9.3.7		Mandatory attributes for a FCDA.		Y
719	9.3.1	Table 11	ConfDataSet - maxAttributes is maximum number of FCDA elements.		Y
721	9.3.5		Default name for Log element is LDInst.		Y
768			Add VisString65 to the bType enum list.		
779	9.5.4.1	Table 45	Relative object references.		N/A
788	Annex G		Make SICS S56 mandatory.		N/A
804	9.5.4.1	Table 46	valKind and IED versus System configuration		N/A
807	9.3.2	Table 11	Need a way to indicate if "Owner" present in RCB.		N

IEC 61850 part 7-2 Tissues

Editorial and schema related TISSUES are: 813, 820

Number	Clause/ Subclause	Paragraph Figure/Table	Final change	M/O/-	Sup
728	17.2.2.5	Table 37	BRCB: PurgeBuf can only be set when RptEna=false.		Y
778	20.5.2.9	Tables 53, 54	The enum value "not-supported" is missing in AddCause enumeration.		Y
780	14.2.2.11		Unsupported trigger options at a control block		Y
783	20.2.3		TimOper resp-		N/A
786	Annex B2		AddCause enum must be: ■ 26 "Inconsistent-parameters" ■ 27 "Locked-by-other-client"		Y

IEC 61850 part 7-3 Tissues

Editorial and schema related TISSUES are: 709, 720, 814, 819, 832, 839

Number	Clause/ Subclause	Paragraph Figure/Table	Final change	M/O/-	Sup
697	6.7		Persistent command not allowed for DPC		N/A
698	7.5.9	Table 47	Rename dB to db in BAC common data class.		N/A
722	Annex A, D		Add units for 'h' and 'min'.		N

IEC 61850 part 7-4 Tissues

Editorial and schema related TISSUES are: 671, 679, 680, 681, 682, 683, 685, 689, 693, 694, 695, 696, 712, 715, 716, 727, 748, 749, 830

Number	Clause/ Subclause	Paragraph Figure/Table	Final change	M/O/-	Sup
670	5.3		Add a SetMod DO to Common LN.		N
674	5.18.14		Change the CDC of LocSta in ZRRRC to SPC.		N/A
676	5.3.5, 5.3.6, 6		Change the name of LCCH.Fer and LCCH.RedFer to FerCh and RedFerCh respectively.		N/A
677	6, 5.11.12, 5.14.7		Change SOPM.MotStr to MotStrNum and SOPM.MotStrNum to MotAlmNum.		N/A
713	5.6.4		Change the DO names as following: Tm1ms --> Tm1Tmms Tm1ldms --> Tm1ldTmms Tm2ms --> Tm2Tmms Tm2ldms --> Tm2ldTmms Tm3ms --> Tm3Tmms		N/A
714	Annex H		Delete ShOpCap and SwOpCap enums and replace by SwCap.		N/A
724	5.4.2		Change ANCR.Auto to optional.		N/A
725	5.4		Change Loc in Axxx LNs to Optional, where it is mandatory. The presence of LockKey, LocSta should be defined as Optional where the DO Loc is present, otherwise forbidden.		N/A
729	5.14.8		In the LN SPDC the DO, add the setting PDAImLev (ASG): Partial discharge alarm level.		N/A
732	5.3.10		Add an optional data object LoQuTrk of CDC OTS to LTRK, which allows the tracking of log queries.	O	N/A
734	5.3.4		Move OpTmh from LLN0 to LPHD.		N/A
742	5.7.2		GAPC.Str, GAPC.Op, GAPC.StrVal are single instance DOs.		Y
743	5.5.3		Change DOs CCGR.PmpCtl and CCGR.FanCtl PmpCtl1 and FanCtl1 (multiple instances allowed).		N/A
744	5.14.11		STMP has no EEHealth and EENAME DOs.		Y
772	5.3.2		In LPHD, the DO for PwrUp and PwrDn should be transient.		N/A
773	5.17.3, 5.17.4		Add Loc, LockKey and LocSta as optional in YLTC and YPSH.	O	N/A
774	5.8.5		Add LockKey as optional in ITCL.		N/A
800	5.5		Change CSYN.VInvTmms to CSYN.VIntvTmms.		N/A
810	5.13.8		Add FltX, CDC MV, Fault reactance and FltR, CDC MV, Fault resistance as optional DO in RFLO.	O	N

IEC 61850 part 8-1 Tissues

Editorial and schema related TISSUES are: 821, 827

Number	Clause/ Subclause	Paragraph Figure/Table	Final change	M/O/-	Sup
834	23.1		File directory names are up to 64 characters.		Y
817			Change fixed length encoding of 32 bits floating point values in Fixed length Goose messages, to match existing implementations.		N/A
784			Tracking of controls		N/A
770	18.1.2.5.2		GoID is VISIBLE STRING 129 (not 65).		Y

Notes

Notes

Notes

Schneider Electric Industries SAS

35, rue Joseph Monier
CS 30323
F - 92506 Rueil-Malmaison Cedex
RCS Nanterre 954 503 439
Share capital 896 313 776 €
www.schneider-electric.com

As standards, specifications and designs change from time to time, please ask for confirmation of the information given in this publication.



Printed on recycled paper.

Production: Assystem France
Publication: Schneider Electric
Printed: