IEC 60870-5-101 (Unbalanced) Remote Communication Protocol for REC 523

Technical Description

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1 Overview of the Protocol

The companion standard IEC 60870-5-101 is derived from the IEC 60870-5 protocol standard definition and specifies a functional profile for basic telecontrol tasks. The IEC 60870-5 protocol stack is based on the reduced reference model called "Enhanced Performance Architecture" (EPA). This architecture includes only three layers of the ISO OSI model: the physical layer, link layer and application layer. The IEC 60870-5 protocol is described by the following standard documents:

Table 1-1 Selected standard provision of the defined telecontrol companion standard

Selected application functions of **IEC 60870-5-5**	**User Process**
Selected application information elements of **IEC 60870-5-4**	**Application layer (7)**
Selected application service data units of **IEC 60870-5-3**	
Selected link transmission procedures of **IEC 60870-5-2**	**Link layer (2)**
Selected transmission frame formats of **IEC 60870-5-1**	
Selected ITU-T recommendations	**Physical layer (1)**

The physical layer defines the hardware-dependent specifications of the IEC 60870-5-101 communication interface. The data link layer (link layer) defines the frame formats and the transmission procedures of the IEC communication. The application layer defines the information elements for structuring application data and the communication service functions. The user process describes an assortment of basic application functions.

1.1 Physical layer

The physical layer provides binary symmetric and memoryless transmission between DCE (Data Circuit terminating Equipment) and DTE (Data Terminal Equipment) of the primary (controlling) and secondary (controlled) stations. It uses **V.24** and **V.28** standards of the **ITU-T** recommendations.

1.2 Data link layer

The link layer consists of a number of link transmission procedures using explicit **Link Protocol Control Information (LPCI)**. These procedures are capable of carrying **Application Service Data Units (ASDU)** as link user data. The link layer accepts, performs and controls transmission service functions required in the higher layers. It also controls single frame transmission procedures one at a time and

reports the success or failure of transmission to higher layers, together with the state of the transmission line and the station.

1.2.1 Link service classes

Table 1.2.1-1 Service classes of link layer

Link service classes	Transmission mode	ACK / NACK	Reply message
S1	Send / No Reply	No	No
S2	Send / Confirm	Yes	No
S3	Request / Respond	No	Yes

A more detailed description can be found in section 6.2.1 of the IEC 60870-5-101 standard document.

1.2.2 Transmission frame formats

The companion standard **IEC 60870-5-101 uses** the frame format **FT1.2** both **in fixed and variable length mode**. In addition, single control characters are permitted in this frame format.

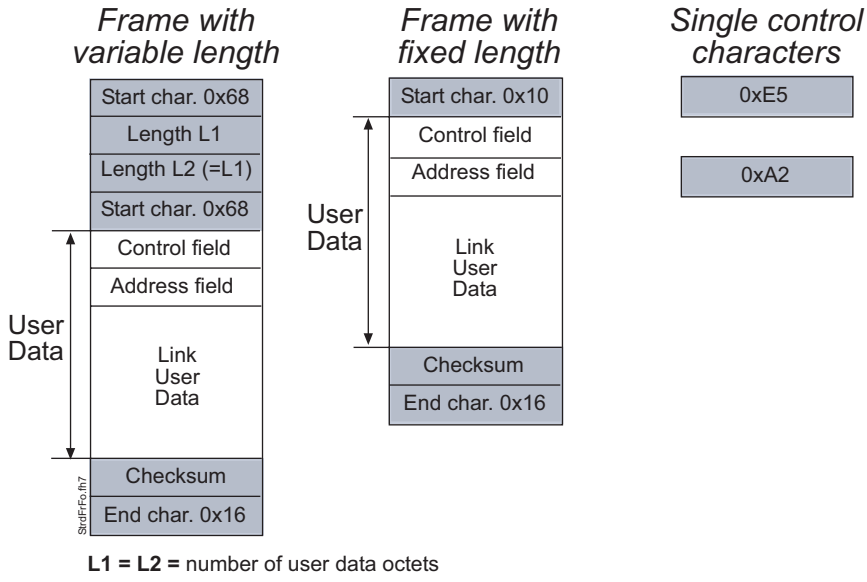

Figure 1.2.2.-1 Description of standard frame format FT1.2

1.2.3 Description of Control Field

The control field is the first octet of user data and it contains information about message direction, the type of service provided and controls for detecting losses or duplications of messages.

1.2.3.1 Control field of transmission from primary to secondary

Table 1.2.3.1-1 Control field of transmission from primary to secondary station

Bit no.	8 (msb)	7	6	5	4	3	2	1 (lsb)
Control Field	RES	PRM = 1	FCB = 0 or 1	FCV = 0 or 1	F-code bit3	F-code bit2	F-code bit1	F-code bit0

RES: not used.

PRM: *primary message;* always set to **1** in a message from the primary to the secondary station.

FCB: *frame* count *bit;* alternates between **0** to **1** for successive SEND/CONFIRM or REQUEST/ RESPOND transmission procedures. This bit is used to detect losses and duplications of information transfers. The primary (master) station alternates this bit for each new transmission to the same secondary (slave) station. The master station also keeps a copy of the last FCB bit sent to the slave station, and if an error occurs in the current transmission procedure, the transmission is repeated with the same FCB.

In case of a **reset** command, the **FCB** bit will always be set to **0**. When the secondary station receives this kind of command, it is set to wait for the next frame from primary to secondary station with a valid FCV bit to qualify the previously received reset command.

FCV: *frame count bit valid;* **0 =** FCB bit is invalid, **1 =** FCB bit is valid.

Note: For SEND / NO REPLY service and broadcast messages FCV is always set to **0.**

F-code: function code of the frame as defined in the table below.

Table 1.2.3.1–2 Function codes of unbalanced transmission from primary station

Function	Frame type	Service function
0	SEND / CONFIRM expected	Reset of remote link
1	SEND / CONFIRM expected	Reset of user process
2	SEND / CONFIRM expected	Reserved for balanced transmission procedure
3	SEND / CONFIRM expected	User data
4	SEND / NO REPLY expected	User data
5		Reserved
6 - 7		Reserved for special use by agreement
8	REQUEST for access demand	Expected response specifies access demand
9	REQUEST / RESPOND expected	Request status of link
10	REQUEST / RESPOND expected	Request user data class 1
11	REQUEST / RESPOND expected	Request user data class 2
12 - 13		Reserved
14 - 15		Reserved for special use by agreement

1.2.3.2 Control field of transmission from secondary to primary

Table 1.2.3.2-1 Control field of transmission from secondary to primary station

Bit no.	8 (msb)	7	6	5	4	3	2	1 (lsb)
Control Field	RES	PRM = 0	ACD = 0 or 1	DFC = 0 or 1	F-code bit3	F-code bit2	F-code bit1	F-code bit0

RES: not used.

PRM: *primary message;* always set to **0** for a message from secondary to primary station

ACD: *access demand;* There are two data classes: Class 1 and Class 2. Values of ACD:

0 = no access demand for class 1 data transmission,
1 = access demand for class 1 data transmission.

Access demand for class 1 data transfer is indicated by the secondary (slave) station.

Note: Class 1 data is typically used for events and for high-priority data.
Class 2 data is typically used for cyclic transmission and low-priority data.

DFC: *data flow control;* The secondary (slave) station uses this bit to indicate to the primary (master) station that the transmission of the next message may cause a buffer overflow. Values of DFC:

0 = further messages are acceptable,
1 = further messages may cause data overflow.

F-code: function code of the frame as defined in the table below.

Table 1.2.3.2-2 Function codes of unbalanced transmission from secondary station

Function	Frame type	Service function
0	CONFIRM	ACK: positive acknowledgement
1	CONFIRM	NACK: message not accepted, link is busy
2 - 5		Reserved
6 - 7		Reserved for special use by agreement
8	RESPOND	User data
9	RESPOND	NACK: requested data not available
10		Reserved
11	RESPOND	Status of link or access demand
12		Reserved
13		Reserved for special use by agreement
14		Link service not functioning
15		Link service not implemented

1.2.4 Description of Address Field

The address field specifies the link address and its length can be either one or two octets, as specified by a system parameter. When a message is transferred from the primary station to the secondary station, the address field specifies the destination address. However, when the message is transferred from the secondary station to the primary station, the address field specifies the source address. The broadcast address is always 255 (for one octet address field) or 65535 (for two-octet address field). On the data link layer the broadcast address is used only in SEND/NO REPLY frames.

1.3 Application layer

The application layer contains a number of “application functions” that include the transmission of ASDUs between source and destination. It does not use explicit Application Protocol Control Information (APCI). This feature is implicit in the contents of the ASDU data unit identifier fields and in the type of link service used. The **Link Protocol Data Unit** (**LPDU**) contains only one **ASDU**, which is composed of **Data Unit Identifier** and one or more **Information objects**.

1.3.1 Application Service Data Units

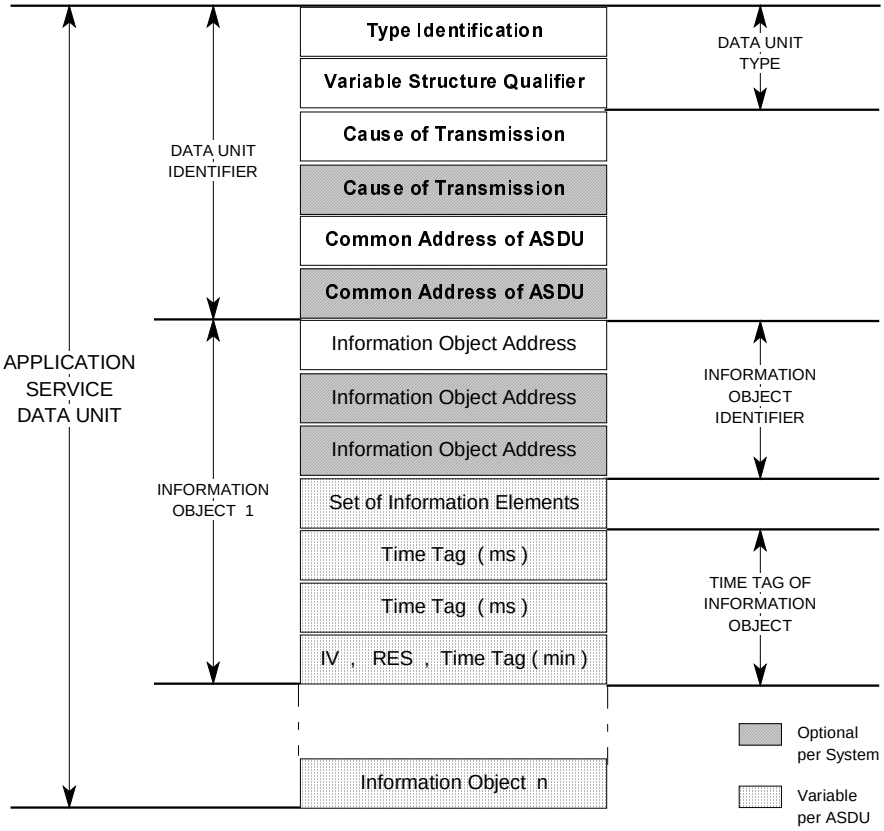

Figure 1.3.1-1 Structure of an Application Service Data Unit ASDU

Type Identification

- Defines the structure, type and format of Information Objects.
- An ASDU without a correct Type Identification is invalid.
- Information Objects can be provided with or without Time Tags.
- Value range: 1 - 127 (standard values) and 128 - 255 (not defined, so-called private range).
- For full interoperability, use values 1 - 127.
- See the list of standard values in the IEC 60870-5-101 standard document.

Variable Structure Qualifier

- The SQ bit (bit 8, MSB) specifies the addressing method for Information Objects / Elements.
- The value of the next 7 bits defines the number of objects/elements in the ASDU (in the range 0 - 127).
- See the list of accepted values in the IEC 60870-5-101 standard document.

Cause of Transmission

- Directs the ASDU to a specific application task (program) for processing.
- The T bit (bit 8, MSB) specifies whether there is a “test” or “no test” transmission.
- The P/N bit (bit 7) indicates whether the confirmation is “positive” or “negative”.
- Originator address in the next octet is optional.
- See the list of accepted values in the IEC 60870-5-101 standard document.

Common Address of ASDUs

- Defines the station address.
- Size: 1 or 2 octets
- Value

  0 (zero) = not used
  1 - 254 (65534) = station address
  255 (65535) = global address (for broadcast only).
- A broadcast ASDU must be answered with a specific Common Address (station address).

Information Object Address

- It is used as a destination object address in the control direction and as a source object address in the monitor direction.
- Size: 1, 2 or 3 octets.

Information Elements

- The standard defines a set of information elements used.
- User-defined formats are also possible.
- See the list of accepted formats in the IEC 60870-5-101 standard document.

1.3.2 Application Information Elements

Information elements are variable quantities that are presented by predefined data types and coding. The variable quantities are of the types: boolean, integer, real number, bit string, octet strings and compound types. Three sets of information elements can be distinguished: Single, Sequence and Combination. The single information element can be, for example, a command, an event, a status or an analogue value. The sequence information element comprises a well-defined set of equal information elements, and only the first element can have the address definition of ASDU. The combination information element includes a well-defined set of different information elements, and in this case, too, only the first element can have the address definition of ASDU.

1.4 Basic application functions

1.4.1 Data acquisition by polling

Data acquisition by polling is used in SCADA systems and when unbalanced data transmission procedures are used to update the primary (controlling) station with the actual states of process variables in secondary (controlled) stations. The primary station polls the secondary stations sequentially. Secondary stations transmit data only when they are polled.

The primary station polls the secondary station for **user data class 2** until the **ACD bit** is set in the reply message received from the secondary station. When the **ACD bit** is set, the primary station must poll for **user data class 1** until the **ACD bit** is reset or the maximum polling counter for class 1 specified by a system parameter is exceeded. After that, the primary station turns to polling for **user data class 2** again and this sequence continues as long as polling is active.

When the primary station makes a poll request, the secondary station replies either with **NACK** (no user data available) or with **user data class 1** (class 1 data is available and requested) or **class 2** (class 2 data is available and requested).

Typically, responses to commands and events are assigned to data class 1 while cyclically scanned values (e.g. supervised analogue values) are allocated to class 2.

1.4.2 Acquisition of events

Events occur spontaneously at the application level of the secondary (controlled) station and they are buffered, because they may appear faster than the primary (controlling) station can poll them. In unbalanced communication systems, the secondary station must always wait for a request for transmission from the primary station.

1.4.3 General interrogation

The outstation interrogation function is used for updating the primary station after the internal station initialization procedure or when the primary station detects a loss of information. By using this function the primary station requests the secondary stations to transmit the actual values of all their process variables. Normally, the amount of information is known by the application functions both of the primary and the secondary stations.

1.4.4 Clock synchronization

The clock of the secondary (controlled) station has to be synchronized with the clock of the primary (controlling) station to provide correct chronological sequence of time-tagged events or information objects that are transmitted to the primary station or logged locally. The clocks are initially synchronized by the primary station after system initialization and then periodically resynchronized by

transmission of a Clock Synchronization Command (C_CS ACT). The time information must always be corrected either by the primary station before sending or by the secondary station when an ASDU with time tag is received. A delay acquisition command can be used to set the measured or estimated transmission delay in the secondary station for time correction on the secondary station side.

1.4.5 Command transmission

A command is used in telecontrol systems to cause a change in the state of operational equipment. Thus commands are used to drive a controlled process in an intended direction. Commands may be initiated by an operator or by automatic supervisory procedures in the primary (controlling) station. Provisions against unauthorized access or against unwanted actions are system- or process-dependent.

There are two standard procedures for command transmission: **Direct command** and **Select and Execute command.** Direct commands are used by the primary station for immediate control operations in the secondary (remote) stations. For safety reasons, the application function of the secondary station checks the permissibility and the validity of the command message received and executes the operation, if the checks are positive. The select and execute command (two-step command) is used by the primary station to prepare a specified control operation in a remote-controlled station, to check that the correct control operation has been prepared and then to execute the command. The check may be carried out by an operator or an application procedure. The secondary station will not commence the control operation until it has received the correct execute indication.

1.4.6 Transmission of integrated totals

An integrated total is a value that is integrated over a specified period of time. The specific clock times and the periodic time interval of successive acquisitions of the integrated totals are system parameters. There are two different methods of acquiring counter information:

1. Acquisition of integrated totals.
2. Acquisition of incremental information.

1.4.7 Storing of protocol and link parameters

When the values of the protocol and link parameters are changed, the new values take effect only after they have been stored and the relay has been reset.

1.4.8 Acquisition of transmission delay

The value of time correction is determined by the sum of the transmission delay and the internal equipment delay. The transmission delay is a value, which may be acquired either separately by parameterization or via a dynamic procedure initiated by the primary (controlling) station.

2 REC 523 Profile in IEC 60870-5-101

2.1 Link layer options

The selection of the link layer options is as follows:

- The selected **frame format** is **FT 1.2,** (with one exception: single control character is not supported) see figure 1.2.2-1 in this document.
- The link transmission procedure is unbalanced.
- Link service function 1 (reset of user process) is not supported (reset operation is supported by the application layer).
- The **address field** of the link layer can be configured as either **one** or **two octets, unstructured**.
- The maximum number of octets in LPDU is 255, including control field, address octet(s) and user data.

2.2 Application layer options

2.2.1 Selection of application layer options

- The Link Protocol Data Unit (LPDU) contains only one Application Service Data Unit (ASDU).
- The ASDU is composed of a Data Unit Identifier and one or more Information Objects.
- The field “Length of ASDU” is not used.
- The size of the common address of ASDU can be configured as either one or two octets, unstructured.
- The size of the information object address is two octets, unstructured.
- The size of the cause of transmission is one octet (originator address not included).

2.2.2 ASDU formats

ASDUs can be of different lengths. The general format contains two parts: the Data unit identifier and the Information object.

The Data unit identifier consists of:

- type identification (the message type) - 1 octet,
- variable structure qualifier - 1 octet,
- cause of transmission - 1 octet,

- common address of ASDU - 1 or 2 octets (depends on the protocol configuration).

The Information object consists of:

- information object address - 2 octets,
- data - length depends on the ASDU type.

TYPE IDENTIFICATION
VARIABLE STRUCTURE QUALIFIER
CAUSE OF TRANSMISSION
COMMON ADDRESS OF ASDU
INFORMATION OBJECT ADDRESS
DATA[0]
DATA[n]

2.2.3 Selection of standard ASDUs used in REC 523

***Table 2.2.3-1 Selected process information elements in* monitor direction**

TYPE	INFORMATION OBJECT	LABEL
1	Single-point information	M_SP_NA_1
2	Single-point information with time tag	M_SP_TA_1
146	Single-point information with full time tag (SIEMENS)	M_SP_FA_1
3	Double-point information	M_DP_NA_1
4	Double-point information with time tag	M_DP_TA_1
148	Double-point information with full time tag (SIEMENS)	M_DP_FA_1
7	Bit string of 32 bit	M_BO_NA_1
11	Measured value, scaled value	M_ME_NB_1
12	Measured value, scaled value with time tag	M_ME_TB_1
156	Measured value, scaled value with full time tag (SIEMENS)	M_ME_FB_1
15	Integrated totals	M_IT_NA_1
16	Integrated totals with time tag	M_IT_TA_1
160	Integrated totals with full time tag (SIEMENS)	M_IT_FA_1

***Table 2.2.3-2 Selected process information elements in* control direction**

TYPE	INFORMATION OBJECT	LABEL
45	Single command	C_SC_NA_1
49	Set point command, scale value	C_SE_NB_1
51	Bitstring of 32 bit	C_BO_NA_1

***Table 2.2.3-3 Selected system information elements in* monitor direction**

TYPE	INFORMATION OBJECT	LABEL
70	End of initialization	M_EI_NA_1

***Table 2.2.3-4 Selected system information elements in* control direction**

TYPE	INFORMATION OBJECT	LABEL
100	Interrogation command	C_IC_NA_1
102	Read command	C_RD_NA_1
103	Clock synchronization command	C_CS_NA_1
105	Reset process command	C_RP_NC_1
106	Delay acquisition command	C_CD_NA_1

Private ASDU types defined in the IEC 60870-5-101 protocol for the REC 523 unit are.

- STRING - type of a character string

Type identification **128**: M_SR_NA_1 - STRING in monitor direction

1	0	0	0	0	0	0	0	TYPE IDENTIFICATION
1	number j of characters							VARIABLE STRUCTURE QUALIFIER
defined in 7.2.3 in [1]								CAUSE OF TRANSMISSION
defined in 7.2.4 in [1]								COMMON ADDRESS OF ASDU
defined in 7.2.5 in [1]								INFORMATION OBJECT ADDRESS
								CHARACTER [0]
								CHARACTER [j-1]

Type identification **131**: C_SR_NA_1 - STRING in control direction

1	0	0	0	0	0	1	1	TYPE IDENTIFICATION
1	number j of characters							VARIABLE STRUCTURE QUALIFIER
defined in 7.2.3 in [1]								CAUSE OF TRANSMISSION
defined in 7.2.4 in [1]								COMMON ADDRESS OF ASDU
defined in 7.2.5 in [1]								INFORMATION OBJECT ADDRESS
								CHARACTER [0]
								CHARACTER [j-1]

- SPABUFFER - type of SPA buffer elements sent in the monitor direction.

Type identification **130**: M_SB_NA_1 - SPABUFFER in monitor direction (**not used in REC 523**)

1	0	0	0	0	0	1	0	TYPE IDENTIFICATION
1	number j of buffer elements							VARIABLE STRUCTURE QUALIFIER
defined in 7.2.3 in [1]								CAUSE OF TRANSMISSION
defined in 7.2.4 in [1]								COMMON ADDRESS OF ASDU
defined in 7.2.5 in [1]								INFORMATION OBJECT ADDRESS
								BUFFER ELEMENT [0]

BUFFER ELEMENT [j-1]

Type identification **133**: C_SB_NA_1 - SPABUFFER in control direction

1	0	0	0	0	1	0	1	TYPE IDENTIFICATION
1	number j of buffer elements							VARIABLE STRUCTURE QUALIFIER
defined in 7.2.3 in [1]								CAUSE OF TRANSMISSION
defined in 7.2.4 in [1]								COMMON ADDRESS OF ASDU
defined in 7.2.5 in [1]								INFORMATION OBJECT ADDRESS
								BUFFER ELEMENT [0]

BUFFER ELEMENT [j-1]

The SPA command should be encoded by the master station using the shortened format:

<Slave address><Command>[<Channel>[/<Channel>]]<Data category>[<Data number>[/<Data number>]]**:**< CR>
e.g.
1RF:*<CR>*
1R200I1/3:*<CR>*

Note: The start character **>** and checksum are omitted.

The SPA response is returned by the slave station in full format.
In the returned response a complete SPA response message will be included (i.e. with start character **<**, checksum and line feed character):

<1D:REC 523:XX*<CR><LF>*
<1D:528.3/528.2/528.3:XX*<CR><LF>*

- Siemens ID 146 - type identification for single point information with full time tag.

  Type ident 146: M_SP_FA_1 corresponds to M_SP_TA_1 with the time tag based on CP56Time2a format defined in the IEC 60870-5-101 standard.

Note: This ASDU type may be optionally used instead of the standard ASDU type 2. See section 3.4.4.

- Siemens ID 148 - type identification for double point information with full time tag.

  Type ident 148: M_DP_FA_1 corresponds to M_DP_TA_1 with the time tag based on CP56Time2a format defined in the IEC 60870-5-101 standard.

  Note: This ASDU type may be optionally used instead of the standard ASDU type 2. See section 3.4.4.

- Siemens ID 156 - type identification for measured value, scaled value with full time tag.

  Type ident 156: M_ME_FB_1 corresponds to M_ME_TB_1 with the time tag based on CP56Time2a format defined in the IEC 60870-5-101 standard.

  Note: This ASDU type may be optionally used instead of the standard ASDU type 2. See section 3.4.4.

- Siemens ID 160 - type identification for integrated total with full time tag.

  Type ident 146: M_IT_FA_1 corresponds to M_IT_TA_1 with the time tag based on CP56Time2a format defined in the IEC 60870-5-101 standard.

  Note: This ASDU type may be optionally used instead of the standard ASDU type 16. See section 3.4.4.

2.3 Selection of basic application functions supported in REC 523

- Remote initialization
- Local initialization
- Clock synchronization
- Command transmission
- Acquisition of events
- General interrogation
- Acquisition of transmission delay

3 Protocol Interface Implementation

3.1 Application to protocol mapping

3.1.1 POD concept

The Protocol Object Dictionary (POD) is a cross-reference table between the REC 523 application and the IEC 60870-5-101 protocol. This table defines what information can be accessed from the device using the protocol interface. As the REC 523 device is programmable and may run various application setups (different sets of function blocks), the POD is also fully re-configurable. This re-configurable table (called visible POD) is used during device initialization to create the POD used at runtime (called operational POD). The visible POD can cover all possible device application setups. At start-up, all present function blocks will be automatically detected and only data items belonging to these blocks will be included in the operational POD.

3.1.2 POD configuration

A default version of the visible POD is provided in the device software and it includes the mapping of process data and events from all available function blocks, and communication interface parameters into the IEC 60870-5-101 protocol. With some exceptions, application settings, parameters, recorded measurement and disturbance data are not included in this mapping.

The default POD contents can be uploaded for review and be modified using the available POD editing tool. Following the changes, the new POD contents can be downloaded to the REC 523 and activated by storing the changes and resetting the device.

Modification of the POD contents may be required due to the following situations:

- a different addressing concept is used in the system because of the primary (controlling) station requirements or limitations in protocol data addressing (readdressing of mapped application objects),
- elimination of obsolete function blocks (not used in the application setup),
- elimination of obsolete data and events from active function blocks (data items not required or not processed by the primary station).

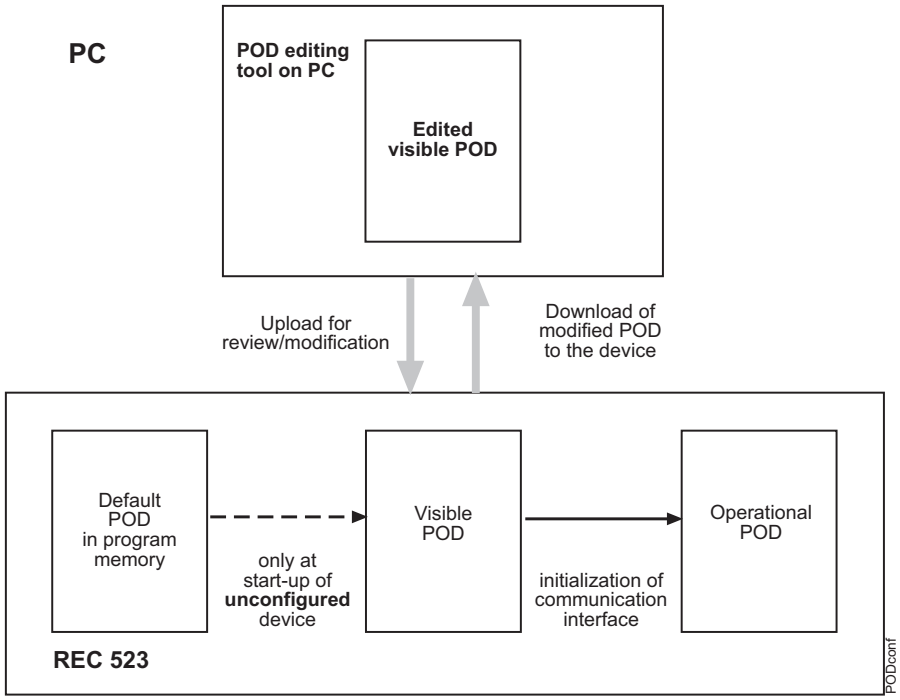

Figure 3.1.2-1 POD in REC 523 device

3.1.3 Addressing scheme

The following protocol addressing scheme has been applied to REC 523 data:

Data type (address group)	Direction (access)	Address of the first IEC information object in the address group (hex)	Format	IEC type identification
Digital data (incl. binary parameters)	Monitor (read)	0000	8 bit	M_SP_NA_1 M_SP_TA_1 - for events*
Digital data (2-bit information)	Monitor (read)	2000	8 bit	M_DP_NA_1 M_DP_TA_1 - for events*
Analogue data, parameter data	Monitor (read)	4400	16 bit 32-bit	M_ME_NB_1 M_IT_NA_1 M_BO_NA_1 M_ME_TB_1 for events*
Counters	Monitor (read)	6000	32 bit	M_IT_NA_1
Digital data (incl. binary parameters)	Control (write)	8000	8 bit	C_SC_NA_1
Analogue data, parameter data	control (write)	B400	16 bit	C_SE_NB_1
STRING data	Monitor (read)	E000	ASCII	M_SR_NA_1

Time	Monitor (read)	E200	Binary time (7 octets)	C_CS_NA_1 with the cause of transmission SPONTANEOUS (used in ABB option - see above)
Transparent SPA messages (last response)	Monitor (read)	E300	ASCII	M_SB_NA_1
STRING data (ASCII texts)	Control (write)	E400 - E402	ASCII	C_SR_NA_1
Time set	Control (write)	0000	Binary time (7 octets)	C_CS_NA_1
Transparent SPA messages (request – response)	Control (write)	E600	ASCII	C_SB_NA_1

*For frames with time tag representing events, there are 3 configurable alternative options:

- IEC standard (3-byte time tag) M_XX_TA_1
- ABB option
  C_CS_NA_1 + M_XX_TA_1 (full time telegram sent before the actual data telegram)
- Siemens option
  M_XX_FA_1 (private type with full time stamp)

Objects of the same type from different function blocks are mapped into sections within each address group. Each function block adds an offset of 0040 hex to the previous address in the given address group. In this way, some address space in the protocol has been left for future extensions in the default mapping.

3.1.4 Defining POD contents

3.1.4.1 Visible POD entry format

The visible POD may contain maximum 3000 entries. The number of defined entries is revision dependent, e.g. the default POD of revision D of REC 523 occupies 2255 entries.

The visible POD can be accessed using Protocol Editing Tool. The attributes in POD table can be divided into two MEAIn categories: general and protocol attributes. Protocol attributes of visible POD can be further divided into two categories:

- attributes of the application (object name, value type, interrogation assignment, access type).
- attributes of the communication (IEC object address, ASDU type, conversion code, data class, “in use” flag).

The application description part can be considered as determined by the available set of function blocks and its default contents corresponds to the so-called maximum application (events and process data objects of all function blocks defined in the REC 523 functional specification are included).

The protocol description part has the default content based on the ABB addressing scheme for the IEC 60870-5-101 protocol. This part may be subject to more frequent modifications, for example, due to a different addressing scheme, different ASDU types selected in the mapping, a different encoding method (conversion code describes e.g. scaling factor for integers containing real numbers, binary logic inversion in signal representation, etc.).

A flag parameter “in use” can be used to facilitate removing (masking) of POD entries from the operational POD. By this flag, the unused entries of the visible POD do not have to be removed from the table but only marked as not in use. In this way, the visible POD still can contain the information required for mapping the maximum set of REC 523 function blocks into the protocol.

The structure of IEC POD is introduced in the figure 3.1.4.1-1.

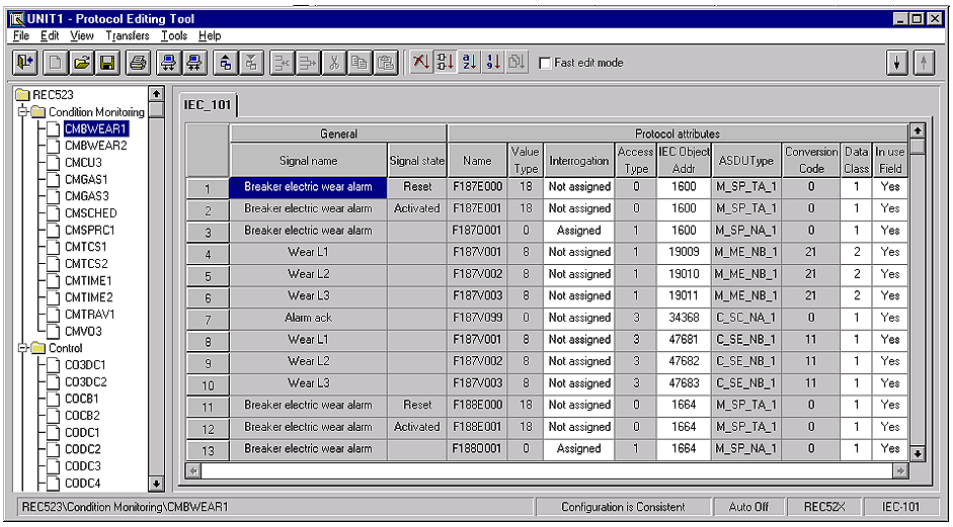

Figure 3.1.4.1-1 Protocol Editing Tool with IEC 60870-5-101 POD

The meaning of each item of a POD entry and its corresponding index is shown in the table below:

Item number	Item	Description
0	Name	Application name of REC 523 object; in most cases in SPA format e.g. F031I001 (input 1 from channel 31), F031E000 (event 0 from channel 31) etc. with some exceptions as, for example, LONSPAIN

1	Value type	Value type of the database item (see the table of codes below)
2	Interrogation assignment	Assigned to general interrogation group (1) or not (0)
3	Access type	Access type for the object (see the table of codes below)
4	IEC object address	IEC protocol address of the mapped object
5	ASDU type	IEC frame type used for data transfer
6	Conversion code	Conversion type for the object between the application format and the protocol format (see next section).
7	Data class	Data class 1 (for higher-priority data) or 2 (for lower-priority data) for the requested data; data class 1 or 2 for objects with write access denotes that the secondary (controlled) station response to a write operation will be sent with this priority. Note: event acquisition data are always data class 1
8	In use	In use flag (1 – accessible, 0 – not accessible)

Object name

According to the REC 523 naming convention, the object name is defined as an **8-character** ASCII string. The following name structure is used for most of the application objects:

"**F**xxxZyyy"

where *xxx* represents a 3-digit channel number (identification of function block), *Z* represents data category (possible values are those used in the SPA protocol: **I**, **O**, **V**, **S**, **M**), *yyy* represents a 3-digit data number. For example, "**F031O001**" denotes output 1 of function block 31.

In addition, in the POD of the IEC 60870-5-101 protocol interface the category **E** will be used to describe application objects that only have event representation. For example, "**F230E000**" denotes an event generated by the function block 230 (User-defined).

Some of the application objects do not follow the above naming convention.

Note that multiple entries of the visible POD may refer to the same application object (i.e. REC 523 database object) if separate mapping is required for different access types (e.g. spontaneous data and read-on-request, or read and write access).

The function block channel number can be derived from the object name.

Value type

This attribute contains the code of the database object type or the code of the data type in the event.

Note: If the data value carried in the event is irrelevant for the protocol, then the EV_NODAT code shall be used.

Name	Code	Description

BOOL	0	Boolean value - 0 or 1
DPBOOL	1	Double point value: 00 - middle, 01 -closed (earthed), 10 - opened (freed), 11 - faulty
SINT	2	8-bit signed integer
INT	3	16-bit signed integer
DINT	4	32-bit signed integer
USINT	5	8-bit unsigned integer
UINT	6	16-bit unsigned integer
UDINT	7	32-bit unsigned integer
REAL	8	32-bit floating point
TIME	9	32-bit unsigned integer containing number of milliseconds
TOD	10	32-bit unsigned integer containing time of the day since midnight in 100us units
DATE	11	32-bit unsigned integer containing number of days since 01-01-1980
CLOCK	12	Full time type used for time synchronisation (function)
STRING	13	String value
SPA	14	Transparent SPA message (function)
BYTE	15	8-bit unsigned integer
WORD	16	16-bit unsigned integer
DWORD	17	32-bit unsigned integer
EV_NODAT	18	Event without data
EV_1BIT	19	Event with 1-bit data
EV_2BIT	20	Event with 2-bit data
EV_3BIT	21	Event with 3-bit data (treated as EV_NODAT - phase information will be ignored)
EV_FLOAT	22	Event with floating point value
EV_INT16	23	Event with 16-bit integer value
EV_INT32	24	Event with 32-bit integer value
EV_COUNT	25	Event with counter value
EV_32BIT	26	Event with 32-bit value

Interrogation assignment

This flag attribute defines whether an object is assigned to general interrogation (only database objects may be assigned). The default assignment is based on function blocks specification.

Interrogation assignment	Code	Name
assigned	1	Yes
not assigned	0	No

Access type

With respect to the IEC 60870-5-101 protocol functions, the following **access types** can be distinguished for REC 523 application objects:

Access type	Code	Name	Description
spontaneous data	0	SPONT	
read on request	1	READREQ	

spont. & read on request	2	SPONTREADREQ	
write on request	3	WRITEREQ	
read & write on request	4	READWRITEREQ	
composite read	5	COMPREAD	if multiple application objects correspond to a single ASDU
composite write	6	COMPWRITE	if multiple application objects correspond to a single ASDU
composite read & write	7	COMPREADWRITE	if multiple application objects correspond to a single ASDU
direct open	10	DIRECTOPEN	
direct close	11	DIRECTCLOSE	
select	12	SELECT	
select open	13	SELECTOPEN	
select close	14	SELECTCLOSE	
execute	15	EXECUTE	
execute open	16	EXECUTEOPEN	
execute close	17	EXECUTECLOSE	
cancel	18	CANCEL	
synchronization	20	SYNCHR	
initialization	21	INIT	

Note: The list above may be subject to extensions.

IEC object address

The IEC information object address is assigned to a given application object based on the addressing scheme chosen. As default, the ABB addressing scheme is used.

Note that multiple entries of the visible POD may refer to the same IEC information object address, if the ASDU refers to multiple application objects (e.g. select/execute/cancel command).

ASDU type

The set of supported ASDU types is defined in section 2.2.3 of this document.

Conversion code

With respect to the IEC 60870-5-101 protocol functions (ABB profile), the following conversion codes can be distinguished for REC 523 application objects:

Conversion required	Code	Name	Description
binary, same logic	0	BIN_SAME	
binary, inverse logic	1	BIN_INVERSE	0 --> 1, 1 --> 0
binary, fixed 1	2	BIN_FIXED1	for single events
binary, fixed 0	3	BIN_FIXED0	for single events
double bit, same logic	4	DOUBLE_SAME	

double bit, inverse logic	5	DOUBLE_INVERSE	01 --> 10, 10 --> 01
integer / integer	10	INT_INT	
unscaled integer / float	11	UINT_FLOAT	
scaled integer with factor 10 / float	12	SINT10_FLOAT	float <-- value / 10
scaled integer with factor 100 / float	13	SINT100_FLOAT	
scaled integer with factor 1000 / float	14	SINT1000_FLOAT	
scaled integer with factor 0.1 / float	15	SINT01_FLOAT	float <-- value * 10
scaled integer with factor 0.01 / float	16	SINT001_FLOAT	
scaled integer with factor 0.001 / float	17	SINT0001_FLOAT	
float / float	20	FLOAT_FLOAT	
float / unscaled integer	21	FLOAT_UINT	
float / scaled integer with factor 10	22	FLOAT_SINT10	integer <-- INT(value * 10)
float / scaled integer with factor 100	23	FLOAT_SINT100	
float / scaled integer with factor 1000	24	FLOAT_SINT1000	
float / scaled integer with factor 0.1	25	FLOAT_SINT01	integer <-- INT(value / 10)
float / scaled integer with factor 0.01	26	FLOAT_SINT001	
float / scaled integer with factor 0.001	27	FLOAT_SINT0001	
time / short time	30	TIME_STIME	
time / full time	31	TIME_FTIME	
string	40	STRING	
SPA message	41	SPA	
no conversion required	50	NOCONV	

Note: The list above may be subject to extensions.

Note: Binary same logic or binary inverse logic may also apply to the event code range if there is no value in the event.

Data class

This attribute defines the data class to which the outgoing ASDU will be assigned on the link layer. The attribute is important in the unbalanced transmission mode of the IEC 60870-5-101 protocol.

In general, all cyclically transmitted data should be assigned to class 2. Low-priority data may be included in this class too.

In REC 523 units, cyclic transmission is not used. Therefore, in the default class assignment all information is transmitted as class 1 data. The only exception is that values of parameters/settings and recorded data are sent to the primary (controlling) station as class 2 data in response to a READ command (but as class 1 data in response to a SET command).

“In use” flag

This flag is a mask defining whether a given object is accessible through the protocol.

"In use"	Code	Name
in use (accessible)	1	Yes
not in use (not accessible)	0	No

The "In use" flag is normally set to 1 for all records of the default POD. When reconfiguring the POD, this flag can be used to mask out some records without removing them from the visible POD content.

3.1.4.2 Operational POD

The so-called **operational POD** will be created by the protocol interface software during its initialization. Some internally used attributes (e.g. FB number, database index, conversion routine number, index supporting search operations) will be automatically derived from the attributes of the visible POD.

3.1.4.3 POD diagnostics

Each POD table that has been downloaded into the unit has an identification string. The identification string is used to check the consistency between the POD stored into REC 523 and the POD opened by Protocol Editing Tool. Refer to POD Tool Operator's Manual for further information.

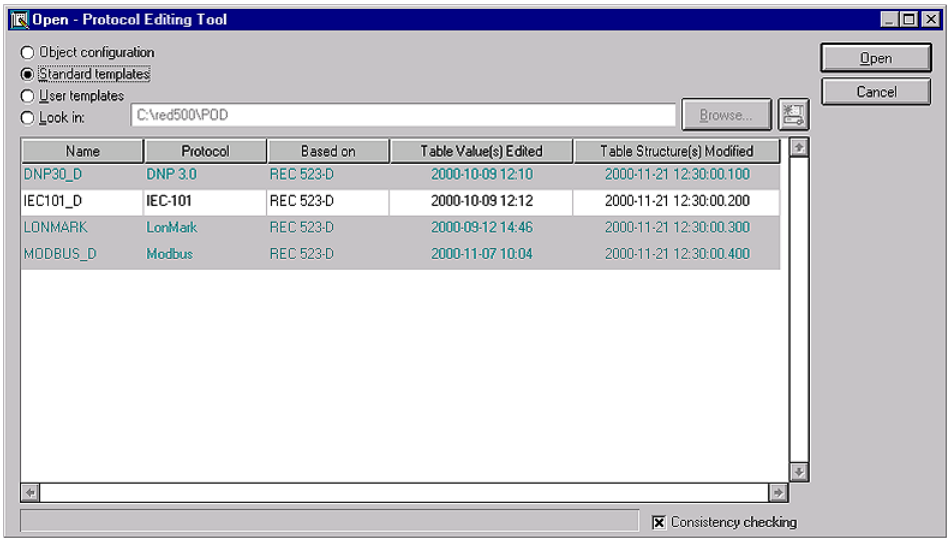

Figure 3.1.4.3-1 Protocol Editing Tool with Open dialog of IEC 60870-5-101 POD

After POD has been downloaded and stored into the unit, it is possible to upload POD diagnostics from the unit.

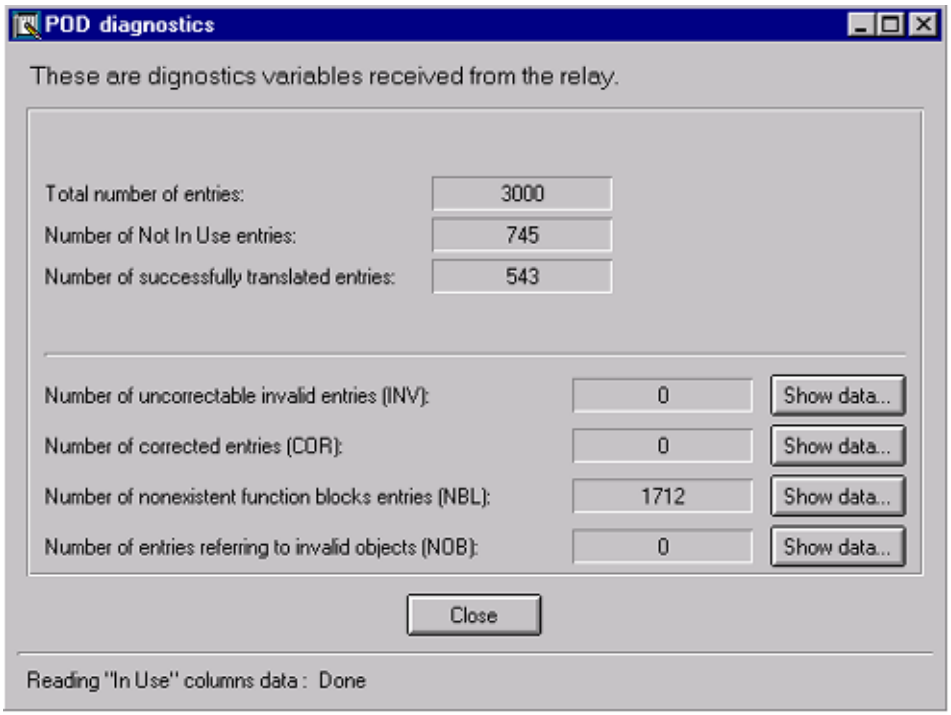

Figure 3.1.4.3-2 Protocol Editing Tool with POD diagnostics

The meaning of each parameter has been introduced in the table below.

Name	***Description***	***SPA parameter***
Total number of entries	Total number of visible POD entries This value is determined by the POD structure size. Both used and unused entries are counted.	F503V060
Number of Not In Use entries	Number of entries not in use (“in use” field set to 0) This number covers all defined POD entries with the “in use” flag reset as well as all empty POD entries which by default have the “in use” flag also reset.	F503V061
Number of entries translated into operational POD	Translation applies only to the entries with “in use” flag set, correct or corrected contents, and referring to valid objects or events of the function blocks included in the application project.	F503V066
Number of uncorrectable invalid entries (INV)	This checking applies only to the entries with “in use” flag set.	F503V062
Number of corrected entries (COR)	This checking applies only to the entries with “in use” flag set.	F503V063

Number of nonexistent function block entries (NBL)	This checking applies only to the entries with “in use” flag set.	F503V064
Number of entries referring to invalid objects (NOB)	This checking applies only to the entries with “in use” flag set.	F503V065

If seen necessary, one can further analyze the result of diagnostics by selecting “Show data…” (see figure 3.1.4.3-2). Diagnostic details introduces a list of items belonging to the selected category. The list is sorted out based on the row number of the item. Using this information, required changes and corrections can be made to the POD.

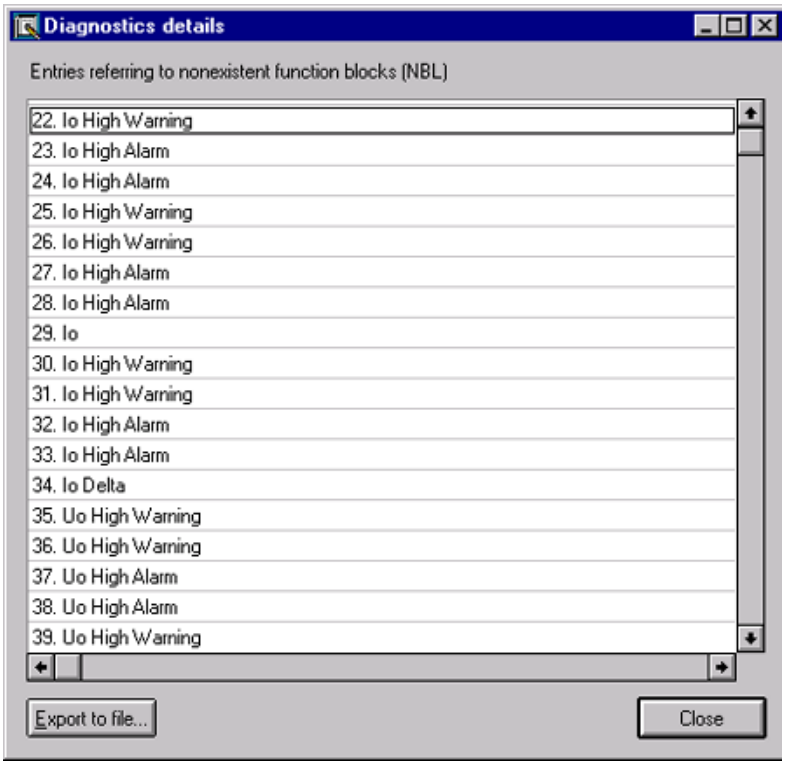

Figure 3.1.4.3 -3 Diagnostic Details

3.1.4.4 Examples of mapping application data into the IEC 60870-5-101 protocol

Example #1: START signal from I3> stage

The function block NOC3LOW provides (among other items) information on the start of protection. This monitoring data is available as:

- current signal status - in database object F031O001,
- signal change - reported by events E0 - signal reset, E1 - signal set.

Note:
For events that do not include an explicit data value, the signal state is assumed to be *reset/deactivated* for the first event, *set/activated* for the second event.

In the IEC 60870-5-101 protocol, these data items are mapped as:

- *single-point information, no time tag,* - for current signal status, reported only on request,
- *single-point information, time-tagged* - for signal change event, reported spontaneously.

The reported signal state is encoded with the same logic:

- reset - value 0
- set - value 1

Assigned to data class 1.

Name	Value type	Interrog. assign.	Access type	IEC object address (hex)	ASDU type	Conv. code	Data class	In use
0	1	2	3	4	5	6	7	8
F031E000	EV_NODAT	0	SPONT	0000	M_SP_TA_1	BIN_SAME	1	1
F031E001	EV_NODAT	0	SPONT	0000	M_SP_TA_1	BIN_SAME	1	1
F031O001	BOOL	0	READREQ	0000	M_SP_NA_1	BIN_SAME	1	1

First entry: events (signal changes)

Function block: NOC3LOW
Object name: F031E000
Event without data
Not included in general interrogation
Access type: spontaneous
IEC-101 address: 0x0000
Single-point information, time-tagged
Conversion made: binary with the same logic (E0 -> 0, E1 -> 1)
Data class 1
Entry in use

Second entry: events (signal changes)

Function block: NOC3LOW
Object name: F031E001
Event without data
Not included in general interrogation
Access type: spontaneous
IEC-101 address: 0x0000
Single-point information, time-tagged
Conversion made: binary with the same logic (E0 -> 0, E1 -> 1)
Data class 1
Entry in use

Third entry: static data (database object)

Function block: NOC3LOW
Object name: F031O001
Binary value (signal status)
Not included in general interrogation
Access type: requested
IEC-101 address: 0x0000
Single-point information, no time tag
Conversion made: binary with the same logic
Data class 1
Entry in use

Example #2: disconnector switch position

The function block CODC2 is used to control and monitor the position of a disconnector switch.

Two types of monitoring information are available:

- current switch position - in database object F123V001
- position change - reported by events E0=Open, E1= Close, E2= Faulty, E3= Middle

In the IEC 60870-5-101 protocol, these data items are mapped as:

- *double-point information, no time tag,* - for current switch position, reported only on request
- *double-point information, time-tagged* - for position change events, reported spontaneously

The reported switch position is encoded as follows:

- open - value 1
- closed - value 2
- indeterminate (middle) - value 0
- indeterminate (faulty) - value 3

Assigned to data class 1.

Name	Value type	Interrog. assign.	Access type	IEC Object address (hex)	ASDU type	Conv. code	Data class	In use
0	1	2	3	4	5	6	7	8
F123E000	EV_2BIT	0	SPONT	2080	M_DP_TA_1	DOUBLE_INVERSE	1	1
F123E001	EV_2BIT	0	SPONT	2080	M_DP_TA_1	DOUBLE_INVERSE	1	1
F123E002	EV_2BIT	0	SPONT	2080	M_DP_TA_1	DOUBLE_INVERSE	1	1

F123E003	EV_2BIT	0	SPONT	2080	M_DP_TA_1	DOUBLE_INVERSE	1	1
F123V001	DPBOOL	1	READREQ	2080	M_DP_NA_1	DOUBLE_INVERSE	1	1

Four entries: one for each event (position changes)

Function block: CODC2
Object name: Data (position) encoded on 2 bits
F123E000 position open
F123E001 position closed
F123E002 position faulty
F123E003 position middle
Event wit 2-bit data
Not included in general interrogation
Access type: spontaneous
IEC-101 address 0x2080
Double-point information, time-tagged
Conversion made: double bit with inverse logic (E0 = 2 -> 1, E1=1 -> 2, E2=3 -> 3, E3=0 -> 0)
Data class 1
Entry in use

Fifth entry: static data (database object)

Function block: CODC2
Object name: F123V001
Double point value: 00- middle, 01 - closed, 10 - opened, 11 - faulty
Included in general interrogation
Access type: requested
IEC-101 address 0x2080
Double-point information, no time tag
Conversion made: double bit with inverse logic
Data class 1
Entry in use

Example #3: analogue event (delta change event)

The MECU1A function block provides neutral current measurement and two ways of supervising this signal - limit (high warning and high alarm) and threshold (delta change).

Delta change is reported from the MECU1A block by:

- event E5 that indicates crossing of the threshold level and contains the measured value

The related database object with the measured value of the neutral current is F201I001.

In the IEC 60870-5-101 protocol, this event is mapped as:

- *measured scaled value, no time tag* - reported spontaneously

Conversion is performed from float to integer (unscaled, fraction of Amp truncated).

Assigned to data class 1.

Name	Value type	Interrog. assign.	Access type	IEC Object address (hex)	ASDU type	Conv. code	Data class	In use
0	1	2	3	4	5	6	7	8
F201E005	EV_FLOAT	0	SPONT	4D00	M_ME_NB_1	FLOAT_UINT	1	1

Entry representing delta change event

Function block: MECU1A
Object name: F201E005
Event with floating point value
Not included in general interrogation
Access type: spontaneous
IEC-101 address 0x4D00
Measured scaled value, no time tag
Conversion made: float -> unscaled integer
Data class 1
Entry in use

Example #4: analogue event (limit supervision event)

The MECU1B function block provides neutral current measurement and two ways of supervising this signal - limit (high warning and high alarm) and threshold (delta change).

Limit supervision change is reported from the MECU1B block by:

- events E0, E1 that indicate High warning activation or resetting.

The related database object with the measured value of the neutral current is F201I001.

In the IEC 60870-5-101 protocol, each of these events is mapped as:

- *single-point information, time tagged,* - for current limit signal status, reported spontaneously,
- *measured scaled value, no time tag* - for current signal value reported spontaneously.

The reported signal state is encoded with the same logic:

- reset - value 0
- activation - value 1

Conversion is performed from float to integer (unscaled, fraction of Amp truncated).

Assigned to data class 1.

Name	Value type	Interrog. assign.	Access type	IEC Object address (hex)	ASDU type	Conv. code	Data class	In use
0	1	2	3	4	5	6	7	8
F203E000	EV_FLOAT	0	SPONT	0180 H	M_SP_TA_1	BIN_SAME	1	1
F203E000	EV_FLOAT	0	SPONT	4580 H	M_ME_NB_1	FLOAT_UINT	1	1
F203E001	EV_FLOAT	0	SPONT	0180 H	M_SP_TA_1	BIN_SAME	1	1
F203E001	EV_FLOAT	0	SPONT	4580 H	M_ME_NB_1	FLOAT_UINT	1	1

First entry representing high warning reset event

Function block: MECU1B
Object name: F203E000
Event with floating point value
Not included in general interrogation
Access type: spontaneous
IEC-101 address 0x0180
Single-point information, time-tagged
Conversion made: binary with the same logic (E0 -> 0, E1 -> 1)
Data class 1
Entry in use

Second entry representing high warning reset event (value)

Function block: MECU1B
Object name: F203E000
Event with floating point value
Not included in general interrogation
Access type: spontaneous
IEC-101 address 0x4580
Measured scaled value, no time tag
Conversion made: float -> unscaled integer
Data class 1
Entry in use

Third entry representing high warning activation event

Function block: MECU1B
Object name: F203E001
Event with floating point value
Not included in general interrogation
Access type: spontaneous
IEC-101 address 0x0180
Single-point information, time-tagged
Conversion made: binary with the same logic (E0 -> 0, E1 -> 1)

Data class 1
Entry in use

Fourth entry representing high warning activation event (value)

Function block: MECU1B
Object name: F203E001
Event with floating point value
Not included in general interrogation
Access type: spontaneous
IEC-101 address 0x4580
Measured scaled value, no time tag
Conversion made: float -> unscaled integer
Data class 1
Entry in use

Example #5: two-step control command

The function block CODC1 is used to control and monitor the position of a disconnector switch. Two types of control operation are available:

- one-step *direct* command - F122V004 and F122V005 for direct open and direct close
- two-step *select/execute* commands - F122V006 and F122V007 - for selecting open and close, F122V011 for selecting the execute operation and F122V010 for cancelling a selection

In the IEC 60870-5-101 protocol these control commands are mapped as:

- *single command* - with the command semantics encoded in the frame

Access type defines the command semantics (for two-step commands):

- select open
- select close
- execute
- cancel

The desired switch position (boolean) is encoded with an inverse logic:
0 - open, 1 - close

Responses to control commands are assigned to data class 1.

Name	Value type	Interrog. assign.	Access type	IEC Object address (hex)	ASDU type	Conv. code	Data class	In use
0	1	2	3	4	5	6	7	8
F122V004	BOOL	0	DIRECTOPEN	8300	C_SC_NA_1	BIN_INVERSE	1	1
F122V005	BOOL	0	DIRECTCLOSE	8300	C_SC_NA_1	BIN_INVERSE	1	1
F122V006	BOOL	0	SELECTOPEN	8301	C_SC_NA_1	BIN_INVERSE	1	1

F122V007	BOOL	0	SELECTCLOSE	8301	C_SC_NA_1	BIN_INVERSE	1	1
F122V011	BOOL	0	EXECUTE	8301	C_SC_NA_1	BIN_INVERSE	1	1
F122V010	BOOL	0	CANCEL	8301	C_SC_NA_1	BIN_INVERSE	1	1

Six entries - one for each command object in the application

Function block: CODC1
Database object name:
F122V004 Direct open Access type: direct open
F122V005 Direct close Access type: direct close
F122V006 Open select Access type: select open
F122V007 Close select Access type: select close
F122V0011 Execute Access type: execute
F122V0010 Cancel Access type: cancel
Data as boolean value
Not included in general interrogation
IEC-101 address for direct command: 0x8300
IEC-101 address for two-step command: 0x8301
Single command
Conversion made: binary with inverse logic
Data class 1
Entries in use

3.2 Protocol address map based on default POD

The mapping presented in this section corresponds to the default POD.

For a given application setup, the visible POD can be reconfigured to omit unused function blocks and data items, and to change the object address if required.

Function block MEAI1

Description	*Name*	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Value High warning	F213E000 F213E001	0DC0 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Value High alarm	F213E002 F213E003	0DC1 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Value Low warning	F213E004 F213E005	0DC2 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Value Low alarm	F213E006 F213E007	0DC3 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Value is valid	F213E008 F213E009	0DC4 H	M_SP_TA_1	SPONT	High priority	No	0 = Valid 1 = Invalid
Measurement value	F213I001	4DC0 H	M_ME_NB_1	READREQ	High priority	Yes	-10000.000..10000.000 -10000.000..10000.000

Description	*Name*	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Value of MEAI 1 high/low/warning/alarm/delta	F213E000	4DC0 H	M_ME_NB_1	SPONT	High priority	No	-10000.000..10000.000
	F213E001						-10000.000..10000.000
	F213E002						
	F213E003						
	F213E004						
	F213E005						
	F213E006						
	F213E007						
	F213E008						
	F213E009						
	F213E011						

Function block MEAI2

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Value High warning	F214E000	0E00 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset
	F214E001						1 = Activated
Value High alarm	F214E002	0E01 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset
	F214E003						1 = Activated
Value Low warning	F214E004	0E02 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset
	F214E005						1 = Activated
Value Low alarm	F214E006	0E03 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset
	F214E007						1 = Activated
Value is valid	F214E008	0E04 H	M_SP_TA_1	SPONT	High priority	No	0 = Valid
	F214E009						1 = Invalid
Measurement value	F214I001	4E00 H	M_ME_NB_1	READREQ	High priority	Yes	-10000.000..10000.000
							-10000.000..10000.000
Value of MEAI 2 high/low/warning/alarm/delta	F214E000	4E00 H	M_ME_NB_1	SPONT	High priority	No	-10000.000..10000.000
	F214E001						-10000.000..10000.000
	F214E002						
	F214E003						
	F214E004						
	F214E005						
	F214E006						
	F214E007						
	F214E008						
	F214E009						
	F214E011						

Function block MEAI3

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Value High warning	F215E000 F215E001	0E40 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Value High alarm	F215E002 F215E003	0E41 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Value Low warning	F215E004 F215E005	0E42 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Value Low alarm	F215E006 F215E007	0E43 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Value is valid	F215E008 F215E009	0E44 H	M_SP_TA_1	SPONT	High priority	No	0 = Valid 1 = Invalid
Measurement value	F215I001	4E40 H	M_ME_NB_1	READREQ	High priority	Yes	-10000.000..10000.000 -10000.000..10000.000
Value of MEAI 3 high/low/warning/alarm/delta	F215E000 F215E001 F215E002 F215E003 F215E004 F215E005 F215E006 F215E007 F215E008 F215E009 F215E011	4E40 H	M_ME_NB_1	SPONT	High priority	No	-10000.000..10000.000 -10000.000..10000.000

Function block MEAI4

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Value High warning	F216E000 F216E001	0E80 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Value High alarm	F216E002 F216E003	0E81 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Value Low warning	F216E004 F216E005	0E82 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Value Low alarm	F216E006 F216E007	0E83 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Value is valid	F216E008 F216E009	0E84 H	M_SP_TA_1	SPONT	High priority	No	0 = Valid 1 = Invalid
Measurement value	F216I001	4E80 H	M_ME_NB_1	READREQ	High priority	Yes	-10000.000..10000.000 -10000.000..10000.000

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Value of MEAI 4 high/low/warning/alarm/delta	F216E000	4E80 H	M_ME_NB_1	SPONT	High priority	No	-10000.000..10000.000
	F216E001						-10000.000..10000.000
	F216E002						
	F216E003						
	F216E004						
	F216E005						
	F216E006						
	F216E007						
	F216E008						
	F216E009						
	F216E011						

Function block MEAI5

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Value High warning	F217E000	0EC0 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset
	F217E001						1 = Activated
Value High alarm	F217E002	0EC1 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset
	F217E003						1 = Activated
Value Low warning	F217E004	0EC2 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset
	F217E005						1 = Activated
Value Low alarm	F217E006	0EC3 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset
	F217E007						1 = Activated
Value is valid	F217E008	0EC4 H	M_SP_TA_1	SPONT	High priority	No	0 = Valid
	F217E009						1 = Invalid
Measurement value	F217I001	4EC0 H	M_ME_NB_1	READREQ	High priority	Yes	-10000.000..10000.000
							-10000.000..10000.000
Value of MEAI 5 high/low/warning/alarm/delta	F217E000	4EC0 H	M_ME_NB_1	SPONT	High priority	No	-10000.000..10000.000
	F217E001						-10000.000..10000.000
	F217E002						
	F217E003						
	F217E004						
	F217E005						
	F217E006						
	F217E007						
	F217E008						
	F217E009						
	F217E011						

Function block MEAI6

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Value High warning	F218E000 F218E001	0F40 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Value High alarm	F218E002 F218E003	0F41 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Value Low warning	F218E004 F218E005	0F42 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Value Low alarm	F218E006 F218E007	0F43 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Value is valid	F218E008 F218E009	0F44 H	M_SP_TA_1	SPONT	High priority	No	0 = Valid 1 = Invalid
Measurement value	F218I001	4F40 H	M_ME_NB_1	READREQ	High priority	Yes	-10000.000..10000.000 -10000.000..10000.000
Value of MEAI 6 high/low/warning/alarm/delta	F218E000 F218E001 F218E002 F218E003 F218E004 F218E005 F218E006 F218E007 F218E008 F218E009 F218E011	4F40 H	M_ME_NB_1	SPONT	High priority	No	-10000.000..10000.000 -10000.000..10000.000

Function block MEAI7

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Value High warning	F219E000 F219E001	0F80 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Value High alarm	F219E002 F219E003	0F81 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Value Low warning	F219E004 F219E005	0F82 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Value Low alarm	F219E006 F219E007	0F83 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Value is valid	F219E008 F219E009	0F84 H	M_SP_TA_1	SPONT	High priority	No	0 = Valid 1 = Invalid
Measurement value	F219I001	4F80 H	M_ME_NB_1	READREQ	High priority	Yes	-10000.000..10000.000 -10000.000..10000.000

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Value of MEAI 7 high/low/warning/alarm/delta	F219E000	4F80 H	M_ME_NB_1	SPONT	High priority	No	-10000.000..10000.000
	F219E001						-10000.000..10000.000
	F219E002						
	F219E003						
	F219E004						
	F219E005						
	F219E006						
	F219E007						
	F219E008						
	F219E009						
	F219E011						

Function block MEAI8

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Value High warning	F220E000	0FC0 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset
	F220E001						1 = Activated
Value High alarm	F220E002	0FC1 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset
	F220E003						1 = Activated
Value Low warning	F220E004	0FC2 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset
	F220E005						1 = Activated
Value Low alarm	F220E006	0FC3 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset
	F220E007						1 = Activated
Value is valid	F220E008	0FC4 H	M_SP_TA_1	SPONT	High priority	No	0 = Valid
	F220E009						1 = Invalid
Measurement value	F220I001	4FC0 H	M_ME_NB_1	READREQ	High priority	Yes	-10000.000..10000.000
							-10000.000..10000.000
Value of MEAI 8 high/low/warning/alarm/delta	F220E000	4FC0 H	M_ME_NB_1	SPONT	High priority	No	-10000.000..10000.000
	F220E001						-10000.000..10000.000
	F220E002						
	F220E003						
	F220E004						
	F220E005						
	F220E006						
	F220E007						
	F220E008						
	F220E009						
	F220E011						

Function block MECU1A

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Io high warning	F201E000 F201E001	0900 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Io high alarm	F201E002 F201E003	0901 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Io high warning/ high alarm/ delta	F201E000 F201E001 F201E002 F201E003 F201E005	4D00 H	M_ME_NB_1	SPONT	High priority	No	0.0..20000.0 A
Current Io	F201I001	4D00 H	M_ME_NB_1	READREQ	High priority	Yes	0.0..20000.0 A

Function block MECU1B

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Io (LV-side) high warning	F203E000 F203E001	0180 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Io (LV-side) high alarm	F203E002 F203E003	0181 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Io (LV-side) high warning/ high alarm/ delta	F203E000 F203E001 F203E002 F203E003 F203E005	4580 H	M_ME_NB_1	SPONT	High priority	No	0.0..20000.0 A
Current Io	F203I001	4580 H	M_ME_NB_1	READREQ	High priority	Yes	0.0..20000.0 A

Function block MECU3A

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
IL1 high warning	F200E000 F200E001	08C0 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
IL2 high warning	F200E002 F200E003	08C1 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
IL3 high warning	F200E004 F200E005	08C2 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
IL1 high alarm	F200E006 F200E007	08C3 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
IL2 high alarm	F200E008 F200E009	08C4 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
IL3 high alarm	F200E010 F200E011	08C5 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
IL1 low warning	F200E012 F200E013	08C6 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
IL2 low warning	F200E014 F200E015	08C7 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
IL3 low warning	F200E016 F200E017	08C8 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
IL1 low alarm	F200E018 F200E019	08C9 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
IL2 low alarm	F200E020 F200E021	08CA H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
IL3 low alarm	F200E022 F200E023	08CB H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
IL1 high/low/warning/alarm/delta	F200E000 F200E001 F200E006 F200E007 F200E012 F200E013 F200E018 F200E019 F200E020 F200E025	4CC0 H	M_ME_NB_1	SPONT	High priority	No	0.0..20000.0 A
IL2 high/low/warning/alarm/delta	F200E002 F200E003 F200E008 F200E009 F200E014 F200E015 F200E021 F200E022 F200E027	4CC1 H	M_ME_NB_1	SPONT	High priority	No	0.0..20000.0 A
IL3 high/low/warning/alarm//delta	F200E004 F200E005 F200E010 F200E011 F200E016 F200E017 F200E023 F200E029	4CC2 H	M_ME_NB_1	SPONT	High priority	No	0.0..20000.0 A

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Current IL1	F200I001	4CC0 H	M_ME_NB_1	READREQ	High priority	Yes	0.0..20000.0 A
Current IL2	F200I002	4CC1 H	M_ME_NB_1	READREQ	High priority	Yes	0.0..20000.0 A
Current IL3	F200I003	4CC2 H	M_ME_NB_1	READREQ	High priority	Yes	0.0..20000.0 A

Function block MECU3B

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
IL1 High warning	F202E000 F202E001	0140 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
IL2 High warning	F202E002 F202E003	0141 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
IL3 High warning	F202E004 F202E005	0142 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
IL1 High alarm	F202E006 F202E007	0143 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
IL2 High alarm	F202E008 F202E009	0144 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
IL3 High alarm	F202E010 F202E011	0145 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
IL1 Low warning	F202E012 F202E013	0146 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
IL2 Low warning	F202E014 F202E015	0147 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
IL3 Low warning	F202E016 F202E017	0148 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
IL1 Low alarm	F202E018 F202E019	0149 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
IL2 Low alarm	F202E020 F202E021	014A H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
IL3 Low alarm	F202E022 F202E023	014B H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
IL1 high/low/warning/alarm/delta	F202E000 F202E001 F202E006 F202E007 F202E012 F202E013 F202E018 F202E019 F202E025	4540 H	M_ME_NB_1	SPONT	High priority	No	0.0..20000.0 A

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
IL2 high/low/warning/alarm/delta	F202E002 F202E003 F202E008 F202E009 F202E014 F202E015 F202E020 F202E021 F202E027	4541 H	M_ME_NB_1	SPONT	High priority	No	0.0..20000.0 A
IL3 high/low/warning/alarm/delta	F202E004 F202E005 F202E010 F202E011 F202E016 F202E017 F202E022 F202E023 F202E029	4542 H	M_ME_NB_1	SPONT	High priority	No	0.0..20000.0 A
Current IL1	F202I001	4540 H	M_ME_NB_1	READREQ	High priority	Yes	0.0..20000.0 A
Current IL2	F202I002	4541 H	M_ME_NB_1	READREQ	High priority	Yes	0.0..20000.0 A
Current IL3	F202I003	4542 H	M_ME_NB_1	READREQ	High priority	Yes	0.0..20000.0 A

Function block MEDREC16

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Recorder memory is full	F225E000 F225E001	0880 H	M_SP_TA_1	SPONT	High priority	No	0 = Off 1 = On
Overwrite of recording On	F225E003	0881 H	M_SP_TA_1	SPONT	High priority	No	1 = On
Configuration error On	F225E005	0882 H	M_SP_TA_1	SPONT	High priority	No	1 = On
Recorder triggered On	F225E031	0883 H	M_SP_TA_1	SPONT	High priority	No	1 = On

Function block MEFR1

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Frequency high warning	F208E000 F208E001	0280 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Frequency high alarm	F208E002 F208E003	0281 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Frequency low warning	F208E004 F208E005	0282 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Frequency low alarm	F208E006 F208E007	0283 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Frequency high/low/warning/alarm/delta	F208E000 F208E001 F208E002 F208E003 F208E004 F208E005 F208E006 F208E007 F208E009	4680 H	M_ME_NB_1	SPONT	High priority	No	10.00..75.00 Hz
System frequency	F208I001	4680 H	M_ME_NB_1	READREQ	High priority	Yes	10.00..75.00 Hz
Average system frequency	F208I002	468A H	M_ME_NB_1	READREQ	Low priority	No	10.00..75.00 Hz

Function block MEPE7

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
P3 High warning	F207E000 F207E001	0240 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
P3 High alarm	F207E002 F207E003	0241 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Q3 High warning	F207E004 F207E005	0242 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Q3 High alarm	F207E006 F207E007	0243 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
P3 Low warning	F207E008 F207E009	0244 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
P3 Low alarm	F207E010 F207E011	0245 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Q3 Low warning	F207E012 F207E013	0246 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Q3 Low alarm	F207E014 F207E015	0247 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
DPF Delta	F207E023	4656 H	M_ME_NB_1	SPONT	High priority	No	-1.00...1.00
Displacement power factor cos(j)	F207I003	4656 H	M_ME_NB_1	READREQ	Low priority	No	-1.00...1.00

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Power factor	F207I004	4657 H	M_ME_NB_1	READREQ	Low priority	No	-1.00...1.00
P3 High/Low/warning/alarm	F207E000 F207E001 F207E002 F207E003 F207E008 F207E009 F207E010 F207E011 F207E017	4640 H	M_IT_NA_1	SPONT	High priority	No	-999999...999999 kW
Q3 High/Low/warning/alarm	F207E004 F207E005 F207E006 F207E007 F207E012 F207E013 F207E014 F207E015 F207E019	4641 H	M_IT_NA_1	SPONT	High priority	No	-999999...999999 kvar
S3 Delta	F207E021	4642 H	M_IT_NA_1	SPONT	High priority	No	
Active energy Delta	F207E025	4643 H	M_IT_NA_1	SPONT	High priority	No	0..999999 kWh
Reversed active energy Delta	F207E027	4644 H	M_IT_NA_1	SPONT	High priority	No	0...999999 kWh
Reactive energy Delta	F207E029	4645 H	M_IT_NA_1	SPONT	High priority	No	0...999999 kvarh
Reversed reactive energy Delta	F207E031	4646 H	M_IT_NA_1	SPONT	High priority	No	0...999999 kvarh
3-phase active power	F207I001	4640 H	M_IT_NA_1	READREQ	High priority	Yes	-999999..999999 kW
3-phase reactive power	F207I002	4641 H	M_IT_NA_1	READREQ	High priority	Yes	-999999..999999 kvar
Last registered active energy	F207V414	4643 H	M_IT_NA_1	READREQ	Low priority	No	0...999999 kWh
Last registered reversed active energy	F207V415	4644 H	M_IT_NA_1	READREQ	Low priority	No	0...999999 kWh
Last registered reactive energy	F207V416	4645 H	M_IT_NA_1	READREQ	Low priority	No	0...999999 kvarh
Last registered reversed reactive energy	F207V417	4646 H	M_IT_NA_1	READREQ	Low priority	No	0...999999 kvarh
Active power demand	F207I005	4658 H	M_IT_NA_1	READREQ	Low priority	No	-999999...999999 kW
Reactive power demand	F207I006	4659 H	M_IT_NA_1	READREQ	Low priority	No	-999999...999999 kvar

Function block MEVO1A

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Uo High warning	F205E000 F205E001	0980 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Uo High alarm	F205E002 F205E003	0981 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Uo High/warning/alarm/Delta	F205E000 F205E001 F205E002 F205E003 F205E005	4D80 H	M_ME_NB_1	SPONT	High priority	No	0..150000 V
Residual voltage Uo	F205I001	4D80 H	M_ME_NB_1	READREQ	High priority	Yes	0..150000 V

Function block MEVO1B

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Uo High warning	F226E000 F226E001	0200 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Uo High alarm	F226E002 F226E003	0201 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Uo High/warning/alarm/Delta	F226E000 F226E001 F226E002 F226E003 F226E005	4600 H	M_ME_NB_1	SPONT	High priority	No	0..150000 V
Residual voltage Uo	F226I001	4600 H	M_ME_NB_1	READREQ	High priority	Yes	0..150000 V

Function block MEVO3A

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
U1 High warning	F204E000 F204E001	0940 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
U2 High warning	F204E002 F204E003	0941 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
U3 High warning	F204E004 F204E005	0942 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
U1 High alarm	F204E006 F204E007	0943 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
U2 High alarm	F204E008 F204E009	0944 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
U3 High alarm	F204E010 F204E011	0945 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
U1 Low warning	F204E012 F204E013	0946 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
U2 Low warning	F204E014 F204E015	0947 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
U3 Low warning	F204E016 F204E017	0948 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
U1 Low alarm	F204E018 F204E019	0949 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
U2 Low alarm	F204E020 F204E021	094A H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
U3 Low alarm	F204E022 F204E023	094B H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
U12 High warning	F204E032 F204E033	094D H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
U23 High warning	F204E034 F204E035	094E H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
U31 High warning	F204E036 F204E037	094F H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
U12 High alarm	F204E038 F204E039	0950 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
U23 High alarm	F204E040 F204E041	0951 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
U31 High alarm	F204E042 F204E043	0952 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
U12 Low warning	F204E044 F204E045	0953 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
U23 Low warning	F204E046 F204E047	0954 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
U31 Low warning	F204E048 F204E049	0955 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
U12 Low alarm	F204E050 F204E051	0956 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
U23 Low alarm	F204E052 F204E053	0957 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
U31 Low alarm	F204E054 F204E055	0958 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
U1 High/Low/warning/alarm/ Delta	F204E000 F204E001 F204E006 F204E007 F204E012 F204E013 F204E018 F204E019 F204E025	4D40 H	M_ME_NB_1	SPONT	High priority	No	0.00...999.99 kV
U2 High/Low/warning/alarm/ Delta	F204E002 F204E003 F204E008 F204E009 F204E014 F204E015 F204E020 F204E021 F204E027	4D41 H	M_ME_NB_1	SPONT	High priority	No	0.00...999.99 kV
U3 High/Low/warning/alarm/ Delta	F204E004 F204E005 F204E010 F204E011 F204E016 F204E017 F204E022 F204E023 F204E029	4D42 H	M_ME_NB_1	SPONT	High priority	No	0.00...999.99 kV
U12 High/Low/warning/alarm/ Delta	F204E032 F204E033 F204E038 F204E039 F204E044 F204E045 F204E057 F204E050 F204E051	4D40 H	M_ME_NB_1	SPONT	High priority	No	0.00...999.99 kV

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
U23 High/Low/warning/alarm/ Delta	F204E034 F204E035 F204E040 F204E041 F204E046 F204E047 F204E059 F204E052 F204E053	4D41 H	M_ME_NB_1	SPONT	High priority	No	0.00...999.99 kV
U31 High/Low/warning/alarm/ Delta	F204E036 F204E037 F204E042 F204E043 F204E048 F204E049 F204E061 F204E054 F204E055	4D42 H	M_ME_NB_1	SPONT	High priority	No	0.00...999.99 kV
Voltage U1_12	F204I001	4D40 H	M_ME_NB_1	READREQ	High priority	Yes	0.0..999.9 kV
Voltage U2_23	F204I002	4D41 H	M_ME_NB_1	READREQ	High priority	Yes	0.0..999.9 kV
Voltage U3_31	F204I003	4D42 H	M_ME_NB_1	READREQ	High priority	Yes	0.0..999.9 kV
Voltage U1_12 in percents	F204I004	4D43 H	M_ME_NB_1	READREQ	Low priority	No	0.00..2.00 *Un
Voltage U2_23 in percents	F204I005	4D44 H	M_ME_NB_1	READREQ	Low priority	No	0.00..2.00 *Un
Voltage U3_31 in percents	F204I006	4D45 H	M_ME_NB_1	READREQ	Low priority	No	0.00..2.00 *Un

Function block MEVO3B

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
U1 High warning	F206E000 F206E001	01C0 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
U2 High warning	F206E002 F206E003	01C1 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
U3 High warning	F206E004 F206E005	01C2 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
U1 High alarm	F206E006 F206E007	01C3 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
U2 High alarm	F206E008 F206E009	01C4 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
U3 High alarm	F206E010 F206E011	01C5 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
U1 Low warning	F206E012 F206E013	01C6 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
U2 Low warning	F206E014 F206E015	01C7 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
U3 Low warning	F206E016 F206E017	01C8 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
U1 Low alarm	F206E018 F206E019	01C9 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
U2 Low alarm	F206E020 F206E021	01CA H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
U3 Low alarm	F206E022 F206E023	01CB H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
U12 High warning	F206E032 F206E033	01CD H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
U23 High warning	F206E034 F206E035	01CE H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
U31 High warning	F206E036 F206E037	01CF H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
U12 High alarm	F206E038 F206E039	01D0 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
U23 High alarm	F206E040 F206E041	01D1 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
U31 High alarm	F206E042 F206E043	01D2 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
U12 Low warning	F206E044 F206E045	01D3 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
U23 Low warning	F206E046 F206E047	01D4 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
U31 Low warning	F206E048 F206E049	01D5 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
U12 Low alarm	F206E050 F206E051	01D6 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
U23 Low alarm	F206E052 F206E053	01D7 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
U31 Low alarm	F206E054 F206E055	01D8 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
U1 High/Low/warning/alarm/ Delta	F206E000 F206E001 F206E006 F206E007 F206E012 F206E013 F206E018 F206E019 F206E025	45C0 H	M_ME_NB_1	SPONT	High priority	No	0.00..999.99 kV
U12 High/Low/warning/alarm/ Delta	F206E032 F206E033 F206E038 F206E039 F206E044 F206E045 F206E050 F206E051 F206E057	45C0 H	M_ME_NB_1	SPONT	High priority	No	0.00..999.99 kV
Voltage U1_12	F206I001	45C0 H	M_ME_NB_1	READREQ	High priority	Yes	0.00..999.99 kV
U2 High/Low/warning/alarm/ Delta	F206E002 F206E003 F206E008 F206E009 F206E014 F206E015 F206E020 F206E021 F206E027	45C1 H	M_ME_NB_1	SPONT	High priority	No	0.00..999.99 kV
U23 High/Low/warning/alarm/ Delta	F206E034 F206E035 F206E040 F206E041 F206E046 F206E047 F206E052 F206E053 F206E059	45C1 H	M_ME_NB_1	SPONT	High priority	No	0.00..999.99 kV
Voltage U2_23	F206I002	45C1 H	M_ME_NB_1	READREQ	High priority	Yes	0.00..999.99 kV

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
U3 High/Low/warning/alarm/ Delta	F206E004 F206E005 F206E010 F206E011 F206E016 F206E017 F206E022 F206E023 F206E029	45C2 H	M_ME_NB_1	SPONT	High priority	No	0.00..999.99 kV
U31 High/Low/warning/alarm/ Delta	F206E036 F206E037 F206E042 F206E043 F206E048 F206E049 F206E054 F206E055 F206E061	45C2 H	M_ME_NB_1	SPONT	High priority	No	0.00..999.99 kV
Voltage U3_31	F206I003	45C2 H	M_ME_NB_1	READREQ	High priority	Yes	0.00..999.99 kV
Voltage U1_12 in percents	F206I004	45C3 H	M_ME_NB_1	READREQ	Low priority	No	0.00...2.00 x Un
Voltage U2_23 in percents	F206I005	45C4 H	M_ME_NB_1	READREQ	Low priority	No	0.00...2.00 x Un
Voltage U3_31 in percents	F206I006	45C5 H	M_ME_NB_1	READREQ	Low priority	No	0.00...2.00 x Un

Function block AR5FUNC

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Auto-reclosing sequence	F080E000 F080E001	1100 H	M_SP_TA_1	SPONT	High priority	No	0 = Ended 1 = Started
AR (shots 1...5) initiated by AR1	F080E002	1101 H	M_SP_TA_1	SPONT	High priority	No	1
AR (shots 1...5) initiated by AR2	F080E003	1102 H	M_SP_TA_1	SPONT	High priority	No	1
AR (shots 1...5) initiated by AR3	F080E004	1103 H	M_SP_TA_1	SPONT	High priority	No	1
AR (shots 1...5) initiated by AR4	F080E005	1104 H	M_SP_TA_1	SPONT	High priority	No	1
AR sequence initiated by AR1 successful	F080E013	110B H	M_SP_TA_1	SPONT	High priority	No	1
AR sequence initiated by AR2 successful	F080E014	110C H	M_SP_TA_1	SPONT	High priority	No	1
AR sequence initiated by AR3 successful	F080E015	110D H	M_SP_TA_1	SPONT	High priority	No	1
AR sequence initiated by AR4 successful	F080E016	110E H	M_SP_TA_1	SPONT	High priority	No	1
CB opening failed via auto-recloser	F080E026	1114 H	M_SP_TA_1	SPONT	High priority	No	1
CB closing failed via auto-recloser	F080E027	1115 H	M_SP_TA_1	SPONT	High priority	No	1
CB closing inhibited	F080E028	1116 H	M_SP_TA_1	SPONT	High priority	No	1
Usage of AR	F080E034 F080E035	111A H	M_SP_TA_1	SPONT	High priority	No	0 – not in use 1 – in use
AR-function currently in use or not	F080S004	111A H	M_SP_NA_1	READREQ	High priority	No	0 = OFF 1 = ON
LOCKOUT	F080E044 F080E045	1121 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Status of LOCKOUT signal	F080O014	1121 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
Operation mode of AR-function	F080S003	5000 H	M_ME_NB_1	READREQ	High priority	No	0=OFF; 1=ON; 2=Selected by the ON input
AR5Func status	F080V001	5001 H	M_ME_NB_1	READREQ	High priority	No	0=AR not in progress; 1=AR shot 1 in progress; 2=AR shot 2 in progress; 3=AR shot 3 in progress; 4=AR shot 4 in progress; 5=AR shot 5 in progress

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Current value of Shot Pointer	F080V002	5002 H	M_ME_NB_1	READREQ	High priority	No	1...7
Parameter for register reset	F080V013	9000 H	C_SC_NA_1	WRITEREQ	High priority	No	1=Reset
Operation mode of AR-function	F080S003	C000 H	C_SE_NB_1	WRITEREQ	High priority	No	0 = OFF; 1 = ON; 2 = Selected by the ON input
Auto-reclose shot 1	F081E000 F081E001	1130 H	M_SP_TA_1	SPONT	High priority	No	0 = Concluded 1 – In progress
AR shot 1 initiated via AR1	F081E002	1131 H	M_SP_TA_1	SPONT	High priority	No	0 = Not active 1 = Active
AR shot 1 initiated via AR2	F081E003	1132 H	M_SP_TA_1	SPONT	High priority	No	0 = Not active 1 = Active
AR shot 1 initiated via AR3	F081E004	1133 H	M_SP_TA_1	SPONT	High priority	No	0 = Not active 1 = Active
AR shot 1 initiated via AR4	F081E005	1134 H	M_SP_TA_1	SPONT	High priority	No	0 = Not active 1 = Active
AR shot 1 successful	F081E006	1135 H	M_SP_TA_1	SPONT	High priority	No	0 = Not active 1 = Active
Auto-reclose shot 2	F082E000 F082E001	1138 H	M_SP_TA_1	SPONT	High priority	No	0 = Concluded 1 – In progress
AR shot 2 initiated via AR1	F082E002	1139 H	M_SP_TA_1	SPONT	High priority	No	0 = Not active 1 = Active
AR shot 2 initiated via AR2	F082E003	113A H	M_SP_TA_1	SPONT	High priority	No	0 = Not active 1 = Active
AR shot 2 initiated via AR3	F082E004	113B H	M_SP_TA_1	SPONT	High priority	No	0 = Not active 1 = Active
AR shot 2 initiated via AR4	F082E005	113C H	M_SP_TA_1	SPONT	High priority	No	0 = Not active 1 = Active
AR shot 2 successful	F082E006	113D H	M_SP_TA_1	SPONT	High priority	No	0 = Not active 1 = Active
Auto-reclose shot 3	F083E000 F083E001	1140 H	M_SP_TA_1	SPONT	High priority	No	0 = Concluded 1 – In progress
AR shot 3 initiated via AR1	F083E002	1141 H	M_SP_TA_1	SPONT	High priority	No	0 = Not active 1 = Active
AR shot 3 initiated via AR2	F083E003	1142 H	M_SP_TA_1	SPONT	High priority	No	0 = Not active 1 = Active
AR shot 3 initiated via AR3	F083E004	1143 H	M_SP_TA_1	SPONT	High priority	No	0 = Not active 1 = Active
AR shot 3 initiated via AR4	F083E005	1144 H	M_SP_TA_1	SPONT	High priority	No	0 = Not active 1 = Active
AR shot 3 successful	F083E006	1145 H	M_SP_TA_1	SPONT	High priority	No	0 = Not active 1 = Active
Auto-reclose shot 4	F084E000 F084E001	1148 H	M_SP_TA_1	SPONT	High priority	No	0 = Concluded 1 – In progress

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
AR shot 4 initiated via AR1	F084E002	1149 H	M_SP_TA_1	SPONT	High priority	No	0 = Not active 1 = Active
AR shot 4 initiated via AR2	F084E003	114A H	M_SP_TA_1	SPONT	High priority	No	0 = Not active 1 = Active
AR shot 4 initiated via AR3	F084E004	114B H	M_SP_TA_1	SPONT	High priority	No	0 = Not active 1 = Active
AR shot 4 initiated via AR4	F084E005	114C H	M_SP_TA_1	SPONT	High priority	No	0 = Not active 1 = Active
AR shot 4 successful	F084E006	114D H	M_SP_TA_1	SPONT	High priority	No	0 = Not active 1 = Active
Auto-reclose shot 5	F085E000 F085E001	1150 H	M_SP_TA_1	SPONT	High priority	No	0 = Concluded 1 – In progress
AR shot 5 initiated via AR1	F085E002	1151 H	M_SP_TA_1	SPONT	High priority	No	0 = Not active 1 = Active
AR shot 5 initiated via AR2	F085E003	1152 H	M_SP_TA_1	SPONT	High priority	No	0 = Not active 1 = Active
AR shot 5 initiated via AR3	F085E004	1153 H	M_SP_TA_1	SPONT	High priority	No	0 = Not active 1 = Active
AR shot 5 initiated via AR4	F085E005	1154 H	M_SP_TA_1	SPONT	High priority	No	0 = Not active 1 = Active
AR shot 5 successful	F085E006	1155 H	M_SP_TA_1	SPONT	High priority	No	0 = Not active 1 = Active
Final trip	F086E000	1158 H	M_SP_TA_1	SPONT	High priority	No	0 = Not active 1 = Active
Final trip via AR1	F086E001	1159 H	M_SP_TA_1	SPONT	High priority	No	0 = Not active 1 = Active
Final trip via AR2	F086E002	115A H	M_SP_TA_1	SPONT	High priority	No	0 = Not active 1 = Active
Final trip via AR3	F086E003	115B H	M_SP_TA_1	SPONT	High priority	No	0 = Not active 1 = Active
Final trip via AR4	F086E004	115C H	M_SP_TA_1	SPONT	High priority	No	0 = Not active 1 = Active

Function block CUB3LOW

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
START signal from DI> stage	F051E000 F051E001	0080 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Status of start signal	F051O001	0080 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
TRIP signal from DI> stage	F051E002 F051E003	0081 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Status of trip signal	F051O002	0081 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
CBFP signal from DI> stage	F051E004 F051E005	0082 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Status of CBFP signal	F051O003	0082 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
BS1 signal of DI> stage	F051E006 F051E007	0083 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Block signal BS1	F051I005	0083 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
BS2 signal of DI> stage	F051E008 F051E009	0084 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Block signal BS2	F051I006	0084 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
Test mode of DI> stage	F051E010 F051E011	0087 H	M_SP_TA_1	SPONT	High priority	No	0 = Off 1 = On

Function block DEF2HIGH

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
START signal from Io>> → stage	F041E000 F041E001	0B00 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Status of start signal	F041O001	0B00 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
TRIP signal from Io>> → stage	F041E002 F041E003	0B01 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Status of trip signal	F041O002	0B01 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
CBFP signal from Io>> → stage	F041E004 F041E005	0B02 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Status of CBFP signal	F041O003	0B02 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
BS1 signal of Io>> → stage	F041E006 F041E007	0B03 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Block signal BS1	F041I005	0B03 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
BS2 signal of Io>> → stage	F041E008 F041E009	0B04 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Block signal BS2	F041I006	0B04 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
Test mode of Io>> → stage	F041E010 F041E011	0B05 H	M_SP_TA_1	SPONT	High priority	No	0 = Off 1 = On

Function block DEF2LOW

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
START signal from Io> → stage	F040E000 F040E001	0100 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Status of start signal	F040O001	0100 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
TRIP signal from Io> → stage	F040E002 F040E003	0101 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Status of trip signal	F040O002	0101 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
CBFP signal from Io> → stage	F040E004 F040E005	0102 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Status of CBFP signal	F040O003	0102 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
BS1 signal of Io> → stage	F040E006 F040E007	0103 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Block signal BS1	F040I005	0103 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
BS2 signal of Io> → stage	F040E008 F040E009	0104 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Block signal BS2	F040I006	0104 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
Test mode of Io> → stage	F040E010 F040E011	0108 H	M_SP_TA_1	SPONT	High priority	No	0 = Off 1 = ON

Function block DOC6HIGH

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
START signal from 3I → stage	F036E000 F036E001	0AC0 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Status of start signal	F036O003	0AC0 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
TRIP signal from 3I>> → stage	F036E002 F036E003	0AC1 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Status of trip signal	F036O004	0AC1 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
CBFP signal from 3I>> → stage	F036E004 F036E005	0AC2 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Status of CBFP signal	F036O005	0AC2 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
BSOUT signal from 3I>> → stage	F036E006 F036E007	0AC3 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Status of BSOUT signal	F036O002	0AC3 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
DIRECTION signal of 3I>> → stage	F036E008 F036E009	0AC4 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Current direction information	F036O001	0AC4 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
BS1 signal of 3I>> → stage	F036E010 F036E011	0AC5 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Block signal BS1	F036I016	0AC5 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
BS2 signal of 3I>> → stage	F036E012 F036E013	0AC6 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Block signal BS2	F036I017	0AC6 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
Test mode of 3I>> → stage	F036E014 F036E015	0AC7 H	M_SP_TA_1	SPONT	High priority	No	0 = Off 1 = On

Function block DOC6LOW

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
START signal from 3I> → stage	F035E000 F035E001	00C0 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Status of start signal	F035O002	00C0 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
TRIP signal from 3I> → stage	F035E002 F035E003	00C1 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Status of trip signal	F035O003	00C1 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
CBFP signal from 3I> → stage	F035E004 F035E005	00C2 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Status of CBFP signal	F035O004	00C2 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
DIRECTION signal of 3I> → stage	F035E006 F035E007	00C3 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Current direction information	F035O001	00C3 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
BS1 signal of 3I> → stage	F035E008 F035E009	00C4 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Block signal BS1	F035I016	00C4 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
BS2 signal of 3I> → stage	F035E010 F035E011	00C5 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Block signal BS2	F035I017	00C5 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
Test mode of 3I> → stage	F035E012 F035E013	00C6 H	M_SP_TA_1	SPONT	High priority	No	0 = Off 1 = On

Function block INRUSH3

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
START signal from Inrush3 stage	F034E000 F034E001	0BC0 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Status of signal START	F034O001	0BC0 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
Test mode of Inrush3 stage	F034E002 F034E003	0BC1 H	M_SP_TA_1	SPONT	High priority	No	0 = Off 1 = On

Function block NEF1HIGH

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
START signal from Io>> stage	F039E000 F039E001	0A80 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Status of start signal	F039O001	0A80 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
TRIP signal from Io>> stage	F039E002 F039E003	0A81 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Status of trip signal	F039O002	0A81 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
CBFP signal from Io>> stage	F039E004 F039E005	0A82 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Status of CBFP signal	F039O003	0A82 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
BS1 signal of Io>> stage	F039E006 F039E007	0A83 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Block signal BS1	F039I002	0A83 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
BS2 signal of Io>> stage	F039E008 F039E009	0A84 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Block signal BS2	F039I003	0A84 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
Test mode of Io>> stage	F039E010 F039E011	0A85 H	M_SP_TA_1	SPONT	High priority	No	0 = Off 1 = On

Function block NEF1LOW

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
START signal from Io> stage	F038E000 F038E001	0040 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Status of start signal	F038O001	0040 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
TRIP signal from Io> stage	F038E002 F038E003	0041 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Status of trip signal	F038O002	0041 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
CBFP signal from Io> stage	F038E004 F038E005	0042 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Status of CBFP signal	F038O003	0042 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
BS1 signal of Io> stage	F038E006 F038E007	0043 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Block signal BS1	F038I002	0043 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
BS2 signal of Io> stage	F038E008 F038E009	0044 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Block signal BS2	F038I003	0044 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
Test mode of Io> stage	F038E010 F038E011	0047 H	M_SP_TA_1	SPONT	High priority	No	0 = Off 1 = On

Function block NOC3HIGH

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
START signal from 3I>>> stage	F032E000 F032E001	0A40 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Status of start signal	F032O002	0A40 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
TRIP signal from 3I>>> stage	F032E002 F032E003	0A41 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Status of trip signal	F032O003	0A41 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
CBFP signal from 3I>>> stage	F032E004 F032E005	0A42 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Status of CBFP signal	F032O004	0A42 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
BSOUT signal from 3I>>> stage	F032E006 F032E007	0A43 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Status of BSOUT signal	F032O001	0A43 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
BS1 signal of 3I>>> stage	F032E008 F032E009	0A44 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Block signal BS1	F032I004	0A44 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
BS2 signal of 3I>>> stage	F032E010 F032E011	0A45 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Block signal BS2	F032I005	0A45 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
Test mode of 3I>>> stagef	F032E012 F032E013	0A46 H	M_SP_TA_1	SPONT	High priority	No	0 = Off 1 = On

Function block NOC3LOW

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
START signal from 3I> stage	F031E000 F031E001	0000 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Status of start signal	F031O001	0000 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
TRIP signal from 3I> stage	F031E002 F031E003	0001 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Status of trip signal	F031O002	0001 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
CBFP signal from 3I> stage	F031E004 F031E005	0002 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Status of CBFP signal	F031O003	0002 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
BS1 signal of 3I> stage	F031E006 F031E007	0003 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Block signal BS1	F031I004	0003 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
BS2 signal of 3I> stage	F031E008 F031E009	0004 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Block signal BS2	F031I005	0004 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
Test mode of 3I> stage	F031E010 F031E011	0008 H	M_SP_TA_1	SPONT	High priority	No	0 = Off 1 = On

Function block UV3HIGH

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
START signal from 3U<< stage	F065E000 F065E001	0C40 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Status of start signal	F065O001	0C40 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
TRIP signal from 3U<< stage	F065E002 F065E003	0C41 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Status of trip signal	F065O002	0C41 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
BS1 signal of 3U<< stage	F065E004 F065E005	0C42 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Block signal BS1	F065I004	0C42 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
BS2 signal of 3U<< stage	F065E006 F065E007	0C43 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Block signal BS2	F065I005	0C43 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
Test mode of 3U<< stage	F065E008 F065E009	0C44 H	M_SP_TA_1	SPONT	High priority	No	0 = Off 1 = On

Function block UV3LOW

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
START signal from 3U< stage	F064E000 F064E001	0C00 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Status of start signal	F064O001	0C00 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
TRIP signal from 3U< stage	F064E002 F064E003	0C01 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Status of trip signal	F064O002	0C01 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
BS1 signal of 3U< stage	F064E004 F064E005	0C02 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Block signal BS1	F064I004	0C02 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
BS2 signal of 3U< stage	F064E006 F064E007	0C03 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Block signal BS2	F064I005	0C03 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
Test mode of 3U< stage	F064E008 F064E009	0C04 H	M_SP_TA_1	SPONT	High priority	No	0 = Off 1 = On

Function block CO3DC1

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
3-state sw. 1 position OC	F139E000 F139E001 F139E002 F139E003	2180 H	M_DP_TA_1	SPONT	High priority	No	00 = Middle 01 = Close 10 = Open 11 = Faulty
Open/Close state of the object	F139V001	2180 H	M_DP_NA_1	READREQ	High priority	Yes	0 = Undefined (00) 1 = Close (01) 2 = Open (10) 3 = Undefined (11)
3-state sw. 1 open command	F139E004 F139E005	0440 H	M_SP_TA_1	SPONT	High priority	No	0 = Enabled 1 = Disabled
Open command interlocking	F139V031	0440 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Enabled 1 = Interlocked
3-state sw. 1 close command	F139E006 F139E007	0441 H	M_SP_TA_1	SPONT	High priority	No	0 = Enabled 1 = Disabled
Close command interlocking	F139V030	0441 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Enabled 1 = Interlocked
3-state sw. 1 invalid state	F139E008	0442 H	M_SP_TA_1	SPONT	High priority	No	0 = Inactive 1 = Active
Object state validitity from IV-signal	F139V034	0442 H	M_SP_NA_1	READREQ	High priority	No	0 = Valid 1 = Invalid
3-state sw. 1 command seqence	F139E010 F139E011	0443 H	M_SP_TA_1	SPONT	High priority	No	0 = Completed 1 = Started
3-state sw. 1 open output	F139E012 F139E013	0444 H	M_SP_TA_1	SPONT	High priority	No	0 = Deactivated 1 = Activated
3-state sw. 1 close output	F139E014 F139E015	0445 H	M_SP_TA_1	SPONT	High priority	No	0 = Deactivated 1 = Activated
3-state sw. 1 opening time	F139E016 F139E017	0446 H	M_SP_TA_1	SPONT	High priority	No	0 = Normal 1 = Alarm
Opening time alarm status	F139O005	0446 H	M_SP_NA_1	READREQ	High priority	No	0 = Inactive 1 = Active
3-state sw. 1 closing time	F139E018 F139E019	0447 H	M_SP_TA_1	SPONT	High priority	No	0 = Normal 1 = Alarm
Closing time alarm status	F139O006	0447 H	M_SP_NA_1	READREQ	High priority	No	0 = Inactive 1 = Active
3-state sw. 1 command status	F139E024 F139E025	0448 H	M_SP_TA_1	SPONT	High priority	No	0 = Nack 1 = Ack
3-state sw. 1 command blocking	F139E026 F139E027	0449 H	M_SP_TA_1	SPONT	High priority	No	0 = Inactive 1 = Active
Object block signal state	F139V035	0449 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Inactive 1 = Active
3-state sw. 1 command status	F139E028	044A H	M_SP_TA_1	SPONT	High priority	No	0 = Unsuccessful

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
3-state sw. 1 earth output	F139E030 F139E031	044B H	M_SP_TA_1	SPONT	High priority	No	0 = Deactivated 1 = Activated
3-state sw. 1 free output	F139E032 F139E033	044C H	M_SP_TA_1	SPONT	High priority	No	0 = Deactivated 1 = Activated
3-state sw. 1 earthing time	F139E034 F139E035	044D H	M_SP_TA_1	SPONT	High priority	No	0 = Normal 1 = Alarm
Earthing time alarm status	F139O007	044D H	M_SP_NA_1	READREQ	High priority	No	0 = Inactive 1 = Active
3-state sw. 1 freeing time	F139E036 F139E037	044E H	M_SP_TA_1	SPONT	High priority	No	0 = Normal 1 = Alarm
Freeing time alarm status	F139O008	044E H	M_SP_NA_1	READREQ	High priority	No	0 = Inactive 1 = Active
3-state sw. 1 position FE	F139E038 F139E039 F139E040 F139E041	2181 H	M_DP_TA_1	SPONT	High priority	No	10 = Free 01 = Earth 11 = Faulty 00 = Middle
Free/Earth state of the object	F139V002	2181 H	M_DP_NA_1	READREQ	High priority	Yes	0 = Undefined (00) 1 = Earth (01) 2 = Free (10) 3 = Undefined (11)
3-state sw. 1 earth command	F139E042 F139E043	044F H	M_SP_TA_1	SPONT	High priority	No	0 = Enabled 1 = Disabled
Earth command interloocking	F139V032	044F H	M_SP_NA_1	READREQ	High priority	Yes	0 = Enabled 1 = Interlocked
3-state sw. 1 free command	F139E044 F139E045	0450 H	M_SP_TA_1	SPONT	High priority	No	0 = Enabled 1 = Disabled
Free command interlocking	F139V033	0450 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Enabled 1 = Interlocked
Direct open command	F139V004	8440 H	C_SC_NA_1	DIRECTOPEN	High priority	No	1 = Open
Direct close command	F139V005	8440 H	C_SC_NA_1	DIRECTCLOSE	High priority	No	1 = Close
Direct free command	F139V021	8441 H	C_SC_NA_1	DIRECTOPEN	High priority	No	1 = Free
Direct earth command	F139V020	8441 H	C_SC_NA_1	DIRECTCLOSE	High priority	No	1 = Earth
Open operation selection of the secured control	F139V006	8442 H	C_SC_NA_1	SELECTOPEN	High priority	No	1 = Select Open
Close operation selection of the secured control	F139V007	8442 H	C_SC_NA_1	SELECTCLOSE	High priority	No	1 = Select Close
Execution of the secured control	F139V011	8442 H	C_SC_NA_1	EXECUTE	High priority	No	1 = Execute
Deselection of the secured control	F139V010	8442 H	C_SC_NA_1	CANCEL	High priority	No	1 = Deselect
Free operation selection of the secured control	F139V023	8443 H	C_SC_NA_1	SELECTOPEN	High priority	No	1 = Select Free

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Earth operation selection of the secured control	F139V022	8443 H	C_SC_NA_1	SELECTCLOSE	High priority	No	1 = Select Earth
Execution of the secured control	F139V011	8443 H	C_SC_NA_1	EXECUTE	High priority	No	1 = Execute
Deselection of the secured control	F139V010	8443 H	C_SC_NA_1	CANCEL	High priority	No	1 = Deselect
Acknowledge alarm	F139V099	8444 H	C_SC_NA_1	WRITEREQ	High priority	No	1 = Ack

Function block CO3DC2

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
3-state sw. 2 position OC	F140E000 F140E001 F140E002 F140E003	21C0 H	M_DP_TA_1	SPONT	High priority	No	00 = Middle 01 = Close 10 = Open 11 = Faulty
Open/Close state of the object	F140V001	21C0 H	M_DP_NA_1	READREQ	High priority	Yes	0 = Undefined (00) 1 = Close (01) 2 = Open (10) 3 = Undefined (11)
3-state sw. 2 open command	F140E004 F140E005	0480 H	M_SP_TA_1	SPONT	High priority	No	0 = Enabled 1 = Disabled
Open command interlocking	F140V031	0480 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Enabled 1 = Interlocked
3-state sw. 2 close command	F140E006 F140E007	0481 H	M_SP_TA_1	SPONT	High priority	No	0 = Enabled 1 = Disabled
Close command interlocking	F140V030	0481 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Enabled 1 = Interlocked
3-state sw. 2 invalid state	F140E008 F140E009	0482 H	M_SP_TA_1	SPONT	High priority	No	0 = Inactive 1 = Active
Object state validitity from IV-signal	F140V034	0482 H	M_SP_NA_1	READREQ	High priority	No	0 = Valid 1 = Invalid
3-state sw. 2 command seqence	F140E010 F140E011	0483 H	M_SP_TA_1	SPONT	High priority	No	0 = Completed 1 = Started
3-state sw. 2 open output	F140E012 F140E013	0484 H	M_SP_TA_1	SPONT	High priority	No	0 = Deactivated 1 = Activated
3-state sw. 2 close output	F140E014 F140E015	0485 H	M_SP_TA_1	SPONT	High priority	No	0 = Deactivated 1 = Activated
3-state sw. 2 opening time	F140E016 F140E017	0486 H	M_SP_TA_1	SPONT	High priority	No	0 = Normal 1 = Alarm
Opening time alarm status	F140O005	0486 H	M_SP_NA_1	READREQ	High priority	No	0 = Normal 1 = Alarm
3-state sw. 2 closing time	F140E018 F140E019	0487 H	M_SP_TA_1	SPONT	High priority	No	0 = Normal 1 = Alarm

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Closing time alarm status	F140O006	0487 H	M_SP_NA_1	READREQ	High priority	No	0 = Inactive 1 = Active
3-state sw. 2 command status	F140E024 F140E025	0488 H	M_SP_TA_1	SPONT	High priority	No	0 = Nack 1 = Ack
3-state sw. 2 command blocking	F140E026 F140E027	0489 H	M_SP_TA_1	SPONT	High priority	No	0 = Inactive 1 = Active
Object block signal state	F140V035	0489 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Inactive 1 = Active
3-state sw. 2 command status	F140E028	048A H	M_SP_TA_1	SPONT	High priority	No	0 = Unsuccessful
3-state sw. 2 earth output	F140E030 F140E031	048B H	M_SP_TA_1	SPONT	High priority	No	0 = Deactivated 1 = Activated
3-state sw. 2 free output	F140E032 F140E033	048C H	M_SP_TA_1	SPONT	High priority	No	0 = Deactivated 1 = Activated
3-state sw. 2 earthing time	F140E034 F140E035	048D H	M_SP_TA_1	SPONT	High priority	No	0 = Normal 1 = Alarm
Earthing time alarm status	F140O007	048D H	M_SP_NA_1	READREQ	High priority	No	0 = Inactive 1 = Active
3-state sw. 2 freeing time	F140E036 F140E037	048E H	M_SP_TA_1	SPONT	High priority	No	0 = Normal 1 = Alarm
Freeing time alarm status	F140O008	048E H	M_SP_NA_1	READREQ	High priority	No	0 = Inactive 1 = Active
3-state sw. 2 position FE	F140E038 F140E039 F140E040 F140E041	21C1 H	M_DP_TA_1	SPONT	High priority	No	10 = Free 01 = Earth 11 = Faulty 00 = Middle
Free/Earth state of the object	F140V002	21C1 H	M_DP_NA_1	READREQ	High priority	Yes	0 = Undefined (00) 1 = Earth (01) 2 = Free (10) 3 = Undefined (11)
3-state sw. 2 earth command	F140E042 F140E043	048F H	M_SP_TA_1	SPONT	High priority	No	0 = Enabled 1 = Disabled
Earth command interloocking	F140V032	048F H	M_SP_NA_1	READREQ	High priority	Yes	0 = Enabled 1 = Interlocked
3-state sw. 2 free command	F140E044 F140E045	0490 H	M_SP_TA_1	SPONT	High priority	No	0 = Enabled 1 = Disabled
Free command interlocking	F140V033	0490 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Enabled 1 = Interlocked
Direct open command	F140V004	8480 H	C_SC_NA_1	DIRECTOPEN	High priority	No	1 = Open
Direct close command	F140V005	8480 H	C_SC_NA_1	DIRECTCLOSE	High priority	No	1 = Close
Direct free command	F140V021	8481 H	C_SC_NA_1	DIRECTOPEN	High priority	No	1 = Free

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Direct earth command	F140V020	8481 H	C_SC_NA_1	DIRECTCLOSE	High priority	No	1 = Earth
Open operation selection of the secured control	F140V006	8482 H	C_SC_NA_1	SELECTOPEN	High priority	No	1 = Select Open
Close operation selection of the secured control	F140V007	8482 H	C_SC_NA_1	SELECTCLOSE	High priority	No	1 = Select Close
Execution of the secured control	F140V011	8482 H	C_SC_NA_1	EXECUTE	High priority	No	1 = Execute
Deselection of the secured control	F140V010	8482 H	C_SC_NA_1	CANCEL	High priority	No	1 = Deselect
Free operation selection of the secured control	F140V023	8483 H	C_SC_NA_1	SELECTOPEN	High priority	No	1 = Select Free
Earth operation selection of the secured control	F140V022	8483 H	C_SC_NA_1	SELECTCLOSE	High priority	No	1 = Select Earth
Execution of the secured control	F140V011	8483 H	C_SC_NA_1	EXECUTE	High priority	No	1 = Execute
Deselection of the secured control	F140V010	8483 H	C_SC_NA_1	CANCEL	High priority	No	1 = Deselect
Acknowledge alarm	F140V099	8484 H	C_SC_NA_1	WRITEREQ	High priority	No	1 = Ack

Function block COCB1

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Breaker 1 position	F120E000 F120E001 F120E002 F120E003	2280 H	M_DP_TA_1	SPONT	High priority	No	01 = Close 10 = Open 00 = Middle 11 = Faulty
2-bit value of the object state	F120V001	2280 H	M_DP_NA_1	READREQ	High priority	Yes	1 = Close (01) 2 = Open (10) 0 = Undefined (00) 3 = Undefined (11)
Breaker 1 open command	F120E004 F120E005	0C80 H	M_SP_TA_1	SPONT	High priority	No	0 = Enabled 1 = Disabled
Open command interlocking	F120V031	0C80 H	M_SP_NA_1	READREQ	High priority	Yes	1 = Interlocked 0 = Enabled
Breaker 1 close command	F120E006 F120E007	0C81 H	M_SP_TA_1	SPONT	High priority	No	0 = Enabled 1 = Disabled
Close command interlocking	F120V030	0C81 H	M_SP_NA_1	READREQ	High priority	Yes	1 = Interlocked 0 = Enabled
Breaker 1 invalid state	F120E008 F120E009	0C82 H	M_SP_TA_1	SPONT	High priority	No	0 = Inactive 1 = Active
Object state validitity from IV-signal	F120V034	0C82 H	M_SP_NA_1	READREQ	High priority	No	0 = Valid 1 = Invalid

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Breaker 1 command sequence	F120E010 F120E011	0C83 H	M_SP_TA_1	SPONT	High priority	No	0 = Completed 1 = Started
Breaker 1 open output	F120E012 F120E013	0C84 H	M_SP_TA_1	SPONT	High priority	No	0 = Deactivated 1 = Activated
Breaker 1 close output	F120E014 F120E015	0C85 H	M_SP_TA_1	SPONT	High priority	No	0 = Deactivated 1 = Activated
Breaker 1 opening time	F120E016 F120E017	0C86 H	M_SP_TA_1	SPONT	High priority	No	0 = Normal 1 = Alarm
Opening time alarm status	F120O003	0C86 H	M_SP_NA_1	READREQ	High priority	No	0 = Inactive 1 = Active
Breaker 1 closing time	F120E018 F120E019	0C87 H	M_SP_TA_1	SPONT	High priority	No	0 = Normal 1 = Alarm
Closing time alarm status	F120O004	0C87 H	M_SP_NA_1	READREQ	High priority	No	0 = Inactive 1 = Active
Breaker 1 inactive time	F120E020 F120E021	0C88 H	M_SP_TA_1	SPONT	High priority	No	0 = Normal 1 = Alarm
Inactive time alarm status	F120O005	0C88 H	M_SP_NA_1	READREQ	High priority	No	0 = Inactive 1 = Active
Breaker 1 cycle count	F120E022 F120E023	0C89 H	M_SP_TA_1	SPONT	High priority	No	0 = Normal 1 = Alarm
Cycle count alarm status	F120O006	0C89 H	M_SP_NA_1	READREQ	High priority	No	0 = Inactive 1 = Active
Breaker 1 command status	F120E024 F120E025	0C8A H	M_SP_TA_1	SPONT	High priority	No	0 = Nack 1 = Ack
Breaker 1 control blocking	F120E026 F120E027	0C8B H	M_SP_TA_1	SPONT	High priority	No	0 = Inactive 1 = Active
Object block signal state	F120V035	0C8B H	M_SP_NA_1	READREQ	High priority	Yes	0 = Inactive 1 = Active
Breaker 1 command status	F120E028	0C8C H	M_SP_TA_1	SPONT	High priority	No	0 = Unsuccessful
Direct open command	F120V004	8C80 H	C_SC_NA_1	DIRECTOPEN	High priority	No	1 = Open
Direct close command	F120V005	8C80 H	C_SC_NA_1	DIRECTCLOSE	High priority	No	1 = Close
Open operation selection of the secured control	F120V006	8C81 H	C_SC_NA_1	SELECTOPEN	High priority	No	1 = Select Open
Close operation selection of the secured control	F120V007	8C81 H	C_SC_NA_1	SELECTCLOSE	High priority	No	1 = Select Close
Execute of the secured command	F120V011	8C81 H	C_SC_NA_1	EXECUTE	High priority	No	1 = Execute
Cancel of the secured command	F120V010	8C81 H	C_SC_NA_1	CANCEL	High priority	No	1 = Cancel
Acknowledge alarms	F120V099	8C82 H	C_SC_NA_1	WRITEREQ	High priority	No	1 = Ack

Function block COCB2

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Breaker 2 position	F121E000 F121E001 F121E002 F121E003	22C0 H	M_DP_TA_1	SPONT	High priority	No	01 = Close 10 = Open 00 = Middle 11 = Faulty
2-bit value of the object state	F121V001	22C0 H	M_DP_NA_1	READREQ	High priority	Yes	1 = Close (01) 2 = Open (10) 0 = Undefined (00) 3 = Undefined (11)
Breaker 2 open command	F121E004 F121E005	0CC0 H	M_SP_TA_1	SPONT	High priority	No	0 = Enabled 1 = Disabled
Open command interlocking	F121V031	0CC0 H	M_SP_NA_1	READREQ	High priority	Yes	1 = Interlocked 0 = Enabled
Breaker 2 close command	F121E006 F121E007	0CC1 H	M_SP_TA_1	SPONT	High priority	No	0 = Enabled 1 = Disabled
Close command interlocking	F121V030	0CC1 H	M_SP_NA_1	READREQ	High priority	Yes	1 = Interlocked 0 = Enabled
Breaker 2 invalid state	F121E008 F121E009	0CC2 H	M_SP_TA_1	SPONT	High priority	No	0 = Inactive 1 = Active
Object state validitity from IV-signal	F121V034	0CC2 H	M_SP_NA_1	READREQ	High priority	No	0 = Valid 1 = Invalid
Breaker 2 command sequence	F121E010 F121E011	0CC3 H	M_SP_TA_1	SPONT	High priority	No	0 = Completed 1 = Started
Breaker 2 open output	F121E012 F121E013	0CC4 H	M_SP_TA_1	SPONT	High priority	No	0 = Deactivated 1 = Activated
Breaker 2 close output	F121E014 F121E015	0CC5 H	M_SP_TA_1	SPONT	High priority	No	0 = Deactivated 1 = Activated
Breaker 2 opening time	F121E016 F121E017	0CC6 H	M_SP_TA_1	SPONT	High priority	No	0 = Normal 1 = Alarm
Opening time alarm status	F121O003	0CC6 H	M_SP_NA_1	READREQ	High priority	No	0 = Inactive 1 = Active
Breaker 2 closing time	F121E018 F121E019	0CC7 H	M_SP_TA_1	SPONT	High priority	No	0 = Normal 1 = Alarm
Closing time alarm status	F121O004	0CC7 H	M_SP_NA_1	READREQ	High priority	No	0 = Inactive 1 = Active
Breaker 2 inactive time	F121E020 F121E021	0CC8 H	M_SP_TA_1	SPONT	High priority	No	0 = Normal 1 = Alarm
Inactive time alarm status	F121O005	0CC8 H	M_SP_NA_1	READREQ	High priority	No	0 = Inactive 1 = Active
Breaker 2 cycle count	F121E022 F121E023	0CC9 H	M_SP_TA_1	SPONT	High priority	No	0 = Normal 1 = Alarm
Cycle count alarm status	F121O006	0CC9 H	M_SP_NA_1	READREQ	High priority	No	0 = Inactive 1 = Active

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Breaker 2 command status	F121E024 F121E025	0CCA H	M_SP_TA_1	SPONT	High priority	No	0 = Nack 1 = Ack
Breaker 2 control blocking	F121E026 F121E027	0CCB H	M_SP_TA_1	SPONT	High priority	No	0 = Inactive 1 = Active
Object block signal state	F121V035	0CCB H	M_SP_NA_1	READREQ	High priority	Yes	0 = Inactive 1 = Active
Breaker 2 command status	F121E028	0CCC H	M_SP_TA_1	SPONT	High priority	No	0 = Unsuccessful
Direct open command	F121V004	8CC0 H	C_SC_NA_1	DIRECTOPEN	High priority	No	1 = Open
Direct close command	F121V005	8CC0 H	C_SC_NA_1	DIRECTCLOSE	High priority	No	1 = Close
Open operation selection of the secured control	F121V006	8CC1 H	C_SC_NA_1	SELECTOPEN	High priority	No	1 = Select Open
Close operation selection of the secured control	F121V007	8CC1 H	C_SC_NA_1	SELECTCLOSE	High priority	No	1 = Select Close
Execute of the secured command	F121V011	8CC1 H	C_SC_NA_1	EXECUTE	High priority	No	1 = Execute
Cancel of the secured command	F121V010	8CC1 H	C_SC_NA_1	CANCEL	High priority	No	1 = Cancel
Acknowledge alarms	F121V099	8CC2 H	C_SC_NA_1	WRITEREQ	High priority	No	1 = Ack

Function block CODC1

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Disconnector 1 position Open	F122E000 F122E001 F122E002 F122E003	2040 H	M_DP_TA_1	SPONT	High priority	No	01 = Close 10 = Open 11 = Faulty 00 = Middle
2-bit state of the object	F122V001	2040 H	M_DP_NA_1	READREQ	High priority	Yes	1 = Close (01) 2 = Open (10) 0 = Undefined (11) 3 = Undefined2 (00)
Disconnector 1 open command	F122E004 F122E005	0300 H	M_SP_TA_1	SPONT	High priority	No	0 = Enabled 1 = Disabled
Open command interlocking	F122V031	0300 H	M_SP_NA_1	READREQ	High priority	Yes	1 = Interlocked 0 = Enabled
Disconnector 1 close command	F122E006 F122E007	0301 H	M_SP_TA_1	SPONT	High priority	No	0 = Enabled 1 = Disabled
Close command interlocking	F122V030	0301 H	M_SP_NA_1	READREQ	High priority	Yes	1 = Interlocked 0 = Enabled
Disconnector 1 invalid state	F122E008 F122E009	0302 H	M_SP_TA_1	SPONT	High priority	No	0 = Inactive 1 = Active

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Object state validitity from IV-signal	F122V034	0302 H	M_SP_NA_1	READREQ	High priority	No	0 = Valid 1 = Invalid
Disconnector 1 command seq.	F122E010 F122E011	0303 H	M_SP_TA_1	SPONT	High priority	No	0 = Completed 1 = Started
Disconnector 1 open output	F122E012 F122E013	0304 H	M_SP_TA_1	SPONT	High priority	No	0 = Deactivated 1 = Activated
Disconnector 1 close output	F122E014 F122E015	0305 H	M_SP_TA_1	SPONT	High priority	No	0 = Deactivated 1 = Activated
Disconnector 1 opening time	F122E016 F122E017	0306 H	M_SP_TA_1	SPONT	High priority	No	0 = Normal 1 = Alarm
Opening time alarm status	F122O003	0306 H	M_SP_NA_1	READREQ	High priority	No	0 = Inactive 1 = Active
Disconnector 1 closing time	F122E018 F122E019	0307 H	M_SP_TA_1	SPONT	High priority	No	0 = Normal 1 = Alarm
Closing time alarm status	F122O004	0307 H	M_SP_NA_1	READREQ	High priority	No	0 = Inactive 1 = Active
Disconnector 1 command status	F122E024 F122E025	0308 H	M_SP_TA_1	SPONT	High priority	No	0 = Nack 1 = Ack
Disconnector 1 control blocking	F122E026 F122E027	0309 H	M_SP_TA_1	SPONT	High priority	No	0 = Inactive 1 = Active
Object block signal state	F122V035	0309 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Inactive 1 = Active
Disconnector 1 command status	F122E028	030A H	M_SP_TA_1	SPONT	High priority	No	0 = Unsuccessful
Direct open command	F122V004	8300 H	C_SC_NA_1	DIRECTOPEN	High priority	No	1 = Open
Direct close command	F122V005	8300 H	C_SC_NA_1	DIRECTCLOSE	High priority	No	1 = Close
Open operation selection of the secured control	F122V006	8301 H	C_SC_NA_1	SELECTOPEN	High priority	No	1 = Select Open
Close operation selection of the secured control	F122V007	8301 H	C_SC_NA_1	SELECTCLOSE	High priority	No	1 = Select Close
Execution of the secured control	F122V011	8301 H	C_SC_NA_1	EXECUTE	High priority	No	1 = Execute
Deselection of the secured control	F122V010	8301 H	C_SC_NA_1	CANCEL	High priority	No	1 = Deselection
Acknowledge alarm	F122V099	8302 H	C_SC_NA_1	WRITEREQ	High priority	No	1 = Ack

Function block CODC2

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Disconnector 2 position	F123E000 F123E001 F123E002 F123E003	2080 H	M_DP_TA_1	SPONT	High priority	No	01 = Close 10 = Open 11 = Faulty 00 = Middle
2-bit state of the object	F123V001	2080 H	M_DP_NA_1	READREQ	High priority	Yes	1 = Close (01) 2 = Open (10) 0 = Undefined (11) 3 = Undefined2 (00)
Disconnector 2 open command	F123E004 F123E005	0340 H	M_SP_TA_1	SPONT	High priority	No	0 = Enabled 1 = Disabled
Open command interlocking	F123V031	0340 H	M_SP_NA_1	READREQ	High priority	Yes	1 = Interlocked 0 = Enabled
Disconnector 2 close command	F123E006 F123E007	0341 H	M_SP_TA_1	SPONT	High priority	No	0 = Enabled 1 = Disabled
Close command interlocking	F123V030	0341 H	M_SP_NA_1	READREQ	High priority	Yes	1 = Interlocked 0 = Enabled
Disconnector 2 invalid state	F123E008 F123E009	0342 H	M_SP_TA_1	SPONT	High priority	No	0 = Inactive 1 = Active
Object state valididity from IV-signal	F123V034	0342 H	M_SP_NA_1	READREQ	High priority	No	0 = Valid 1 = Invalid
Disconnector 2 command seq.	F123E010 F123E011	0343 H	M_SP_TA_1	SPONT	High priority	No	0 = Completed 1 = Started
Disconnector 2 open output	F123E012 F123E013	0344 H	M_SP_TA_1	SPONT	High priority	No	0 = Deactivated 1 = Activated
Disconnector 2 close output	F123E014 F123E015	0345 H	M_SP_TA_1	SPONT	High priority	No	0 = Deactivated 1 = Activated
Disconnector 2 opening time	F123E016 F123E017	0346 H	M_SP_TA_1	SPONT	High priority	No	0 = Normal 1 = Alarm
Opening time alarm status	F123O003	0346 H	M_SP_NA_1	READREQ	High priority	No	0 = Inactive 1 = Active
Disconnector 2 closing time	F123E018 F123E019	0347 H	M_SP_TA_1	SPONT	High priority	No	0 = Normal 1 = Alarm
Closing time alarm status	F123O004	0347 H	M_SP_NA_1	READREQ	High priority	No	0 = Inactive 1 = Active
Disconnector 2 command status	F123E024 F123E025	0348 H	M_SP_TA_1	SPONT	High priority	No	0 = Nack 1 = Ack
Disconnector 2 control blocking	F123E026 F123E027	0349 H	M_SP_TA_1	SPONT	High priority	No	0 = Inactive 1 = Active
Object block signal state	F123V035	0349 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Inactive 1 = Active
Disconnector 2 command status	F123E028	034A H	M_SP_TA_1	SPONT	High priority	No	0 = Unsuccessful

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Direct open command	F123V004	8340 H	C_SC_NA_1	DIRECTOPEN	High priority	No	1 = Open
Direct close command	F123V005	8340 H	C_SC_NA_1	DIRECTCLOSE	High priority	No	1 = Close
Open operation selection of the secured control	F123V006	8341 H	C_SC_NA_1	SELECTOPEN	High priority	No	1 = Select Open
Close operation selection of the secured control	F123V007	8341 H	C_SC_NA_1	SELECTCLOSE	High priority	No	1 = Select Close
Execution of the secured control	F123V011	8341 H	C_SC_NA_1	EXECUTE	High priority	No	1 = Execute
Deselection of the secured control	F123V010	8341 H	C_SC_NA_1	CANCEL	High priority	No	1 = Deselection
Acknowledge alarm	F123V099	8342 H	C_SC_NA_1	WRITEREQ	High priority	No	1 = Ack

Function block CODC3

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Disconnector 3 position	F124E000 F124E001 F124E002 F124E003	20C0 H	M_DP_TA_1	SPONT	High priority	No	01 = Close 10 = Open 11 = Faulty 00 = Middle
2-bit state of the object	F124V001	20C0 H	M_DP_NA_1	READREQ	High priority	Yes	1 = Close (01) 2 = Open (10) 0 = Undefined (11) 3 = Undefined2 (00)
Disconnector 3 open command	F124E004 F124E005	0380 H	M_SP_TA_1	SPONT	High priority	No	0 = Enabled 1 = Disabled
Open command interlocking	F124V031	0380 H	M_SP_NA_1	READREQ	High priority	Yes	1 = Interlocked 0 = Enabled
Disconnector 3 close command	F124E006 F124E007	0381 H	M_SP_TA_1	SPONT	High priority	No	0 = Enabled 1 = Disabled
Close command interlocking	F124V030	0381 H	M_SP_NA_1	READREQ	High priority	Yes	1 = Interlocked 0 = Enabled
Disconnector 3 invalid state	F124E008 F124E009	0382 H	M_SP_TA_1	SPONT	High priority	No	0 = Inactive 1 = Active
Object state validitity from IV-signal	F124V034	0382 H	M_SP_NA_1	READREQ	High priority	No	0 = Valid 1 = Invalid
Disconnector 3 command seq.	F124E010 F124E011	0383 H	M_SP_TA_1	SPONT	High priority	No	0 = Completed 1 = Started
Disconnector 3 open output	F124E012 F124E013	0384 H	M_SP_TA_1	SPONT	High priority	No	0 = Deactivated 1 = Activated
Disconnector 3 close output	F124E014 F124E015	0385 H	M_SP_TA_1	SPONT	High priority	No	0 = Deactivated 1 = Activated

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Disconnector 3 opening time	F124E016 F124E017	0386 H	M_SP_TA_1	SPONT	High priority	No	0 = Normal 1 = Alarm
Opening time alarm status	F124O003	0386 H	M_SP_NA_1	READREQ	High priority	No	0 = Inactive 1 = Active
Disconnector 3 closing time	F124E018 F124E019	0387 H	M_SP_TA_1	SPONT	High priority	No	0 = Normal 1 = Alarm
Closing time alarm status	F124O004	0387 H	M_SP_NA_1	READREQ	High priority	No	0 = Inactive 1 = Active
Disconnector 3 command status	F124E024 F124E025	0388 H	M_SP_TA_1	SPONT	High priority	No	0 = Nack 1 = Ack
Disconnector 3 control blocking	F124E026 F124E027	0389 H	M_SP_TA_1	SPONT	High priority	No	0 = Inactive 1 = Active
Object block signal state	F124V035	0389 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Inactive 1 = Active
Disconnector 3 command status	F124E028	038A H	M_SP_TA_1	SPONT	High priority	No	0 = Unsuccessful
Direct open command	F124V004	8380 H	C_SC_NA_1	DIRECTOPEN	High priority	No	1 = Open
Direct close command	F124V005	8380 H	C_SC_NA_1	DIRECTCLOSE	High priority	No	1 = Close
Open operation selection of the secured control	F124V006	8381 H	C_SC_NA_1	SELECTOPEN	High priority	No	1 = Select Open
Close operation selection of the secured control	F124V007	8381 H	C_SC_NA_1	SELECTCLOSE	High priority	No	1 = Select Close
Execution of the secured control	F124V011	8381 H	C_SC_NA_1	EXECUTE	High priority	No	1 = Execute
Deselection of the secured control	F124V010	8381 H	C_SC_NA_1	CANCEL	High priority	No	1 = Deselection
Acknowledge alarm	F124V099	8382 H	C_SC_NA_1	WRITEREQ	High priority	No	1 = Ack

Function block CODC4

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Disconnector 4 position	F125E000 F125E001 F125E002 F125E003	2100 H	M_DP_TA_1	SPONT	High priority	No	01 = Close 10 = Open 11 = Faulty 00 = Middle
2-bit state of the object	F125V001	2100 H	M_DP_NA_1	READREQ	High priority	Yes	1 = Close (01) 2 = Open (10) 0 = Undefined (11) 3 = Undefined2 (00)
Disconnector 4 open command	F125E004 F125E005	03C0 H	M_SP_TA_1	SPONT	High priority	No	0 = Enabled 1 = Disabled

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Open command interlocking	F125V031	03C0 H	M_SP_NA_1	READREQ	High priority	Yes	1 = Interlocked 0 = Enabled
Disconnector 4 close command	F125E006 F125E007	03C1 H	M_SP_TA_1	SPONT	High priority	No	0 = Enabled 1 = Disabled
Close command interlocking	F125V030	03C1 H	M_SP_NA_1	READREQ	High priority	Yes	1 = Interlocked 0 = Enabled
Disconnector 4 invalid state	F125E008 F125E009	03C2 H	M_SP_TA_1	SPONT	High priority	No	0 = Inactive 1 = Active
Object state validitity from IV-signal	F125V034	03C2 H	M_SP_NA_1	READREQ	High priority	No	0 = Valid 1 = Invalid
Disconnector 4 command seq.	F125E010 F125E011	03C3 H	M_SP_TA_1	SPONT	High priority	No	0 = Completed 1 = Started
Disconnector 4 open output	F125E012 F125E013	03C4 H	M_SP_TA_1	SPONT	High priority	No	0 = Deactivated 1 = Activated
Disconnector 4 close output	F125E014 F125E015	03C5 H	M_SP_TA_1	SPONT	High priority	No	0 = Deactivated 1 = Activated
Disconnector 4 opening time	F125E016 F125E017	03C6 H	M_SP_TA_1	SPONT	High priority	No	0 = Normal 1 = Alarm
Opening time alarm status	F125O003	03C6 H	M_SP_NA_1	READREQ	High priority	No	0 = Inactive 1 = Active
Disconnector 4 closing time	F125E018 F125E019	03C7 H	M_SP_TA_1	SPONT	High priority	No	0 = Normal 1 = Alarm
Closing time alarm status	F125O004	03C7 H	M_SP_NA_1	READREQ	High priority	No	0 = Inactive 1 = Active
Disconnector 4 command status	F125E024 F125E025	03C8 H	M_SP_TA_1	SPONT	High priority	No	0 = Nack 1 = Ack
Disconnector 4 control blocking	F125E026 F125E027	03C9 H	M_SP_TA_1	SPONT	High priority	No	0 = Inactive 1 = Active
Object block signal state	F125V035	03C9 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Inactive 1 = Active
Disconnector 4 command status	F125E028	03CA H	M_SP_TA_1	SPONT	High priority	No	0 = Unsuccessful
Direct open command	F125V004	83C0 H	C_SC_NA_1	DIRECTOPEN	High priority	No	1 = Open
Direct close command	F125V005	83C0 H	C_SC_NA_1	DIRECTCLOSE	High priority	No	1 = Close
Open operation selection of the secured control	F125V006	83C1 H	C_SC_NA_1	SELECTOPEN	High priority	No	1 = Select Open
Close operation selection of the secured control	F125V007	83C1 H	C_SC_NA_1	SELECTCLOSE	High priority	No	1 = Select Close
Execution of the secured control	F125V011	83C1 H	C_SC_NA_1	EXECUTE	High priority	No	1 = Execute
Deselection of the secured control	F125V010	83C1 H	C_SC_NA_1	CANCEL	High priority	No	1 = Deselection

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Acknowledge alarm	F125V099	83C2 H	C_SC_NA_1	WRITEREQ	High priority	No	1 = Ack

Function block CODC5

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Disconnector 5 position	F126E000 F126E001 F126E002 F126E003	2140 H	M_DP_TA_1	SPONT	High priority	No	01 = Close 10 = Open 11 = Faulty 00 = Middle
2-bit state of the object	F126V001	2140 H	M_DP_NA_1	READREQ	High priority	Yes	1 = Close (01) 2 = Open (10) 0 = Undefined (11) 3 = Undefined2 (00)
Disconnector 5 open command	F126E004 F126E005	0400 H	M_SP_TA_1	SPONT	High priority	No	0 = Enabled 1 = Disabled
Open command interlocking	F126V031	0400 H	M_SP_NA_1	READREQ	High priority	Yes	1 = Interlocked 0 = Enabled
Disconnector 5 close command	F126E006 F126E007	0401 H	M_SP_TA_1	SPONT	High priority	No	0 = Enabled 1 = Disabled
Close command interlocking	F126V030	0401 H	M_SP_NA_1	READREQ	High priority	Yes	1 = Interlocked 0 = Enabled
Disconnector 5 invalid state	F126E008 F126E009	0402 H	M_SP_TA_1	SPONT	High priority	No	0 = Inactive 1 = Active
Object state validitity from IV-signal	F126V034	0402 H	M_SP_NA_1	READREQ	High priority	No	0 = Valid 1 = Invalid
Disconnector 5 command seq.	F126E010 F126E011	0403 H	M_SP_TA_1	SPONT	High priority	No	0 = Completed 1 = Started
Disconnector 5 open output	F126E012 F126E013	0404 H	M_SP_TA_1	SPONT	High priority	No	0 = Deactivated 1 = Activated
Disconnector 5 close output	F126E014 F126E015	0405 H	M_SP_TA_1	SPONT	High priority	No	0 = Deactivated 1 = Activated
Disconnector 5 opening time	F126E016 F126E017	0406 H	M_SP_TA_1	SPONT	High priority	No	0 = Normal 1 = Alarm
Opening time alarm status	F126O003	0406 H	M_SP_NA_1	READREQ	High priority	No	0 = Inactive 1 = Active
Disconnector 5 closing time	F126E018 F126E019	0407 H	M_SP_TA_1	SPONT	High priority	No	0 = Normal 1 = Alarm
Closing time alarm status	F126O004	0407 H	M_SP_NA_1	READREQ	High priority	No	0 = Inactive 1 = Active
Disconnector 5 command status	F126E024 F126E025	0408 H	M_SP_TA_1	SPONT	High priority	No	0 = Nack 1 = Ack
Disconnector 5 control blocking	F126E026 F126E027	0409 H	M_SP_TA_1	SPONT	High priority	No	0 = Inactive 1 = Active

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Object block signal state	F126V035	0409 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Inactive 1 = Active
Disconnector 5 command status	F126E028	040A H	M_SP_TA_1	SPONT	High priority	No	0 = Unsuccessful
Direct open command	F126V004	8400 H	C_SC_NA_1	DIRECTOPEN	High priority	No	1 = Open
Direct close command	F126V005	8400 H	C_SC_NA_1	DIRECTCLOSE	High priority	No	1 = Close
Open operation selection of the secured control	F126V006	8401 H	C_SC_NA_1	SELECTOPEN	High priority	No	1 = Select Open
Close operation selection of the secured control	F126V007	8401 H	C_SC_NA_1	SELECTCLOSE	High priority	No	1 = Select Close
Execution of the secured control	F126V011	8401 H	C_SC_NA_1	EXECUTE	High priority	No	1 = Execute
Deselection of the secured control	F126V010	8401 H	C_SC_NA_1	CANCEL	High priority	No	1 = Deselection
Acknowledge alarm	F126V099	8402 H	C_SC_NA_1	WRITEREQ	High priority	No	1 = Ack

Function block COIND1

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Indication 1 position	F127E000 F127E001 F127E002 F127E003	2000 H	M_DP_TA_1	SPONT	High priority	No	00 = Middle 01 = Close 10 = Open 11 = Faulty
2-bit state of the object	F127V001	2000 H	M_DP_NA_1	READREQ	High priority	Yes	0 = Undefined1 (00) 1 = Close (01) 2 = Open (10) 3 = Undefined2 (11)
Indication 1 invalid state	F127E008 F127E009	02C0 H	M_SP_TA_1	SPONT	High priority	No	0 = Inactive 1 = Active
Object state validitity from IV-signal	F127V034	02C0 H	M_SP_NA_1	READREQ	High priority	No	0 = Valid 1 = Invalid

Function block COIND2

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Indication 2 position	F128E000 F128E001 F128E002 F128E003	2001 H	M_DP_TA_1	SPONT	High priority	No	00 = Middle 01 = Close 10 = Open 11 = Faulty

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
2-bit state of the object	F128V001	2001 H	M_DP_NA_1	READREQ	High priority	Yes	0 = Undefined1 (00) 1 = Close (01) 2 = Open (10) 3 = Undefined2 (11)
Indication 2 invalid state	F128E008 F128E009	02C1 H	M_SP_TA_1	SPONT	High priority	No	0 = Inactive 1 = Active
Object state validitity from IV-signal	F128V034	02C1 H	M_SP_NA_1	READREQ	High priority	No	0 = Valid 1 = Invalid

Function block COIND3

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Indication 3 position	F129E000 F129E001 F129E002 F129E003	2002 H	M_DP_TA_1	SPONT	High priority	No	00 = Middle 01 = Close 10 = Open 11 = Faulty
2-bit state of the object	F129V001	2002 H	M_DP_NA_1	READREQ	High priority	Yes	0 = Undefined1 (00) 1 = Close (01) 2 = Open (10) 3 = Undefined2 (11)
Indication 3 invalid state	F129E008 F129E009	02C2 H	M_SP_TA_1	SPONT	High priority	No	0 = Inactive 1 = Active
Object state validitity from IV-signal	F129V034	02C2 H	M_SP_NA_1	READREQ	High priority	No	0 = Valid 1 = Invalid

Function block COIND4

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Indication 4 position	F130E000 F130E001 F130E002 F130E003	2003 H	M_DP_TA_1	SPONT	High priority	No	00 = Middle 01 = Close 10 = Open 11 = Faulty
2-bit state of the object	F130V001	2003 H	M_DP_NA_1	READREQ	High priority	Yes	0 = Undefined1 (00) 1 = Close (01) 2 = Open (10) 3 = Undefined2 (11)
Indication 4 invalid state	F130E008 F130E009	02C3 H	M_SP_TA_1	SPONT	High priority	No	0 = Inactive 1 = Active
Object state validitity from IV-signal	F130V034	02C3 H	M_SP_NA_1	READREQ	High priority	No	0 = Valid 1 = Invalid

Function block COIND5

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Indication 5 position	F131E000 F131E001 F131E002 F131E003	2004 H	M_DP_TA_1	SPONT	High priority	No	00 = Middle 01 = Close 10 = Open 11 = Faulty
2-bit state of the object	F131V001	2004 H	M_DP_NA_1	READREQ	High priority	Yes	0 = Undefined1 (00) 1 = Close (01) 2 = Open (10) 3 = Undefined2 (11)
Indication 5 invalid state	F131E008 F131E009	02C4 H	M_SP_TA_1	SPONT	High priority	No	0 = Inactive 1 = Active
Object state validitity from IV-signal	F131V034	02C4 H	M_SP_NA_1	READREQ	High priority	No	0 = Valid 1 = Invalid

Function block COIND6

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Indication 6 position	F132E000 F132E001 F132E002 F132E003	2005 H	M_DP_TA_1	SPONT	High priority	No	00 = Middle 01 = Close 10 = Open 11 = Faulty
2-bit state of the object	F132V001	2005 H	M_DP_NA_1	READREQ	High priority	Yes	0 = Undefined1 (00) 1 = Close (01) 2 = Open (10) 3 = Undefined2 (11)
Indication 6 invalid state	F132E008 F132E009	02C5 H	M_SP_TA_1	SPONT	High priority	No	0 = Inactive 1 = Active
Object state validitity from IV-signal	F132V034	02C5 H	M_SP_NA_1	READREQ	High priority	No	0 = Valid 1 = Invalid

Function block COIND7

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Indication 7 position	F133E000 F133E001 F133E002 F133E003	2006 H	M_DP_TA_1	SPONT	High priority	No	00 = Middle 01 = Close 10 = Open 11 = Faulty
2-bit state of the object	F133V001	2006 H	M_DP_NA_1	READREQ	High priority	Yes	0 = Undefined1 (00) 1 = Close (01) 2 = Open (10) 3 = Undefined2 (11)

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Indication 7 invalid state	F133E008 F133E009	02C6 H	M_SP_TA_1	SPONT	High priority	No	0 = Inactive 1 = Active
Object state valididity from IV-signal	F133V034	02C6 H	M_SP_NA_1	READREQ	High priority	No	0 = Valid 1 = Invalid

Function block COIND8

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Indication 8 position	F134E000 F134E001 F134E002 F134E003	2007 H	M_DP_TA_1	SPONT	High priority	No	00 = Middle 01 = Close 10 = Open 11 = Faulty
2-bit state of the object	F134V001	2007 H	M_DP_NA_1	READREQ	High priority	Yes	0 = Undefined1 (00) 1 = Close (01) 2 = Open (10) 3 = Undefined2 (11)
Indication 8 invalid state	F134E008 F134E009	02C7 H	M_SP_TA_1	SPONT	High priority	No	0 = Inactive 1 = Active
Object state valididity from IV-signal	F134V034	02C7 H	M_SP_NA_1	READREQ	High priority	No	0 = Valid 1 = Invalid

Function block COLOCAT

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Logic position setting	F142E000 F142E001	09C0 H	M_SP_TA_1	SPONT	High priority	No	0 = Inactive 1 = Active
Reset logic position setting	F142V001	09C0 H	M_SP_NA_1	READREQ	High priority	No	0 = Inactive 1 = Active

Function block COPFC

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Control oper. failed	F143E000 F143E001	1180 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Output CONT_FAIL	F143O003	1180 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
Q not within limits	F143E002 F143E003	1181 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Output ALAR_Q	F143O004	1181 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Pumping situation alarm	F143E004 F143E005	1182 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Output ALAR_PUMP	F143O005	1182 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
Not discharged yet	F143E006 F143E007	1183 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Automatic testing mode	F143E008 F143E009	1184 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Output TESTING	F143O006	1184 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = In progress
Testing finished	F143E010 F143E011	1185 H	M_SP_TA_1	SPONT	High priority	No	0 = OK. 1 = Failed
Overvoltage inhibition	F143E012 F143E013	1186 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
BLOCK signal	F143E014 F143E015	1187 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Input BLOCK	F143I005	1187 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
DISCONNECT signal	F143E016 F143E017	1188 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Input DISCONNECT	F143I007	1188 H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
Input DN_COSPHI	F143I006	1189 H	M_SP_NA_1	READREQ	High priority	No	0 = Day target 1 = Night target
Input RESET	F143I008	118A H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
Output REQ_UP	F143O001	118B H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
Output REQ_DOWN	F143O002	118C H	M_SP_NA_1	READREQ	High priority	No	0 = Not active 1 = Active
Commands	F143V015	118D H	M_SP_NA_1	READREQ	High priority	No	0 = Disabled 1 = Enabled
P3 (kW)	F143I001	5040 H	M_IT_NA_1	READREQ	High priority	No	-999999...999999 kW
Q3 (kvar)	F143I002	5041 H	M_IT_NA_1	READREQ	High priority	No	-999999...999999 kvar
Power factor DPF	F143I003	5042 H	M_ME_NB_1	READREQ	High priority	No	0.00...1.00
Connected banks	F143I004	5043 H	M_ME_NB_1	READREQ	High priority	No	0...65535

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Operation mode	F143V001	5044 H	M_ME_NB_1	READREQ	High priority	No	0 = Not in use 1 = Automatic mode 2 = Manual mode 3 = Testing mode
Manual command	F143V006	5045 H	M_ME_NB_1	READREQ	High priority	No	0 = Not activated 1 = Remove one step 2 = Add one step 3 = Disconnect all
D&n command	F143V008	5046 H	M_ME_NB_1	READREQ	High priority	No	0 = Not activated 1 = Day target PF 2 = Night target PF
Switches / day	F143V011	5047 H	M_ME_NB_1	READREQ	High priority	No	0...65535
Operation mode	F143V001	C040 H	C_SE_NB_1	WRITEREQ	High priority	No	0 = Not in use 1 = Automatic mode 2 = Manual mode 3 = Testing mode
Manual command	F143V006	C041 H	C_SE_NB_1	WRITEREQ	High priority	No	0 = Not activated 1 = Remove one step 2 = Add one step 3 = Disconnect all
D&n command	F143V008	C042 H	C_SE_NB_1	WRITEREQ	High priority	No	0 = Not activated 1 = Day target PF 2 = Night target PF

Function block CMBWEAR1

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Breaker 1 electric wear alarm	F187E000 F187E001	0640 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Alarm state	F187O001	0640 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Inactive 1 = Active
Accumulated breaker wear at pole 1	F187V001	4A41 H	M_ME_NB_1	READREQ	Low priority	No	0.00...10000.00
Accumulated breaker wear at pole 2	F187V002	4A42 H	M_ME_NB_1	READREQ	Low priority	No	0.00...10000.00
Accumulated breaker wear at pole 3	F187V003	4A43 H	M_ME_NB_1	READREQ	Low priority	No	0.00...10000.00
Acknowledge alarm	F187V099	8640 H	C_SC_NA_1	WRITEREQ	High priority	No	0 = 0 1 = Acknowledge
Accumulated breaker wear at pole 1	F187V001	BA41 H	C_SE_NB_1	WRITEREQ	High priority	No	0.00...10000.00
Accumulated breaker wear at pole 2	F187V002	BA42 H	C_SE_NB_1	WRITEREQ	High priority	No	0.00...10000.00

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Accumulated breaker wear at pole 3	F187V003	BA43 H	C_SE_NB_1	WRITEREQ	High priority	No	0.00...10000.00

Function block CMBWEAR2

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Breaker 2 electric wear alarm	F188E000 F188E001	0680 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Alarm state	F188O001	0680 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Inactive 1 = Active
Accumulated breaker wear at pole 1	F188V001	4A81 H	M_ME_NB_1	READREQ	Low priority	No	0.00...10000.00
Accumulated breaker wear at pole 2	F188V002	4A82 H	M_ME_NB_1	READREQ	Low priority	No	0.00...10000.00
Accumulated breaker wear at pole 3	F188V003	4A83 H	M_ME_NB_1	READREQ	Low priority	No	0.00...10000.00
Acknowledge alarm	F188V099	8680 H	C_SC_NA_1	WRITEREQ	High priority	No	0 = 0 1 = Acknowledge
Accumulated breaker wear at pole 1	F188V001	BA81 H	C_SE_NB_1	WRITEREQ	High priority	No	0.00...10000.00
Accumulated breaker wear at pole 2	F188V002	BA82 H	C_SE_NB_1	WRITEREQ	High priority	No	0.00...10000.00
Accumulated breaker wear at pole 3	F188V003	BA83 H	C_SE_NB_1	WRITEREQ	High priority	No	0.00...10000.00

Function block CMCU3

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Current input circuit alarm	F181E000 F181E001	0580 H	M_SP_TA_1	SPONT	High priority	No	0 = Off 1 = On
Status of alarm signal	F181O001	0580 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Not active 1 = Active

Function block CMGAS1

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Low gas density alarm	F186E000 F186E001	0600 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Alarm state	F186O001	0600 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Inactive 1 = Active
Low gas density warning	F186E002 F186E003	0601 H	M_SP_TA_1	SPONT	High priority	No	0 = Inactive 1 = Active
Indication of valid gas pressure	F186I001	0601 H	M_SP_NA_1	READREQ	High priority	No	0 = Invalid 1 = Valid

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Acknowledge alarm	F186V099	8600 H	C_SC_NA_1	WRITEREQ	High priority	No	0 = 0 1 = Acknowledge

Function block CMGAS3

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Low gas density alarm	F194E000 F194E001	0D80 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Alarm state	F194O001	0D80 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Inactive 1 = Active
Low gas density warning L1	F194E002 F194E003	0D81 H	M_SP_TA_1	SPONT	High priority	No	0 = Inactive 1 = Active
Low gas density warning L2	F194E004 F194E005	0D82 H	M_SP_TA_1	SPONT	High priority	No	0 = Inactive 1 = Active
Low gas density warning L3	F194E006 F194E007	0D83 H	M_SP_TA_1	SPONT	High priority	No	0 = Inactive 1 = Active
Gas pressure L1	F194I001	0D81 H	M_SP_NA_1	READREQ	High priority	No	0 = Invalid 1 = Valid
Gas pressure L2	F194I002	0D82 H	M_SP_NA_1	READREQ	High priority	No	0 = Invalid 1 = Valid
Gas pressure L3	F194I003	0D83 H	M_SP_NA_1	READREQ	High priority	No	0 = Invalid 1 = Valid
Acknowledge alarm	F194V099	8D00 H	C_SC_NA_1	WRITEREQ	High priority	No	0 = 0 1 = Acknowledge

Function block CMSCHED

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Scheduled Maintenance alarm	F189E000 F189E001	06C0 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Alarm state	F189O001	06C0 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Inactive 1 = Active
Acknowledge alarm	F189V099	86C0 H	C_SC_NA_1	WRITEREQ	High priority	No	0 = 0 1 = Acknowledge

Function block CMSPRC1

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Spring 1 charging motor	F190E000 F190E001	0540 H	M_SP_TA_1	SPONT	High priority	No	0 = Inactive 1 = Active

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Spring 1 max charging alarm	F190E002 F190E003	0541 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Alarm status of maximum alarm pulse	F190O002	0541 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Inactive 1 = Active
Spring 1 min charging alarm	F190E004 F190E005	0542 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Alarm status of minimum alarm pulse	F190O003	0542 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Inactive 1 = Active
Spring 1 charge command	F190E007	0543 H	M_SP_TA_1	SPONT	High priority	No	1 = Activated
Spring 1 charge status	F190E008 F190E009	0544 H	M_SP_TA_1	SPONT	High priority	No	0 = Uncharged 1 = Charged
Spring charge status	F190I002	0544 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Uncharged 1 = Charged
Acknowledge alarm	F190V099	8540 H	C_SC_NA_1	WRITEREQ	High priority	Yes	0 = 0 1 = Acknowledge

Function block CMTIME1

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Accumulated time 1 alarm	F184E000 F184E001	04C0 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Alarm state	F184O001	04C0 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Inactive 1 = Active
Accumulated time 1 measurement	F184E002 F184E003	04C1 H	M_SP_TA_1	SPONT	High priority	No	0 = Inactive 1 = Active
Binary input state	F184I001	04C1 H	M_SP_NA_1	READREQ	High priority	No	0 = Inactive 1 = Active
Acknowledge alarm	F184V099	84C0 H	C_SC_NA_1	WRITEREQ	High priority	No	0 = 0 1 = Acknowledge

Function block CMTIME2

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Accumulated time 2 alarm	F185E000 F185E001	0500 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Alarm state	F185O001	0500 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Inactive 1 = Active
Accumulated time 2 measurement	F185E002 F185E003	0501 H	M_SP_TA_1	SPONT	High priority	No	0 = Inactive 1 = Active

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Binary input state	F185I001	0501 H	M_SP_NA_1	READREQ	High priority	No	0 = Inactive 1 = Active
Acknowledge alarm	F185V099	8500 H	C_SC_NA_1	WRITEREQ	High priority	No	0 = 0 1 = Acknowledge

Function block CMTRAV1

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Breaker 1 open travel alarm	F193E000 F193E001	0B40 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Alarm signal status for open	F193O001	0B40 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Inactive 1 = Active
Breaker 1 close travel alarm	F193E002 F193E003	0B41 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
Alarm signal status for close	F193O002	0B41 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Inactive 1 = Active
Acknowledge alarm	F193V099	8B40 H	C_SC_NA_1	WRITEREQ	High priority	No	0 = 0 1 = Acknowledge

Function block CMVO3

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Input voltage circuit alarm	F182E000 F182E001	05C0 H	M_SP_TA_1	SPONT	High priority	No	0 = Off 1 = On
Status of alarm signal	F182O001	05C0 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Not active 1 = Active

Function block PQCU3H

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Harmonic limit	F512E000 F512E001	11C0 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Exceeded
Out HAR_HIGH	F512O001	11C0 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Not active 1 = Active
Cumulative limit	F512E002	11C1 H	M_SP_TA_1	SPONT	High priority	No	1 = Exceeded
Out CUM_HIGH	F512O002	11C1 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Not active 1 = Active
Obs. period near end	F512E003	11C2 H	M_SP_TA_1	SPONT	High priority	No	1= On

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Obs. period ended	F512E004	11C3 H	M_SP_TA_1	SPONT	High priority	No	1 =On
THD	F512I002	5080 H	M_ME_NB_1	READREQ	High priority	No	0.0...1000.0 %
Fund. Component	F512I003	5081 H	M_ME_NB_1	READREQ	High priority	No	0.0...1000.0 %In
2nd harmonic	F512I004	5082 H	M_ME_NB_1	READREQ	High priority	No	0.0...1000.0 %In
3rd harmonic	F512I005	5083 H	M_ME_NB_1	READREQ	High priority	No	0.0...1000.0 %In
4th harmonic	F512I006	5084 H	M_ME_NB_1	READREQ	High priority	No	0.0...1000.0 %In
5th harmonic	F512I007	5085 H	M_ME_NB_1	READREQ	High priority	No	0.0...1000.0 %In
6th harmonic	F512I008	5086 H	M_ME_NB_1	READREQ	High priority	No	0.0...1000.0 %In
7th harmonic	F512I009	5087 H	M_ME_NB_1	READREQ	High priority	No	0.0...1000.0 %In
8th harmonic	F512I010	5088 H	M_ME_NB_1	READREQ	High priority	No	0.0...1000.0 %In
9th harmonic	F512I011	5089 H	M_ME_NB_1	READREQ	High priority	No	0.0...1000.0 %In
10th harmonic	F512I012	508A H	M_ME_NB_1	READREQ	High priority	No	0.0...1000.0 %In
11th harmonic	F512I013	508B H	M_ME_NB_1	READREQ	High priority	No	0.0...1000.0 %In
12th harmonic	F512I014	508C H	M_ME_NB_1	READREQ	High priority	No	0.0...1000.0 %In
13th harmonic	F512I015	508D H	M_ME_NB_1	READREQ	High priority	No	0.0...1000.0 %In
THD	F512I018	508E H	M_ME_NB_1	READREQ	High priority	No	0.0...1000.0 %
2nd harmonic	F512I019	508F H	M_ME_NB_1	READREQ	High priority	No	0.0...1000.0 %In
3rd harmonic	F512I020	5090 H	M_ME_NB_1	READREQ	High priority	No	0.0...1000.0 %In
4th harmonic	F512I021	5091 H	M_ME_NB_1	READREQ	High priority	No	0.0...1000.0 %In
5th harmonic	F512I022	5092 H	M_ME_NB_1	READREQ	High priority	No	0.0...1000.0 %In
6th harmonic	F512I023	5093 H	M_ME_NB_1	READREQ	High priority	No	0.0...1000.0 %In
7th harmonic	F512I024	5094 H	M_ME_NB_1	READREQ	High priority	No	0.0...1000.0 %In
8th harmonic	F512I025	5095 H	M_ME_NB_1	READREQ	High priority	No	0.0...1000.0 %In
9th harmonic	F512I026	5096 H	M_ME_NB_1	READREQ	High priority	No	0.0...1000.0 %In
10th harmonic	F512I027	5097 H	M_ME_NB_1	READREQ	High priority	No	0.0...1000.0 %In

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
11th harmonic	F512I028	5098 H	M_ME_NB_1	READREQ	High priority	No	0.0...1000.0 %In
12th harmonic	F512I029	5099 H	M_ME_NB_1	READREQ	High priority	No	0.0...1000.0 %In
13th harmonic	F512I030	509A H	M_ME_NB_1	READREQ	High priority	No	0.0...1000.0 %In
Recorded THD	F512V206	509B H	M_ME_NB_1	READREQ	High priority	No	0.0...1000.0 %
Recorded THD	F512V306	509C H	M_ME_NB_1	READREQ	High priority	No	0.0...1000.0 %
THD	F512V404	509D H	M_ME_NB_1	READREQ	High priority	No	0.0...1000.0 %
Reset registers	F512V025	90C0 H	C_SC_NA_1	WRITEREQ	High priority	No	0...23

Function block PQVO3H

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Harmonic limit	F513E000 F513E001	1200 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Exceeded
Out HAR_HIGH	F513O001	1200 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Not active 1 = Active
Cumulative limit	F513E002	1201 H	M_SP_TA_1	SPONT	High priority	No	1 = Exceeded
Out CUM_HIGH	F513O002	1201 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Not active 1 = Active
Obs. period near end	F513E003	1202 H	M_SP_TA_1	SPONT	High priority	No	1= On
Obs. period ended	F513E004	1203 H	M_SP_TA_1	SPONT	High priority	No	1 =On
THD	F513I002	50C0 H	M_ME_NB_1	READREQ	High priority	No	0.0...120.0 %
Fund. Component	F513I003	50C1 H	M_ME_NB_1	READREQ	High priority	No	0.0...120.0 %Un
2nd harmonic	F513I004	50C2 H	M_ME_NB_1	READREQ	High priority	No	0.0...120.0 %Un
3rd harmonic	F513I005	50C3 H	M_ME_NB_1	READREQ	High priority	No	0.0...120.0 %Un
4th harmonic	F513I006	50C4 H	M_ME_NB_1	READREQ	High priority	No	0.0...120.0 %Un
5th harmonic	F513I007	50C5 H	M_ME_NB_1	READREQ	High priority	No	0.0...120.0 %Un
6th harmonic	F513I008	50C6 H	M_ME_NB_1	READREQ	High priority	No	0.0...120.0 %Un
7th harmonic	F513I009	50C7 H	M_ME_NB_1	READREQ	High priority	No	0.0...120.0 %Un
8th harmonic	F513I010	50C8 H	M_ME_NB_1	READREQ	High priority	No	0.0...120.0 %Un

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
9th harmonic	F513I011	50C9 H	M_ME_NB_1	READREQ	High priority	No	0.0...120.0 %Un
10th harmonic	F513I012	50CA H	M_ME_NB_1	READREQ	High priority	No	0.0...120.0 %Un
11th harmonic	F513I013	50CB H	M_ME_NB_1	READREQ	High priority	No	0.0...120.0 %Un
12th harmonic	F513I014	50CC H	M_ME_NB_1	READREQ	High priority	No	0.0...120.0 %Un
13th harmonic	F513I015	50CD H	M_ME_NB_1	READREQ	High priority	No	0.0...120.0 %Un
THD	F513I018	50CE H	M_ME_NB_1	READREQ	High priority	No	0.0...120.0 %
2nd harmonic	F513I019	50CF H	M_ME_NB_1	READREQ	High priority	No	0.0...120.0 %Un
3rd harmonic	F513I020	50D0 H	M_ME_NB_1	READREQ	High priority	No	0.0...120.0 %Un
4th harmonic	F513I021	50D1 H	M_ME_NB_1	READREQ	High priority	No	0.0...120.0 %Un
5th harmonic	F513I022	50D2 H	M_ME_NB_1	READREQ	High priority	No	0.0...120.0 %Un
6th harmonic	F513I023	50D3 H	M_ME_NB_1	READREQ	High priority	No	0.0...120.0 %Un
7th harmonic	F513I024	50D4 H	M_ME_NB_1	READREQ	High priority	No	0.0...120.0 %Un
8th harmonic	F513I025	50D5 H	M_ME_NB_1	READREQ	High priority	No	0.0...120.0 %Un
9th harmonic	F513I026	50D6 H	M_ME_NB_1	READREQ	High priority	No	0.0...120.0 %Un
10th harmonic	F513I027	50D7 H	M_ME_NB_1	READREQ	High priority	No	0.0...120.0 %Un
11th harmonic	F513I028	50D8 H	M_ME_NB_1	READREQ	High priority	No	0.0...120.0 %Un
12th harmonic	F513I029	50D9 H	M_ME_NB_1	READREQ	High priority	No	0.0...120.0 %Un
13th harmonic	F513I030	50DA H	M_ME_NB_1	READREQ	High priority	No	0.0...120.0 %Un
Recorded THD	F513V206	50DB H	M_ME_NB_1	READREQ	High priority	No	DD %
Recorded THD	F513V306	50DC H	M_ME_NB_1	READREQ	High priority	No	YYYY-MM- %
THD	F513V404	50DD H	M_ME_NB_1	READREQ	High priority	No	0.0...120.0 %
Reset registers	F513V024	9100 H	C_SC_NA_1	WRITEREQ	High priority	No	0 = 0 1 = Reset

Function block BIO

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Binary input 1	F013E000 F013E001	1040 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
State of binary input 1	F013I001	1040 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Reset 1 = Activated
Binary input 2	F013E002 F013E003	1041 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
State of binary input 2	F013I002	1041 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Reset 1 = Activated
Binary input 3	F013E004 F013E005	1042 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
State of binary input 3	F013I003	1042 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Reset 1 = Activated
Binary input 4 Reset	F013E006 F013E007	1043 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
State of binary input 4	F013I004	1043 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Reset 1 = Activated
Binary input 5	F013E008 F013E009	1044 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
State of binary input 5	F013I005	1044 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Reset 1 = Activated
Binary input 6	F013E010 F013E011	1045 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
State of binary input 6	F013I006	1045 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Reset 1 = Activated
Binary input 7	F013E012 F013E013	1046 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
State of binary input 7	F013I007	1046 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Reset 1 = Activated
Binary input 8	F013E014 F013E015	1047 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
State of binary input 8	F013I008	1047 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Reset 1 = Activated
Binary input 9	F013E016 F013E017	1048 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
State of binary input 9	F013I009	1048 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Reset 1 = Activated
Binary input 10	F013E018 F013E019	1049 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
State of binary input 10	F013I010	1049 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Reset 1 = Activated
Binary input 11	F013E020 F013E021	104A H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
State of binary input 11	F013I011	104A H	M_SP_NA_1	READREQ	High priority	Yes	0 = Reset 1 = Activated
Binary input 12	F013E022 F013E023	104B H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
State of binary input 12	F013I012	104B H	M_SP_NA_1	READREQ	High priority	Yes	0 = Reset 1 = Activated
Binary output 1	F013E024 F013E025	104C H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
State of binary output 1	F013O001	104C H	M_SP_NA_1	READREQ	High priority	Yes	0 = Reset 1 = Activated
Binary output 2	F013E026 F013E027	104D H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
State of binary output 2	F013O002	104D H	M_SP_NA_1	READREQ	High priority	Yes	0 = Reset 1 = Activated
Binary output 3	F013E028 F013E029	104E H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
State of binary output 3	F013O003	104E H	M_SP_NA_1	READREQ	High priority	Yes	0 = Reset 1 = Activated
Binary output 4	F013E030 F013E031	104F H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
State of binary output 4	F013O004	104F H	M_SP_NA_1	READREQ	High priority	Yes	0 = Reset 1 = Activated
Binary output 5	F013E032 F013E033	1050 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
State of binary output 5	F013O005	1050 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Reset 1 = Activated
Binary output 6	F013E034 F013E035	1051 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
State of binary output 6	F013O006	1051 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Reset 1 = Activated
Binary input 1 oscillate	F013E036 F013E037	1052 H	M_SP_TA_1	SPONT	High priority	No	0 = Stop 1 = Start
Validity of binary input 1	F013I021	1052 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Valid 1 = Invalid
Binary input 2 oscillate	F013E038 F013E039	1053 H	M_SP_TA_1	SPONT	High priority	No	0 = Stop 1 = Start
Validity of binary input 2	F013I022	1053 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Valid 1 = Invalid
Binary input 3 oscillate	F013E040 F013E041	1054 H	M_SP_TA_1	SPONT	High priority	No	0 = Stop 1 = Start
Validity of binary input 3	F013I023	1054 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Valid 1 = Invalid

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Binary input 4 oscillate	F013E042 F013E043	1055 H	M_SP_TA_1	SPONT	High priority	No	0 = Stop 1 = Start
Validity of binary input 4	F013I024	1055 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Valid 1 = Invalid
Binary input 5 oscillate	F013E044 F013E045	1056 H	M_SP_TA_1	SPONT	High priority	No	0 = Stop 1 = Start
Validity of binary input 5	F013I025	1056 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Valid 1 = Invalid
Binary input 6 oscillate	F013E046 F013E047	1057 H	M_SP_TA_1	SPONT	High priority	No	0 = Stop 1 = Start
Validity of binary input 6	F013I026	1057 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Valid 1 = Invalid
Binary input 7 oscillate	F013E048 F013E049	1058 H	M_SP_TA_1	SPONT	High priority	No	0 = Stop 1 = Start
Validity of binary input 7	F013I027	1058 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Valid 1 = Invalid
Binary input 8 oscillate	F013E050 F013E051	1059 H	M_SP_TA_1	SPONT	High priority	No	0 = Stop 1 = Start
Validity of binary input 8	F013I028	1059 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Valid 1 = Invalid
Binary input 9 oscillate	F013E052 F013E053	105A H	M_SP_TA_1	SPONT	High priority	No	0 = Stop 1 = Start
Validity of binary input 9	F013I029	105A H	M_SP_NA_1	READREQ	High priority	Yes	0 = Valid 1 = Invalid
Binary input 10 oscillate	F013E054 F013E055	105B H	M_SP_TA_1	SPONT	High priority	No	0 = Stop 1 = Start
Validity of binary input 10	F013I030	105B H	M_SP_NA_1	READREQ	High priority	Yes	0 = Valid 1 = Invalid
Binary input 11 oscillate	F013E056 F013E057	105C H	M_SP_TA_1	SPONT	High priority	No	0 = Stop 1 = Start
Validity of binary input 11	F013I031	105C H	M_SP_NA_1	READREQ	High priority	Yes	0 = Valid 1 = Invalid
Binary input 12 oscillate	F013E058 F013E059	105D H	M_SP_TA_1	SPONT	High priority	No	0 = Stop 1 = Start
Validity of binary input 12	F013I032	105D H	M_SP_NA_1	READREQ	High priority	Yes	0 = Valid 1 = Invalid

CH000, CH001 and CH002

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Analog configuration Error	F000E048	0780 H	M_SP_TA_1	SPONT	High priority	No	1 = Error

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Module Startup	F000E050	0781 H	M_EI_NA_1	SPONT	High priority	No	0 = Started up
Event buffer Overflow	F000E051	0782 H	M_SP_TA_1	SPONT	High priority	No	1 = Overflow
IRF error	F000E056 F000E057	0783 H	M_SP_TA_1	SPONT	High priority	No	0 = Deactivated 1 = Activated
Watchdog error	F000E059	0784 H	M_SP_TA_1	SPONT	High priority	No	1 = Error
Store issued, settings into nonvolatile memory	F000V151	4B80 H	M_ME_NB_1	READREQ	Low priority	No	0 = OK/Done 1 = Progress 2 = Error 166 = Fast Store in Progress
Software reset for relay	F000V250	0000 H	C_RP_NC_1	INIT	High priority	No	-
Store issued settings into nonvolatile memory	F000V151	BB80 H	C_SE_NB_1	WRITEREQ	High priority	No	1 = Start 166 = Fast Store Start
Opening of password for remote setting	F000V160	BB81 H	C_SE_NB_1	WRITEREQ	High priority	No	1..999 = Password
Changing and closing the password for remote setting	F000V161	BB82 H	C_SE_NB_1	WRITEREQ	High priority	No	0 = Close 1..999 = New password
Fault code of selfsupervision system	F001V015	4B81 H	M_BO_NA_1	READREQ	Low priority	Yes	0... 4294967295
Test mode	F001E000 F001E001	07C0 H	M_SP_TA_1	SPONT	High priority	No	0 = OFF 1 = ON
Resetting of oper. indic.	F001V011	87C0 H	C_SC_NA_1	WRITEREQ	High priority	No	1 = Reset
Resetting of oper. indic. & latched output signals	F001V012	87C1 H	C_SC_NA_1	WRITEREQ	High priority	No	1 = Reset
Resetting all	F001V013	87C2 H	C_SC_NA_1	WRITEREQ	High priority	No	1 = Reset
Recent control position	F002E000 F002E001 F002E002	2200 H	M_DP_TA_1	SPONT	High priority	No	0 = Disable 1 = Local 2 = Remote
Recent control position	F002V005	2200 H	M_DP_NA_1	READREQ	High priority	Yes	0 = Disable 1 = Local 2 = Remote
Interlocking bypass mode	F002E004 F002E005	0A00 H	M_SP_TA_1	SPONT	High priority	No	0 = Inactive 1 = Active
Interlocking bypass mode for all control objects	F002V004	0A00 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Inactive 1 = Active

Function block PSC1

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Binary input 1	F017E000 F017E001	1000 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
State of binary input 1	F017I001	1000 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Reset 1 = Activated
Binary input 2	F017E002 F017E003	1001 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
State of binary input 2	F017I002	1001 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Reset 1 = Activated
Binary input 3	F017E004 F017E005	1002 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
State of binary input 3	F017I003	1002 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Reset 1 = Activated
ACFail	F017E006 F017E007	1003 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
State of AC fail	F017I004	1003 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Reset 1 = Activated
OvTemp	F017E008 F017E009	1004 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
State of over temperature	F017I005	1004 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Reset 1 = Activated
Binary output 1	F017E010 F017E011	1005 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
State of binary output 1	F017O001	1005 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Reset 1 = Activated
Binary output 2	F017E012 F017E013	1006 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
State of binary output 2	F017O002	1006 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Reset 1 = Activated
Binary output 3	F017E014 F017E015	1007 H	M_SP_TA_1	SPONT	High priority	No	0 = Reset 1 = Activated
State of binary output 3	F017O003	1007 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Reset 1 = Activated
Binary input 1 oscillate	F017E016 F017E017	1008 H	M_SP_TA_1	SPONT	High priority	No	0 = Stop 1 = Start
Validity of binary input 1	F017I021	1008 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Valid 1 = Invalid
Binary input 2 oscillate	F017E018 F017E019	1009 H	M_SP_TA_1	SPONT	High priority	No	0 = Stop 1 = Start
Validity of binary input 2	F017I022	1009 H	M_SP_NA_1	READREQ	High priority	Yes	0 = Valid 1 = Invalid
Binary input 3 oscillate	F017E020 F017E021	100A H	M_SP_TA_1	SPONT	High priority	No	0 = Stop 1 = Start

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Validity of binary input 3	F017I023	100A H	M_SP_NA_1	READREQ	High priority	Yes	0 = Valid 1 = Invalid
Battery status Good/Low voltage	F017E022 F017E023	100B H	M_SP_TA_1	SPONT	High priority	No	0 = Good 1 = Low voltage
Battery Low	F017I006	100B H	M_SP_NA_1	READREQ	High priority	No	0 = Good 1 = Low voltage
Heating status Off/On	F017E024 F017E025	100C H	M_SP_TA_1	SPONT	High priority	No	0 = Off 1 = On
Heating status	F017I009	100C H	M_SP_NA_1	READREQ	High priority	No	0 = Off 1 = On
Activation of the Battery test	F017V005	100D H	M_SP_NA_1	READREQ	High priority	No	0 = Test ready 1 = Test running
The state of Battery test	F017I010	100E H	M_SP_NA_1	READREQ	High priority	No	0 = Test ready 1 = Test running
Temperature changed	F017E026	4F00 H	M_ME_NB_1	SPONT	High priority	No	-40 ... 70 °C
Voltage changed	F017E027	4F01 H	M_ME_NB_1	SPONT	High priority	No	18.0 ... 33.0 V
Measured temperature	F017I007	4F00 H	M_ME_NB_1	READREQ	Low priority	No	-40 ... 70 °C
Battery voltage	F017I008	4F01 H	M_ME_NB_1	READREQ	Low priority	No	18.0 ... 33.0 V
Minimum battery voltage recorded.	F017I011	4F02 H	M_ME_NB_1	READREQ	Low priority	No	18.0 ... 33.0 V
Activation of the Battery test	F017V005	8F00 H	C_SC_NA_1	WRITEREQ	High priority	No	1 = Start test
Reset recorded minimum battery voltage	F017I011	BC80 H	C_SE_NB_1	WRITEREQ	High priority	No	0..65535

SWITCH groups

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Ruling checksum of SWGRP1	F030S001	5180 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum1 of switching group SWGRP1	F030S041	5181 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum2 of switching group SWGRP1	F030S071	5182 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum selection of switching group SWGRP1	F030V001	5183 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum1 of switching group SWGRP1	F030S041	C180 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Checksum2 of switching group SWGRP1	F030S071	C181 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Checksum selection of switching group SWGRP1	F030V001	C182 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Ruling checksum of SWGRP2	F030S002	5188 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum1 of switching group SWGRP2	F030S042	5189 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum2 of switching group SWGRP2	F030S072	518A H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum selection of switching group SWGRP2	F030V002	518B H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum1 of switching group SWGRP2	F030S042	C188 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Checksum2 of switching group SWGRP2	F030S072	C189 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Checksum selection of switching group SWGRP2	F030V002	C18A H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Ruling checksum of SWGRP3	F030S003	5190 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum1 of switching group SWGRP3	F030S043	5191 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum2 of switching group SWGRP3	F030S073	5192 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum selection of switching group SWGRP3	F030V003	5193 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum1 of switching group SWGRP3	F030S043	C190 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Checksum2 of switching group SWGRP3	F030S073	C191 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Checksum selection of switching group SWGRP3	F030V003	C192 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Ruling checksum of SWGRP4	F030S004	5198 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum1 of switching group SWGRP4	F030S044	5199 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum2 of switching group SWGRP4	F030S074	519A H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum selection of switching group SWGRP4	F030V004	519B H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum1 of switching group SWGRP4	F030S044	C198 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Checksum2 of switching group SWGRP4	F030S074	C199 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Checksum selection of switching group SWGRP4	F030V004	C19A H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Ruling checksum of SWGRP5	F030S005	51A0 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum1 of switching group SWGRP5	F030S045	51A1 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum2 of switching group SWGRP5	F030S075	51A2 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum selection of switching group SWGRP5	F030V005	51A3 H	M_ME_NB_1	READREQ	High priority	No	0..255

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Checksum1 of switching group SWGRP5	F030S045	C1A0 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Checksum2 of switching group SWGRP5	F030S075	C1A1 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Checksum selection of switching group SWGRP5	F030V005	C1A2 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Ruling checksum of SWGRP6	F030S006	51A8 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum1 of switching group SWGRP6	F030S046	51A9 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum2 of switching group SWGRP6	F030S076	51AA H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum selection of switching group SWGRP6	F030V006	51AB H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum1 of switching group SWGRP6	F030S046	C1A8 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Checksum2 of switching group SWGRP6	F030S076	C1A9 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Checksum selection of switching group SWGRP6	F030V006	C1AA H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Ruling checksum of SWGRP7	F030S007	51B0 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum1 of switching group SWGRP7	F030S047	51B1 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum2 of switching group SWGRP7	F030S077	51B2 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum selection of switching group SWGRP7	F030V007	51B3 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum1 of switching group SWGRP7	F030S047	C1B0 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Checksum2 of switching group SWGRP7	F030S077	C1B1 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Checksum selection of switching group SWGRP7	F030V007	C1B2 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Ruling checksum of SWGRP8	F030S008	51B8 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum1 of switching group SWGRP8	F030S048	51B9 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum2 of switching group SWGRP8	F030S078	51BA H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum selection of switching group SWGRP8	F030V008	51BB H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum1 of switching group SWGRP8	F030S048	C1B8 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Checksum2 of switching group SWGRP8	F030S078	C1B9 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Checksum selection of switching group SWGRP8	F030V008	C1BA H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Ruling checksum of SWGRP9	F030S009	51C0 H	M_ME_NB_1	READREQ	High priority	No	0..255

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Checksum1 of switching group SWGRP9	F030S049	51C1 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum2 of switching group SWGRP9	F030S079	51C2 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum selection of switching group SWGRP9	F030V009	51C3 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum1 of switching group SWGRP9	F030S049	C1C0 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Checksum2 of switching group SWGRP9	F030S079	C1C1 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Checksum selection of switching group SWGRP9	F030V009	C1C2 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Ruling checksum of SWGRP10	F030S010	51C8 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum1 of switching group SWGRP10	F030S050	51C9 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum2 of switching group SWGRP10	F030S080	51CA H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum selection of switching group SWGRP10	F030V010	51CB H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum1 of switching group SWGRP10	F030S050	C1C8 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Checksum2 of switching group SWGRP10	F030S080	C1C9 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Checksum selection of switching group SWGRP10	F030V010	C1CA H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Ruling checksum of SWGRP11	F030S011	51D0 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum1 of switching group SWGRP11	F030S051	51D1 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum2 of switching group SWGRP11	F030S081	51D2 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum selection of switching group SWGRP11	F030V011	51D3 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum1 of switching group SWGRP11	F030S051	C1D0 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Checksum2 of switching group SWGRP11	F030S081	C1D1 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Checksum selection of switching group SWGRP11	F030V011	C1D2 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Ruling checksum of SWGRP12	F030S012	51D8 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum1 of switching group SWGRP12	F030S052	51D9 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum2 of switching group SWGRP12	F030S082	51DA H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum selection of switching group SWGRP12	F030V012	51DB H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum1 of switching group SWGRP12	F030S052	C1D8 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Checksum2 of switching group SWGRP12	F030S082	C1D9 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Checksum selection of switching group SWGRP12	F030V012	C1DA H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Ruling checksum of SWGRP13	F030S013	51E0 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum1 of switching group SWGRP13	F030S053	51E1 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum2 of switching group SWGRP13	F030S083	51E2 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum selection of switching group SWGRP13	F030V013	51E3 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum1 of switching group SWGRP13	F030S053	C1E0 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Checksum2 of switching group SWGRP13	F030S083	C1E1 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Checksum selection of switching group SWGRP13	F030V013	C1E2 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Ruling checksum of SWGRP14	F030S014	51E8 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum1 of switching group SWGRP14	F030S054	51E9 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum2 of switching group SWGRP14	F030S084	51EA H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum selection of switching group SWGRP14	F030V014	51EB H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum1 of switching group SWGRP14	F030S054	C1E8 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Checksum2 of switching group SWGRP14	F030S084	C1E9 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Checksum selection of switching group SWGRP14	F030V014	C1EA H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Ruling checksum of SWGRP15	F030S015	51F0 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum1 of switching group SWGRP15	F030S055	51F1 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum2 of switching group SWGRP15	F030S085	51F2 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum selection of switching group SWGRP15	F030V015	51F3 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum1 of switching group SWGRP15	F030S055	C1F0 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Checksum2 of switching group SWGRP15	F030S085	C1F1 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Checksum selection of switching group SWGRP15	F030V015	C1F2 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Ruling checksum of SWGRP16	F030S016	51F8 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum1 of switching group SWGRP16	F030S056	51F9 H	M_ME_NB_1	READREQ	High priority	No	0..255

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Checksum2 of switching group SWGRP16	F030S086	51FA H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum selection of switching group SWGRP16	F030V016	51FB H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum1 of switching group SWGRP16	F030S056	C1F8 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Checksum2 of switching group SWGRP16	F030S086	C1F9 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Checksum selection of switching group SWGRP16	F030V016	C1FA H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Ruling checksum of SWGRP17	F030S017	5200 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum1 of switching group SWGRP17	F030S057	5201 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum2 of switching group SWGRP17	F030S087	5202 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum selection of switching group SWGRP17	F030V017	5203 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum1 of switching group SWGRP17	F030S057	C200 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Checksum2 of switching group SWGRP17	F030S087	C201 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Checksum selection of switching group SWGRP17	F030V017	C202 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Ruling checksum of SWGRP18	F030S018	5208 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum1 of switching group SWGRP18	F030S058	5209 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum2 of switching group SWGRP18	F030S088	520A H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum selection of switching group SWGRP18	F030V018	520B H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum1 of switching group SWGRP18	F030S058	C208 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Checksum2 of switching group SWGRP18	F030S088	C209 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Checksum selection of switching group SWGRP18	F030V018	C20A H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Ruling checksum of SWGRP19	F030S019	5210 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum1 of switching group SWGRP19	F030S059	5211 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum2 of switching group SWGRP19	F030S089	5212 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum selection of switching group SWGRP19	F030V019	5213 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum1 of switching group SWGRP19	F030S059	C210 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Checksum2 of switching group SWGRP19	F030S089	C211 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Checksum selection of switching group SWGRP19	F030V019	C212 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Ruling checksum of SWGRP20	F030S020	5218 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum1 of switching group SWGRP20	F030S060	5219 H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum2 of switching group SWGRP20	F030S090	521A H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum selection of switching group SWGRP20	F030V020	521B H	M_ME_NB_1	READREQ	High priority	No	0..255
Checksum1 of switching group SWGRP20	F030S060	C218 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Checksum2 of switching group SWGRP20	F030S090	C219 H	C_SE_NB_1	WRITEREQ	High priority	No	0..255
Checksum selection of switching group SWGRP20	F030V020	C21A H	C_SE_NB_1	WRITEREQ	High priority	No	0..255

REC-CH231 (LON events)

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
LON Problem	F231E000	0740 H	M_SP_TA_1	SPONT	High priority	No	0 = Problem

RECCH025 and RECCH026 (LON virtual inputs and outputs)

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
COMM_IN33	F025I017	1240 H	M_SP_NA_1	SPONT	High priority	No	0 = Reset 1 = Activated
COMM_IN33	F025I017	1240 H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_IN34	F025I018	1241 H	M_SP_NA_1	SPONT	High priority	No	0 = Reset 1 = Activated
COMM_IN34	F025I018	1241 H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_IN35	F025I019	1242 H	M_SP_NA_1	SPONT	High priority	No	0 = Reset 1 = Activated
COMM_IN35	F025I019	1242 H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_IN36	F025I020	1243 H	M_SP_NA_1	SPONT	High priority	No	0 = Reset 1 = Activated
COMM_IN36	F025I020	1243 H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_IN37	F025I021	1244 H	M_SP_NA_1	SPONT	High priority	No	0 = Reset 1 = Activated

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
COMM_IN37	F025I021	1244 H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_IN38	F025I022	1245 H	M_SP_NA_1	SPONT	High priority	No	0 = Reset 1 = Activated
COMM_IN38	F025I022	1245 H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_IN39	F025I023	1246 H	M_SP_NA_1	SPONT	High priority	No	0 = Reset 1 = Activated
COMM_IN39	F025I023	1246 H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_IN40	F025I024	1247 H	M_SP_NA_1	SPONT	High priority	No	0 = Reset 1 = Activated
COMM_IN40	F025I024	1247 H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_IN41	F025I025	1248 H	M_SP_NA_1	SPONT	High priority	No	0 = Reset 1 = Activated
COMM_IN41	F025I025	1248 H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_IN42	F025I026	1249 H	M_SP_NA_1	SPONT	High priority	No	0 = Reset 1 = Activated
COMM_IN42	F025I026	1249 H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_IN43	F025I027	124A H	M_SP_NA_1	SPONT	High priority	No	0 = Reset 1 = Activated
COMM_IN43	F025I027	124A H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_IN44	F025I028	124B H	M_SP_NA_1	SPONT	High priority	No	0 = Reset 1 = Activated
COMM_IN44	F025I028	124B H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_IN45	F025I029	124C H	M_SP_NA_1	SPONT	High priority	No	0 = Reset 1 = Activated
COMM_IN45	F025I029	124C H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_IN46	F025I030	124D H	M_SP_NA_1	SPONT	High priority	No	0 = Reset 1 = Activated
COMM_IN46	F025I030	124D H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_IN47	F025I031	124E H	M_SP_NA_1	SPONT	High priority	No	0 = Reset 1 = Activated
COMM_IN47	F025I031	124E H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
COMM_IN48	F025I032	124F H	M_SP_NA_1	SPONT	High priority	No	0 = Reset 1 = Activated
COMM_IN48	F025I032	124F H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT33	F025O017	1250 H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT34	F025O018	1251 H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT35	F025O019	1252 H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT36	F025O020	1253 H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT37	F025O021	1254 H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT38	F025O022	1255 H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT39	F025O023	1256 H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT40	F025O024	1257 H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT41	F025O025	1258 H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT42	F025O026	1259 H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT43	F025O027	125A H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT44	F025O028	125B H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT45	F025O029	125C H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT46	F025O030	125D H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT47	F025O031	125E H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT48	F025O032	125F H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_IN1	F025I001	5100 H	M_ME_NB_1	SPONT	High priority	No	0..65535
COMM_IN1	F025I001	5100 H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_IN2	F025I002	5101 H	M_ME_NB_1	SPONT	High priority	No	0..65535
COMM_IN2	F025I002	5101 H	M_ME_NB_1	READREQ	High priority	No	0..65535

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
COMM_IN3	F025I003	5102 H	M_ME_NB_1	SPONT	High priority	No	0..65535
COMM_IN3	F025I003	5102 H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_IN4	F025I004	5103 H	M_ME_NB_1	SPONT	High priority	No	0..65535
COMM_IN4	F025I004	5103 H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_IN5	F025I005	5104 H	M_ME_NB_1	SPONT	High priority	No	0..65535
COMM_IN5	F025I005	5104 H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_IN6	F025I006	5105 H	M_ME_NB_1	SPONT	High priority	No	0..65535
COMM_IN6	F025I006	5105 H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_IN7	F025I007	5106 H	M_ME_NB_1	SPONT	High priority	No	0..65535
COMM_IN7	F025I007	5106 H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_IN8	F025I008	5107 H	M_ME_NB_1	SPONT	High priority	No	0..65535
COMM_IN8	F025I008	5107 H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_IN9	F025I009	5108 H	M_ME_NB_1	SPONT	High priority	No	0..65535
COMM_IN9	F025I009	5108 H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_IN10	F025I010	5109 H	M_ME_NB_1	SPONT	High priority	No	0..65535
COMM_IN10	F025I010	5109 H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_IN11	F025I011	510A H	M_ME_NB_1	SPONT	High priority	No	0..65535
COMM_IN11	F025I011	510A H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_IN12	F025I012	510B H	M_ME_NB_1	SPONT	High priority	No	0..65535
COMM_IN12	F025I012	510B H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_IN13	F025I013	510C H	M_ME_NB_1	SPONT	High priority	No	0..65535
COMM_IN13	F025I013	510C H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_IN14	F025I014	510D H	M_ME_NB_1	SPONT	High priority	No	0..65535
COMM_IN14	F025I014	510D H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_IN15	F025I015	510E H	M_ME_NB_1	SPONT	High priority	No	0..65535

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
COMM_IN15	F025I015	510E H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_IN16	F025I016	510F H	M_ME_NB_1	SPONT	High priority	No	0..65535
COMM_IN16	F025I016	510F H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_OUT1	F025O001	5110 H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_OUT2	F025O002	5111 H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_OUT3	F025O003	5112 H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_OUT4	F025O004	5113 H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_OUT5	F025O005	5114 H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_OUT6	F025O006	5115 H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_OUT7	F025O007	5116 H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_OUT8	F025O008	5117 H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_OUT9	F025O009	5118 H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_OUT10	F025O010	5119 H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_OUT11	F025O011	511A H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_OUT12	F025O012	511B H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_OUT13	F025O013	511C H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_OUT14	F025O014	511D H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_OUT15	F025O015	511E H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_OUT16	F025O016	511F H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_OUT33	F025O017	9140 H	C_SC_NA_1	WRITEREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT34	F025O018	9141 H	C_SC_NA_1	WRITEREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT35	F025O019	9142 H	C_SC_NA_1	WRITEREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT36	F025O020	9143 H	C_SC_NA_1	WRITEREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT37	F025O021	9144 H	C_SC_NA_1	WRITEREQ	High priority	No	0 = Reset 1 = Activated

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
COMM_OUT38	F025O022	9145 H	C_SC_NA_1	WRITEREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT39	F025O023	9146 H	C_SC_NA_1	WRITEREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT40	F025O024	9147 H	C_SC_NA_1	WRITEREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT41	F025O025	9148 H	C_SC_NA_1	WRITEREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT42	F025O026	9149 H	C_SC_NA_1	WRITEREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT43	F025O027	914A H	C_SC_NA_1	WRITEREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT44	F025O028	914B H	C_SC_NA_1	WRITEREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT45	F025O029	914C H	C_SC_NA_1	WRITEREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT46	F025O030	914D H	C_SC_NA_1	WRITEREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT47	F025O031	914E H	C_SC_NA_1	WRITEREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT48	F025O032	914F H	C_SC_NA_1	WRITEREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT1	F025O001	C100 H	C_SE_NB_1	WRITEREQ	High priority	No	0..65535
COMM_OUT2	F025O002	C101 H	C_SE_NB_1	WRITEREQ	High priority	No	0..65535
COMM_OUT3	F025O003	C102 H	C_SE_NB_1	WRITEREQ	High priority	No	0..65535
COMM_OUT4	F025O004	C103 H	C_SE_NB_1	WRITEREQ	High priority	No	0..65535
COMM_OUT5	F025O005	C104 H	C_SE_NB_1	WRITEREQ	High priority	No	0..65535
COMM_OUT6	F025O006	C105 H	C_SE_NB_1	WRITEREQ	High priority	No	0..65535
COMM_OUT7	F025O007	C106 H	C_SE_NB_1	WRITEREQ	High priority	No	0..65535
COMM_OUT8	F025O008	C107 H	C_SE_NB_1	WRITEREQ	High priority	No	0..65535
COMM_OUT9	F025O009	C108 H	C_SE_NB_1	WRITEREQ	High priority	No	0..65535
COMM_OUT10	F025O010	C109 H	C_SE_NB_1	WRITEREQ	High priority	No	0..65535
COMM_OUT11	F025O011	C10A H	C_SE_NB_1	WRITEREQ	High priority	No	0..65535
COMM_OUT12	F025O012	C10B H	C_SE_NB_1	WRITEREQ	High priority	No	0..65535

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
COMM_OUT13	F025O013	C10C H	C_SE_NB_1	WRITEREQ	High priority	No	0..65535
COMM_OUT14	F025O014	C10D H	C_SE_NB_1	WRITEREQ	High priority	No	0..65535
COMM_OUT15	F025O015	C10E H	C_SE_NB_1	WRITEREQ	High priority	No	0..65535
COMM_OUT16	F025O016	C10F H	C_SE_NB_1	WRITEREQ	High priority	No	0..65535
COMM_IN49	F026I017	1280 H	M_SP_NA_1	SPONT	High priority	No	0 = Reset 1 = Activated
COMM_IN49	F026I017	1280 H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_IN50	F026I018	1281 H	M_SP_NA_1	SPONT	High priority	No	0 = Reset 1 = Activated
COMM_IN50	F026I018	1281 H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_IN51	F026I019	1282 H	M_SP_NA_1	SPONT	High priority	No	0 = Reset 1 = Activated
COMM_IN51	F026I019	1282 H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_IN52	F026I020	1283 H	M_SP_NA_1	SPONT	High priority	No	0 = Reset 1 = Activated
COMM_IN52	F026I020	1283 H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_IN53	F026I021	1284 H	M_SP_NA_1	SPONT	High priority	No	0 = Reset 1 = Activated
COMM_IN53	F026I021	1284 H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_IN54	F026I022	1285 H	M_SP_NA_1	SPONT	High priority	No	0 = Reset 1 = Activated
COMM_IN54	F026I022	1285 H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_IN55	F026I023	1286 H	M_SP_NA_1	SPONT	High priority	No	0 = Reset 1 = Activated
COMM_IN55	F026I023	1286 H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_IN56	F026I024	1287 H	M_SP_NA_1	SPONT	High priority	No	0 = Reset 1 = Activated
COMM_IN56	F026I024	1287 H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_IN57	F026I025	1288 H	M_SP_NA_1	SPONT	High priority	No	0 = Reset 1 = Activated
COMM_IN57	F026I025	1288 H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
COMM_IN58	F026I026	1289 H	M_SP_NA_1	SPONT	High priority	No	0 = Reset 1 = Activated
COMM_IN58	F026I026	1289 H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_IN59	F026I027	128A H	M_SP_NA_1	SPONT	High priority	No	0 = Reset 1 = Activated
COMM_IN59	F026I027	128A H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_IN60	F026I028	128B H	M_SP_NA_1	SPONT	High priority	No	0 = Reset 1 = Activated
COMM_IN60	F026I028	128B H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_IN61	F026I029	128C H	M_SP_NA_1	SPONT	High priority	No	0 = Reset 1 = Activated
COMM_IN61	F026I029	128C H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_IN62	F026I030	128D H	M_SP_NA_1	SPONT	High priority	No	0 = Reset 1 = Activated
COMM_IN62	F026I030	128D H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_IN63	F026I031	128E H	M_SP_NA_1	SPONT	High priority	No	0 = Reset 1 = Activated
COMM_IN63	F026I031	128E H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_IN64	F026I032	128F H	M_SP_NA_1	SPONT	High priority	No	0 = Reset 1 = Activated
COMM_IN64	F026I032	128F H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT49	F026O017	1290 H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT50	F026O018	1291 H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT51	F026O019	1292 H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT52	F026O020	1293 H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT53	F026O021	1294 H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT54	F026O022	1295 H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT55	F026O023	1296 H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
COMM_OUT56	F026O024	1297 H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT57	F026O025	1298 H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT58	F026O026	1299 H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT59	F026O027	129A H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT60	F026O028	129B H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT61	F026O029	129C H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT62	F026O030	129D H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT63	F026O031	129E H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT64	F026O032	129F H	M_SP_NA_1	READREQ	High priority	No	0 = Reset 1 = Activated
COMM_IN17	F026I001	5140 H	M_ME_NB_1	SPONT	High priority	No	0..65535
COMM_IN17	F026I001	5140 H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_IN18	F026I002	5141 H	M_ME_NB_1	SPONT	High priority	No	0..65535
COMM_IN18	F026I002	5141 H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_IN19	F026I003	5142 H	M_ME_NB_1	SPONT	High priority	No	0..65535
COMM_IN19	F026I003	5142 H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_IN20	F026I004	5143 H	M_ME_NB_1	SPONT	High priority	No	0..65535
COMM_IN20	F026I004	5143 H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_IN21	F026I005	5144 H	M_ME_NB_1	SPONT	High priority	No	0..65535
COMM_IN21	F026I005	5144 H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_IN22	F026I006	5145 H	M_ME_NB_1	SPONT	High priority	No	0..65535
COMM_IN22	F026I006	5145 H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_IN23	F026I007	5146 H	M_ME_NB_1	SPONT	High priority	No	0..65535
COMM_IN23	F026I007	5146 H	M_ME_NB_1	READREQ	High priority	No	0..65535

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
COMM_IN24	F026I008	5147 H	M_ME_NB_1	SPONT	High priority	No	0..65535
COMM_IN24	F026I008	5147 H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_IN25	F026I009	5148 H	M_ME_NB_1	SPONT	High priority	No	0..65535
COMM_IN25	F026I009	5148 H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_IN26	F026I010	5149 H	M_ME_NB_1	SPONT	High priority	No	0..65535
COMM_IN26	F026I010	5149 H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_IN27	F026I011	514A H	M_ME_NB_1	SPONT	High priority	No	0..65535
COMM_IN27	F026I011	514A H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_IN28	F026I012	514B H	M_ME_NB_1	SPONT	High priority	No	0..65535
COMM_IN28	F026I012	514B H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_IN29	F026I013	514C H	M_ME_NB_1	SPONT	High priority	No	0..65535
COMM_IN29	F026I013	514C H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_IN30	F026I014	514D H	M_ME_NB_1	SPONT	High priority	No	0..65535
COMM_IN30	F026I014	514D H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_IN31	F026I015	514E H	M_ME_NB_1	SPONT	High priority	No	0..65535
COMM_IN31	F026I015	514E H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_IN32	F026I016	514F H	M_ME_NB_1	SPONT	High priority	No	0..65535
COMM_IN32	F026I016	514F H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_OUT17	F026O001	5150 H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_OUT18	F026O002	5151 H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_OUT19	F026O003	5152 H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_OUT20	F026O004	5153 H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_OUT21	F026O005	5154 H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_OUT22	F026O006	5155 H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_OUT23	F026O007	5156 H	M_ME_NB_1	READREQ	High priority	No	0..65535

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
COMM_OUT24	F026O008	5157 H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_OUT25	F026O009	5158 H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_OUT26	F026O010	5159 H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_OUT27	F026O011	515A H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_OUT28	F026O012	515B H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_OUT29	F026O013	515C H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_OUT30	F026O014	515D H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_OUT31	F026O015	515E H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_OUT32	F026O016	515F H	M_ME_NB_1	READREQ	High priority	No	0..65535
COMM_OUT49	F026O017	9180 H	C_SC_NA_1	WRITEREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT50	F026O018	9181 H	C_SC_NA_1	WRITEREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT51	F026O019	9182 H	C_SC_NA_1	WRITEREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT52	F026O020	9183 H	C_SC_NA_1	WRITEREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT53	F026O021	9184 H	C_SC_NA_1	WRITEREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT54	F026O022	9185 H	C_SC_NA_1	WRITEREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT55	F026O023	9186 H	C_SC_NA_1	WRITEREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT56	F026O024	9187 H	C_SC_NA_1	WRITEREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT57	F026O025	9188 H	C_SC_NA_1	WRITEREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT58	F026O026	9189 H	C_SC_NA_1	WRITEREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT59	F026O027	918A H	C_SC_NA_1	WRITEREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT60	F026O028	918B H	C_SC_NA_1	WRITEREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT61	F026O029	918C H	C_SC_NA_1	WRITEREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT62	F026O030	918D H	C_SC_NA_1	WRITEREQ	High priority	No	0 = Reset 1 = Activated

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
COMM_OUT63	F026O031	918E H	C_SC_NA_1	WRITEREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT64	F026O032	918F H	C_SC_NA_1	WRITEREQ	High priority	No	0 = Reset 1 = Activated
COMM_OUT17	F026O001	C140 H	C_SE_NB_1	WRITEREQ	High priority	No	0..65535
COMM_OUT18	F026O002	C141 H	C_SE_NB_1	WRITEREQ	High priority	No	0..65535
COMM_OUT19	F026O003	C142 H	C_SE_NB_1	WRITEREQ	High priority	No	0..65535
COMM_OUT20	F026O004	C143 H	C_SE_NB_1	WRITEREQ	High priority	No	0..65535
COMM_OUT21	F026O005	C144 H	C_SE_NB_1	WRITEREQ	High priority	No	0..65535
COMM_OUT22	F026O006	C145 H	C_SE_NB_1	WRITEREQ	High priority	No	0..65535
COMM_OUT23	F026O007	C146 H	C_SE_NB_1	WRITEREQ	High priority	No	0..65535
COMM_OUT24	F026O008	C147 H	C_SE_NB_1	WRITEREQ	High priority	No	0..65535
COMM_OUT25	F026O009	C148 H	C_SE_NB_1	WRITEREQ	High priority	No	0..65535
COMM_OUT26	F026O010	C149 H	C_SE_NB_1	WRITEREQ	High priority	No	0..65535
COMM_OUT27	F026O011	C14A H	C_SE_NB_1	WRITEREQ	High priority	No	0..65535
COMM_OUT28	F026O012	C14B H	C_SE_NB_1	WRITEREQ	High priority	No	0..65535
COMM_OUT29	F026O013	C14C H	C_SE_NB_1	WRITEREQ	High priority	No	0..65535
COMM_OUT30	F026O014	C14D H	C_SE_NB_1	WRITEREQ	High priority	No	0..65535
COMM_OUT31	F026O015	C14E H	C_SE_NB_1	WRITEREQ	High priority	No	0..65535
COMM_OUT32	F026O016	C14F H	C_SE_NB_1	WRITEREQ	High priority	No	0..65535

Link handler

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Communication speed of remote protocol	F500V211	4C00 H	M_ME_NB_1	READREQ	Low priority	No	300..19200 bps
		BC00 H	C_SE_NB_1	WRITEREQ	High priority	No	
Number of stop bits	F500V212	4C01 H	M_ME_NB_1	READREQ	Low priority	No	1..2
		BC01 H	C_SE_NB_1	WRITEREQ	High priority	No	
CTS line delay in RS232 port	F500V213	4C02 H	M_ME_NB_1	READREQ	Low priority	No	0..10000 ms
		BC02 H	C_SE_NB_1	WRITEREQ	High priority	No	
RTS line delay in RS232 port	F500V214	4C03 H	M_ME_NB_1	READREQ	Low priority	No	0..10000 ms
		BC03 H	C_SE_NB_1	WRITEREQ	High priority	No	
Next char timeout	F500V215	4C04 H	M_ME_NB_1	READREQ	Low priority	No	0..10000 ms 0 = Not in use
		BC04 H	C_SE_NB_1	WRITEREQ	High priority	No	
End of frame timeout	F500V216	4C05 H	M_ME_NB_1	READREQ	Low priority	No	1..10000 ms
		BC05 H	C_SE_NB_1	WRITEREQ	High priority	No	
CTS usage	F500V217	0800 H	M_SP_NA_1	READREQ	Low priority	No	0 = not used 1 = in use
		8800 H	C_SC_NA_1	WRITEREQ	High priority	No	
RTS usage	F500V218	0801 H	M_SP_NA_1	READREQ	Low priority	No	0 = not used 1 = in use
		8801 H	C_SC_NA_1	WRITEREQ	High priority	No	
Connection mode	F500V220	0803 H	M_SP_NA_1	READREQ	Low priority	No	0 = fixed line 1 = dial-up
		8803 H	C_SC_NA_1	WRITEREQ	High priority	No	
Modem init string	F500V221	E000 H	M_SR_NA_1	READREQ	Low priority	No	max. 75 characters
		E400 H	C_SR_NA_1	WRITEREQ	High priority	No	
Modem dialing string	F500V222	E001 H	M_SR_NA_1	READREQ	Low priority	No	max. 20 characters
		E401 H	C_SR_NA_1	WRITEREQ	High priority	No	
Modem hang-up string	F500V223	E002 H	M_SR_NA_1	READREQ	Low priority	No	max. 20 characters
		E402 H	C_SR_NA_1	WRITEREQ	High priority	No	

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Modem 1st spare string	F500V224	E003 H	M_SR_NA_1	READREQ	Low priority	No	max. 20 characters
		E403 H	C_SR_NA_1	WRITEREQ	High priority	No	
Modem 2nd spare string	F500V225	E004 H	M_SR_NA_1	READREQ	Low priority	No	max. 20 characters
		E404 H	C_SR_NA_1	WRITEREQ	High priority	No	
Modem 3rd spare string	F500V226	E005 H	M_SR_NA_1	READREQ	Low priority	No	max. 20 characters
		E405 H	C_SR_NA_1	WRITEREQ	High priority	No	
Modem 4th spare string	F500V227	E006 H	M_SR_NA_1	READREQ	Low priority	No	max. 20 characters
		E406 H	C_SR_NA_1	WRITEREQ	High priority	No	
Modem emergency string	F500V228	E007 H	M_SR_NA_1	READREQ	Low priority	No	max. 20 characters
		E407 H	C_SR_NA_1	WRITEREQ	High priority	No	
Modem PIN code string	F500V229	E008 H	M_SR_NA_1	READREQ	Low priority	No	max. 40 characters
		E408 H	C_SR_NA_1	WRITEREQ	High priority	No	
Parity	F500V230	4C06 H	M_ME_NB_1	READREQ	Low priority	No	0 = no parity 1 = odd parity 2 = even parity (standard)
		BC06 H	C_SE_NB_1	WRITEREQ	High priority	No	
Number of data bits	F500V231	4C07 H	M_ME_NB_1	READREQ	Low priority	No	5..8
		BC07 H	C_SE_NB_1	WRITEREQ	High priority	No	

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Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Size of link address in bytes	F502V244	4C40 H	M_ME_NB_1	READREQ	Low priority	No	1.. 2
		BC40 H	C_SE_NB_1	WRITEREQ	High priority	No	
Link Address	F502V245	4C41 H	M_ME_NB_1	READREQ	Low priority	No	0..65535
		BC41 H	C_SE_NB_1	WRITEREQ	High priority	No	
Size of common address of ASDU in bytes	F502V246	4C42 H	M_ME_NB_1	READREQ	Low priority	No	1..2

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
		BC42 H	C_SE_NB_1	WRITEREQ	High priority	No	
Common address of ASDU	F502V247	4C43 H	M_ME_NB_1	READREQ	Low priority	No	0..65535
		BC43 H	C_SE_NB_1	WRITEREQ	High priority	No	
Master idle timeout in seconds	F502V249	4C44 H	M_ME_NB_1	READREQ	Low priority	No	0..10000
		BC44 H	C_SE_NB_1	WRITEREQ	High priority	No	
IEC101 Application layer response timeout	F502V250	4C45 H	M_ME_NB_1	READREQ	Low priority	No	0..10000
IEC timestamp type	F502V251	4C46 H	M_ME_NB_1	READREQ	Low priority	No	0 – standard time stamp (IEC)
		BC45 H	C_SE_NB_1	WRITEREQ	High priority	No	1 – ABB standard (time context message C_CS_NA sent before the standard time-tagged message) 2 – SIEMENS standard (frames with full time stamp M_FT_XXX defined in the private range)
Watchdog TO	F502V252	4C47 H	M_ME_NB_1	READREQ	Low priority	No	0..65535
		BC46 H	C_SE_NB_1	WRITEREQ	High priority	No	
Clear class 1 buffer	F502CLB1	8840 H	C_SC_NA_1	WRITEREQ	High priority	No	1 = Clear
Clear class 2 buffer	F502CLB2	8841 H	C_SC_NA_1	WRITEREQ	High priority	No	1 = Clear
System time	F502SCLK	E200 H	C_CS_NA_1	READREQ	High priority	No	
Time synchronization	F502TSYN	0000 H	C_CS_NA_1	SYNCHR	High priority	No	

Transparent SPA

Description	Name	IEC Address	ASDU Type	Access Type	Class	Interrogation assignment	Values
Transparent SPA	LONSPAIN	E600 H	C_SB_NA_1	WRITEREQ	High priority	No	

3.2.1 Addressing ranges for mapped function blocks

This section presents the details addressing ranges in the IEC 60870-5-101 protocol for the complete set of REC 523 function blocks. The address range of frames in the monitor direction is presented in the numerator field and for frames in control direction in the denominator field of cell.

Group of function blocks	*Function block*	*Addresses*					
		Binary	*Double point*	*Analog*	*String*	*Time*	*SPA*
Measurement	MEAI1	0DC0-0DC4		4DC0			
	MEAI2	0E00-0E04		4E00			
	MEAI3	0E40-0E44		4E40			
	MEAI4	0E80-0E84		4E80			
	MEAI5	0EC0-0EC4		4EC0			
	MEAI6	0F40-0F44		4F40			
	MEAI7	0F80-0F84		4F80			
	MEAI8	0FC0-0FC4		4FC0			
	MECU1A	0900-0901		4D00			
	MECU1B	0180-0181		4580			
	MECU3A	08C0-08CB		4CC0-4CC2			
	MECU3B	0140-014B		4540-4542			
	MEDREC16	0880-0883					
	MEFR1	0280-0283		4680, 468A			
	MEPE7	0240-0247		4640-4646 4656-5659			
	MEVO1A	0980-0981		4D80			
	MEVO1B	0200-0201		4600			
	MEVO3A	0940-094B 094D-0958		4D40-4D45			
	MEVO3B	01C0-01CB 01CD-01D8		45C0-45C5			
Protection	AR5FUNC (80)	1100-1104 110B-110E 1114-1116 111A 1121		5000-5002			
		9000		C000			
	AR5FUNC (81)	1130-1135					
	AR5FUNC (82)	1138-113D					
	AR5FUNC (83)	1140-1145					
	AR5FUNC (84)	1148-114D					

Group of function blocks	*Function block*	*Addresses*					
		Binary	*Double point*	*Analog*	*String*	*Time*	*SPA*
	AR5FUNC (85)	1150-1155					
	AR5FUNC (86)	1158-115C					
	CUB3LOW	0080-0084 0087					
	DEF2HIGH	0B00-0B05					
	DEF2LOW	0100-0104 0108					
	DOC6HIGH	0AC0-0AC7					
	DOC6LOW	00C0-00C6					
	INRUSH3	0BC0-0BC1					
	NEF1HIGH	0A80-0A85					
	NEF1LOW	0040-0044 0047					
	NOC3HIGH	0A40-0A46					
	NOC3LOW	0000-0004 0008					
	UV3HIGH	0C40-0C44					
	UV3LOW	0C00-0C04					
Control	CO3DC1	0440-450	2180-2181				
		8440-8443					
	CO3DC2	0480-0490	21C0-21C1				
		8480-8483					
	COCB1	0C80-0C8C	2280				
		8C80-8C82					
	COCB2	0CC0-0CCC	22C0				
		8CC0-8CC2					
	CODC1	0300-030A	2040				
		8300-8301					
	CODC2	0340-034A	2080				
		8340-8341					
	CODC3	0380-038A	20C0				
		8380-8381					
	CODC4	03C0-03CA	2100				
		83C0-83C1					
	CODC5	0400-040A	2140				
		8400-8401					
	COIND1	02C0	2000				
	COIND2	02C1	2001				
	COIND3	02C2	2002				
	COIND4	02C3	2003				
	COIND5	02C4	2004				
	COIND6	02C5	2005				

Group of function blocks	*Function block*	*Addresses*					
		Binary	*Double point*	*Analog*	*String*	*Time*	*SPA*
	COIND7	02C6	2006				
	COIND8	02C7	2007				
	COLOCAT	09C0					
	COPFC	1180-118D		5040-5047			
				C040-C042			
Condition monitoring	CMBWEAR1	0640		4A41-4A43			
		8640		BA41-BA43			
	CMBWEAR2	0680		4A81-4A83			
		8680		BA81-BA83			
	CMCU3	0580					
	CMGAS1	0600-0601					
		8600					
	CMGAS3	0D80-0D83					
		8D00					
	CMSCHED	06C0					
		86C0					
	CMSPRC1	0540-0544					
		8540					
	CMTIME1	04C0-04C1					
		84C0					
	CMTIME2	0500-0501					
		8500					
	CMTCS1	0D00-0D01					
	CMTCS2	0D40-0D41					
	CMTRAV1	0B40-0B41					
		8B40					
	CMVO3	05C0					
Power quality	PQCU3H	11C0-11C3		5080-509E			
		90C0					
	PQVO3H	1200-1203		50C0-50DE			
		9100					
I/O modules	BIO1 (Channel 013)	1040-105D					
	PSC1 (Channel 017)	1000-100E		4F00-4F02			
		8F00		BC80			
System	Channel 0	0000		4B80			
		0780-0784		BB80-BB82			
	Channel 1	07C0					
		87C0-87C2					
	Channel 2	0A00	2200				
	SWGRP1			5180-5183			
				C180-C182			

Group of function blocks	*Function block*	*Addresses*					
		Binary	*Double point*	*Analog*	*String*	*Time*	*SPA*
	SWGRP10			51C8-51CB			
				C1C8-C1CA			
	SWGRP11			51D0-51D3			
				C1D0-C1D2			
	SWGRP12			51D8-51DB			
				C1D8-C1DA			
	SWGRP13			51E0-51E3			
				C1E0-C1E2			
	SWGRP14			51E8-51EB			
				C1E8-C1EA			
	SWGRP15			51F0-51F3			
				C1F0-C1F2			
	SWGRP16			51F8-51FB			
				C1F8-C1FA			
	SWGRP17			5200-5203			
				C200-C202			
	SWGRP18			5208-520B			
				C208-C20A			
	SWGRP19			5210-5213			
				C210-C212			
	SWGRP2			5188-518B			
				C188-C18A			
	SWGRP20			5218-521B			
				C218-C21A			
	SWGRP3			5190-5193			
				C190-C192			
	SWGRP4			5198-519B			
				C198-C19A			
	SWGRP5			51A0-51A3			
				C1A0-C1A2			
	SWGRP6			51A8-51AB			
				C1A8-C1AA			
	SWGRP7			51B0-51B3			
				C1B0-C1B2			
	SWGRP8			51B8-51BB			
				C1B8-C1BA			
	SWGRP9			51C0-51C3			
				C1C0-C1C2			
Communication	Channel 25	1240-125F		5100-511F			
		9140-914F		C100-C10F			
	Channel 26	1280-129F		5140-515F			

Group of function blocks	*Function block*	*Addresses*					
		Binary	*Double point*	*Analog*	*String*	*Time*	*SPA*
		9180-918F		C140-C14F			
	EVENT230			4AC0-4AFF			
	IEC 870-5-101 parameters - channel 502			4C40-4C47		E200	E600
		8840-8841		BC40-BC46		0000	
	Link parameters - channel 500	0800-0801 0803		4C00-4C07	E000-E008		
		8800-8801 8803		BC00-BC07	E400-E408		
	LON (Channel 231)	0740					

3.3 Protocol sofware version

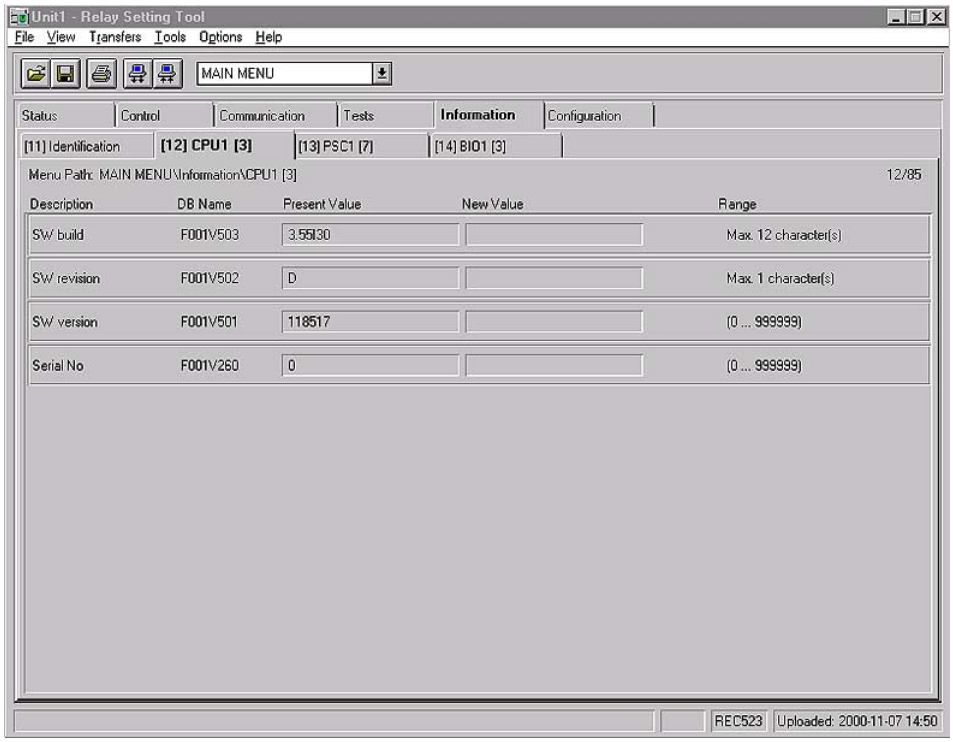


Figure 3.3-1 Software version

Name	*Description of coding scheme*
Software build	System software version (e.g. 3.00) followed by a letter indicating the remote protocol included (I – for IEC protocol) and remote protocol version (e.g. 20 for the initial version 2.0)
Software revision	Revision letter (e.g. “C”)
Software version	The number of the CPU card delivered with the IEC 60870-5-101 protocol
CPU card number	Serial number of the CPU card

3.4 Interface configuration

This section describes the communication parameters required to configure REC 523 to communicate using the IEC 60870-5-101 protocol over a given link.

These parameters can be uploaded, reviewed and modified using the Relay Setting Tool from the CAP 501/505 package by choosing the Communication library and the General, Link Handler or IEC-101 pages.

3.4.1 Communication start-up procedure

Before the start-up of the IEC 60870-5-101 based communication with REC 523, the link and protocol parameters should be verified using the Relay Setting Tool from the CAP 501/505 package. To properly configure the interface of REC 523, it is necessary to know the setup of the primary (controlling) station and the characteristics of the utilized communication channel. At the end of the configuration process the tool should enforce storing of updated parameters in the non-volatile memory, after which the REC 523 unit must be reset to activate the new parameters. In some cases it may also be required to modify the application mapping in the POD table using a Protocol Editing Tool.

3.4.2 Port assignment

There are three communication ports in REC 523: two RS 232 and one RS 485. IEC 60870-5-101 protocol can be assigned to each one of them (but only one at the time). The port assignment to the protocol can be done by choosing the Communication library and the General pages in the Relay Setting Tool. Default values for REC 523 ports are as follows:
Port X5.1: IEC
Port X5.2: None
Port X5.3: LON.
In Relay Setting Tool parameter “Protocol1” refers to REC 523 port X5.1, “Protocol2” port X5.2 and “Protocol 3” port X5.3.

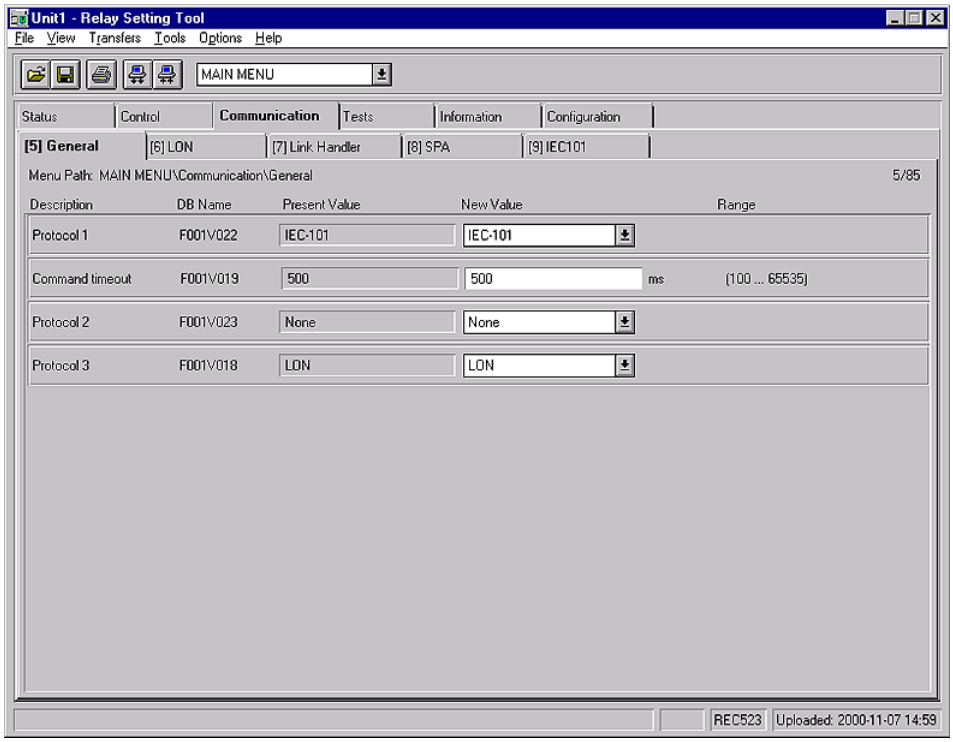


Figure 3.4.2-1 General pages

Note that the port assignments for protocols are revision dependent. This product supports only following protocols: IEC 60870-5-101, SPA and LON. Refer to Technical Reference Manual for revision history.

3.4.3 Link parameters

The link parameters of REC 523 can be accessed by choosing the Communication library and the Link Handler pages in the Relay Setting Tool.

Group description	Object name	Description	Notes
Transmission settings	F500V220	Connection mode 0 – fixed line 1 – dial-up	0 - in case of fixed line or leased line connection (with preconfigured modems) 1 – in case of dial-up connection (modem controlled by REC 523)
	F500V211	Communication speed (in bps) Baud rate	The same as configured in the master station (fixed line) or in the modem (dial-up).
	F500V212	Number of stop bits	The same as configured in the master station (fixed line) or in the modem (dial-up).
	F500V230	Parity 0 – no parity 1 – odd parity 2 – even parity (standard)	The same as configured in the master station (normally even parity, but with some modems no parity may be used).
	F500V231	Number of data bits	8 is a default value for the IEC protocol as defined by the standard

Timeout settings (frame transmission delays)	F500V215	Next character timeout (in ms): maximum allowed time gap between received characters of the same frame; 0 – not in use.	Not in use in the IEC protocol.
	F500V216	End of frame timeout (in ms): minimum idle time following the frame transmission to REC 523	Must be tuned according to the link characteristics, recommended minimum: longer than the character transmission time.
Handshaking settings (connection to DCE)	F500V217	CTS usage 0 – not used 1 – in use	In use if required by the DCE (modem in half duplex mode) and supported by the connection cable.
	F500V218	RTS usage 0 – not used 1 – in use	In use if required by the DCE (modem in half duplex mode) and supported by the connection cable.
	F500V213	CTS delay value (in ms)	In REC 523 controlled by hardware, set to 0.
	F500V214	RTS delay value (in ms)	In REC 523 controlled by hardware, set to 0.

Group description	Object name	Description	Notes
Modem settings (only to be used in dial-up connection mode)	F500V221	Modem initialization string (max. 75 characters)	According to the modem type (refer to the modem manual). To achive beter performance of REC 523 – modem communication include E0 (echo off) and V0 (numeric results codes) commands in initialization string.
	F500V222	Modem dialing string (max. 20 characters) Note: This parameter will be used only if REC 523 is permitted to activate the dial-up connection with the controlling station.	According to the modem type (refer to the modem manual).
	F500V223	Modem hang-up string (max. 20 characters) Note: This parameter will be used in case of enforced interface restart or unknown modem state.	According to the modem type (refer to the modem manual). To achive beter reliability include “~~~+++~~~” secuence at the begining of modem hangup string.
	F500V224	1st spare modem dialing string (max. 20 characters) Note: This parameter will be used only if REC 523 is permitted to activate the dial-up connection with the controlling station. Add dial str 1	According to the modem type (refer to the modem manual). Set to “NOTUSED” if not in use.
	F500V225	2nd spare modem dialing string (max. 20 characters) Note: This parameter will be used only if REC 523 is permitted to activate the dial-up connection with the controlling station (unsolicited reporting of events will be allowed). Add dial str 2	According to the modem type (refer to the modem manual). Set to “NOTUSED” if not in use.
	F500V226	3rd spare modem dialing string (max. 20 characters) Note: This parameter will be used only if REC 523 is permitted to activate the dial-up connection with the controlling station (unsolicited reporting of events will be allowed). Add dial str 3	According to the modem type (refer to the modem manual). Set to “NOTUSED” if not in use.
	F500V227	4th spare modem dialing string (max. 20 characters) Note: This parameter will be used only if REC 523 is permitted to activate the dial-up connection with the controlling station (unsolicited reporting of events will be allowed). Add dial str 4	According to the modem type (refer to the modem manual). Set to “NOTUSED” if not in use.

	F500V228	Emergency dialing string (max. 20 characters) Note: This parameter will be used only if REC 523 is permitted to activate the dial-up connection with the controlling station (unsolicited reporting of events will be allowed).	According to the modem type (refer to the modem manual). Set to “NOTUSED” if not in use.
	F500V229	PIN code string (max. 40 characters) Note: This parameter is used only with GSM modems.	According to the modem type (refer to the modem manual). Set to “NOTUSED” if not in use.

According to the specification of the protocol, the following transmission parameters are required (when using fixed line connection):

- 8 data bits
- parity odd, even or none
- 1 or 2 stop bits
- next character timeout - not active
- end of frame timeout 10 ms

baud rate in the range supported by the REC 523 link handler

Note:

- For communication over leased line, REC 523 should be configured as in the fixed line connection mode. The utilized modem must be set up from the terminal program. For this kind of communication, the end of frame timeout should be adjusted.

- For communication in the dial-up connection mode, the utilized modem is configured by REC 523. The E0 command should be included in the modem initialization string to prevent sending echo of received commands. The modem initialization string must not include any command that establishes connection with the remote modem. Only the dialling string shall be used for this purpose.

- The IEC 60870-5-101 protocol uses even parity for the control of character transmission. In case of specific communication medium requirements, the use of parity bit can be disabled in the REC 523 configuration.

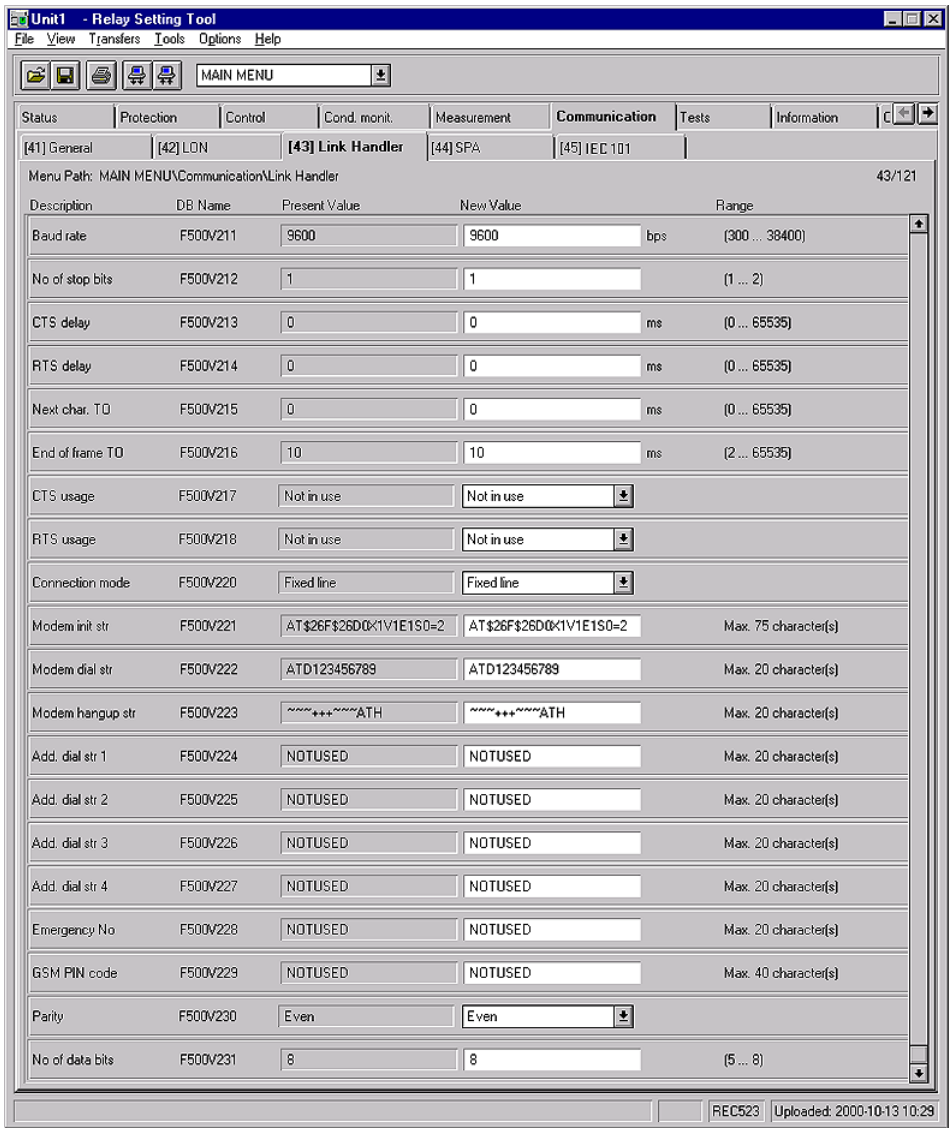


Figure 3.4.3-1 LinkHandler

3.4.3.1 Communication in a dial-up environment

When using a modem connection through the PSN (Public Switched Network), string parameters are used. These parameters include initialization, hang-up and dialing strings. Please refer to section *Link parameters* for further information. There can be one default and 4 spare dialling strings. The dialling string contains a phone number of the designated controlling station. The REC 523 unit will open the channel only when communication with the designated controlling station is needed and the channel is actually closed. If the default controlling station does not answer the call spare dialling numbers will be used. If all attempts to connect will fail then the emergency number will be dialled. REC 523 will hung up immediately after connecting. The emergency number can be e.g. operator GSM number.

When dial-up connection is used, following parameters must be set to configure REC 523 with IEC protocol:

- Parameter “Connection mode” must be set to *dial-up*
- Parameter “Modem init string” must be set to parameterize modem (according to manual of used modem)
- In case of using GSM modem “GSM PIN code” parameter must also be set accordingly.

Each modem operation is started by hanging-up any active connection. This includes also the procedure of establishing the connection between REC523 and SCADA system. Modem configuration/initialization is done every time when the link initialization is performed (this does not apply to entering the GSM modem PIN-code).

In case of using GSM modems, two levels of modem initialization are used:

- hard initialization after the device start-up, which includes the entering of PIN-code and common modem configuration,
- soft initialization, which includes only modem reconfiguration.

To be able to connect to the primary station at least “Modem dial string” must be set to dial controlling stations number (note that this string must include ATD prefix).

Communication channel is opened only after a request from the protocol software. The algorithm of this operation assumes a predefined number of 6 attempts done with random and increasing intervals between consecutive tries (intervals are given in figure 3.4.3.1-1). It is possible to define more than one telephone number of the SCADA system using separate dialing strings as link handler parameters (1 primary number, up to 4 spare numbers).

During each attempt of establishing a connection all configured dialing numbers from the list will be used one after another (without delays). It is also possible to define one emergency number that is used only when it is not possible to establish the connection with any of the configured numbers (primary and spare numbers)

after all attempts. This emergency number can be e.g. a number of the operator's telephone. The idea of using this number is to inform the operator about traffic problem in the telephone switching network or possible error in system configuration. After a call has been made to the emergency number (if defined) or all attempts to all configured numbers has failed, REC 523 initializes the link (and hang-ups the connection) and waits for the primary station to connect. Detailed behavior of the dialing algorithm is shown in the figure below:

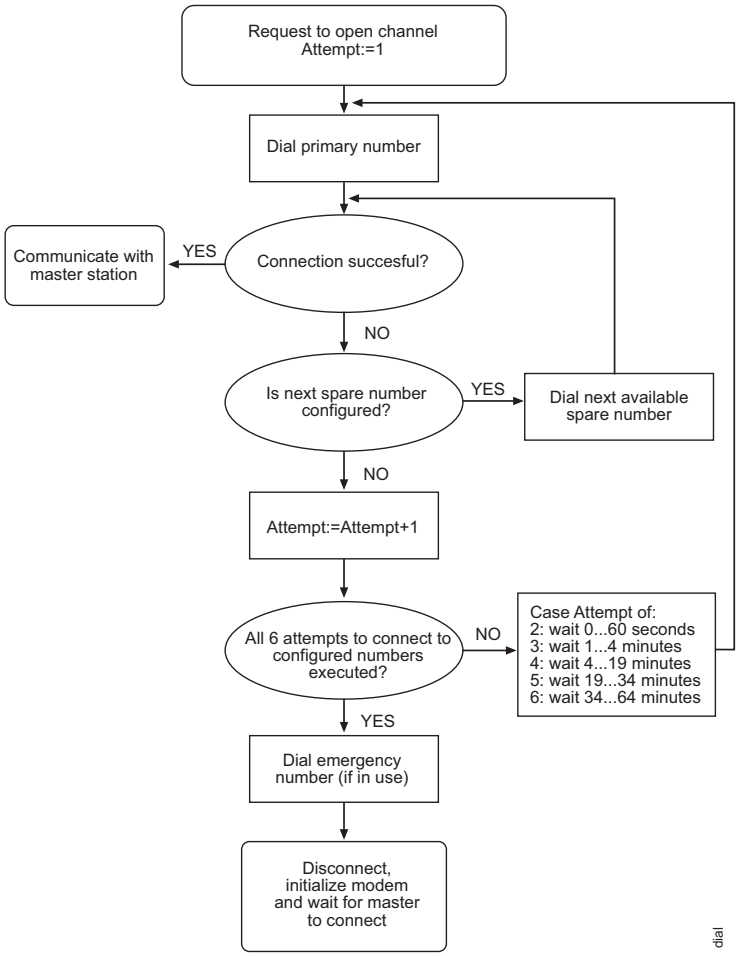


Figure 3.4.3.1-1 The behaviour of the dialing algorithm

When controlling station will dial the number of REC 523 unit and successfully connect between dialling attempts, this situation is treated the same way as if REC 523 would successfully connect.

REC 523 is responsible for closing the communication channel when there is no communication with the controlling station for a predefined time (no valid frame is received, including also the frames addressed to other units). A watchdog function supervising the incoming valid frames was added to the protocol software; the watchdog timeout is defined by a configurable parameter "Watchdog TO" in the protocol parameter group.

3.4.4 Protocol parameters

The IEC 60870-5-101 protocol parameters can be accessed by choosing the communication library and the IEC - 101 page in the Relay Setting Tool.

For a consistent setup, the protocol parameters can be analysed in three groups:

- address parameters
- timeout and delay parameters
- time stamp option

Group description	Object name	Description	Recommendation
Address parameters	F502V244	Size of the link address (in bytes): 1 or 2 byes Link address size	The same as configured in the primary (controlling) station.
	F502V245	Link address	The same as configured in the primary station.
	F502V246	Size of station address (in bytes): 1 or 2 bytes ASDU addr fld len	The same as configured in the primary station.
	F502V247	Station address Common address	The same as configured in the primary station.
Timeout and delay parameters	F502V249	Master idle timeout (in s) Used only in dial-up connection mode; in case the primary station does not request data and there is pending information buffered for a given time, the secondary (controlled) station will establish the communication with the primary station. Set to 0 if not used. Note: In case of already established connection no action is taken by secondary station.	System specific parameter, depends on data acquisition strategy of the primary station. To achive fast notification of events this value should be set to 1 (the possible shortest timeout).
	F502V250	Transmission delay (in ms) Initial value used in the clock synchronization procedure for compensation before the actual delay is measured.	Can be set based on the known channel characteristics
	F502V252	Channel idle watchdog timeout (in s) Used to supervise the activity on the communication channel in dial-up connection mode. The timer is started/restarted by the reception of a valid frame on the link layer. When timeout occurs REC 523 assumes the communication failure and closes the dial-up connection to prevent billing.	System specific parameter, depends on the communication delays. The shortest possible value is 1 s.

Time stamp option	F502V251	Time stamp option: 0 – standard time stamp (IEC) 1 – ABB standard (time context message C_CS_NA sent before the standard time-tagged message) 2 - SIEMENS standard (frames with full time stamp M_FT_XXX defined in the private range)	As required by the primary station: - option 0 follows the standard format (with time within an hour), - options 1 and 2 provide an unambigous full time value.

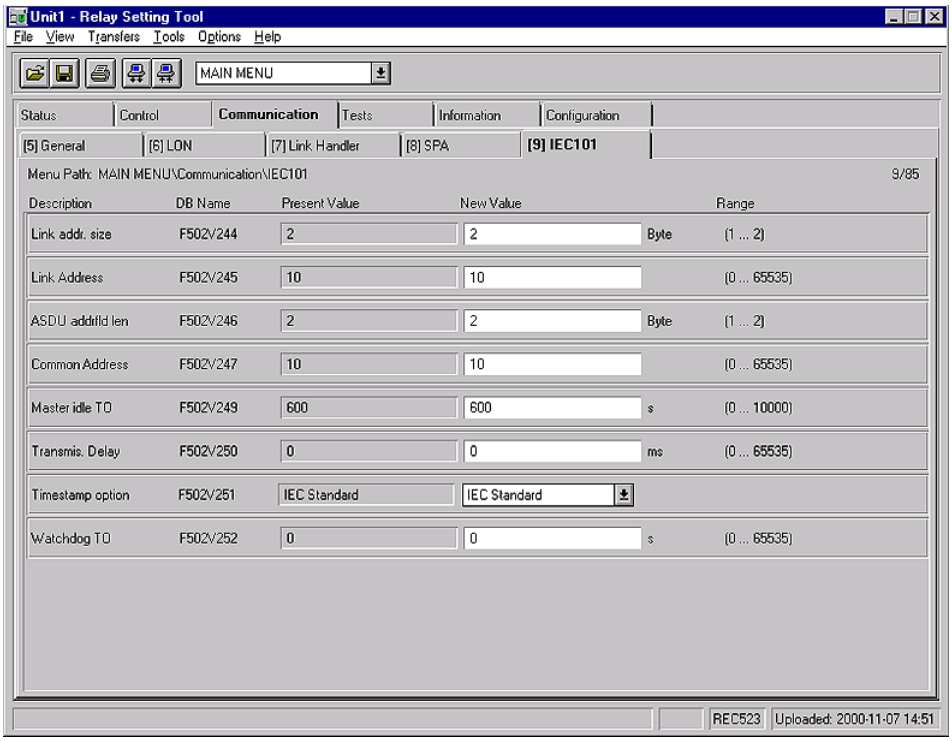


Figure 3.4.4-1 Relay Setting Tool with IEC 60870-5-101 parameters

Note:

In addition to the above configuration parameters IEC 60870-5-101 interface of REC 523 supports also two control parameters to enable clearing of the buffers for data class 1 and data class 2 in run-time (see chapter 3.2).

3.4.4.1 Application mapping review

In most of the system configurations the application mapping defined by the default POD should be acceptable. However, there might occur some cases when the modification of the visible POD table is necessary:

- when a different addressing concept is used in the system because of the primary (controlling) station's requirements or limitations in the protocol data addressing (re-addressing of mapped application objects),
- to eliminate obsolete data and events from active function blocks (data items not required or not processed by the primary station).

The visible POD table can be uploaded, reviewed and modified using a Protocol Editing Tool. The most common operations are:

- removing selected data items from the mapping – this can be done by setting the "In use" flag (column 9) to 0,
- changing type of data acquisition (e.g. spontaneous or on request) – this can be done by updating the "access type" value (column 4),
- disabling assignment to groups – this can be done by setting the "Interrogation assignment" value (column 3) to 0.

After changing the contents of the visible POD, the table can be downloaded to REC 523 and the tool will enforce the storing of data in the non-volatile memory followed by the device reset. In this way the updated table will be used to generate the operational POD.

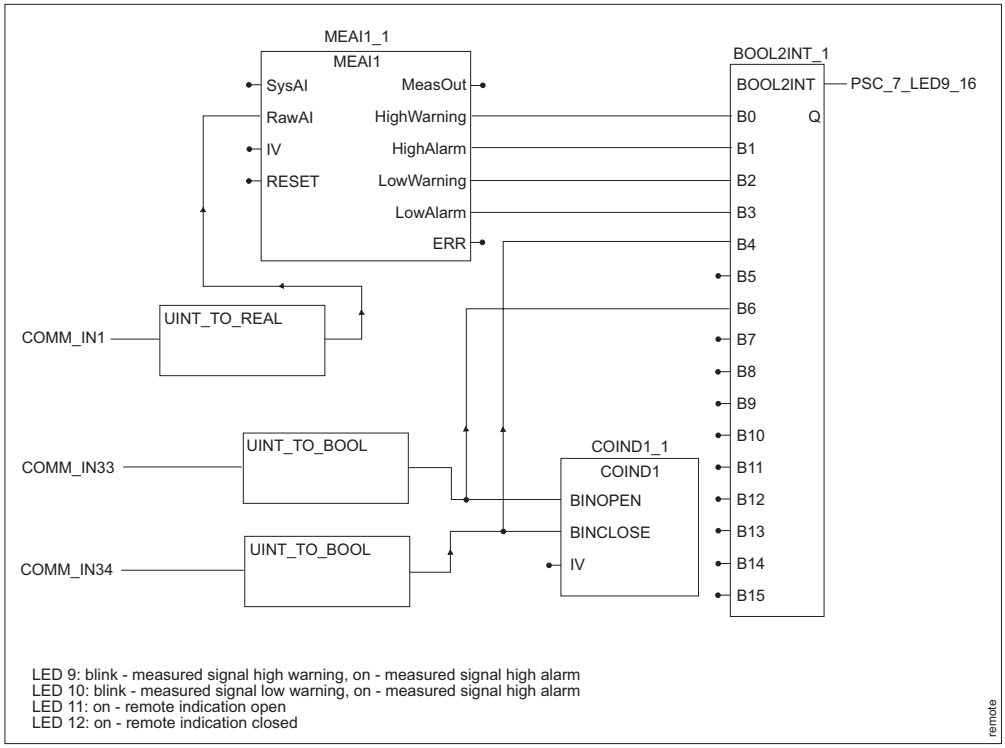
3.4.4.2 IEC 60870-5-101/LON gateway function

It is possible to use REC523 as IEC 60870-5-101/LON gateway. There are 32 analogue inputs, 32 analogue outputs, 32 binary inputs and 32 binary outputs (from IEC 60870-5-101 point of view) that represent LON network variables. Change of any input network variable (seen from IEC 60870-5-101 side as an analogue or binary input) will be reported as a change event on IEC 60870-5-101 side. Setting a new value of binary output or analogue output will result in sending an appropriate output network variable update message on LON side.

IEC 60870-5-101/LON gateway function can be used in two ways:

- Directly - by using LON network variables as data points (data from channels 25 and 26)
- As remote I/O - by connecting LON network variables to inputs and outputs of function blocks in the application.

Example of using remote I/O:



Note:

- LON interface must be properly configured to use IEC 60870-5-101/LON gateway function.
- Timestamps of LON events are assigned by REC 523 software, not by LON devices providing updates of network variables to REC 523. The timestamp contains the time of receiving network variable update.

4 Appendix A: Profile Checklist

IEC 60870-5-101

Device Profile Document

Vendor Name: ABB Substation Automation Oy

Device Name: REC 523 rev. D

This profile checklist presents sets of parameters and alternatives selected from the IEC 60870-5-101 standard to be implemented in REC 523. Certain parameter values, such as the number of octets in the COMMON ADDRESS of ASDUs, represent mutually exclusive alternatives. This means that only one value of the defined parameters is admitted per system. Other parameters, such as the listed set of different process information in command and in monitor direction, allow the use of the complete set or subsets, as appropriate for given applications.

If a system is composed of equipment stemming from different manufacturers, it is necessary that all partners agree on the selected parameters.

The supported options are marked with black boxes. ■

The unsupported options are left with white boxes. □

Note: In addition, the full specification of a system may require individual selection of certain parameters for certain parts of the system, such as the individual selection of scaling factors for individually addressable measured values.

4.1 Network configuration

(network-specific parameter)

- [x] Point-to-point
- [ ] Multiple point to point
- [ ] Redundant lines
- [x] Multi-point-party line
- [ ] Multi-point-star

4.2 Physical layer

(network-specific parameter)

Transmission speed (control direction)

Unbalanced interchange circuit V.24/V.28 Standard	Unbalanced interchange circuit V.24/V.28 Recommended if > 1200 bit/s	Balanced interchange circuit X.24/X.27	
[ ] 100 bit/s	[x] 400 bit/s	[ ] 2400 bit/s	[ ] 56000 bit/s
[ ] 200 bit/s	[x] 4800 bit/s	[ ] 4800 bit/s	[ ] 64000 bit/s
[ ] 300 bit/s	[x] 9600 bit/s	[ ] 9600 bit/s	
[ ] 600 bit/s	[x] 19200 bit/s	[ ] 19200 bit/s	
[x] 1200 bit/s		[ ] 38400 bit/s	

Transmission speed (monitor direction)

Unbalanced interchange circuit V.24/V.28 Standard	Unbalanced interchange circuit V.24/V.28 Recommended if > 1200 bit/s	Balanced interchange circuit X.24/X.27	
[ ] 100 bit/s	[x] 2400 bit/s	[ ] 2400 bit/s	[ ] 56000 bit/s
[ ] 200 bit/s	[x] 4800 bit/s	[ ] 4800 bit/s	[ ] 64000 bit/s
[ ] 300 bit/s	[x] 9600 bit/s	[ ] 9600 bit/s	
[ ] 600 bit/s	[x] 19200 bit/s	[ ] 19200 bit/s	
[x] 1200 bit/s		[ ] 38400 bit/s	

4.3 Link layer

Frame format FT 1.2, single character 1 and the fixed time out interval are used exclusively in this companion standard.

Link transmission procedure

- ☐ Balanced transmission
- ■ Unbalanced transmission

Address field of the link

- ☐ not present (balanced transmission only)
- ■ One octet
- ■ Two octets

Frame length

- ☐ Structured
- ■ Unstructured

255 Maximum length L (number of octets)

The maximum frame length can be selected per Controlled Station up to 255

4.4 Application layer

Transmission mode for application data

Mode 1 (Least significant octet first), as defined in clause 4.10 of IEC 60870-5-4, is used exclusively in this companion standard.

Common address of ASDU

(system-specific parameter)

- ■ One octet
- ■ Two octets

Information object address

(system-specific parameter)

- ☐ One octet
- ■ Two octets
- ☐ Three octets
- ☐ structured
- ■ unstructured

Cause of transmission

(system-specific parameter)

- ■ One octet
- ☐ Two octets (with originator address)

Selection of standard ASDUs

Process information in monitor direction

(station-specific parameter)

■	<1> := Single-point information	M_SP_NA_1
■	<2> := Single-point information with time tag	M_SP_TA_1
■	<146> := Single-point information with full time tag (SIEMENS)	M_SP_FA_1
■	<3> := Double-point information	M_DP_TA_1
■	<4> := Double-point information with time tag	M_DP_TA_1
■	<148> := Double-point information with full time tag (SIEMENS)	M_DP_FA_1
□	<5> := Step position information	M_ST_NA_1
□	<6> := Step position information with time tag	M_ST_TA_1
■	<7> := Bitstring of 32 bit	M_BO_NA_1
□	<8> := Bitstring of 32 bit with time tag	M_BO_TA_1
□	<9> := Measured value, normalised value	M_ME_NA_1
□	<10> := Measured value, normalised value with time tag	M_ME_TA_1
■	<11> := Measured value, scaled value	M_ME_NB_1
■	<12> := Measured value, scaled value with time tag	M_ME_TB_1
■	<156> := Measured value, scaled value with full time tag (SIEMENS)	M_ME_FB_1
□	<13> := Measured value, short floating point value	M_ME_NC_1
□	<14> := Measured value, short floating point value with time tag	M_ME_TC_1
■	<15> := Integrated totals	M_IT_NA_1
■	<16> := Integrated totals with time tag	M_IT_TA_1
■	<160> := Integrated totals with full time tag (SIEMENS)	M_IT_FA_1
□	<17> := Event of protection equipment with time tag	M_EP_TA1
□	<18> := Packed start events of protection equipment with time tag	M_EP_TB1
□	<19> := Packed output circuit information of protection equipment with time tag	M_EP_TC_1
□	<20> := Packed single point information with time tag	M_PS_NA_1
□	<21> := Measured value, normalised value without quality descriptor	M_ME_ND_1
■	<128> := STRING in monitor direction	M_SR_NA_1

Process information in control direction

(station-specific parameter)

■	<45> := Single command	C_SC_NA_1
□	<46> := Double command	C_DC_NA_1
□	<47> := Regulating step command	C_RC_NA_1
□	<48> := Set point command, normalised value	C_SE_NA_1
■	<49> := Set point command, scaled value	C_SE_NB_1
□	<50> := Set point command, short floating point value	C_SE_NC_1
■	<51> := Bitstring of 32 bit	C_BO_NA_1
■	<131> := STRING in control direction	C_SR_NA_1
■	<133> := SPABUFFER in control direction	C_SB_NA_1

System information in monitor direction

(station-specific parameter)

■	<70> := End of initialisation	M_EI_NA_1

System information in control direction

(station-specific parameter)

■	<100> := Interrogation command	C_IC_NA_1
□	<101> := Counter interrogation command	C_CI_NA_1
■	<102> := Read command	C_RD_NA_1
■	<103> := Clock synchronisation command	C_CS_NA_1
□	<104> := Test command	C_TS_NB_1
■	<105> := Reset process command	C_RP_NC_1
■	<106> := Delay acquisition command	C_CD_NA_1

Parameter in control direction

(station-specific parameter)

□	<110> := Parameter of measured value, normalised value	P_ME_NA_1
□	<111> := Parameter of measured value, scaled value	P_ME_NB_1
□	<112> := Parameter of measured value, short floating point value	P_ME_NC_1
□	<113> := Parameter activation	P_AC_NA_1

File Transfer

(station-specific parameter)

☐	<120> := File ready	F_FR_NA_1
☐	<121> := Section ready	F_SR_NA_1
☐	<122> := Call directory, select file, call file, call section	F_SC_NA_1
☐	<123> := Last section, last segment	F_LS_NA_1
☐	<124> := Ack file, ack section	F_AF_NA_1
☐	<125> := Segment	F_SG_NA_1
☐	<126> := Directory	F_DR_TA_1

4.5 Basic application functions

Station initialisation

(station-specific parameter)

■ Remote initialisation

Note: As stated in IEC 60870-5-101 - indication to Controlled Station Controlling Station Initialised is not used.

General interrogation

(system- or station-specific parameter)

■ global

☐ group 1	☐ group 7	☐ group 13
☐ group 2	☐ group 8	☐ group 14
☐ group 3	☐ group 9	☐ group 15
☐ group 4	☐ group 10	☐ group 16
☐ group 5	☐ group 11	
☐ group 6	☐ group 12	

Addresses per group have to be defined

Clock synchronisation

(station-specific parameter)

■ Clock synchronisation

Command transmission

(object-specific parameter)

- ■ Direct command transmission
- ■ Direct set point command transmission
- ■ Select and execute command
- ☐ Select and execute set point command
- ☐ C_SE ACTTERM used
- ☐ No additional definition
- ☐ Short pulse duration (duration determined by a system parameter in the outstation)
- ☐ Long pulse duration (duration determined by a system parameter in the outstation)
- ☐ Persistent output

Transmission of integrated totals

(station- or object-specific parameter)

- ☐ Counter request
- ☐ Counter freeze without reset
- ☐ Counter freeze with reset
- ☐ Counter reset
- ☐ General request counter
- ☐ Request counter group 1
- ☐ Request counter group 2
- ☐ Request counter group 3
- ☐ Request counter group 4

Addresses per group have to be defined

Parameter loading

(object-specific parameter)

- ☐ Threshold value
- ☐ Smoothing factor
- ☐ Low limit for transmission of measured value
- ☐ High limit for transmission of measured value

Parameter activation

(object-specific parameter)

- ☐ Act/deact of persistent cyclic or periodic transmission of the addressed object

File transfer

(station-specific parameter)

- ☐ File transfer in monitor direction
- ☐ File transfer in control direction

5 Appendix B: List of Used Abbreviations

ACD Access Demand

APCI Application Protocol Control Information

ASDU Application Service Data Units

CTS Clear To Send

DCD Data Carrier Detected

DCE Data Circuit terminating Equipment

DFC Data Flow Control

DTE Data Terminal Equipment

EPA Enhanced Performance Architecture

FB Function Block

FCB Frame Count Bit

FCV Frame Count Bit Valid

IEC International Electrotechnical Commission

ISO International Organization for Standarization

LPCI Link Protocol Control Information

LPDU Link Protocol Data Unit

LSB Least Significant Bit (here in the octet)

OSI Open System Interconnection

MSB Most Significant Bit (here in the octet)

POD Protocol Object Dictionary

PRM Primary Message

RTS Request To Send

ABB Oy

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